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(54) **WAVE GENERATOR SYSTEM WITH ABSORBING SHORE**

SYSTEM ZUR WELLENERZEUGUNG MIT ABSORBIERENDEM UFER

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Description

Field of the Invention

[0001] The invention relates to a wave generator system and, in particular, to a system for generating waves in an aquatic environment, provided with dissipative shores capable of absorbing wave energy and minimising wave rebounds.

Prior Art

[0002] Many designs of devices and systems for generating waves in an aquatic environment are known in prior art, the purpose of these devices and systems being to artificially generate waves in the aquatic environment for human enjoyment and to practice sports such as surfing. An example of a wave generator system is based on dragging a mobile element through the water (for example under the water, through the water surface and in contact with the water like a paddle, or along the surface of the water), pushing the water and causing a wave to be formed; successive waves can be generated by making the mobile element move in circles, in forward and backward movements, and/or by including various mobile elements. Another example of a wave generator system is based on launching or allowing water to fall against a fixed profile, so that the water changes direction in a predefined fashion and forms a wave. Depending on the type of device, the wave can be generated relatively statically, i.e. without travelling along the aquatic environment, or dynamically, i.e. moving along the aquatic environment in the same way as ocean waves travel, for instance, towards a shore.

[0003] Wave generator systems specifically designed for surfing present further complexity compared with other wave generation devices. Specifically, these systems seek the formation of a wave with very precise characteristics and forms. On one hand, the wave should be high and preferably dynamic for greater realism. Furthermore, the wave should move relatively fast and, if possible, break and present a tube in which the surfer can carry out his/her routines and techniques. Achieving a wave that is suitable for surfing is an extremely complex task; not in vain, it has even been considered for years that the perfect artificial wave, which is an exact copy of a natural wave, does not exist or is impossible to generate.

[0004] One of the difficulties presented in dynamic wave generator systems for surfing arises from the fact that these systems normally operate in an aquatic environment with limited dimensions compared with the sea, which relatively speaking, is "infinite". For example, the aquatic environment of these systems may be a lake, pond or swimming pool surrounded by walls or shores with a variable inclination. In another example, the aquatic environment may be in the form of a ring, with walls or shores on the exterior and the interior. In general, when the wave reaches the limits of the aquatic environment and reaches the walls or shores, the wave totally or partially rebounds towards the aquatic environment, forming what could be called a wave rebound. The wave rebound may collide with the next wave and merge with it, destroying the form of the wave. Alternatively, the wave rebound may travel through the water that is behind the wave generated by the system, preventing this water from calming before the next wave passes (which is usually essential to ensure that the waves are generated with perfect forms). In other words, in short, a wave rebound is a major interference which has a negative impact on the final shape of the wave making it less suitable for surfing, and leading to an increased time between the waves generated successively by the system to allow more time for the water to calm, thus negatively affecting the economic performance of the system.

[0005] The document WO03092460A1 is considered to be the closest solution to the present invention. The patent application WO03092460A1 teaches a solution to control some characteristics of a wave, mainly disclosing the preamble of the present invention.

[0006] Other known applications, like the document US3431734A, disclose prefabricated structures or dams designed for the protection of harbours and not specifically adapted for surfing.

[0007] This invention aims to design a wave generation system in which the negative effect of the rebound waves from the edges of the aquatic environment on the waves generated by the system is reduced or minimised.

Brief Description of the Invention

[0008] In order to fulfil the aforementioned objective, a wave generator system for leisure or sporting use is proposed, comprising a floor on which there is a mass of water. A certain mechanism, which is not relevant for the invention, generates successive waves, there being a time lapse between each wave and the following wave. For example, the waves may have the appropriate form, size and speed for surfing. The mass of water in which the waves are generated has an edge towards which the waves travel. Along this edge, there is a shore. As per the invention, this shore comprises a permeable shore ceiling, a shore floor with a decreasing height towards the floor that is under the mass of water, and a space between the floor and the ceiling in which some compartments are defined. The compartments slow down the water that enters through the ceiling and direct it towards the mass of water. Each compartment comprises at least one obstacle or barrier against which the water impacts. The barrier leaves a space to allow the water to pass towards the mass of water. In addition, the compartments are preferably separated by transverse walls extending from the shore floor to the shore ceiling.

