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(54) **Title**: INTERLOCKING BUOYANT ELEMENT

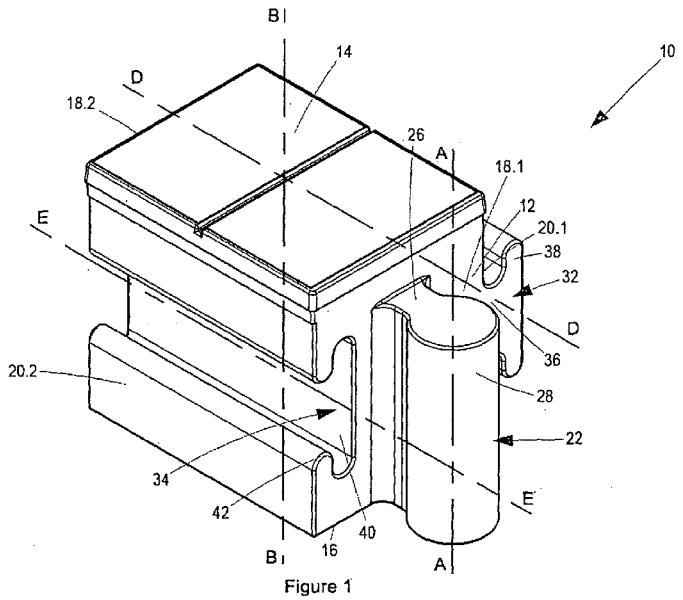

Figure 1

(57) **Abstract**: An interlocking buoyant element (10) includes a right-angled parallelepiped body (12) defining opposite top (14) and bottom (16) faces, a first pair of opposite side faces (18.1, 18.2) and a second pair of opposite side faces (20.1, 20.2). A first male connector (22) is located on one of the first pair of opposite side faces (18.1, 18.2) and a corresponding first female connector (24) is located on the other of the first pair of opposite side faces (18.1, 18.2), the first female connector (24) defining a channel with longitudinal axis (C-C) along which a first male connector (22) of an adjacent interlocking buoyant element (10) may be received slidably. A second male connector (32) is located on one of the second pair of opposite side faces (20.1, 20.2) and a corresponding second female connector (34) is located on the other of the second pair of opposite side faces (20.1, 20.2), the second female connector (34) defining a channel with a longitudinal axis (E-E) along which a second male connector (32) of an adjacent interlocking buoyant element (10) may be received slidably. The longitudinal axis (C-C) of the first female connector (24) extends between the second pair of opposite side faces (20.1, 20.2), alternatively, the longitudinal axis (E-E) of the second female connector (34) extends between the first pair of opposite side faces (18.1, 18.2).

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Interlocking buoyant element

BACKGROUND

The present invention relates to an interlocking buoyant element. More specifically, the present invention relates to an interlocking buoyant element with two orthogonally aligned sets of integral male and female connectors for connecting adjacent interlocking buoyant elements together.

Various interlocking buoyant elements are known. For example, FR2,680,749 describes a cubic buoyant element with integral dovetail shaped projections and recesses for connecting adjacent cubic buoyant elements together. The projections and recesses are aligned such that the projections on a cube buoyant element are slidably received within the recesses of adjacent cubic buoyant elements in one direction. Similar arrangements are described in US1,900,319 "Structural Device" and US5,536,009 "Pool puzzle, method of play".

A drawback of known interlocking buoyant elements is that, when a buoyant element is connected to adjacent buoyant elements, the male and female connectors permit relative movement of adjacent buoyant elements in one direction. Known systems have resorted to additional locking formations or pins and stringers to restrict such relative movement. For instance, DE1,531,582 uses locking pins, FR2,680,749 uses locking tabs, and US1,900,319 uses a stringer with pins.

It is an object of the present invention to align the corresponding sets of male and female connectors such that a buoyant element connected to neighbouring buoyant elements on two adjacent sides is movable relative to a first neighbouring buoyant element in a first direction and movable relative to a second neighbouring buoyant element in a second direction that is not parallel to (i.e. angularly offset relative to) the first direction.

SUMMARY OF THE INVENTION

According a preferred embodiment of the present invention, an interlocking buoyant element includes:

a right-angled parallelepiped body defining: (i) operative opposed top and bottom faces; (ii) a first pair of opposed side faces; and (iii) a second pair of opposed side faces;

a first male connector on one of the first pair of opposed side faces and a corresponding first female connector on the other of the first pair of opposed side faces, the first female connector defining a channel with a longitudinal axis along which a first male connector of an adjacent interlocking buoyant element may, in use, be slidably received;

a second male connector on one of the second pair of opposed side faces and a corresponding second female connector on the other of the second pair of opposed side faces, the second female connector defining a channel with a longitudinal axis along which a second male connector of an adjacent interlocking buoyant element may, in use, be slidably received,

wherein: (i) the longitudinal axis of the first female connector extends between the second pair of opposed side faces; or (ii) the longitudinal axis of the second female connector extends between the first pair of opposed side faces.

Generally, the longitudinal axis of the first female connector and the longitudinal axis of the second female connector are not parallel.

Preferably, the longitudinal axis of the first female connector and the longitudinal axis of the second female connector are angularly offset by more than 60 degrees. More preferably, they are angularly offset by between 80 degrees and 100 degrees. Even more preferably, the longitudinal axis of the first female connector and the longitudinal axis of the second female connector are orthogonal to each other.

Typically, the first and second male connectors are, in cross-section: (i) wedge shaped; or (ii) puzzle-shaped in that they comprise a neck extending from the body and an enlarged head at the free end of the neck.

Generally, the first and second female connectors: (i) are, in cross-section, wedge shaped cavities defined by the body; or (ii) comprise, in cross-section, a cavity with a constricted opening defined by the body.

Preferably, the cross-sectional shapes of the first male and female connectors are different to the cross-sectional shapes of the second male and female connectors. More preferably, the cross-sectional shapes of the first and second male and female connectors are such that: (i) the first male connector is not receivable and slidable within the second female connector; and (ii) the second male connector is not receivable and slidable within the first female connector.

Typically, the first and second male and female connectors are elongate, defining longitudinal axes orthogonal to their cross-sections.

Generally, the longitudinal axes of the first male and female connectors are parallel to each other. And, the longitudinal axes of the second male and female connectors are parallel to each other.

Preferably, the longitudinal axes of the first male and female connectors are orthogonal to the longitudinal axes of the second male and female connectors.

Typically, the longitudinal axes of the first male and female connectors are parallel to a line connecting the midpoints of the operative opposed top and bottom faces of the body.

Generally, the first male and female connectors extend from the operative bottom face towards the operative top face of the body, but terminate short of the operative top face of the body.

Preferably, the operative bottom face of the body defines an opening for one longitudinal end of the first female connector. Typically, the other longitudinal end of the first female connector is closed.

Generally, the second male and female connectors extend between the operative bottom face and the operative top face of the body. Preferably, both the operative top and bottom faces of the body define openings for longitudinal ends of the second female connector.

Typically, the body is a cube.

Generally, the first and second male and female connectors are integral to the body.

Preferably, the interlocking buoyant element is homogeneous.

Typically, the body is hollow.

Optionally, the interlocking buoyant element further includes a valve to permit air and/or water to enter/exit the body.

In an alternative embodiment, (i) the longitudinal axis of the first female connector extends between the second pair of opposed side faces; and (ii) the longitudinal axis of the second female connector extends between the first pair of opposed side faces.

The operative top and bottom faces may also include puzzle-shaped corresponding male and female connectors for connecting subjacent and superjacent layers of interlocking buoyant elements together.

