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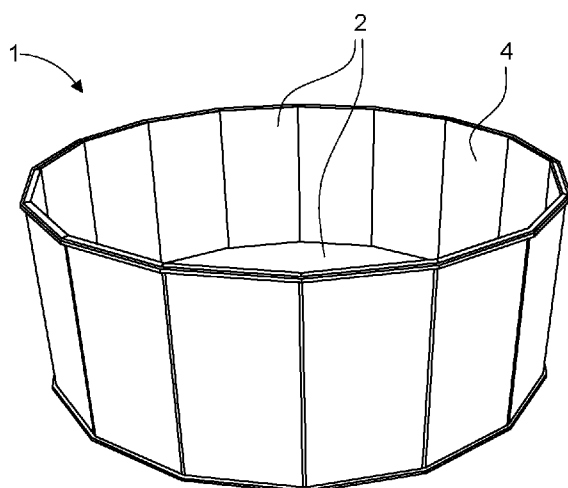


FIG. 1

(57) Abstract: The disclosure relates to an aquafarming tank (1) for growing water-living species, the aquafarming tank (1) comprising: a wall (2) shaped as a bowl so as to enable containment of a liquid; wherein the wall (2) comprises a structural bearing wall element (3,3'); and a first sheet (4) for providing an inner layer of the wall (2); wherein the first sheet (4) of the wall (2) is attached to the structural bearing wall element (3,3') and adapted to be in contact with the liquid contained in the aquafarming tank (1); and wherein the first sheet (4) of the wall (2) is made of a solid surface material composed of aluminium trihydrate (ATH) or aluminium monohydrate (AMH) and a polymer binding medium. The disclosure further relates to a method of constructing the aquafarming tank (1).



## **An aquafarming tank for growing water-living species and a method of constructing the aquafarming tank**

### Technical field

The present disclosure relates to an aquafarming tank for growing water-living species  
5 and a method of constructing the aquafarming tank. More specifically, the disclosure relates to an aquafarming tank for growing water-living species and a method of constructing the aquafarming tank as defined in the introductory parts of the independent claims.

### Background art

10 Aquafarming is mostly performed in oceans, lakes and ponds where e.g. fish is grown in an often industrial manner. In small scale, such aquafarming is a great and environmentally sound way of producing food. However, when the scale of the production becomes too large, aquafarming becomes a liability to the environment providing the water with so much  
15 residues that it becomes polluted. The scale of aquafarming in natural water thereby has a natural limit set by how much residues the environment can take care of. To increase production from aquafarming beyond that limit it has in recent years become increasingly popular to set up land based aquafarming in tanks.

Land based tanks for aquafarming often have problems of being expensive as they  
20 need to be constructed to stand for the heavy load of large volumes of water. A need to keep the surfaces of the tank clean also presents a problem not present in aquafarming in natural watercourses.

A further problem with land based aquafarming is that the water in the tanks has to be kept clean and oxygenated to a correct level. This can be solved by placing the tanks close to a large watercourse or ocean and simply constantly replacing the water. However, such  
25 locations are often fairly inaccessible making it expensive to bring building material for large tanks to the site for the aquafarming.

There is thus a need in the industry for better solutions when moving aqua farming onto land.

## Summary

It is an object of the present disclosure to mitigate, alleviate or eliminate one or more of the above-identified deficiencies and disadvantages in the prior art and solve at least the above mentioned problem. According to a first aspect there is provided an aquafarming tank for growing species that live in water, the aquafarming tank comprising: a wall shaped as a bowl so as to enable containment of a liquid. The wall comprises a structural bearing wall element and a first sheet for providing an inner layer of the wall. The first sheet of the wall is attached to the structural bearing wall element and adapted to be in contact with the liquid contained in the aquafarming tank. The first sheet of the wall is made of a solid surface material composed of aluminium trihydrate or aluminium monohydrate and a polymer binding medium.

The solid surface material is antiseptic reducing the need for cleaning and presenting surface that is not harmful for the species, e.g. fish, that is grown in the tank. By only using the solid surface material as an inner layer and using the structural bearing wall element to handle the load of the liquid, the amount of solid surface material can be reduced, keeping price and weight of the tank down.

Any water-living species may be grown in the tank. It could be marine species, anadromous species, or fresh water species. The species could be fish, any other water-living animal or plant based species that live in water.

The polymer binding medium may e.g. be a acryl-modified polyester. ATH or AMH and a polymer are so similar to each other in their chemical structure so that, when the solid surface material has cured, it will not absorb liquids or other chemical agents. The material is so insensitive to other substances that it can even stand most acids without being stained or absorbing any of it. This has the effect that the aquafarming tank will be easy to clean, and since it does not absorb other substances easily it will have an antiseptic property. This makes the aquafarming tank durable with a long lifetime which will bring down maintenance costs to a minimum.