[0009] The solution described heretofore presents many significant advantages. First of all, since the shore ceiling is permeable, the water can be collected generally along the entire surface of the shore ceiling, allowing a large mass of water to be collected quickly. Secondly, the fact that the water is collected in compartments fitted with barriers against collected water moving towards the mass of water enables the water to be gradually slowed down by these barriers as it falls towards the mass of water, and to finally reach the mass of water with little energy and without generating turbulence in the mass of water. At the same time, the transverse walls that extend from the shore floor to the shore ceiling confine the water so that it is mainly directed towards the mass of water, reducing the time that the water takes to be returned to the mass of water. All of these advantages mean that the wave can be absorbed, dissipated and returned to the mass of water in a very short time, enabling the wave generator system to generate the waves at lesser intervals, without the need for the shore to have excessive dimensions.

[0010] An additional advantage of the invention is that it does not require the use of pumps or other active devices to return the water from the wave to the mass of water; instead, water returns by gravity. Therefore, the energy consumption associated with pumps is avoided; in prior art water systems, instead, pumping requires an energy consumption which can be as much as twice the energy consumption required to form the wave itself.

[0011] Furthermore, the wave-absorbing capacity of the shore as per the invention allows the shore to be built with a reduced height (estimated at around a third of the height of conventional non-dissipative shores) without the wave overflowing out of the aquatic environment. Therefore, the maximum excavation height required to construct the aquatic environment is lower, thus simplifying and reducing the construction cost of the installation. Furthermore, as the shore has a lower height and therefore a lower slope, the shore is more open, similar to that of the shore of a real beach. In consequence, the user perceives the shore as an aesthetically pleasant element with which he/she can easily interact (for example, walking along the shore or sitting on the shore).

[0012] An additional advantage of the system as per the invention is that it reduces the risk of the user being dragged along the shore by the wave's foam, as the foam quickly disappears through the permeable shore.

[0013] It can therefore be appreciated that the shores as per the invention provide significant economic savings in the operation of the wave generator system. They also help to reduce the environmental impact of said system, offer increased safety for the user, and are aesthetically pleasant and easy to use.

Brief Description of the Figures

[0014] The details of the invention can be seen in the accompanying figures, which do not intend to limit the scope of the invention:

- Figure 1 shows a perspective view of a wave generator system in accordance with the invention.
- Figure 2 shows a similar view to the previous figure, the shore ceiling having been partially omitted to show the space inside the shore, the space being divided into compartments, which in turn are divided into sub-compartments.
- Figure 3 shows a transverse cross-sectional view of part of a compartment.
- Figure 4 shows a transverse cross-sectional view of the system in Figure 1.

Detailed Description of the invention

[0015] Figure 1 shows a perspective view of a wave generator system (1) as per an example of an embodiment of the invention. The wave generator system (1), which is normally used for leisure or to practise sports such as surfing, comprises a mass of water (2) that, when calm, is delimited by a floor (3), a calm water surface (4) and an edge (5), said edge (5) being the edge of the calm water surface (4). The wave generator system (1) also includes a shore (6) that extends along the edge (5) of the mass of water (2). The shore (6) can extend completely around the mass of water, in limited areas of the outer perimeter of the mass of water, on any end of the mass of water, in an inner island of the mass of water, or following any other configuration, this not being relevant for the present invention.

