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(54) FLOATING MODULE FOR THE REDUCTION OF LOSSES BY EVAPORATION IN AQUEOUS- BASED LIQUIDS

(57) A floating module (1) for the reduction of losses by evaporation in aqueous-based liquids which is characterized by two (2) hexagonal, watertight, hollow cells and configured to accommodate an internal ballast; and a perimeter wing (4) arranged on the horizontal axis of the floating module (1).

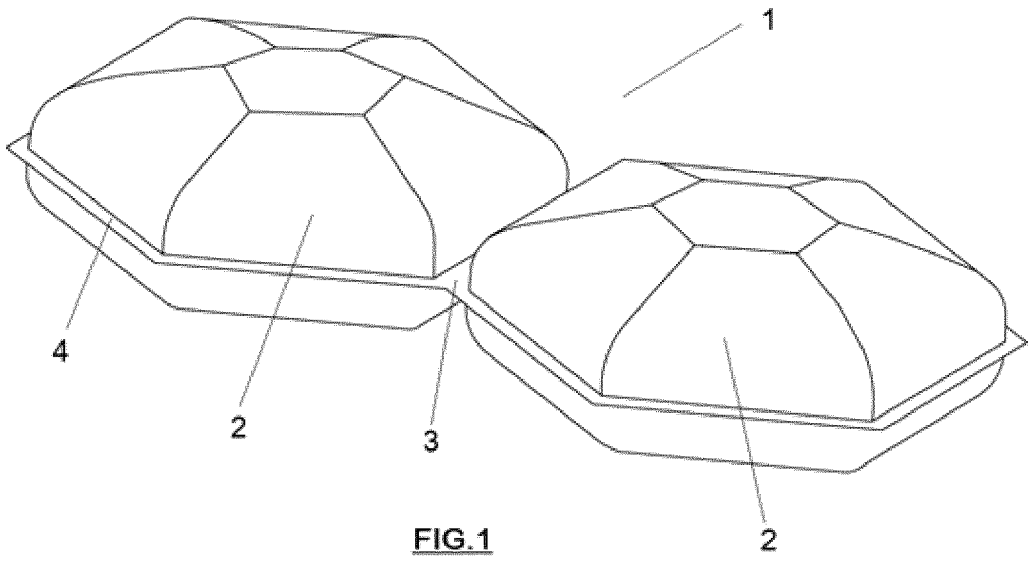

FIG.1

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Description

Technical field of the invention

[0001] The present invention relates to a device for the maintenance of large bodies of water and, more specifically, to systems for the reduction of water losses due to the evaporation of these.

State of the prior art

[0002] It is known that large masses of water and water-based liquids, such as ponds, artificial lakes or pools, suffer losses due mainly to evaporation caused by the action of sunlight and the action of wind. Therefore, systems are needed that cover the surface of the water body and prevent these actions from sunlight and wind, reducing evaporation losses.

[0003] These systems consist, essentially, of floating modules, floating covers, shading covers and chemical barriers. The floating modules are constituted by pieces of plastic or any other material that float on the surface. Floating covers are plastic sheets that float on the surface and need an anchorage to the perimeter of the body of water. The shade covers consist of structures that cover the body of water providing shade. Finally, chemical barriers are chemical products that create a thin hydrophobic layer on the surface of the body of water.

[0004] Within all the systems, the only one that allows an adaptation to any type of water mass, by surface and geometry, being able to cover 100% of the surface without the need for civil works, with little maintenance and long lifespan, is that of floating modules.

[0005] However, the vast majority of existing floating modules require complex assembly prior to use. In addition, these modules have a very high weight to ensure proper handling, since they need a large amount of material that allows sufficient rigidity to fit the parts that compose them.

[0006] In the state of the art there are floating modules formed by circular base pieces that have the disadvantage of not covering 100% of the surface of the water body. In addition, these modules suppose a weight of between 4-5 Kg to cover 1 m2, which causes handling problems. Another drawback of the current floating modules is that, if they are manufactured lightweight to favor buoyancy, they are easily lifted by the effect of wind suction, not fulfilling the proposed objective of covering the body of water.