According to some embodiments, the solid surface material has an ATH or an AMH content of above 50%. According to some embodiments, the solid surface material has a ATH or AMH content of 50 – 90% by weight, more preferably 60 – 80% by weight and most preferably 70-80% by weight. A high ratio of ATH or AMH to binder material will give the material good heat resistance and also make it so dense that it has excellent antiseptic

properties. Having 80% ATH or AMH to binder in the solid surface material, the material will withstand temperatures of up to 200°C, which is very good from a fire safety perspective.

According to some embodiments, the first sheet of the wall has a thickness in the range of 3 to 13 mm. Using a relatively thin first sheet keeps weight and costs down while still  
5 presenting the advantageous properties discussed above towards the content of the tank. It may be important with a minimized weight as aquafarming tanks many times advantageously are built at inaccessible places to which transportation may be difficult.

According to some embodiments, the structural bearing wall element is made of concrete. Concrete is suitable as the structural bearing wall element as it is strong, durable,  
10 fairly inexpensive and easy to mold. The downside is that the material is heavy, but in some cases sand can be found locally at the chosen site for the aquafarming tank.

According to some embodiments, the inner side of the concrete structural bearing wall element is covered by a honeycomb structure plate that is attached to the first sheet, wherein the honeycomb structure plate has columnar cells extending in a direction perpendicular to  
15 the first sheet. The honeycomb structure plate may have a thickness about 15-25 mm. The purpose is to present a rigid surface that does not move due to heat expansion etc. so that the solid surface sheet is not damaged by cracks during the lifetime of the aquafarming tank.

According to some embodiments, the structural bearing wall element is a honeycomb structure plate with columnar cells extending in a direction perpendicular to the first sheet.  
20 The honeycomb structure plate thereby replaces the concrete of the previously mentioned embodiment as structural bearing wall element. As honeycomb materials are lightweight while extremely torsionally rigid, a stable foundation for the first layer of solid state material is provided while having a very small weight compared to a concrete based tank. Transportation of the building material for the tank is thereby much easier.

According to some embodiments, the wall has a sandwich construction the aquafarming comprises the structural bearing wall element made of the honeycomb structure plate; the first sheet for providing an inner layer of the wall attached to the inner side of the structural bearing wall element; a second sheet for providing an outer layer of the wall attached to the outer side of the structural bearing wall element. The wall of the tank is thus  
25 built up by a sandwich structure with the first sheet towards the inside of the tank is made of solid state material, the middle part is made by honeycomb material. The outer second sheet  
30

does not have to be solid surface material. It could be any sheet material, preferably plastic or metal.

According to some embodiments, the honeycomb structure plate has a thickness in the range of 10 to 100 mm. If the honeycomb structure plate act as the structural bearing wall element, then the honeycomb structure plate preferably is 20 to 100 mm thick to make the wall extremely torsionally rigid. If the structural bearing wall element, and the honeycomb material is only supporting the solid surface material, then the plat can be 5 to 25 mm thick.

According to some embodiments, the honeycomb structure plate is constructed by aluminium or plastic to present a durable, corrosion free and lightweight honeycomb material.

According to some embodiments, the honeycomb structure plate has columnar cells that are hexagonal in shape, a shape that has proven strong in nature.

According to some embodiments, the first sheet, the honeycomb structure plate and the first sheet, or the sandwich construction of the wall is comprised by a bottom wall element; and plural side wall elements. The parts are connected via bottom connection profiles shaped to lockingly engage the side wall elements with the bottom wall element. Further, side connection profiles shaped to lockingly engage one side wall element with another side wall element are used.

The bottom connection profiles and the side connection profiles are preferably made of aluminium to present light weight connection parts that are durable and have low maintenance needs.

According to some embodiments, the bottom wall element comprises at least one edge profile and the plural side wall elements further comprises at least one edge profile arranged at the edges of the bottom wall element and the plural side wall elements for engaging with the bottom connection profiles or the side connection profiles. The edge profiles are securely integrated in the bottom wall elements or side wall elements and preferably made from the same material as the side connection profiles and the bottom connection profiles to avoid corrosion, preferably aluminium or plastic.

According to some embodiments, aquafarming tank has a cylindrical shape; a number  $n$  planar side wall elements; and a bottom wall element that has a shape with  $n$  edges for receiving the  $n$  planar side wall elements via the bottom connection profiles to build the tank

shape from a number of smaller element. That makes transportation easier when building the aquafarming tank.