According an alternative embodiment of the present invention, an interlocking buoyant element includes:

a right-angled parallelepiped body defining: (i) operative opposed top and bottom faces; (ii) a first pair of opposed side faces; and (iii) a second pair of opposed side faces;

a first male connector on one of the first pair of opposed side faces and a corresponding first female connector on the other of the first pair of opposed side faces, the first female connector defining a channel with a longitudinal axis along which a first male connector of an adjacent interlocking buoyant element may, in use, be slidably received;

a second male connector on one of the second pair of opposed side faces and a corresponding second female connector on the other of the second pair of opposed side faces, the second female connector defining a channel with a longitudinal axis along which a second male connector of an adjacent interlocking buoyant element may, in use, be slidably received,

wherein:

(i) the longitudinal axis of the first female connector extends between the second pair of opposed side faces; or (ii) the longitudinal axis of the second female connector extends between the first pair of opposed side faces; and

the longitudinal axes of the first female connector, the second female connector, the first male connector and the second male connector lie substantially in the same plane.

The operative top face may include a third female connector that runs alongside an edge of the top face and extends between a pair of opposed side faces.

Optionally, the operative bottom face may include: (i) a third male connector; or (ii) a fourth female connector, that extends along the middle of the operative bottom face, parallel to an edge of the operative bottom face.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention will now be described in more detail, by way of examples only, with reference to the accompanying drawings in which:

Figure 1 is a first perspective view of an interlocking buoyant element according to a first embodiment of the present invention;

Figure 2 is a second perspective view of the interlocking buoyant element in Figure 1;

Figure 3 is a front view of the buoyant element in Figure 1;

Figure 4 is a back view of the buoyant element in Figure 1;

Figure 5 is a left side view of the buoyant element in Figure 1;

Figure 6 is a right side view of the buoyant element in Figure 1;

Figure 7 is a top view of the buoyant element in Figure 1;

Figure 8 is a bottom view of the buoyant element in Figure 1;

Figure 9 is a perspective view of a platform comprising four buoyant elements in Figure 1 attached to each other;

Figure 10 is a perspective view of a buoyant element with half the width of the buoyant element in Figure 1;

Figure 11 is a perspective view of a platform comprising: (i) three buoyant elements in Figure 1; and (ii) two buoyant elements in Figure 10, attached to each other;

Figure 12 is a first perspective view of an interlocking buoyant element according to a second embodiment of the present invention; and

Figure 13 is a second perspective view of the interlocking buoyant element in Figure 12.

DESCRIPTION OF A PREFERRED EMBODIMENT

With reference to Figures 1 to 9 of the drawings, a preferred embodiment of an interlocking buoyant element 10 is homogeneous, formed from polyethylene, a polymer based compound, resin, polyurethane, PET, Styrene or polypropylene during a casting, roto-moulding or blow moulding process.

The buoyant element 10 includes a right-angled parallelepiped body 12 defining: an operative top face 14; an operative bottom face 16; a first pair of opposed side faces 18; and a second pair of opposed side faces 20. The texture of the operative top face 14 is rougher than that of the other faces 16, 18 and 20.

To ensure buoyancy, the body 12 is either hollow or filled with a polyurethane foam (or a similar closed-cell low-density material or foaming compound).

The body 12 is preferably in the shape of a cube.

A first male connector 22 is located on one of the first pair of opposed side faces 18.1, whereas a corresponding first female connector 24 is located on the other of the first pair of opposed side faces 18.2.

The first male connector 22 is elongate and, in cross-section, includes a neck 26 that extends from the first side face 18.1, terminating in an enlarged head 28 at its free end.

Longitudinal axis A-A extends axially along the first male connector 22, orthogonal to its cross-section, and is parallel to the line B-B connecting the mid-point of the operative top face 14 of the body 12 with the operative bottom face 16 of the body 12.

The first male connector 22 extends from the operative bottom face 16, midway between the second pair of opposed faces 20, towards the operative top face 14 of the body 12, but terminated short of the operative top face 14 of the body 12.

It will be appreciated that, although the first male connector 22 is described as being puzzle-shaped, it could alternatively be wedge-shaped in cross-section.

The first female connector 24 is elongate and, in cross-section, includes a cavity 30 with a constricted opening 31 defined by the body 12. The cavity 30 and constricted opening 31 defines a channel with longitudinal axis C-C extending axially along the first female connector 24, orthogonal to its cross-section. The longitudinal axis C-C is parallel to the longitudinal axis A-A of the first male connector 22.

The first female connector 24 extends from the operative bottom face 16, midway between the second pair of opposed faces 20, towards the operative top face 14 of the body 12, but stops short of the operative top face 14 of the body 12. The operative bottom face 14 of the body 12 defines an aperture permitting access to the channel / cavity and constricted opening 30 and 31 via an axial end of the first female connector 24. The opposite axial end of the first female connector 24 / channel / cavity and constricted opening 30 and 31 is closed.

It will be appreciated that, although the first female connector 24 is described as being puzzle-shaped, it could alternatively be wedge-shaped in cross-section.

The first male and female connectors 22 and 24 are sized and shaped such that a first male connector 22 on a first buoyant element 10 can be received within and moved

slidably along longitudinal axis C-C of the first female connector 24 / the channel / the cavity and constricted opening 30 and 31 on a second, adjacent buoyant element 10. It will be appreciated that the closed axial end of the first female connector 24 limits slidable movement of the first male connector 22 therealong.

A second male connector 32 is located on one of the second pair of opposed side faces 20.1, whereas a corresponding second female connector 34 is located on the other of the second pair of opposed side faces 20.2.

The second male connector 32 is elongate and, in cross-section, includes a neck 36 that extends from the second side face 20.1, terminating in an enlarged head 38 at its free end.

Longitudinal axis D-D extends axially along the second male connector 32, orthogonal to its cross-section, and is orthogonal to the line B-B connecting the mid-point of the operative top face 14 of the body 12 with the operative bottom face 16 of the body 12.

The second male connector 32 extends between the first pair of opposed side faces 18, midway between the operative top and bottom faces 14 and 16 of the body 12.

It will be appreciated that, although the second male connector 32 is described as being puzzle-shaped, it could alternatively be wedge-shaped in cross-section.

The second female connector 34 is elongate and, in cross-section, includes a cavity 40 with a constricted opening 42 defined by the body 12. The cavity 40 and constricted opening 42 defines a channel with longitudinal axis E-E that extends: (i) axially along the second female connector 34, orthogonal to its cross-section; and (ii) between the first pair of opposed side faces 18. The longitudinal axis E-E is parallel to the longitudinal axis D-D of the second male connector 32 and is, in use, substantially horizontal.

The second female connector 34 extends between the first pair of opposed side faces 18, midway between the operative top and bottom faces 14 and 16. Both the first pair of opposed side faces 18 define apertures that permit access to the channel / cavity and constricted opening 40 and 42 via both axial end of the second female connector 34.

It will be appreciated that, although the second female connector 34 is described as being puzzle-shaped, it could alternatively be wedge-shaped in cross-section.

The second male and female connectors 32 and 34 are sized and shaped such that a second male connector 32 on a first buoyant element 10 can be received within and moved slidably along longitudinal axis E-E of the second female connector 34 / channel / cavity and constricted opening 40 and 42 on a second, adjacent buoyant element 10.

The first and second male and female connectors 22, 24, 32 and 34 are integral to the body 12.

It will be appreciated that since the longitudinal axes A-A and C-C of the first male and female connectors 22 and 24 are angularly offset relative (in this instance, orthogonal) to the longitudinal axes D-D and E-E of the second male and female connectors 32 and 34, adjacent buoyant elements 10 connected via the first male and female connectors 22 and 24 are permitted to move relative to each other in one direction, whereas adjacent buoyant elements 10 connected via the second male and female connectors 32 and 34 are permitted to move relative to each other in a second direction that is angularly offset relative to the first direction.

Although the angular offset between the longitudinal axis C-C of the first female connector 24 and the longitudinal axis E-E of the second female connector 34 has been described as orthogonal to each other, it will be appreciated that they could be angularly offset by more than 60 degrees, more preferably by between 80 and 100 degrees.

Furthermore, the cross-sectional shapes of the first male and female connectors 22 and 24 are different to the cross-sectional shapes of the second male and female connectors 32 and 34 such that: (i) the first male connector 22 is not receivable and slidable within the second female connector 34; and (ii) the second male connector 32 is not receivable and slidable within the first female connector 24.

