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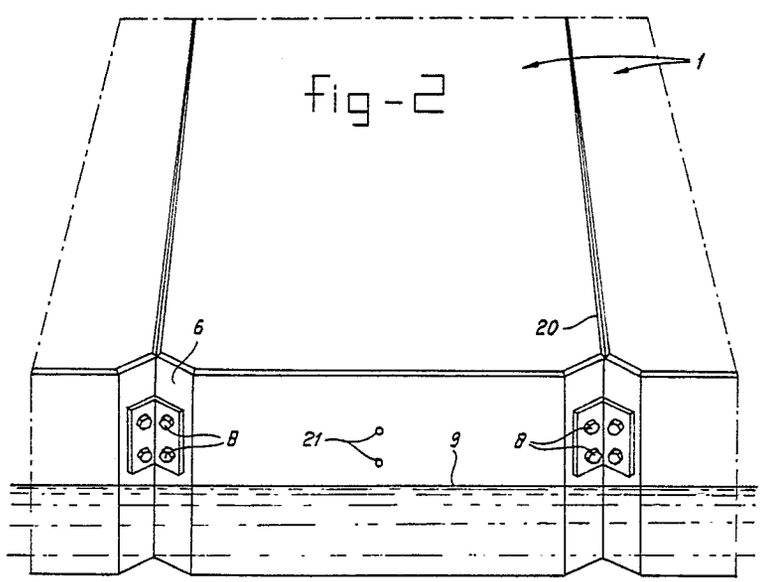
(54) Parallelepiped floating structure.

(57) Parallelepiped floating structure wherein in position of use two adjoining vertical sides are delimited by a vertical face enclosing substantially equal angles with both adjoining vertical sides. Connecting means are provided on this vertical face.



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Parallelepiped floating structure.

The subject invention relates to a parallelepiped floating structure, comprising connecting means.

Such a structure is known from the Australian patent specification 554951. Several floating structures can be assembled by means of connecting means provided in the top layer of each floating structure. By putting two floating structures against each other and applying of a cover plate the connection is obtained between the two floating structures through the cover plate being bolted to the top face of each floating structure. The first drawback of this method is that it is required to have a cover plate which must be adapted to the use of the floating structure. This means that it is not possible to simply connect several floating structures and obtain a cheap modular system. Furthermore the connection through the cover plate is not very rigid and/or requires a cover plate having a considerable thickness. In either case considerable momentums result at the interface between two floating structures in the cover plate resulting in premature failure. Finally it is necessary that after the cover plate is provided and the bolts are inserted some covering of the bolt holes is realized such that a smooth upper surface is obtained.

The subject invention aims to obviate these drawbacks and to provide a parallelepiped floating structure which can be connected in an easy way with other devices such as similar floating structures without requiring any further work and being easy to produce.

According to the invention this is realized in that the extremities of at least two adjoining sides, being vertical in the position of use, are separated by a vertical face, enclosing substantially equal angles with said sides and being provided with said connecting means.

When connecting several floating structures according to the invention the connecting means can be provided in the face between two vertical sides of the parallelepiped structure. This means that space is provided to arrange connecting means which can be provided both at the upper and the lower end of a floating structure. Because of this tensions will be more uniformly distributed over the surface of the floating structure, such that on the one hand a more rigid connecting between two floating structures is obtained and on the other hand these structures can be realized in a more lighter embodiment. As the face between two vertical sides encloses about the same angle with said vertical sides, tensions are optimally distributed over these sides. If, such as with the prior art, a right angle exists between two adjoining sides, a force applied to one of said sides will generally have a component which cannot be absorbed by that side and failure will occur.

Because the connection is realized at the sides of the floating structure it is possible to provide each parallelepided structure with its own upper surface functioning as cover surface and no further finishing is required. This in contrast to the prior art where a separate cover surface had to be realized. Landings etc. are constructed by connecting several floating structures together. In contrast to the prior art the same area as the upper surface of the construction is immersed in water giving an increased floating capacity and stability. In contrast to the prior art the connection between two structures can be realized near the center which means that if any only small momentums are present.