According to some embodiments, the bottom wall element is constructed by a number of rectangular bottom wall elements and a number of triangular bottom wall elements to form a bottom wall element. The bottom wall element is thereby constructed by a number of smaller part making transportation easier.

According to some embodiments, the planar side wall elements are substantially rectangular to produce a vertical tank side wall. However, the side wall elements may also be trapezoidal or triangular to produce a tank side wall leaning outwards or inwards.

According to a second aspect there is provided a method of constructing the aquafarming tank according to the first aspect, the method comprising the steps of: constructing a mould arranged to receive the honeycomb structure plates and the first sheet with a distance D between the mould and the honeycomb structure plates; mounting the honeycomb structure plates and the first sheet with a distance D between the mould and the honeycomb structure plates using the bottom connection profiles and the side connection profiles. Concrete is then moulded in the mould between the mould and the honeycomb structure plates. When the concrete is hardened the mould may optionally be removed.

Effects and features of the second aspect are to a large extent analogous to those described above in connection with the first aspect. Embodiments mentioned in relation to the first aspect are largely compatible with the second aspect.

The present disclosure will become apparent from the detailed description given below. The detailed description and specific examples disclose preferred embodiments of the disclosure by way of illustration only. Those skilled in the art understand from guidance in the detailed description that changes and modifications may be made within the scope of the disclosure.

Hence, it is to be understood that the herein disclosed disclosure is not limited to the particular component parts of the device described or steps of the methods described since such device and method may vary. It is also to be understood that the terminology used herein is for purpose of describing particular embodiments only, and is not intended to be limiting. It should be noted that, as used in the specification and the appended claim, the articles "a", "an", "the", and "said" are intended to mean that there are one or more of the elements unless the context explicitly dictates otherwise. Thus, for example, reference to "a

unit" or "the unit" may include several devices, and the like. Furthermore, the words "comprising", "including", "containing" and similar wordings does not exclude other elements or steps.

5 Brief descriptions of the drawings

The above objects, as well as additional objects, features and advantages of the present disclosure, will be more fully appreciated by reference to the following illustrative and non-limiting detailed description of example embodiments of the present disclosure, when taken in conjunction with the accompanying drawings.

10

Figure 1 shows a perspective view of an aquafarming tank according to an embodiment of the present disclosure.

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Figure 2 shows a perspective view of an aquafarming tank according to embodiment of the present disclosure where the structural bearing wall element is made of concrete.

Figure 3 shows a cross-sectional drawing of two side wall elements locked together by side connection profiles.

20

Figures 4a and 4b show cross-sectional drawings of a side wall element and a different connection profile than in Figure 3.

Figure 5 shows a cross-sectional drawing of a side wall elements locked together with a bottom wall element by a bottom connection profile.

25

Figure 6a shows shapes from three bottom wall elements and one side wall element for constructing the aquafarming tank shown in Figure 6c.

Figures 6b shows a bottom wall of an aquafarming tank built by the three elements to the left in Figure 6a.

5 Figure 6c shows an aquafarming tank built by the four elements of Figure 6a.

Figure 7 is a flow chart representing a method according to the present disclosure.

### Detailed description

10 The present disclosure will now be described with reference to the accompanying drawings, in which preferred example embodiments of the disclosure are shown. The disclosure may, however, be embodied in other forms and should not be construed as limited to the herein disclosed embodiments. The disclosed embodiments are provided to fully convey the scope of the disclosure to the skilled person.

15 Figure 1 shows an example of the first aspect of this disclosure disclosing an aquafarming tank 1 for growing water-living species, e.g. fish. The aquafarming tank 1 comprises a wall 2 shaped as a bowl so as to enable containment of a liquid. With reference to Figures 2-5, the wall 2 comprises a structural bearing wall element 3,3', and a first sheet 4 for providing an inner layer of the wall 2. The first sheet 4 of the wall 2 is attached to the  
20 structural bearing wall element 3,3' and adapted to be in contact with the liquid contained in the aquafarming tank 1. The first sheet 4 of the wall 2 is made of a solid surface material composed of aluminium trihydrate ATH or aluminium monohydrate AMH and a polymer binding medium. The solid surface material presents a very dense surface to the water which is hard to penetrate for any substance, which has the effect that the surface has antiseptic  
25 properties. The solid surface material of the first sheet preferably has an ATH or an AMH content of above 50%. The first sheet 4 of the wall 2 has a thickness in the range of 3 to 13 mm. As seen in Figures 3, 4a, 4b and 5, the first sheet is thin in relation to the structural bearing wall element 3.