A valve 44 secured to the body 12 permits air and/or water to enter/exit the body 12 to vary the buoyancy of the buoyant element 10.

The interlocking buoyant elements 10 described herein are particularly suited to forming floating platforms.

Figure 10 shows a buoyant element 110 with half the width of the buoyant elements 10 shown in the preceding Figures. By incorporating such half-size elements 110 into

platforms (as illustrated in Figure 11), the full-sized buoyant elements 10 can be staggered to reduce relative movement of the interlocked buoyant elements 10.

In an alternative embodiment (not shown): (i) the longitudinal axis C-C of the first female connector 24 could extend between the second pair of opposed side faces 20; and (ii) the longitudinal axis E-E of the second female connector 34 could extend between the first pair of opposed side faces 18. In other words, both longitudinal axes C-C and E-E could, in use, be substantially horizontal. This arrangement would require the male connectors 22 and 32 similarly to be oriented substantially horizontally.

In a further alternative embodiment (also not shown), the operative top and bottom faces 14 and 16 could include corresponding third male and female connectors (similar to the male and female connectors previously described) for connecting subjacent and superjacent layers of buoyant elements 10 together.

With reference to Figures 12 and 13, an alternative embodiment of an interlocking buoyant element 110 is similar to the preferred embodiment of the buoyant element 10. However, instead of the longitudinal axes A-A and C-C of the first male and female connectors 122 and 124 being orthogonal to the longitudinal axes D-D and E-E of the second male and female connectors 132 and 134 (as per the preferred embodiment of the buoyant element 10), the longitudinal axes A-A, C-C, D-D and E-E all lie in substantially the same plane (i.e. with a deviation from the plane of less than 10cm).

Although each male connector 122 and 132 of the pair and each female connector 124 and 134 of the pair has been shown in Figures 12 and 13 with different axial cross sectional shapes, it will be appreciated that the connectors 122 and 132 as well as 124 and 134 forming each pair can be of the same axial cross sectional shape.

The operative top face 114 also defines a third female connector 146, which runs parallel to / alongside an edge of the operative top face 114 and extends between opposed operative side faces 118 or 120.

The third female connector 146 is elongate and, in cross-section, includes a cavity 148 with a constricted opening 150 defined by the body 112. In use, a balustrade (not shown) with a correspoinding male connector may be captured within the third female connector 146 to secure the balustrade to the interlocking buoyant element 110.

Furthermore, the operative bottom face 116 defines a fourth female connector 152 (that is similar to the first female connector 124 in shape), which extends along the middle of the operative bottom face 116, parallel to an edge of the operative bottom face 116. It will be appreciated that the operative bottom face 116 could alterantively include a third male connector that is similar in shape to the first male connector 122, which extends along the middle of the operative bottom face 116, parallel to an edge of the operative bottom face 116.

CLAIMS

1. An interlocking buoyant element including:

a right-angled parallelepiped body defining: (i) operative opposed top and bottom faces; (ii) a first pair of opposed side faces; and (iii) a second pair of opposed side faces;

a first male connector on one of the first pair of opposed side faces and a corresponding first female connector on the other of the first pair of opposed side faces, the first female connector defining a channel with a longitudinal axis along which a first male connector of an adjacent interlocking buoyant element may, in use, be slidably received;

a second male connector on one of the second pair of opposed side faces and a corresponding second female connector on the other of the second pair of opposed side faces, the second female connector defining a channel with a longitudinal axis along which a second male connector of an adjacent interlocking buoyant element may, in use, be slidably received,

wherein: (i) the longitudinal axis of the first female connector extends between the second pair of opposed side faces; or (ii) the longitudinal axis of the second female connector extends between the first pair of opposed side faces.

2. An interlocking buoyant element according to claim 1, wherein the longitudinal axis of the first female connector and the longitudinal axis of the second female connector are not parallel.

3. An interlocking buoyant element according to claim 2, wherein the longitudinal axis of the first female connector and the longitudinal axis of the second female connector are angularly offset by more than 60 degrees.

4. An interlocking buoyant element according to claim 3, wherein the longitudinal axis of the first female connector and the longitudinal axis of the second female connector are angularly offset by between 80 degrees and 100 degrees.

5. An interlocking buoyant element according to claim 4, wherein the longitudinal axis of the first female connector and the longitudinal axis of the second female connector are orthogonal to each other.

6. An interlocking buoyant element according to claim 5, wherein the first and second male connectors are, in cross-section: (i) wedge shaped; or (ii) puzzle-shaped in that they comprise a neck extending from the body and an enlarged head at the free end of the neck.

7. An interlocking buoyant element according to claim 6, wherein the first and second female connectors: (i) are, in cross-section, wedge shaped cavities defined by the body; or (ii) comprise, in cross-section, a cavity with a constricted opening defined by the body.

8. An interlocking buoyant element according to claim 7, wherein the cross-sectional shapes of the first male and female connectors are different to the cross-sectional shapes of the second male and female connectors.

9. An interlocking buoyant element according to claim 8, wherein the cross-sectional shapes of the first and second male and female connectors are such that: (i) the first male connector is not receivable and slidable within the second female connector; and (ii) the second male connector is not receivable and slidable within the first female connector.

10. An interlocking buoyant element according to claim 9, wherein the first and second male and female connectors are elongate, defining longitudinal axes orthogonal to their cross-sections.

11. An interlocking buoyant element according to claim 10, wherein the longitudinal axes of the first male and female connectors are parallel to each other.

12. An interlocking buoyant element according to claim 11, wherein the longitudinal axes of the second male and female connectors are parallel to each other.

13. An interlocking buoyant element according to claim 12, wherein the longitudinal axes of the first male and female connectors are orthogonal to the longitudinal axes of the second male and female connectors.

14. An interlocking buoyant element according to claim 13, wherein the longitudinal axes of the first male and female connectors are parallel to a line connecting the midpoints of the operative opposed top and bottom faces of the body.

15. An interlocking buoyant element according to claim 14, wherein the first male and female connectors extend from the operative bottom face towards the operative top face of the body, but terminate short of the operative top face of the body.

16. An interlocking buoyant element according to claim 15, wherein the operative bottom face of the body defines an opening for one longitudinal end of the first female connector.

17. An interlocking buoyant element according to claim 16, wherein the other longitudinal end of the first female connector is closed.

18. An interlocking buoyant element according to claim 17, wherein the second male and female connectors extend between the operative bottom face and the operative top face of the body.

19. An interlocking buoyant element according to claim 18, wherein both the operative top and bottom faces of the body define openings for longitudinal ends of the second female connector.

20. An interlocking buoyant element according to claim 19, wherein the body is a cube.

21. An interlocking buoyant element according to claim 20, wherein the first and second male and female connectors are integral to the body.

22. An interlocking buoyant element according to claim 21, wherein the interlocking buoyant element is homogeneous.

23. An interlocking buoyant element according to claim 22, wherein the operative top face of the body is rougher than the other faces of the body.

24. An interlocking buoyant element according to claim 23, wherein the body is hollow.

25. An interlocking buoyant element according to claim 24, further including a valve to permit air and/or water to enter/exit the body.

26. An interlocking buoyant element according to claim 25, wherein operative top and bottom faces include puzzle-shaped corresponding male and female connectors for connecting subjacent and superjacent layers of interlocking buoyant elements together.

27. An interlocking buoyant element according to claim 1, wherein: (i) the longitudinal axis of the first female connector extends between the second pair of opposed side faces; and (ii) the longitudinal axis of the second female connector extends between the first pair of opposed side faces.

28. An interlocking buoyant element according to claim 2, wherein the longitudinal axes of the first female connector, the second female connector, the first male connector and the second male connector lie substantially in the same plane.

29. An interlocking buoyant element according to claim 28, wherein the operative top face defines a third female connector that runs alongside an edge of the top face and extends between a pair of opposed side faces.

30. An interlocking buoyant element according to claim 28, wherein the operative bottom face includes: (i) a third male connector; or (ii) a fourth female connector, that extends along the middle of the operative bottom face, parallel to an edge of the operative bottom face.