[0016] As per the invention, the shore (6) comprises a shore floor (7) and a shore ceiling (8) that extend from an outer side (9) to an inner side (10) of the shore (6). The shore floor (7) and the shore ceiling (8) are arranged in such a way that an inner space (11) is delimited between them. The inner space (11) is closed on the outer side (9) by an end wall (12), which extends between an outer edge (13) of the shore floor (7) and an outer edge (14) of the shore ceiling (8) in this embodiment. The end wall (12) may be made out of a material that supports the weight and that is preferably resistant to corrosion (for example, precast concrete). The shore floor (7) has a decreasing height towards the floor (3) that is below the mass of water (2), so that water on the shore floor (7) is displaced towards the mass of water (2) by gravity. In this embodiment, the shore floor (7) has an inclined flat upper surface (71). However, alternative embodiments are contemplated in which the shore floor (7) has a staggered, rippled or any other configuration in which the height of the upper surface (71) decreases towards the floor (3) of the mass of water (2). The shore ceiling (8), in turn, is permeable, enabling water to pass through from the shore ceiling (8) towards the inner space (11) and the shore floor (7).

[0017] The shore floor (7) is made out of one or more materials with sufficient mechanical resistance to withstand the weight of the shore (6) and the possible load supported on the shore (6) (users, water, sporting equipment such as surfboards, etc.). For example, the shore floor (7) may be made out of dirt, cement, concrete, ceramic, steel, aluminium, wood or any combination thereof. In the present embodiment, as shown in the transverse section of Figure 4, the shore floor (7) comprises a main part (7a) made out of a material with less resistance, such as cement, and some longitudinal bands (7b) made out of a material with greater resistance, such as concrete. The reason why the shore floor (7) is divided into said parts is explained hereafter.

[0018] In turn, the shore ceiling (8) is made out of a material or combination of materials that enable the passage of water whilst offering sufficient mechanical resistance to withstand the force of the waves that hit the shore (6) and to withstand an additional load, for example equivalent to a maximum number of users per surface unit. The shore ceiling (8) may have slots, holes or other spaces to allow water to pass through, or it may be made out of a highly permeable material. For example, in the embodiment shown, the shore ceiling (8) is made using flat plates (8a) fitted with holes (15) to allow water to pass through. The flat plates (8a) can be made out of fibre glass with polyester and can have a thickness of between 1 and 10 cm. The holes (15) can be circular with a diameter of 2 cm. In general, an opening ratio (ratio between the total surface of the holes and the surface without holes) of at least 50% is preferable to ensure that all of the water that reaches the shore falls towards the compartments before reaching the outer edge (14) of the shore ceiling (8). For example, square holes having 2.5-centimetre sides and a separation of 2.5 centimetres between holes can be provided. It is contemplated that the shape, dimensions and/or separation ratio of the holes, slots or spaces may vary in general. It is also contemplated that the holes can be homogeneous in shape, dimensions and/or separation. It is also contemplated that the shape, dimension and/or separation between holes can be heterogeneous and distributed in variable ways on the shore ceiling (8). For example, some holes may be larger than others, forming a certain pattern such as alternate rows.

[0019] In addition, the flat plates (8a) of the illustrated embodiment are inclined towards the mass of water (2), so that the shore (6) has a generally triangular transverse cross-section. The shore ceiling (8) has an outer surface (16) that is inclined towards the mass of water (2), by means of which the width of the shore (6) required to absorb the wave that reaches the shore ceiling (8) is reduced.

[0020] As shown in Figure 1, the shore ceiling (8) of the present embodiment intersects with the shore floor (6) at the inner edge (10) of the shore (6), and this intersection underwater when the mass of water (2) is calm. In other words, the inner edge (10) and an adjacent stretch of the shore ceiling (7) are underwater. However, alternative embodiments are contemplated in which this intersection may be at water surface level or above the surface of the mass of water (2).