In Figure 2 the structural bearing wall element 3' is made of concrete. The inner side of  
30 the concrete structural bearing wall element 3' is covered by a honeycomb structure plate 5'



that is attached to the first sheet 4, wherein the honeycomb structure plate 5' has columnar cells extending in a direction perpendicular to the first sheet 4. The thickness of the honeycomb plate in Figure 2 is in the 15-25mm. In Figure 2 the concrete structural bearing wall element 3' is cut away to show the honeycomb structure plate 5' behind it. The mould 11, used for moulding the concrete structural bearing wall element 3' is also disclosed and cut away in the front part of the drawing. The mould 11 may be removed after moulding or it can be kept as an outermost layer of the aquafarming tank as protection of the concrete or just for a better or different visual appearance.

In Figures 1, 3, 4a, 4b and 5 the structural bearing wall element is a honeycomb structure plate 5 with columnar cells extending in a direction perpendicular to the first sheet 4. The wall has a sandwich construction made of the honeycomb structure plate 5, the first sheet 4 for providing an inner layer of the wall 2 attached to the inner side of the structural bearing wall element 3 and a second sheet 6 for providing an outer layer of the wall 2 attached to the outer side of the structural bearing wall element 3. The second sheet 6 does not have to be solid surface material. It could be any sheet material, preferably plastic or metal to provide an outer surface of the aquafarming tank that has low maintenance needs.

The honeycomb structure plate 5,5' has a thickness in the range of 10 to 100 mm. In Figure 2, where the structural bearing wall element 3' is made of concrete, the thickness of the honeycomb structure plate 5' is in the lower region of the interval as the structural bearing function of the aquafarming tank is achieved by the concrete structural bearing wall element 3'. In Figures 1, 3, 4a, 4b and 5, the thickness of the honeycomb structure plate 5' is preferably 20 to 100 mm to make the wall extremely torsionally rigid

The honeycomb structure plate 5,5' in all embodiments is constructed by aluminium. However, it could be constructed by other lightweight and strong materials as carbon fibre materials or plastic. The honeycomb structure plate 5,5' has columnar cells that are hexagonal in shape (not shown).

With reference to Figures 3, 4a, 4b, 5, 6a, 6b and 6c is disclosed how the wall 2 of the aquafarming tank can be divided into wall elements that can be built into a complete wall. The reason to have smaller parts is to make transportation of the aquafarming tank wall easier. The bottom wall element 7 and plural side wall elements 8 are connected via bottom connection profiles 9 shaped to lockingly engage the side wall elements 8 with the bottom wall element 7 and side connection profiles 10 shaped to lockingly engage one side wall element 8 with another side wall element 8. the bottom wall element 7 comprises at least one edge profile 71

and the plural side wall elements 8 further comprises at least one edge profile 81 arranged at the edges of the bottom wall element 7 and the plural side wall elements 8 for engaging with the bottom connection profiles 9 or the side connection profiles 10. The aquafarming tank 1 has a cylindrical shape with a number  $n$  planar side wall elements 8 and a bottom wall element 7 that has a shape with  $n$  edges for receiving the  $n$  planar side wall elements via the bottom connection profiles 9.

With reference to Figures 6a and 6b the bottom wall element 7 is constructed by a number of rectangular bottom wall elements 72,73 and a number of triangular bottom wall elements 74 to form a bottom wall element 7 that resembles a rectangle with rounded corners. The planar side wall elements 8 are substantially rectangular.

With reference to Figure 6c an aquafarming tank is disclosed with the bottom 7 of Figure 6b and the side wall elements 8 of Figure 6a. An aquafarming tank is thus achieved by a large number of smaller sections making transportation of the parts for the aquafarming tank easy.

Figure 7 discloses the second aspect of this disclosure. The flow diagram represents a method of constructing the aquafarming tank of the first and comprises the steps of: constructing S1 a mould 11 arranged to receive the honeycomb structure plates 5,5' and the first sheet 4 with a distance  $D$  (see Figure 2) between the mould and the honeycomb structure plates; mounting S2 the honeycomb structure plates 5,5' and the first sheet 4 with a distance  $D$  between the mould 11 and the honeycomb structure plates 5,5' using the bottom connection profiles and the side connection profiles; moulding S3 concrete in the mould 11 between the mould 11 and the honeycomb structure plates 5,5'.

The person skilled in the art realizes that the present disclosure is not limited to the preferred embodiments described above. The person skilled in the art further realizes that modifications and variations are possible within the scope of the appended claims. For example, a person skilled in the art understands that other shapes of the side wall elements and the bottom wall elements can be used as long as they are possible to mount to the desired aquafarming tank shape, while still providing the benefit of easier transportation of the parts for the aquafarming tank. A person skilled in the art also realizes that the honeycomb material may be replaced by another rigid plate, especially if using a concrete structural bearing wall element. The skilled person realizes that many combinations of the presented embodiments are feasible, e.g. the concrete wall elements could be pre-fabricated with the inner sheet of solid surface material attached and provided as planar side wall

elements and bottom wall elements. No moulding would then be required on site, i.e. the mould 11 does not have to be constructed on site. Finished concrete sections would instead be transported to the site for the aquafarming tank. Additionally, variations to the disclosed embodiments can be understood and effected by the skilled person in practicing the claimed disclosure, from a study of the drawings, the disclosure, and the appended claims.