AMENDED CLAIMS
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1. An interlocking buoyant element including:

a right-angled parallelepiped body defining: (i) operative opposed top and bottom faces; (ii) a first pair of opposed side faces; and (iii) a second pair of opposed side faces;

a first male connector on one of the first pair of opposed side faces and a corresponding first female connector on the other of the first pair of opposed side faces, the first female connector defining a channel with a longitudinal axis along which a first male connector of an adjacent interlocking buoyant element may, in use, be slidably received;

a second male connector on one of the second pair of opposed side faces and a corresponding second female connector on the other of the second pair of opposed side faces, the second female connector defining a channel with a longitudinal axis along which a second male connector of an adjacent interlocking buoyant element may, in use, be slidably received;

the longitudinal axis of the second female connector extending between the first pair of opposed side faces,

characterised in that the first and second male connectors are, in cross-section: (a) wedge shaped; or (b) puzzle-shaped in that they comprise a neck extending from the body and an enlarged head at the free end of the neck.

2. An interlocking buoyant element according to claim 1, wherein the longitudinal axis of the first female connector extends between the top and bottom faces.

3. An interlocking buoyant element according to claim 2, wherein: (i) the longitudinal axis of the first female connector extends from the top and bottom faces at an angle of more than 60 degrees; and (ii) the longitudinal axis of the second female connector extends from the first pair of opposed side faces at an angle of more than 60 degrees.

AMENDED SHEET (ARTICLE 19)

4. An interlocking buoyant element according to claim 2, wherein: (i) the longitudinal axis of the first female connector extends from the top and bottom faces at an angle of between 80 degrees and 100 degrees; and (ii) the longitudinal axis of the second female connector extends from the first pair of opposed side faces at an angle of between 80 degrees and 100 degrees.

5. An interlocking buoyant element according to claim 2, wherein the longitudinal axis of the first female connector extends orthogonally between the top and bottom faces; and (ii) the longitudinal axis of the second female connector extends orthogonally between the first pair of opposed side faces .

6. An interlocking buoyant element according to claim 5, wherein the first and second female connectors: (i) are, in cross-section, wedge shaped cavities defined by the body; or (ii) comprise, in cross-section, a cavity with a constricted opening defined by the body.

7. An interlocking buoyant element according to claim 6, wherein the cross-sectional shapes of the first male and female connectors are different to the cross-sectional shapes of the second male and female connectors.

8. An interlocking buoyant element according to claim 7, wherein the cross-sectional shapes of the first and second male and female connectors are such that: (i) the first male connector is not receivable and slidable within the second female connector; and (ii) the second male connector is not receivable and slidable within the first female connector.

9. An interlocking buoyant element according to claim 8, wherein the first and second male and female connectors are elongate, defining longitudinal axes orthogonal to their cross-sections.

10. An interlocking buoyant element according to claim 9, wherein the longitudinal axes of the first male and female connectors are parallel to each other.

11. An interlocking buoyant element according to claim 10, wherein the longitudinal axes of the second male and female connectors are parallel to each other.

12. An interlocking buoyant element according to claim 11, wherein the longitudinal axis of the first male connector is parallel to a line connecting the midpoints of the operative opposed top and bottom faces of the body.

13. An interlocking buoyant element according to claim 12, wherein the first male and female connectors extend from the operative bottom face towards the operative top face of the body, but terminate short of the operative top face of the body.

14. An interlocking buoyant element according to claim 13, wherein the operative bottom face of the body defines an opening for a first longitudinal end of the first female connector.

15. An interlocking buoyant element according to claim 14, wherein a second longitudinal end of the first female connector is closed.

16. An interlocking buoyant element according to claim 12, wherein the first male and female connectors extend between the operative bottom face and the operative top face of the body.

17. An interlocking buoyant element according to claim 16, wherein both the operative top and bottom faces of the body define openings for longitudinal ends of the first female connector.

18. An interlocking buoyant element according to claim 15, wherein the body is a cube.

19. An interlocking buoyant element according to claim 18, wherein the first and second male and female connectors are integral to the body.

20. An interlocking buoyant element according to claim 19, wherein the interlocking buoyant element is homogeneous.

21. An interlocking buoyant element according to claim 18, wherein the operative top face of the body is rougher than the other faces of the body.

22. An interlocking buoyant element according to claim 21, wherein the body is hollow.

AMENDED SHEET (ARTICLE 19)

23. An interlocking buoyant element according to claim 22, further including a valve to permit air and/or water to enter/exit the body.

24. An interlocking buoyant element according to claim 23, wherein operative top and bottom faces include puzzle-shaped corresponding male and female connectors for connecting subjacent and superjacent layers of interlocking buoyant elements together.

25. An interlocking buoyant element according to claim 1, wherein: (i) the longitudinal axis of the first female connector extends between the second pair of opposed side faces; and (ii) the longitudinal axis of the second female connector extends between the first pair of opposed side faces.

26. An interlocking buoyant element according to claim 25, wherein the longitudinal axes of the first female connector, the second female connector, the first male connector and the second male connector lie substantially in the same plane.

27. An interlocking buoyant element according to claim 26, wherein the operative top face defines a third female connector that runs alongside an edge of the top face and extends between a pair of opposed side faces.

28. An interlocking buoyant element according to claim 27, wherein the operative bottom face includes: (i) a third male connector; or (ii) a fourth female connector, that extends along the middle of the operative bottom face, parallel to an edge of the operative bottom face.