[0007] Document ES1162209U describes a floating module for the reduction of losses by evaporation in water-based masses and water-based liquids, characterized in that it comprises a plurality of independent longitudinal cells arranged in parallel and a plurality of orifices arranged in the longitudinal cells for ballasting with liquid. The present invention is to improve the geometry and general operation of the device described in this document.

Explanation of the invention

[0008] It is an object of the present invention to provide a floating module that solves the problems described in the state of the art. Thus, an object of the present invention is a floating module that maintains its buoyancy characteristics, even if they break or deteriorate. Another object of the present invention is to provide a floating module that can be manufactured using different techniques and in different materials, such as plastic polymers, which simplifies and cheapens production.

[0009] Another object of the invention is to provide a floating module that adapts to any type of mass of water and water-based liquids, independently of the surface of the mass, its geometry, the slopes of the reservoirs and other elements of the mass. In addition, the floating module must adapt to any type of water body and its level ups or downs.

[0010] Another object of the present invention is that the modules resist sunlight and allow navigation in the body of water for maintenance work; be easy to install and maintain; that its recovery is possible for its subsequent recycling; and that they allow a simple transport and installation.

[0011] Another object of the invention is the resistance to wind events in order to avoid dragging it out of the reservoir and its stacking on slopes located to windward thanks to its ballasting, as well as to quickly recover their optimal working position in the event of strong gusts of wind by the self-flip effect for which they are designed.

[0012] All objects of the invention are achieved by the floating module of claim 1. Other particular embodiments of the invention are described in the dependent claims. More specifically, the floating module for the reduction of losses by evaporation of liquids in water bodies and liquids in aqueous base is formed by one or two sealed cells of polygonal shape, preferably two of hexagonal shape, independent of one another but joined together, where each of the cells is configured for the ballasting of said cells by means of a liquid housed therein and which, moreover, has the peculiarity of incorporating a wing distributed around the perimeter.

[0013] The module of the invention, in a particular use thereof, is arranged on the surface of the aqueous mass, taken one by one or in combination with a plurality of modules joined or not together to cover 100% of the surface of the aforementioned mass of water, floating above it and preventing the entry of sunlight and the action of the wind, which are the atmospheric agents responsible for evaporation.

[0014] The internal compartments to accommodate the ballast allow, thanks to the self-fliping effect, that the position of the modules is always the designed for optimum performance, and that in the case of high winds the module regains its operating position.

[0015] Throughout the description and the claims, the word "comprises" and its variants are not intended to exclude other technical characteristics, additives, compo-

nents or steps. For those skilled in the art, other objects, advantages and characteristics of the invention will emerge partly from the invention and partly from the practice of the invention. The following examples and drawings are provided by way of illustration and are not intended to restrict the present invention. In addition, the invention covers all possible combinations of particular and preferred embodiments indicated herein.

Brief description of the drawings

[0016] Next, a series of drawings that help to better understand the invention and that are expressly related to an embodiment of said invention, which is illustrated as a non-limiting example thereof.

FIG. 1 shows a perspective view of a particular embodiment of a floating module object of the present invention of rectangular shape and formed by two hexagonal cells.

FIG. 2 shows a partial section in perspective of an alternative embodiment of a floating module object of the present invention that includes an internal compartment configured to accommodate a ballast.

FIG. 3 shows a diagram of the operation of the invention. Where is shown a cell (2) without compartment (figure 3a) and with compartment (figure 3b) according to the invention.

Explanation of a detailed embodiment of the invention and examples

[0017] As can be seen in the attached figures, the floating module (1) configured for the reduction of losses caused by evaporation in water-based liquids and, particularly, in water bodies, such as ponds, artificial lakes, etc. marshes or pools.

[0018] More specifically, each of the floating modules (1) consists of one or two sealed cells of polygonal plant, preferably hexagonal (2), which are independent of each other and configured as a hollow body and tightly configured to accommodate a ballast, preferably water, since it is the way to ballast the floating module (1).

[0019] Each of the modules (1) incorporates a perimeter wing (4) and allows to cover more or less watery surface depending on the overlap between the wings (4) of the modules (1)

[0020] According to different particular embodiments of the invention, the cells (2) can have different drafts and geometries as long as they maintain their polygonal shape, preferably hexagonal or bi-hexagonal in the plane of their working position. That is, the cells (2) have such a geometry that prevents the permanent stacking of some modules on others due to the wind, precisely due to the joint action of the location and span of the ballast and the rounded surface of the module (1).