**CLAIMS**

1. An aquafarming tank (1) for growing species that live in water, the aquafarming tank (1) comprising:
  - a wall (2) shaped as a bowl so as to enable containment of a liquid;
  - 5 wherein the wall (2) comprises
    - a structural bearing wall element (3, 3'); and
    - a first sheet (4) for providing an inner layer of the wall (2);
  - wherein the first sheet (4) of the wall (2) is attached to the structural bearing wall element (3, 3') and adapted to be in contact with the liquid contained in the aquafarming
  - 10 tank (1); and
    - wherein the first sheet (4) of the wall (2) is made of a solid surface material composed of aluminium trihydrate (ATH) or aluminium monohydrate (AMH) and a polymer binding medium.
- 15 2. The aquafarming tank (1) according to claim 1, wherein the solid surface material contains ATH or AMH to an extent of above 50%.
3. The aquafarming tank (1) according to any one of claims 1-2, wherein the first sheet (4) of the wall (2) has a thickness in the range of 3 to 13 mm.
- 20 4. The aquafarming tank (1) according to any one of claims 1-3, wherein the structural bearing wall element (3') is made of concrete.
5. The aquafarming tank (1) according to claim 4, wherein the inner side of the concrete
- 25 structural bearing wall element (3) is covered by a honeycomb structure plate (5) that is attached to the first sheet (4), wherein the honeycomb structure plate (5) has columnar cells extending in a direction perpendicular to the first sheet (4).
6. The aquafarming tank (1) according to any one of claims 1-3, wherein the structural
- 30 bearing wall element is a honeycomb structure plate (5') with columnar cells extending in a direction perpendicular to the first sheet (4).

7. The aquafarming tank (1) according to claim 6, wherein the wall has a sandwich construction comprising

the structural bearing wall element (3) made of the honeycomb structure plate (5');

the first sheet (4) for providing an inner layer of the wall (2) attached to the inner side of the structural bearing wall element (3);

a second sheet (6) for providing an outer layer of the wall (2) attached to the outer side of the structural bearing wall element (3).

8. The aquafarming tank (1) according to any one of claims 5-7, wherein the honeycomb structure plate (5, 5') has a thickness in the range of 10 to 100 mm.

9. The aquafarming tank (1) according to any one of claims 5-8, wherein the honeycomb structure plate (5, 5') is constructed by aluminium.

10. The aquafarming tank (1) according to any one of claims 5-9, wherein the honeycomb structure plate (5, 5') has columnar cells that are hexagonal in shape.

11. The aquafarming tank (1) according to any one of the preceding claims, wherein the first sheet (4) is comprised by

a bottom wall element (7); and

plural side wall elements (8);

wherein the parts are connected via bottom connection profiles (9) shaped to lockingly engage the side wall elements (8) with the bottom wall element (7); and side connection profiles (10) shaped to lockingly engage one side wall element (8) with another side wall element (8).

12. The aquafarming tank (1) according to any one of the preceding claims, wherein the bottom wall element (7) comprises at least one edge profile (71) and the plural side wall elements (8) further comprises at least one edge profile (81) arranged at the edges of the

bottom wall element (7) and the plural side wall elements (8) for engaging with the bottom connection profiles (9) or the side connection profiles (10).

13. The aquafarming tank (1) according to claim 11, wherein aquafarming tank (1) has a  
5 cylindrical shape; a number n planar side wall elements (8); and a bottom wall element (7) that has a shape with n edges for receiving the n planar side wall elements via the bottom connection profiles (9).

14. The aquafarming tank (1) according to claim 11 or 12, wherein the bottom wall  
10 element (7) is constructed by a number of rectangular bottom wall elements (72, 73) and a number of triangular bottom wall elements (74) to form a bottom wall element (7).

15. The aquafarming tank (1) according to any one of claims 11 or 13, wherein the planar  
side wall elements (8) are substantially rectangular.

16. A method of constructing the aquafarming tank (1) according to any one of claims 5, or  
7-13, the method comprising the steps of:

constructing (S1) a mould (11) arranged to receive the honeycomb structure plates  
20 (5, 5') and the first sheet (4) with a distance D between the mould and the honeycomb structure plates;

mounting (S2) the honeycomb structure plates (5, 5') and the first sheet (4) with a  
distance D between the mould (11) and the honeycomb structure plates (5, 5');

moulding (S3) concrete in the mould (11) between the mould (11) and the  
25 honeycomb structure plates (5, 5').