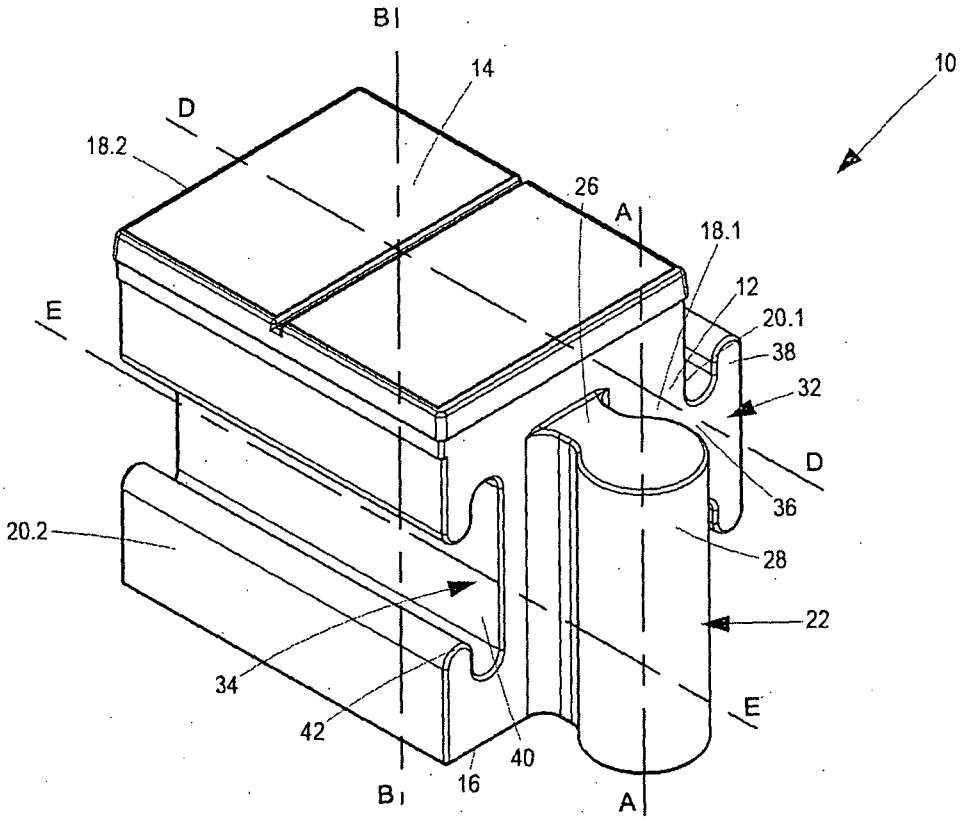


Figure 1

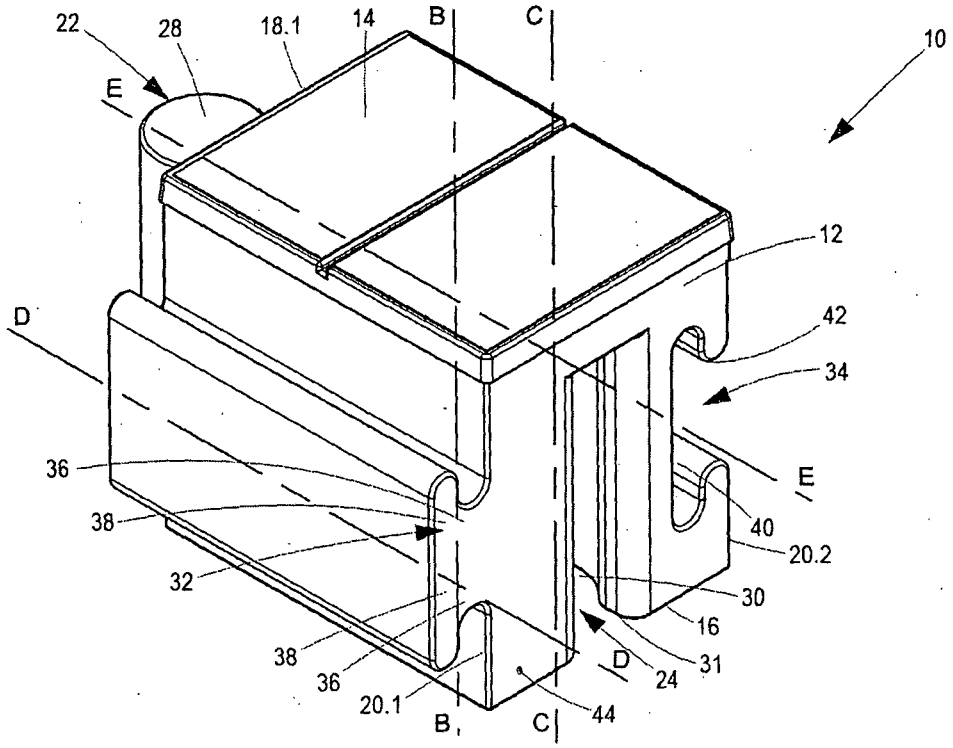


Figure 2

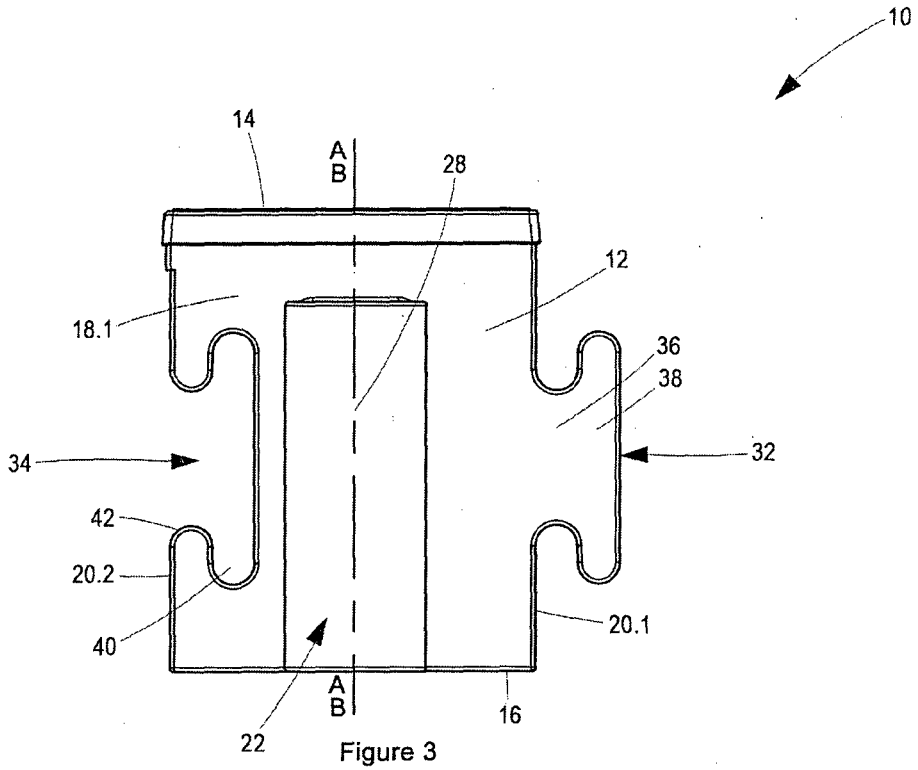


Figure 3