[0021] The ballasting of the floating module (1) can be carried out by including in the manufacture a quantity of water in the different compartments of the cell or independent cells (2) that form the module (1). According to an alternative embodiment of the invention, the ballasting of the modules (1) will be done by fixing said amount of water to its working position by adding thereto some kind of innocuous additive that thickens, gels or solidifies the ballast, confining it in the interior compartment of each cell (2).

[0022] The module (1) described allows to achieve a weight reduction in relation to those currently existing, and maintains the necessary wind resistance thanks to ballasting. The geometry of the modules (1) makes it possible to move the upper surface thereof away from the surface of the body of water so that there is no ponding effect on the module (1), or heating of the surface of the water body to cover.

In a particular embodiment of the invention the module (1) is made in a plastic polymer, although they can be made in any material that has equivalent mechanical characteristics. The cells (2) are articulated together by means of a separating element (3) that grants a degree of freedom in the axis orthogonal to the work plane.

[0023] Figure 3 shows a preferred embodiment of the invention in which the hexagonal cells (2) are compartmented by means of a plastic sheet which can be laminar, as can be seen in said figure 3, or have greater or lesser thickness, or present any type of configuration.

The compartments (5) are separated by a sheet (7) made therein with the same material that the hexagonal cell or hexagonal cells (2), as a continuation of these, although they could also be made in any other material that would be considered advantageous in each particular case.

[0024] The function of the internal compartments (5) is shown in Figure 3. Figure 3a shows, schematically, a cell (2) without compartments and ballasted (6). In case of wind action, the cell (2) will be placed in vertical position and orthogonal with respect to the water surface, the ballast (6) will be placed in its lower area and will have a stable vertical position. Since this verticality implies that the cell (2) is orthogonal to the aqueous surface, the module (1) without compartments could not fulfill its function of returning to the operating position in the presence of strong gusts of air.

[0025] However, when the cell or cells (2) are compartmentalized (5) then the situation is that shown in Figure 4b. The ballast (6) is located in the lower compartment (5) of the cell (2) and, when there is a turn caused by a strong wind, the cell is turned 90° until reaching the orthogonal position mentioned above. However, in this case, the ballast (6) located in one of the compartments (5) of the cell (2) will accumulate on a single side, making the vertical position unstable and tending, therefore, to recover its horizontal position with respect to the aqueous liquid and thus fulfill the function for which it has been designed.

[0026] Finally, it should be noted that the floating mod-

ule (1) can be made by extrusion, molding, thermoforming, injection of plastics, or a combination of these techniques. Subsequently, the module (1) will be processed and the necessary machining will be performed, such as the arrangement of the compartment (5) for ballasting, articulation of spacer elements (3) and configuration of perimeter wings (4) for, finally , cut it with the concrete desired shape.

Claims

1. A floating module (1) for the reduction of losses by evaporation in water-based liquids **characterized in that** it comprises at least one cell (2) of polygonal plant that is watertight, hollow and is configured to accommodate a ballast (6) inside an internal compartment (5); and a perimeter wing (4) disposed on the horizontal axis of the floating module (1); in such a way that the module (1) is configured to recover from the action of the wind a horizontal and floating position with respect to the water-based liquid.

2. The floating module (1) of claim 1 wherein the interior of the cell (2) is divided into at least two compartments (5) by an intermediate sheet (7) having different dimensions and configurations.

3. The floating module (1) of claim 2 wherein at least one polygonal cell15 (2) as well as the intermediate sheet (7) are made by one or more different plastic polymers.

4. The floating module (1) of any of claims 1-3 wherein, at least one polygonal cell (2) is hexagonal.

5. The floating module (1) of any of claims 1-4 comprising two polygonal cells (2).

6. The floating module (1) of any of the preceding claims comprising a separating element (3) configured to articulate the union between cells (2).

7. The floating module (1) of any of the preceding claims wherein the ballast is a liquid comprising an additive configured for fixing the ballast liquid to its working position.