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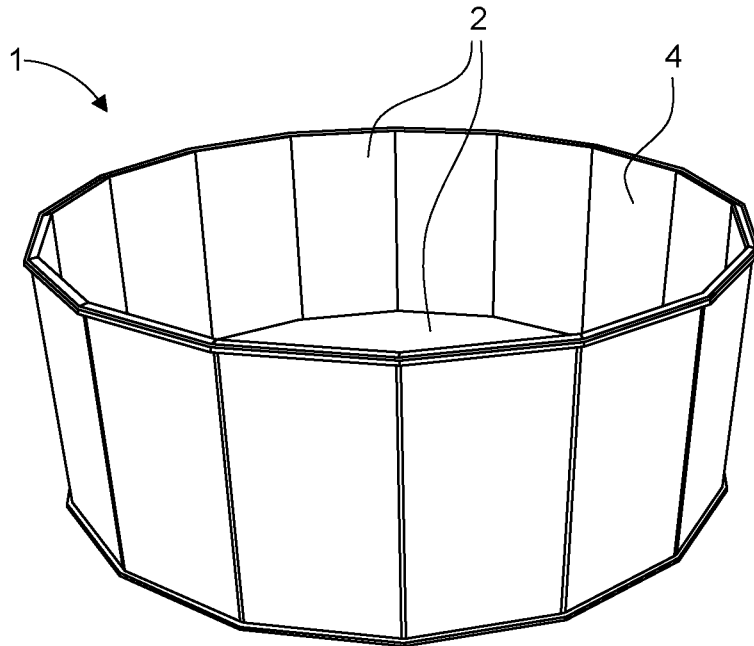