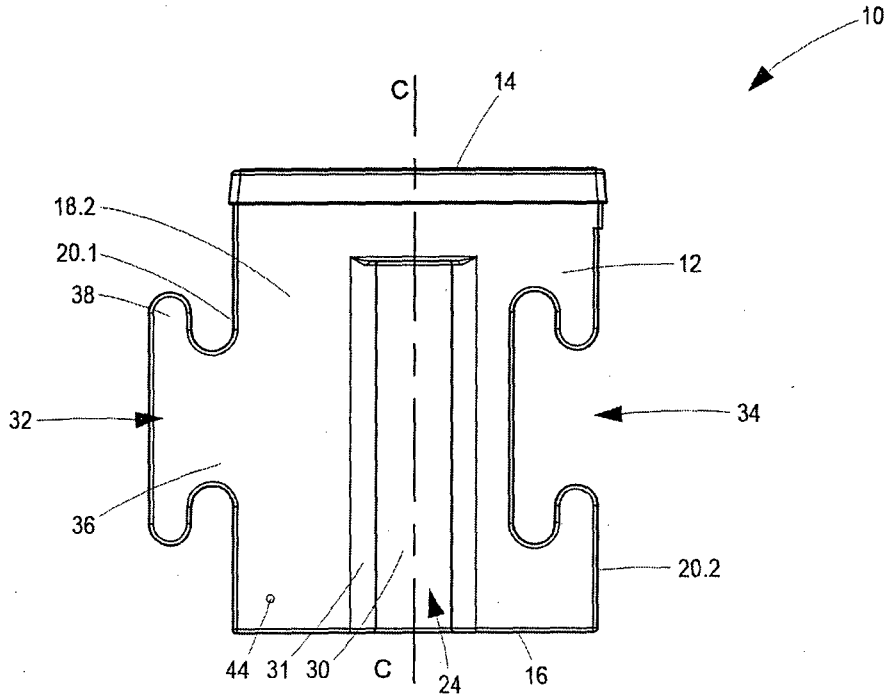


Figure 4

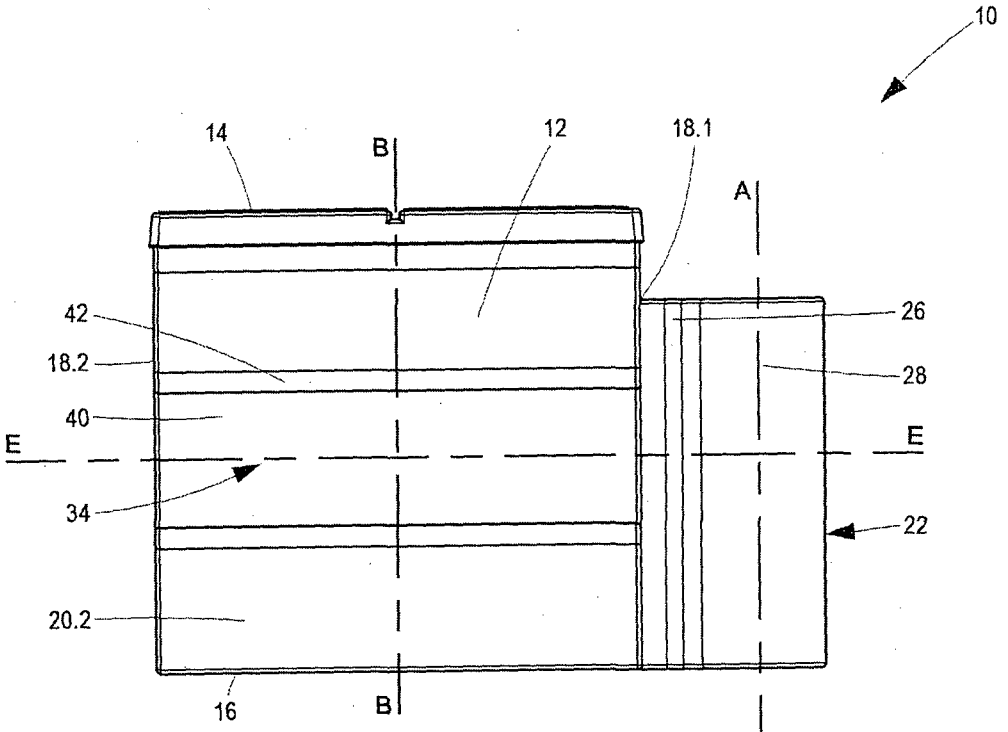


Figure 5

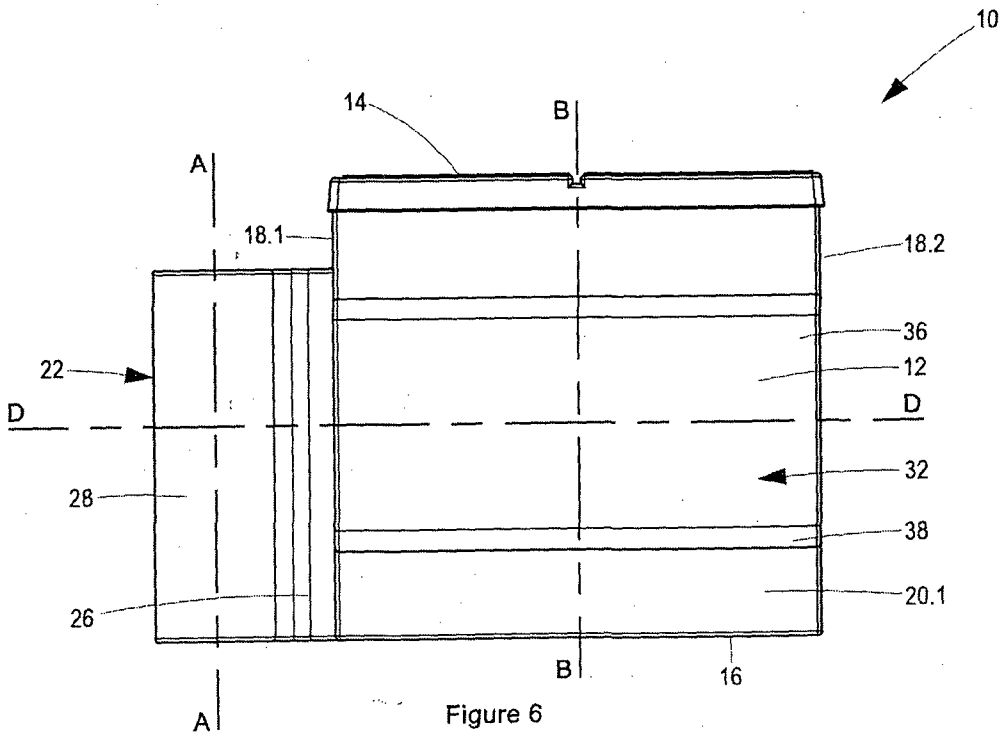
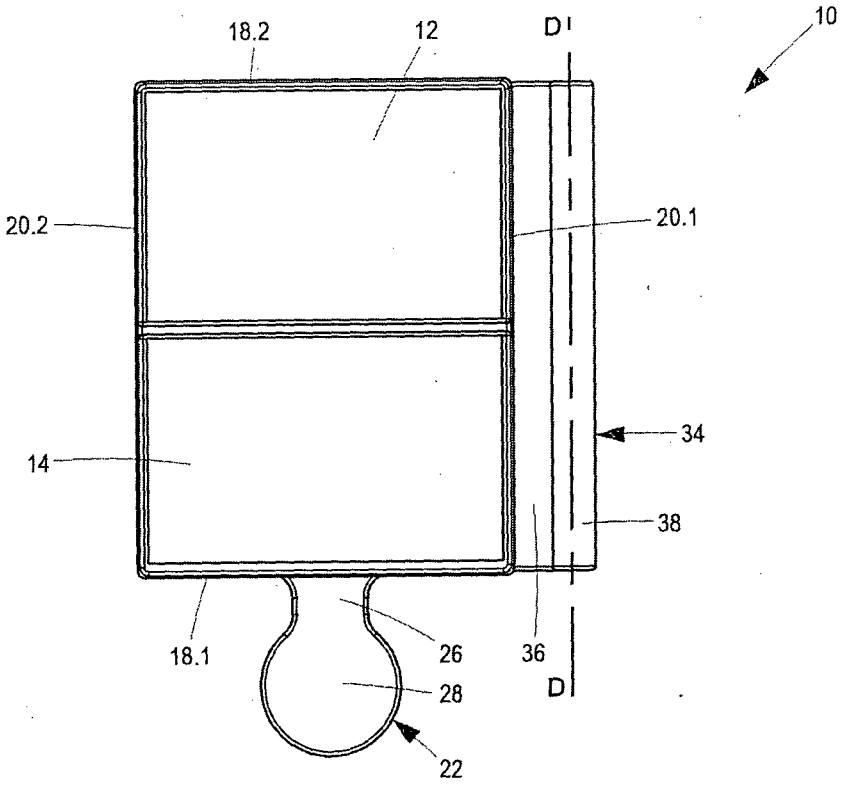