[0021] Figure 2 shows a perspective view of the system (1) similar to the view of Figure 1, but where some of the plates that make up the shore ceiling (8) have been omitted in order to reveal the inner space (11) of the shore (6). The inner space (11) between the shore ceiling (8) and the shore floor (7) is divided into a plurality of compartments (17) that are separated by transverse walls (18). The transverse walls (18) can be made out of a material that supports the weight and is preferably resistant to corrosion, for example precast concrete. The compartments (17) are delimited by the shore floor (7), the shore ceiling (8) and two transverse walls (18), and each compartment (17) constitutes a space that extends from the outer side (9) of the shore to the inner side (10) of the shore (6). In the present embodiment, the transverse walls (18) are triangular, with a first side (19) laid adjacent to the shore floor (7), a second side (20) adjacent to the shore ceiling (8) and a third side (21) adjacent to the end wall (12), in such a way that the height of each compartment (17) decreases towards the mass of water (2). As per the invention, each compartment (17) includes one or more obstacles or barriers (22) -four, in the embodiment shown in the figures-, in such a way that the compartment (17) is divided into sub-compartments (17a, 17b, 17c, 17d, 17e). The barriers (22) may be made out of a material that is not necessarily as suitable to support weight, but which offers resistance to the passage of water (for example, a plastic panel).

[0022] Figure 3 shows a transverse sectional view of a compartment (17) of the present embodiment, and more particularly an enlarged transverse cross-sectional view of a sub-compartment (17b), as way of example. The enlarged view shows in greater detail how the shore floor (7) is inclined, forming an angle (23) with a horizontal direction, which allows the water that falls onto the floor to be directed towards the mass of water (2) (towards the right, as per the position of the figure). The figure also provides an understanding of how the compartment (17) is delimited between the shore floor (7), the shore ceiling (8) and two transverse walls (18), and how it comprises a series of barriers (22) separated by a certain distance and dividing the compartment (17) into sub-compartments such as the depicted sub-compartment (17b). Furthermore, the figure illustrates an additional aspect of the invention, whereby the barriers (22) are arranged in such a way that they offer resistance to the passage of water inside the compartment (17) in a direction towards the mass of water (2). Below each barrier (22) there is a water passage space (24) for the passage of water towards the mass of water (2).

[0023] The system (1) and, more specifically, the shore (6), operate as follows. The wave generator system (1) is normally configured to generate successive waves at a certain frequency, i.e. allowing a predetermined time to lapse between one wave and the next. Therefore, the waves generated by the system arrive to the shore (6) one by one. Figure 3 shows a schematic representation of a wave (25) reaching the shore (6), the wave (25) drawn in broken lines. As shown, the wave (25) reaches the permeable shore ceiling (8) and penetrates the shore ceiling (8) -in this case, through the holes (15)- to the compartments (17), each compartment (17) thus receiving part of the wave (25). Because the shore floor (7) is sloped with respect to the horizontal, the water that enters each compartment (17) tends to flow, with some turbulence, towards the mass of water (2) -towards the right in the figure-. Whilst being displaced through the compartment (17), the water collides with the barriers (22) and the transverse walls (18), thus losing energy, and eventually passes through the water passage space (24) and continues its descent towards the mass of water (2) due to gravity. The partial-in-height, temporary confinement of the water within the successive sub-compartments allows the water to lose speed in any direction (vertical, longitudinal and transverse); this is particularly convenient for instance if the system (1) is configured so that the wave (25) reaches the shore in an oblique way, i.e. not perpendicular to the edge (5) (in a plan view of the system), and thus having a speed component in the longitudinal direction of the edge (5) and another speed component perpendicular to the edge (5). In the embodiment shown, the shore (6) functions by making the wave lose energy inside each sub-compartment due to the collision with the transverse walls (18) and barriers (22) before moving on to the next sub-compartment, and so on until it reaches the mass of water (2) with very little energy and therefore without the capacity to cause turbulence in the water and destroy the form of the next wave that is approaching the mass of water (2). Figure 3 shows this effect by means of illustrated arrow (26), which represents the water on its journey from the time it enters the compartment (17) through a hole (15), travelling through the sub-compartment (17b), colliding with a barrier (22) and thus losing energy, and finally passing to the next sub-compartment (17c) through the water passage space (24). When the water reaches the last sub-compartment (17d), it passes through the permeable shore ceiling (8) in an ascending direction and reaches the mass of water (2).