8. The floating module (1) of any of the preceding claims that is obtained by a manufacturing process selected from extrusion, molding, thermoforming, injection of plastics or a combination of the above.

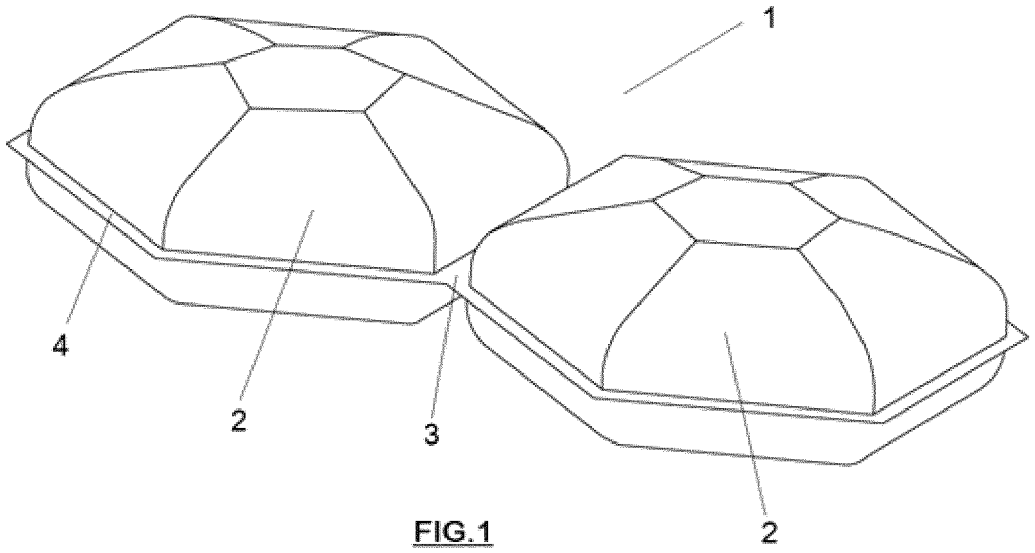

FIG.1

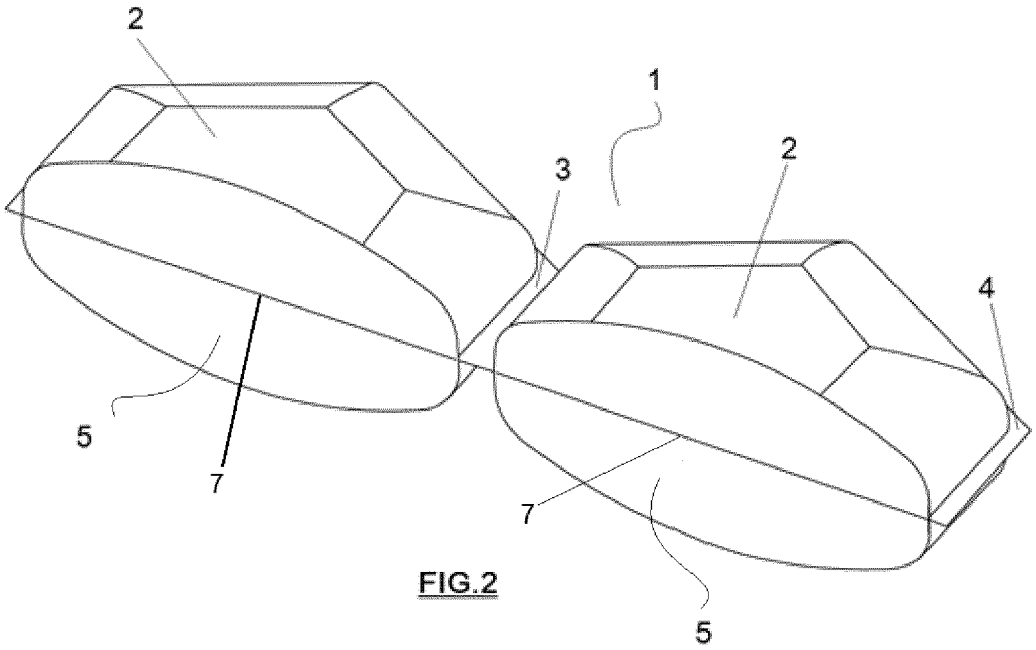

FIG.2

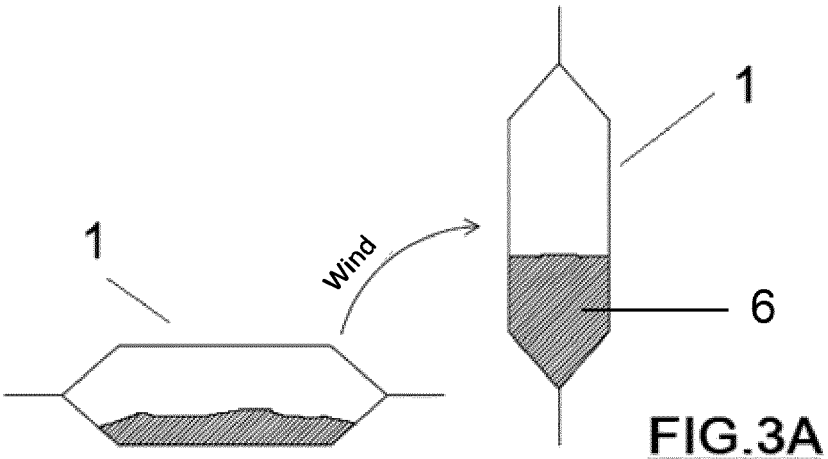

FIG.3A

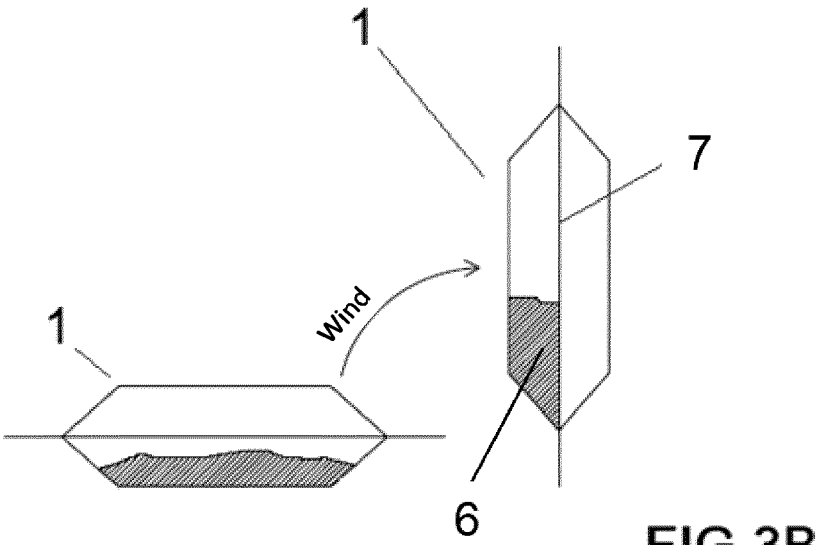

FIG.3B

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EUROPEAN SEARCH REPORT

Application Number
EP 19 38 2209

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	US 2010/028082 A1 (DONOVAN LEN [US] ET AL) 4 February 2010 (2010-02-04) * page 3, paragraph 47 - page 4, paragraph 47 * * page 4, paragraph 55 - page 5, paragraph 57 * * page 5, paragraph 62 * * page 6, paragraph 71-72 * * page 7, paragraph 86 * * figures 1, 2 *	1-8	INV. B65D88/36
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A	WO 2011/109867 A1 (JEFFRIES PHILIP PAUL [AU]) 15 September 2011 (2011-09-15) * page 4, lines 9-14 * * figures 1-11 *	1,6	
A	WO 2006/010204 A1 (WATER INNOVATIONS PTY LTD [AU]; CAP GEORGE JAROSLAV [AU] ET AL.) 2 February 2006 (2006-02-02) * page 5, lines 3-15 * * page 6, lines 19-24 * * figures 1-2, 14 *	1	TECHNICAL FIELDS SEARCHED (IPC) B65D E04H A01C B01J

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	20 May 2019	Piolat, Olivier

CATEGORY OF CITED DOCUMENTS

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REFERENCES CITED IN THE DESCRIPTION

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