According to a preferred embodiment the connecting means comprise anchoring sleeves. These can be simply provided when the floating structure is realized. If the floating structure comprises a concrete shell this can be simply provided in the mould before pouring of the concrete material.

If at least one of the other vertical sides has connecting means as decribed above it is possible to connect floating structures in several ways. Because it is relatively easy to connect and disconnect the floating structures it is e.g. possible to use one set of floating structures in a marina one time as landing and another time as floating terrace.

According to a further embodiment the floating structure comprises a concrete container being filled with foam material. Of course the specific weight of the floating structure as such must be smaller than 1 to obtain the desired floating properties.

According to further preferred embodiment the concrete shell is prepared from a steel fiber-concrete mixture and coated with a concrete cover layer.

The invention also relates to an assembly comprising several floating structures as described above wherein means are provided to elastically connect those floating structures. Such a connecting is especially preferred when larger floating structures or a number of rigidly connected floating structures are connected to other larger floating structures or another number of floating structures.

The invention will be further elucidated referring to the enclosed drawings, wherein:

Fig. 1 shows in plan view a floating structure according to the invention,

Fig. 2 shows in perspective view three float-

ing structures according to the invention defining a field,

Fig. 3 shows in perspective a detail of the floating structure according to fig. 1,

Fig. 4 shows in plan view connecting of four floating structures together, and

fig. 5 shows a cross section V-V through the floating structure according to fig. 1.

In fig. 1 a floating structure according to the invention is shown generally indicated with 1. The substantially parallelepiped structure comprises an upper surface 2 and a lower surface 3 as well as long sides 4 and short sides 5. According to the invention the long sides 4 and the short sides 5 are defined at their extremities by a face 6 enclosing about the same angles with both side 4 and side 5. The length-width ratio of the parallelepiped structure according to the invention is chosen such that easily a modular system can be obtained. This means that the length is an whole number of the width. As example the length can be 3,84 m and the width 1,28 m. This is e.g. dictated by a shape of the filling of the floating structure as will be described below more in detail.

In fig. 2 several floating structures 1 according to the invention are shown being coupled together through angle profiles 7 being secured with bolts 8 to anchoring sleeves (not shown) provided in the floating structures 1. With 9 schematically the water line is shown.

In fig. 3 a detail of fig. 1 is shown from which the position of the anchoring sleeves 10 becomes clear. As shown in figure 1 also at sides 4 and 5 connecting sleeves 21 are provided. Now it is possible to perpendicularly connect two structures 1 or with a 45° angle. Fig. 4 shows in top view an example of four floating structures 1 being connected with two angular profiles 11. These angular profiles are provided with (in the position of use) horizontal extending plates 12 and 13 overlapping each other. If the four floating elements are positioned correctly a hole in each of the plates 12 and 13 comes into register and into this hole a bolt 15 can be introduced. In the height of each angle profile several of such plate assemblies can be provided.

Fig. 5 shows a cross section through a floating structure according to the invention and it is clear from the figure that it comprises a concrete shell 16 filled with polystyrene material 17. Concrete shell 17 comprises a cover layer 18 only containing concrete whilst thicker layer 19 comprises a mixture of concrete and steel fiber to give a reinforcement. It is clear that at its sides the floating structure is chamferred at 20 to provide discharge of water, prevent damage and to absorb differences in height.

A floating structure according to the invention can be realized by pouring concrete around a standard foam plate in the mould.

Forces acting on the connecting through the connecting means on face 6 will be evenly distributed to sides 5 and 4. This in contrast to what is known in the prior art. The floating structures and more particular an assembly of several connected floating structures according to the invention can be used as pontoon, as landing in harbours etc. If several units, each comprising e.g. three floating elements according to the invention, have to be coupled, it is preferable to use an elastic coupling. This can comprise the use of rubber material elastic rings. This to allow some relative movement between several of the units.

Claims

1. Parallelepiped floating structure, comprising connecting means, characterized in that the extremities of at least two adjoining sides, being vertical in the position of use, are separated by a vertical face, enclosing substantially equal angles with said sides and being provided with said connecting means.