[0024] This system of sub-compartments succeeds in dissipating the wave (25) almost entirely, or completely, minimising the time that the wave generator system (1) must wait between one wave and the next. Furthermore, as shown, the dissipation of the wave is carried out without a pump or any other active element requiring the consumption of electrical energy. In addition, tests have shown that it is possible to fully absorb the entire wave (25) without the need for the permeable shore ceiling (8) to have a large extension; this means that a reasonably-sized shore (6) can work properly. Therefore, the shore system disclosed herein is extremely efficient and can be constructed and operated at reasonable cost.

[0025] In the embodiment as shown in Figure 1, part of the shore (6) -more specifically, a stretch on the inner side (10)- is inside the mass of water (2) when said mass of water is calm. This helps to complete the dissipation of the wave (25) as it ensures that the full wave (25) reaches the shore ceiling (8).

[0026] Furthermore, in the embodiment shown, the transverse walls (18) extend from the shore floor (7) to the shore ceiling (8). In other words, water cannot pass between adjacent compartments (17) through the transverse wall (18) which separates them. This enables the water to be directed more effectively and quickly towards the mass of water (2). However, it is not essential for there to be a totally watertight compartment between the transverse walls (18) and the shore floor (7).

[0027] In another aspect, as previously explained, the height of the compartments (17) decreases in a direction towards the mass of water (2). In consequence, as the water approaches the mass of water (2), it continues to lose energy due to its impact against the shore ceiling (8).

[0028] Furthermore, in this embodiment, the barrier (22) is formed as a continuous and uninterrupted wall that extends from (in other words, to) the shore ceiling (8). The water passage space (24) extends between said wall and the shore floor (7). In other words, in the depicted embodiment, the barrier (22) is an upper wall and the water does not pass over the wall. In consequence, when there is only a little water left in the compartment (17), the water can still be displaced towards the mass of water (2), as no matter how little water remains, it can always pass through the water passage space (24) towards the next sub-compartment. In other words, such feature allows the shore (6) to return the full wave (25) to the mass of water (2).

[0029] In the present embodiment, as shown in Figure 2, the wall that forms the barrier (22) extends from one transverse wall (18) to the other transverse wall (18) delimiting a compartment (17). In turn, the water passage space (24) also extends said one transverse wall (18) to the other transverse wall (18) delimiting the compartment (17). This maximises the dissipation of the wave energy and the capacity of removing the water from the compartment (17).

[0030] Figure 4 shows a full transverse sectional view of the shore (6), allowing to view a full compartment (17). In this embodiment, as is shown in the figure, the shore floor (7) comprises an impermeable layer (27) that delimits the compartment (17), providing water-tightness under the water which prevents a certain amount of the water of the wave (25) to be unnecessarily lost or filtered past the shore floor (7), requiring more frequent replacement of water in the wave generator system (1) and increasing the amount of water consumed by the system (1). In addition, the impermeable layer (27) of the present embodiment extends continuously and uninterruptedly under the end wall (12) and is adjacent to a rear face of this end wall (12), achieving optimum water tightness in the union between the shore floor (7) and the end wall (12), thus minimising water loss. The impermeable layer (27) thus has a layout in the shape of an L which contributes to the water being removed only from the inner side (10) of the shore (6) towards the mass of water (2). Furthermore, in the present embodiment, the impermeable layer (27) extends over the whole height of the end wall

(13), i.e. from the union between the end wall (12) and the shore floor (7) to the outer edge (13) of the shore ceiling (8). Therefore, the end wall (12) is totally watertight, which is particularly beneficial if the end wall (12) is made up of successive plates or panels, as is the case of the present embodiment (see Figure 2, in which there are two plates (12a, 12b) of the end wall (12)).