FIG. 1

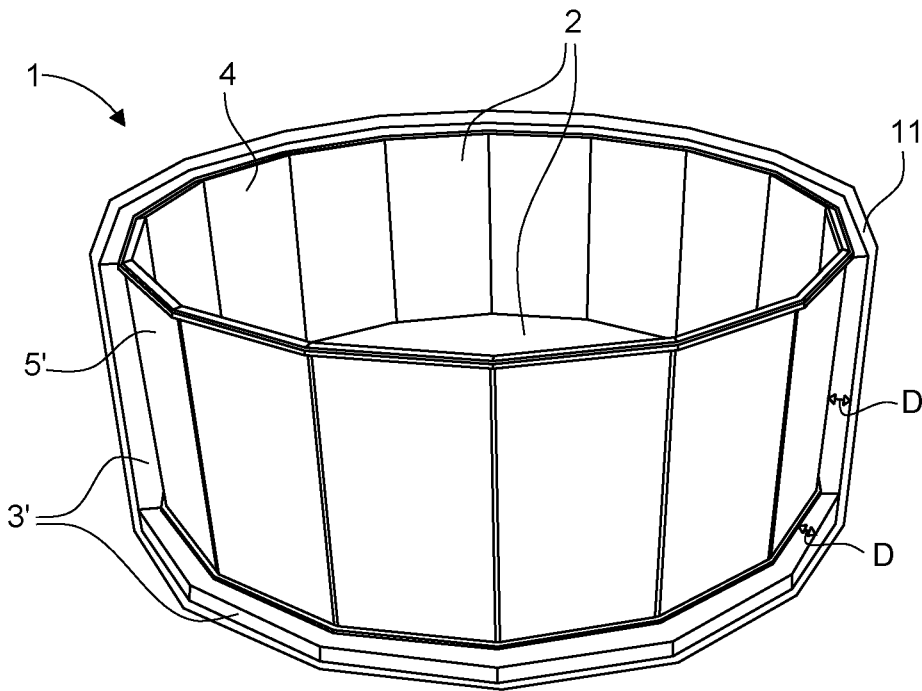


FIG. 2

2/4

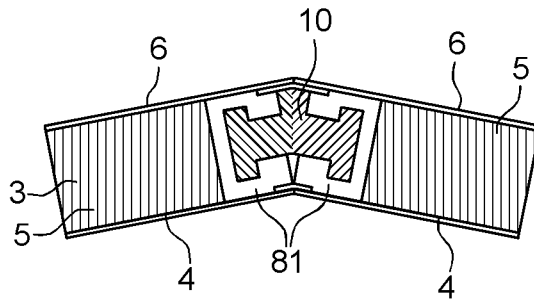


FIG. 3

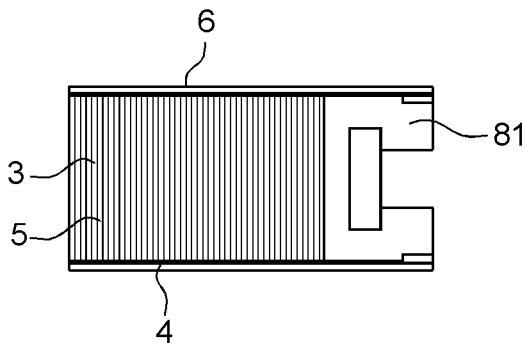


FIG. 4a

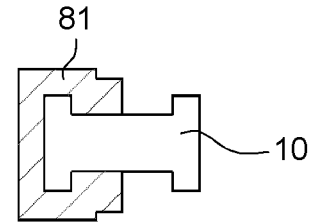


FIG. 4b

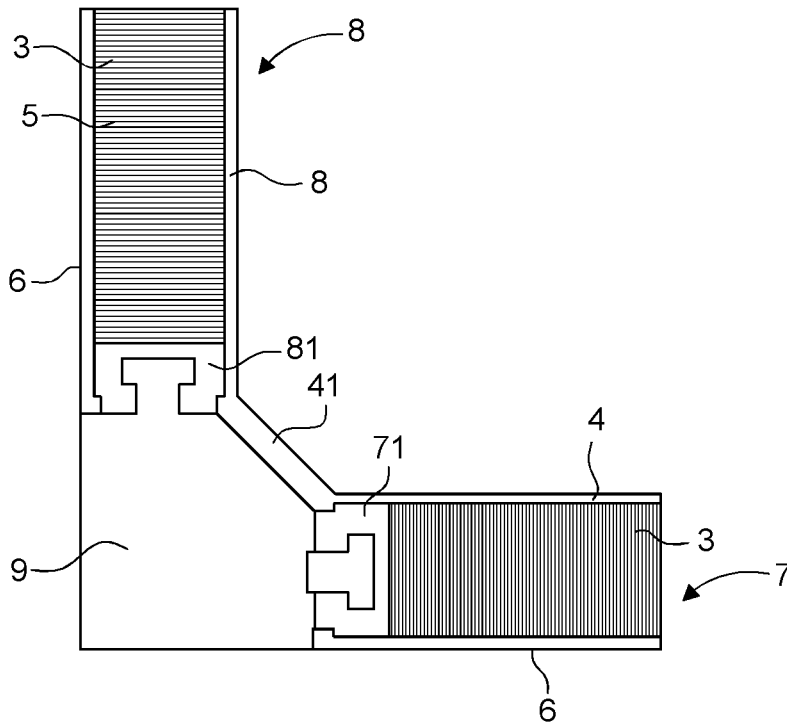


FIG. 5



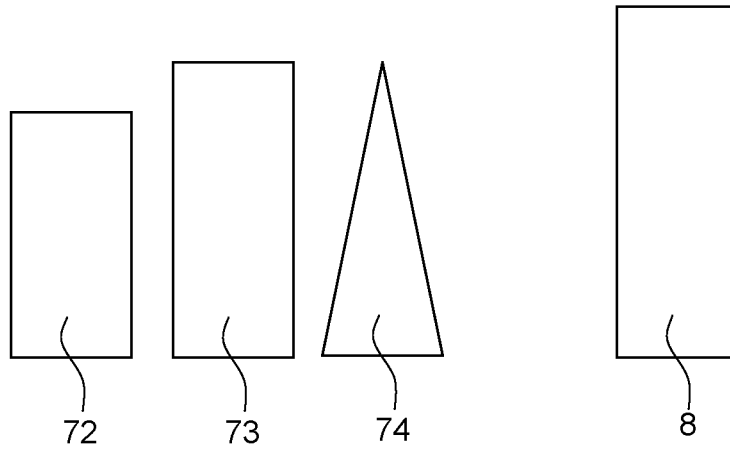


FIG. 6a

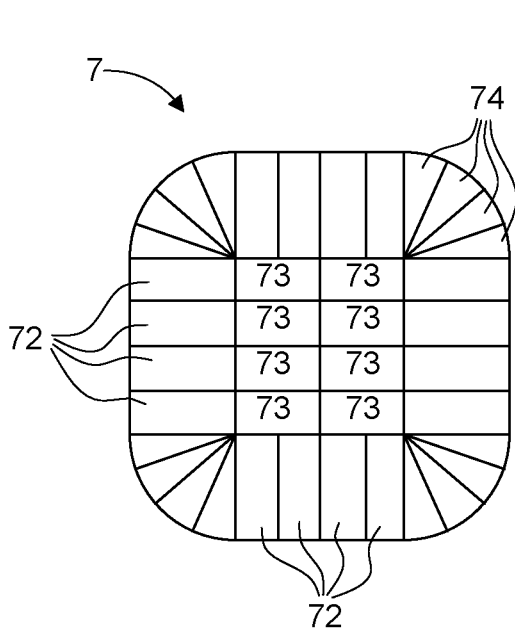


FIG. 6b

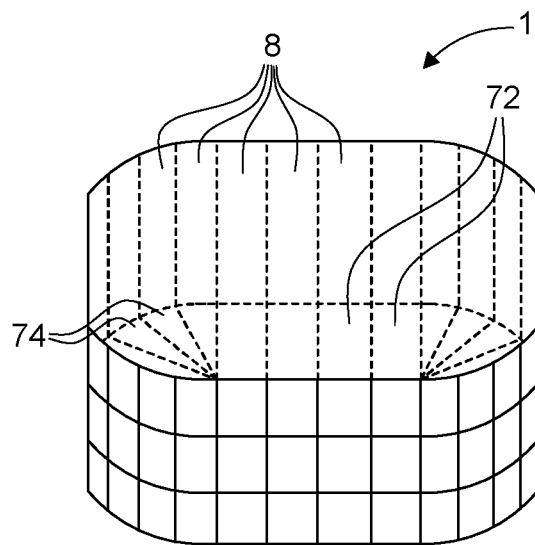


FIG. 6c

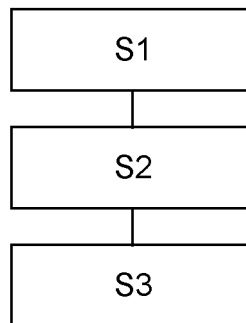


FIG. 7

**INTERNATIONAL SEARCH REPORT**

International application No  
**PCT/EP2022/065858**

<b>A. CLASSIFICATION OF SUBJECT MATTER</b>		
INV. <b>A01K61/00</b>		
ADD.		
According to International Patent Classification (IPC) or to both national classification and IPC		
<b>B. FIELDS SEARCHED</b>		
Minimum documentation searched (classification system followed by classification symbols) <b>A01K</b>		
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) <b>EPO-Internal, WPI Data</b>		
<b>C. DOCUMENTS CONSIDERED TO BE RELEVANT</b>		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
<b>X</b>	<b>WO 2019/172776 A1 (SEARAS AS [NO]) 12 September 2019 (2019-09-12)</b>	<b>3, 4, 14</b>
<b>Y</b>	<b>page 6, line 29 - page 12, line 15; figures 1-4</b>	<b>1, 2, 11-13, 15</b>
<b>A</b>	-----	<b>5-10</b>