Figure 6



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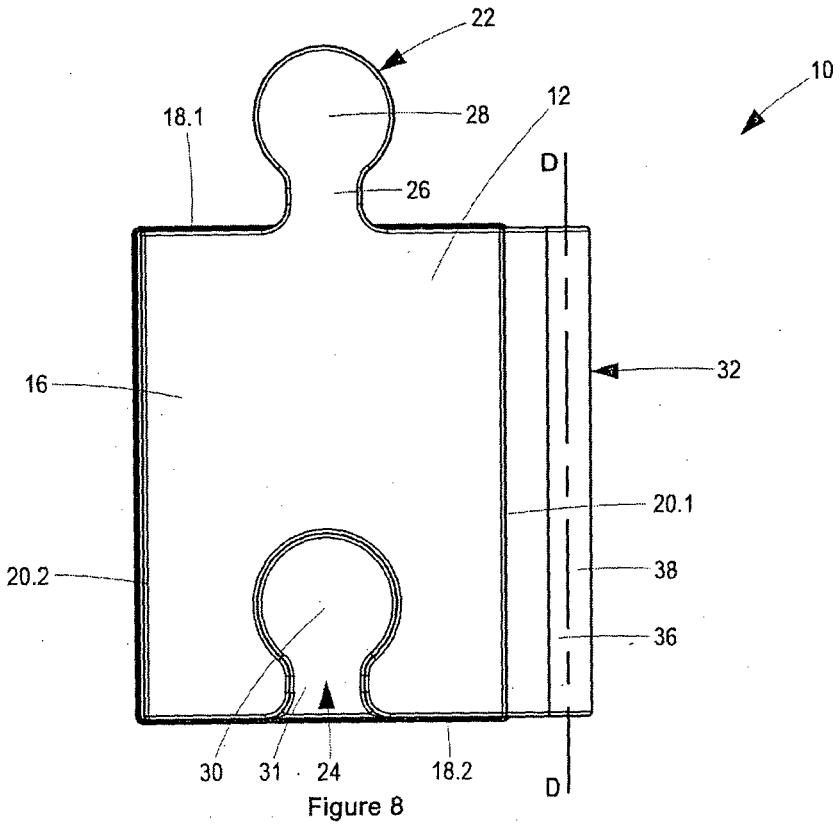
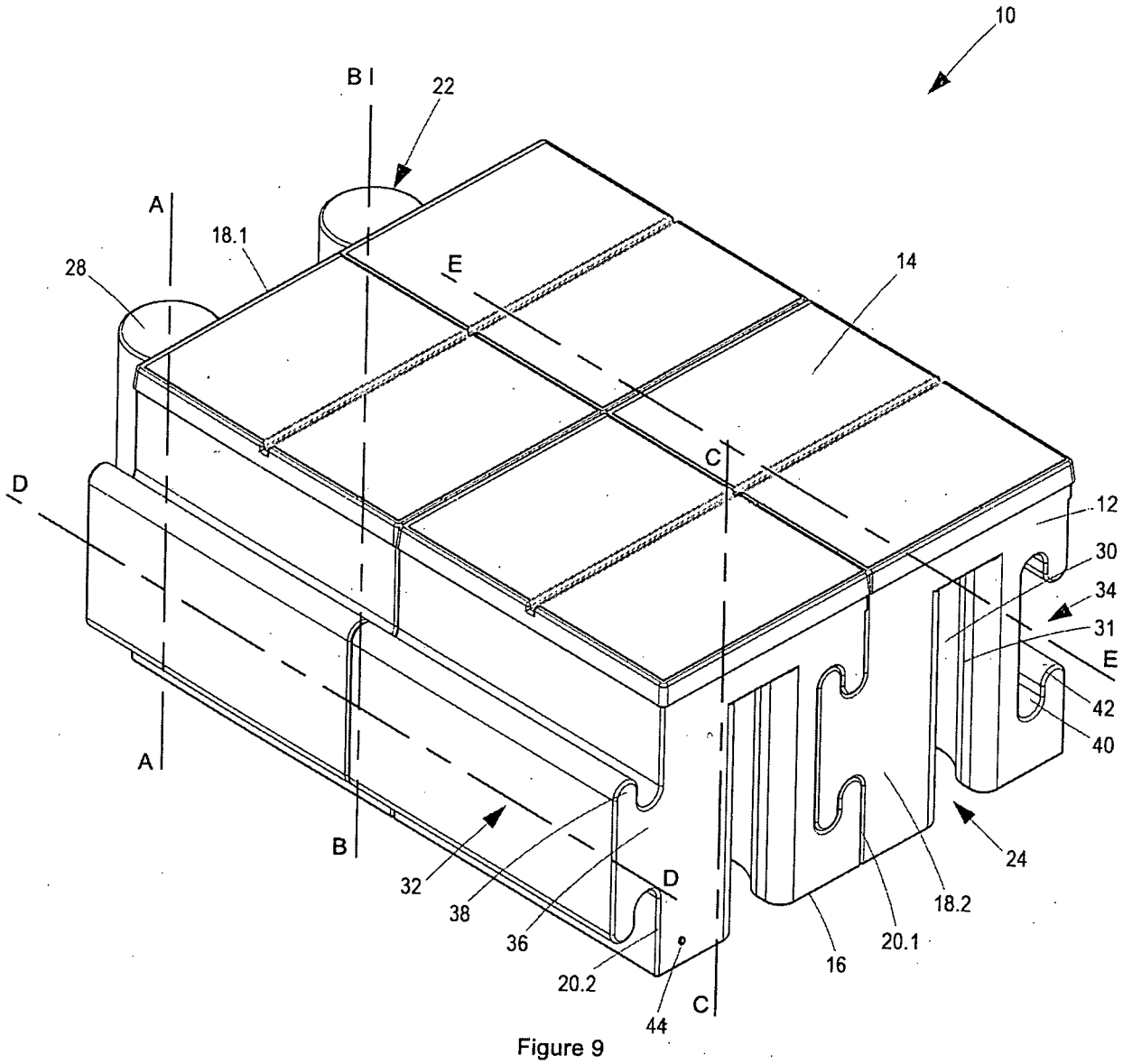


Figure 8


10
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18.2
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16
20.2
C
44