2. Floating structure according to claim 1, wherein the upper surface functions as cover surface.

3. Floating structure according to claim 1 or 2, wherein said connecting means comprise anchoring sleeves.

4. Floating structure according to one of the preceding claims wherein at least one of the vertical sides of the parallelepiped structure is provided with connecting means.

5. Floating structure according to one of the preceding claims, wherein said floating structure comprises a concrete shell filled with foam material.

6. Floating structure according to claim 5, wherein the concrete container is prepared from a steel fiber-concrete mixture, coated with a concrete cover layer.

7. Assembly comprising several floating structures according to one of the preceding claims, wherein means are provided for elastically connecting.

fig-1

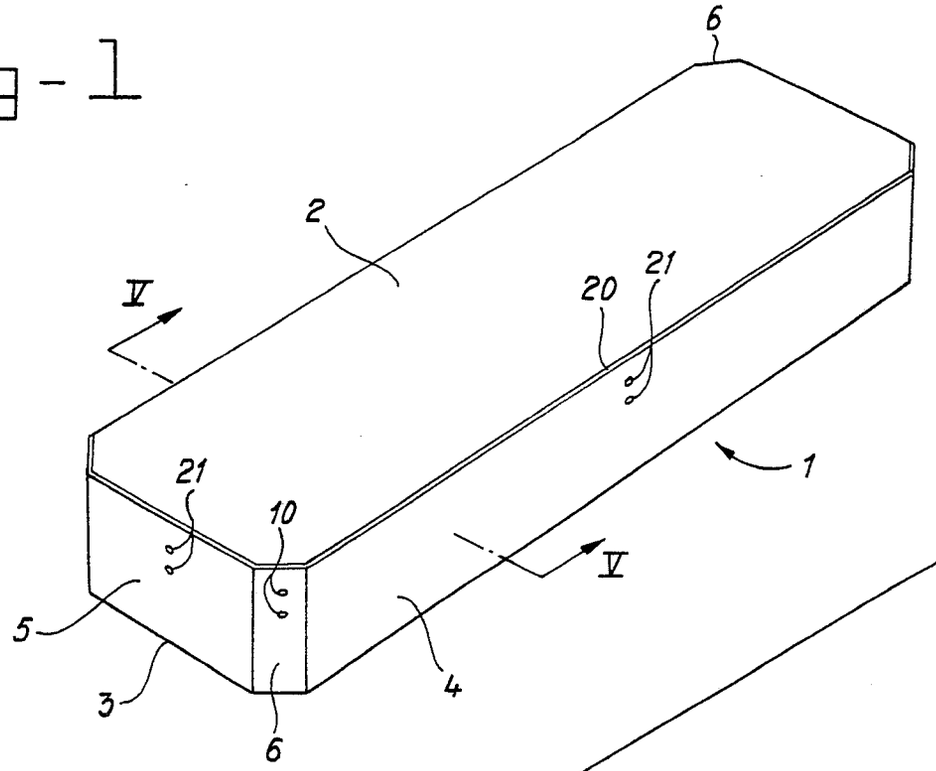


fig-5

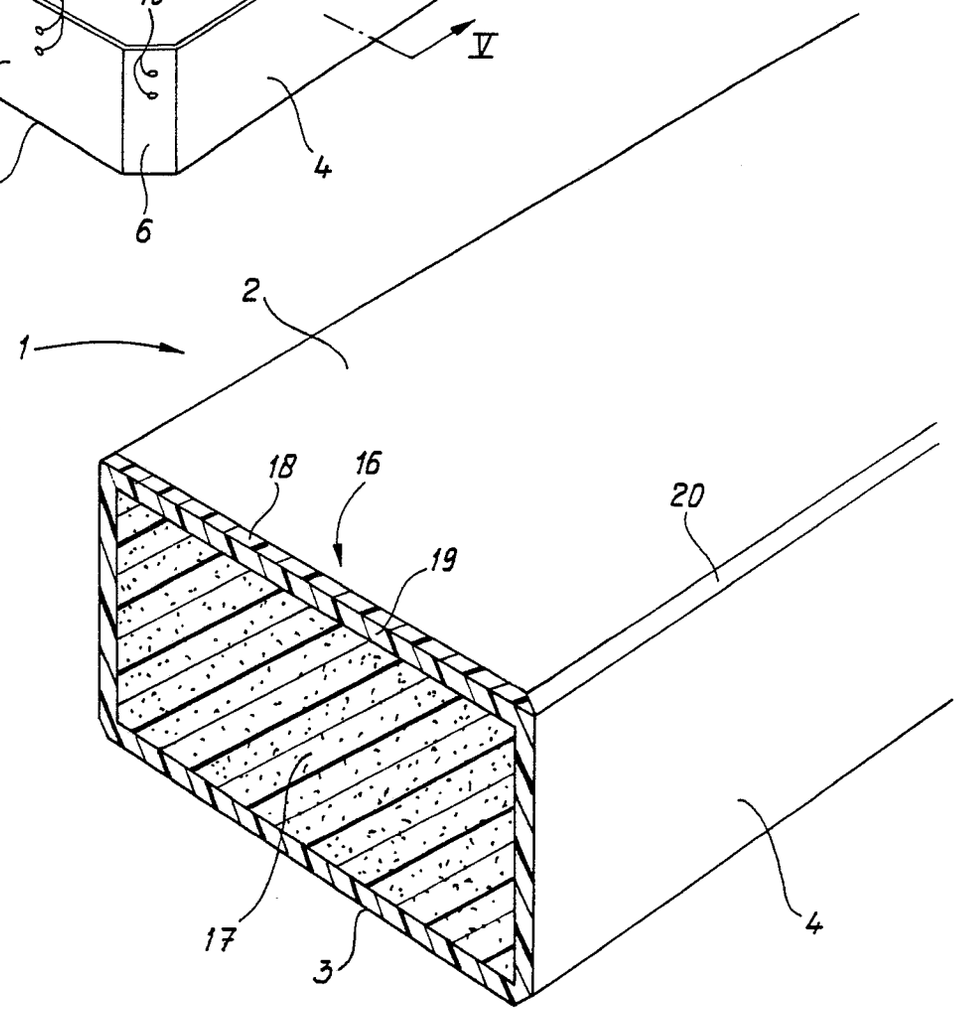


fig-2

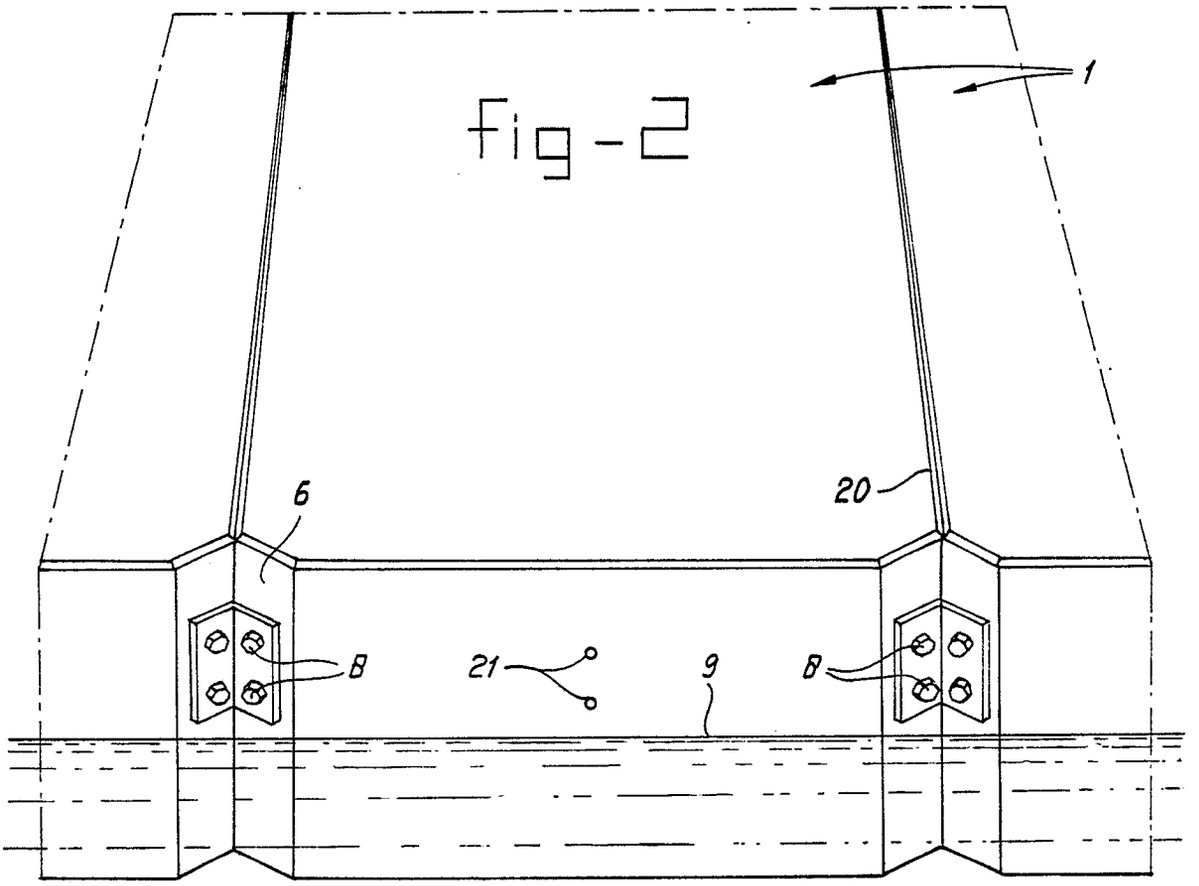


fig-4

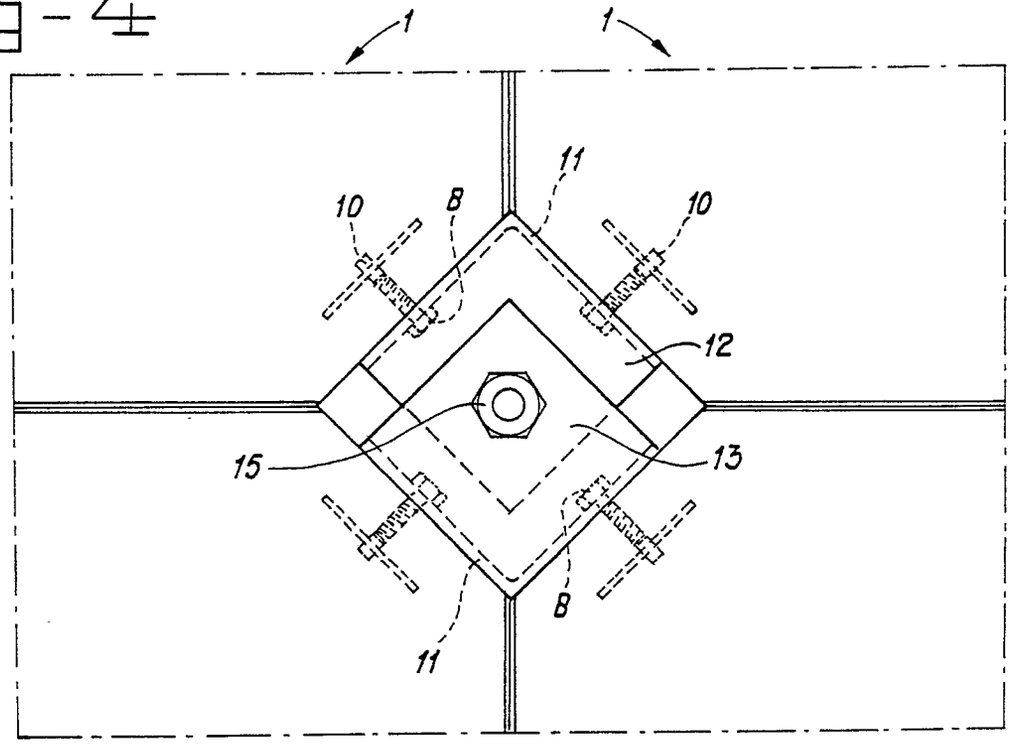
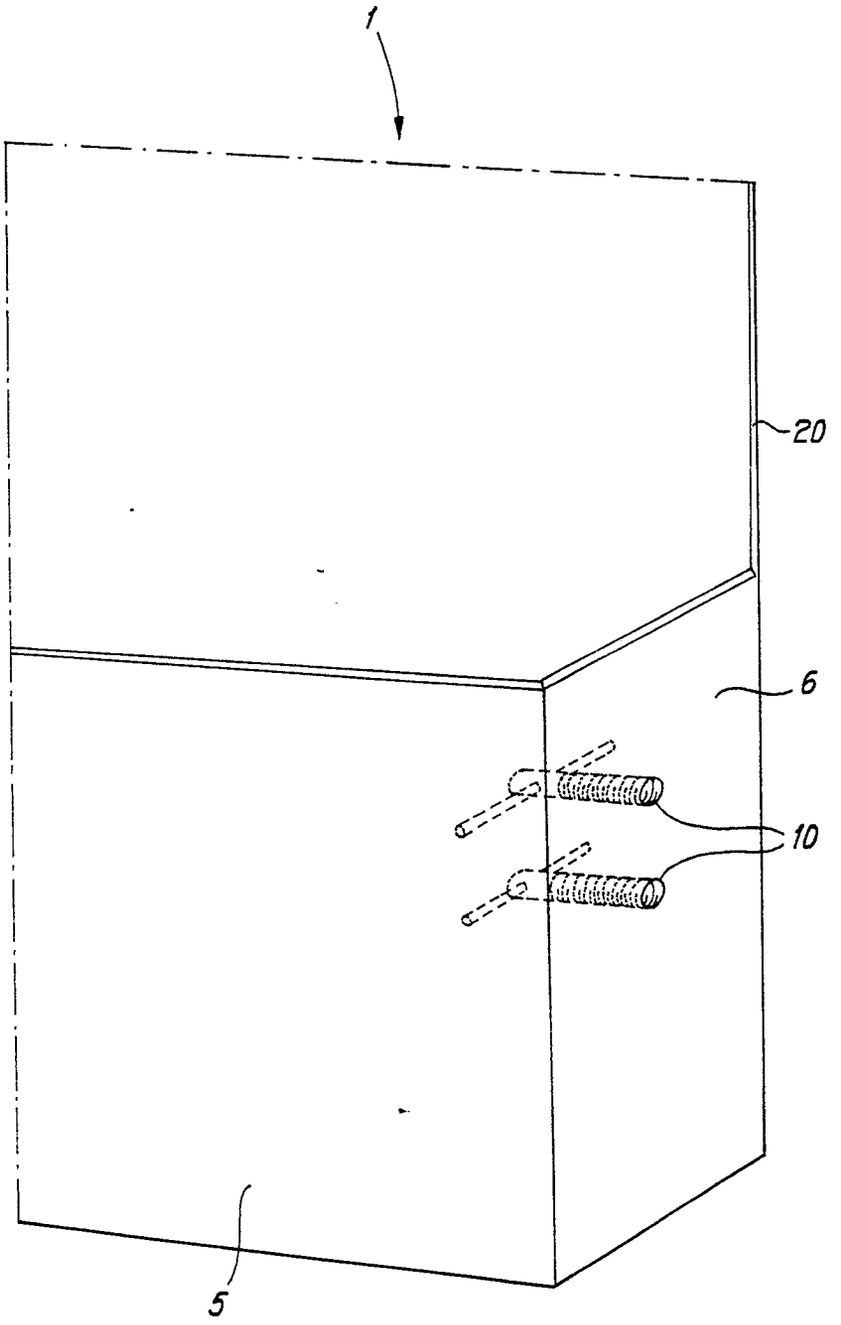


Fig-3



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EUROPEAN SEARCH REPORT

Application Number

EP 89 20 2437

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
A	US-A-2 742 012 (BRIDGES) * Column 3, lines 7-17; figure 8 *	1,2,4,7	B 63 B 35/38
A	FR-A-2 147 856 (JORAND) * Pages 1,2; figure 1 *	1,2,3,4	

TECHNICAL FIELDS SEARCHED (Int. Cl.5)

B 63 B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	10-01-1990	VISENTIN, M.

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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