<b>Y</b>	<b>JP 2001 277388 A (UBE NITTO KASEI CO) 9 October 2001 (2001-10-09)</b>	<b>11-13, 15</b>
<b>A</b>	<b>paragraphs [0011] - [0035]; figures 1-7</b>	<b>1-10, 14, 16</b>
<b>A</b>	-----	<b>1-16</b>
	<b>JP H04 74596 A (MARUYAMA MASAO; ISHIBASHI MASATAKA) 9 March 1992 (1992-03-09)</b>	<b>1-16</b>
	<b>paragraphs [0001] - [0003]; figures 1, 2</b>	
<b>Y</b>	-----	<b>1, 2</b>
	<b>EP 2 976 395 A1 (FÜRSTENBERG AMFI FLOOR LTD [LV]) 27 January 2016 (2016-01-27)</b>	<b>1, 2</b>
<b>A</b>	<b>paragraphs [0008] - [0019]; figures 1-2</b>	<b>3-16</b>
	-----	
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# INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/EP2022/065858

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 2019172776 A1	12-09-2019	CA 3091737 A1	12-09-2019
		CN 112118733 A	22-12-2020
		EP 3761782 A1	13-01-2021
		JP 2021516067 A	01-07-2021
		NO 344276 B1	28-10-2019
		NO 20201078 A1	02-10-2020
		US 2021092941 A1	01-04-2021
		WO 2019172776 A1	12-09-2019
		-----	
JP 2001277388 A	09-10-2001	NONE	
-----			
JP H0474596 A	09-03-1992	JP 3054176 B2	19-06-2000
		JP H0474596 A	09-03-1992
-----			
EP 2976395 A1	27-01-2016	BR 112015024045 A2	18-07-2017
		DK 2976395 T3	18-12-2017
		EP 2976395 A1	27-01-2016
		NO 2976395 T3	10-02-2018
		SE 1350361 A1	23-09-2014
		SG 11201507187P A	29-10-2015
		WO 2014147258 A1	25-09-2014
		-----	