Figure 9

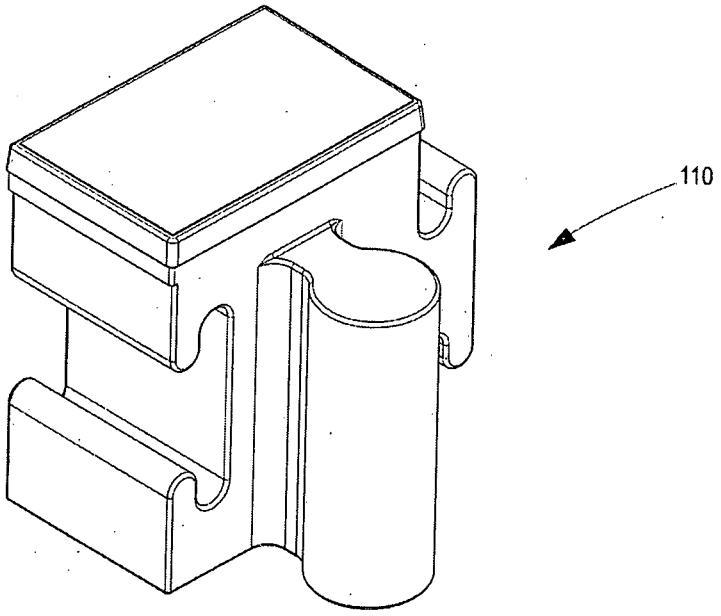

Figure 10

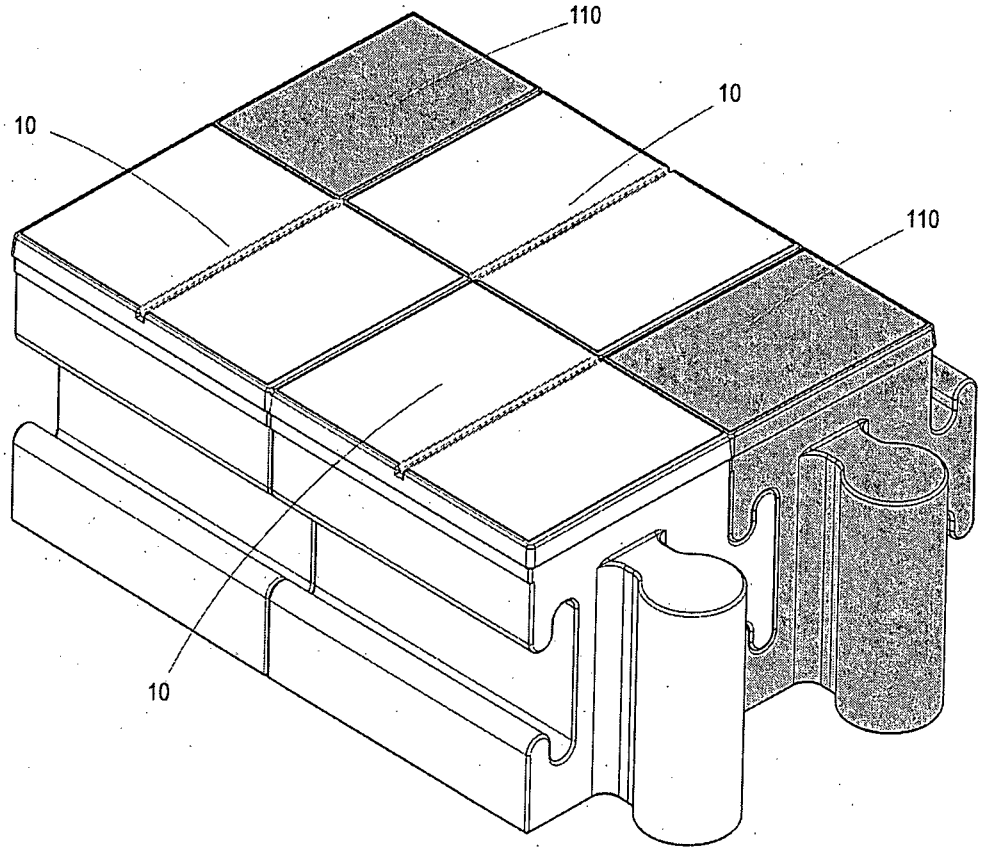

Figure 11

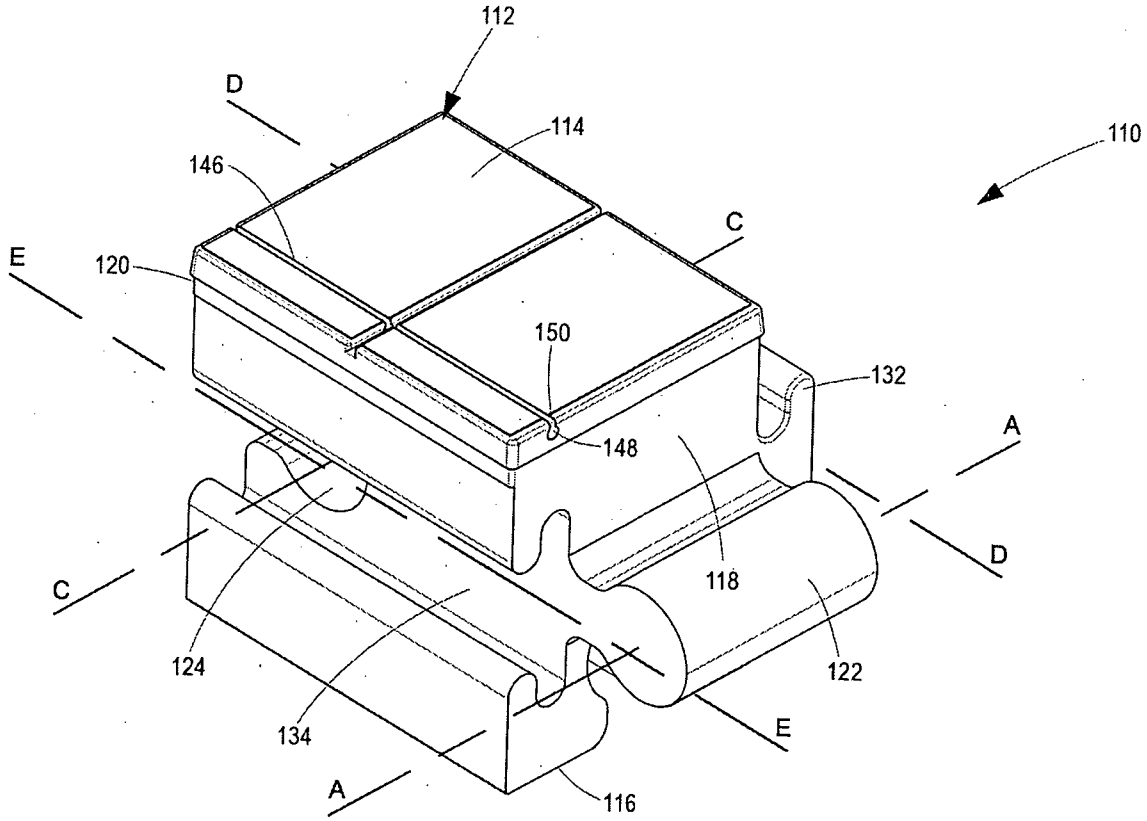

Figure 12

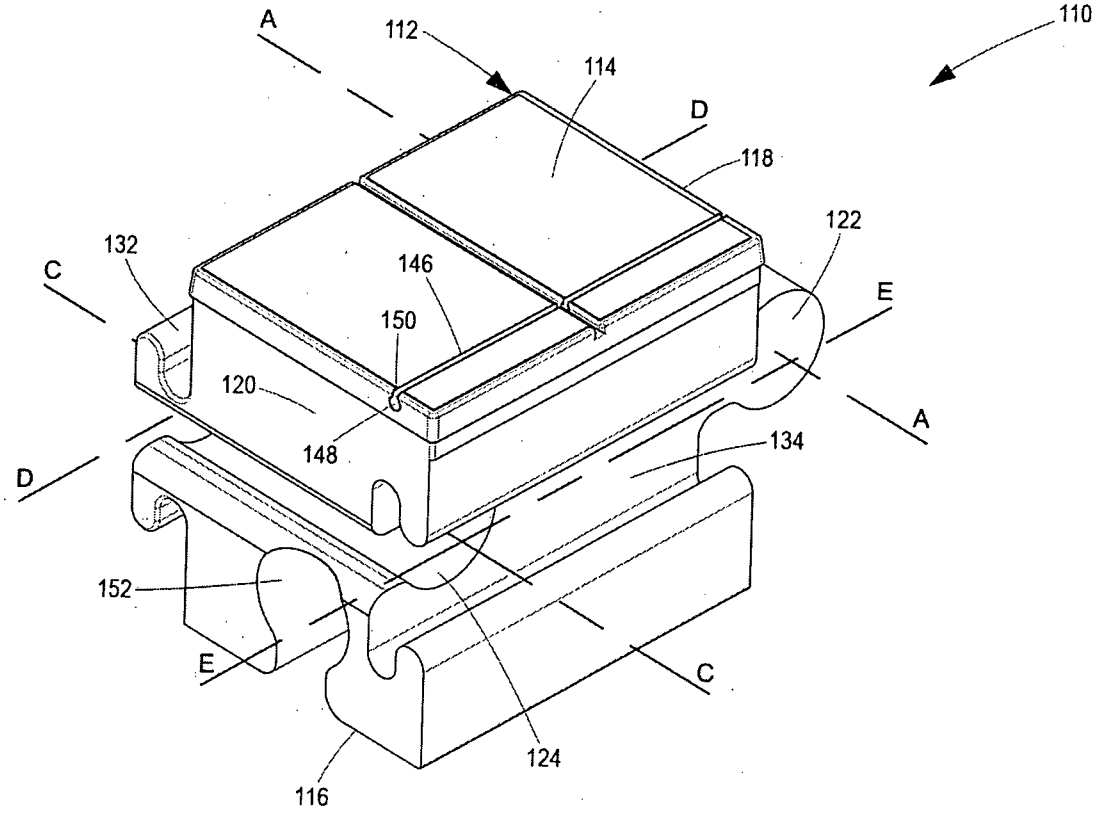

Figure 13

INTERNATIONAL SEARCH REPORT

International application No.

PCT / ZA 2013/000084

A. CLASSIFICATION OF SUBJECT MATTER

IPC: ***B63B 35/38*** (2006.01)

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

B63B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPODOC, FULLTEXT

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 3587503 A (STEHR) 28 June 1971 (28.06.1971) Fig. 1, 2, 5, 6, column 2 lines 57-75	1-5, 27, 28
X	US 3691974 A (SEIFORD) 19 September 1972 (19.09.1972) Fig. 1-4, abstract	1-5, 27, 28
A	JP 2007109769 A (TAKIRON CO LTD) 26 April 2007 (26.04.2007) Fig. 1-4, paragraph [0015]	1-17, 19, 21, 22
A	DE 8525778 U (DOLLINGER) 02 January 1986 (02.01.1986) Fig. 13, 14, claims 1, 2	6, 7
A	US 3522618 A (STRANZINGER) 04 August 1970 (04.08.1970) Fig. 1-3, 12, column 2 lines 61-72	6, 7

☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

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"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
28 January 2014 (28.01.2014)	17 February 2014 (17.02.2014)
Name and mailing address of the ISA/AT Austrian Patent Office Dresdner Straße 87, A-1200 Vienna Facsimile No. +43 / 1 / 534 24-535	Authorized officer EHRENDORFER K. Telephone No. +43 / 1 / 534 24-367

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT / ZA 2013/000084

Patent document cited in search report			Patent family member(s)			Publication date
US	A	3587503	US	A	3587503	1971-06-28
US	A	3691974	NL	A	7102732	1971-09-07
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			DE	A1	2108093	1971-11-18
JP	A	2007109769	JP	A	2007109769	2007-04-26
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			US	A	3522618	1970-08-04
			DE	A1	1556457	1970-02-26
			CH	A	463300	1968-09-30
			DE	U	1988924	1968-07-04
			NL	A	6801097	1968-07-31
			GB	A	1214041	1970-11-25