[0031] Figure 4 further shows that, in the present embodiment, the transverse walls (18) do not support the shore floor (7) homogeneously; instead, the transverse walls (18) have at least one lower protruding supporting protuberance (28). The shore floor (7) thus does not need to be entirely made out of a high resistance material, such as concrete; instead, only certain areas of the shore floor (7) must present a greater resistance, and more particularly, it is sufficient that the longitudinal concrete strips (7b) under the lower supporting protuberances (28) present a greater resistance. A support area or longitudinal strip (7b) can be included in the shore floor area (7) which is located under the end wall (12). By only having certain areas with greater resistance instead of building the entire shore floor (7) with high resistance, the construction cost of the system (1) can be significantly reduced, while ensuring a proper structural and mechanical performance. It is estimated that the amount of high resistance material required to build the shore floor (7) can be reduced by 70-90% with respect to the amount required if the shore floor (7) were to be built entirely out of a high resistance material.

[0032] In some embodiments, it is contemplated that the shore ceiling (8) comprises a mesh made out of textile material, this mesh providing a stepping surface with a pleasant texture for the user of the system. An example of a mesh is a PVC coated polyester mesh.

[0033] In the embodiment shown, the sub-compartments form a two dimensional grid or mesh separated by transverse walls (18) and barriers (22) arranged at 90° to each other, for greater dissipation of energy and faster removal of the water towards the mass of water (2). As for the size of the sub-compartments, they may vary depending on other variables such as the inclination of the shore floor (7) and the inclination of the shore ceiling (8); for example, for shores with only a slight inclination, the sub-compartments may have a width and length of between 0.5 and 1.5 m. In turn, the water passage spaces (24) generally have a reduced height of between 2 and 20 cm, preferably between 2 and 10 cm. In these ranges, the slowing down of the wave is optimised (for which high walls are preferred) and the time that the wave takes to be removed from the compartments to the mass of water (for which large water passage spaces are preferable).

[0034] In the embodiment shown, there is a space (29) between each transverse wall (18) and the end wall (12), to allow a water pipe (not shown) to pass. In general, the passage of water between adjacent compartments (17) will not be possible through these spaces (29).

Claims

1. Wave generator system (1) for human leisure or sporting use, which comprises a floor (3) on which a mass of water (2) with an edge (5) is placed, and which further comprises of a shore (6) that extends along said edge (5) of the mass of water (2), **characterised in that** the shore (6) comprises:

    - a shore floor (7) with a decreasing height towards said floor (3) under the mass of water (2), so that water on said shore floor (7) is displaced by gravity towards the mass of water (2);
    - a permeable shore ceiling (8), which allows the passage of water from above the shore ceiling (8) towards the shore floor (7);
    - a plurality of compartments (17) arranged between the shore floor (7) and the shore ceiling (8), wherein each compartment (17) comprises at least one barrier (22) that offers resistance to the passage of water in a direction towards the mass of water (2) and leaves a water passage space (24) that allows the passage of water towards the mass of water (2).

2. Wave generator system (1), according to claim 1, **characterised in that** the compartments (17) are delimited by transverse walls (18).

3. Wave generator system (1), according to claim 2, **characterised in that** the transverse walls (18) extend from the shore floor (7) to the shore ceiling (8).

4. Wave generator system (1), according to claim 1, **characterised in that** the barrier (22) comprises a wall that extends from the shore ceiling (8), and **in that** the water passage space (24) extends between said wall and the shore floor (7).

5. Wave generator system (1), according to claim 4, **characterised in that** the compartments (17) are delimited by transverse walls (18), and **in that** said wall and said water passage space (24) extend from one to the other of said two transverse walls (18) that delimit the compartment (17).

6. Wave generator system (1), according to claim 1, **characterised in that** the shore ceiling (8) has an outer surface (16) that is inclined towards the mass of water (2).

7. Wave generator system (1), according to claim 1, **characterised in that** the shore (6) comprises an end wall (12) which extends between an outer edge (13) of the shore floor (7) and an outer edge (14) of the shore ceiling (8).

8. Wave generator system (1), according to claim 7,

characterised in that the compartments (17) are delimited by transverse walls (18), and **in that** the system comprises an impermeable layer (27) placed under the transverse walls (18) and delimited by the compartments (17), and which extends under the end wall (12) and is affixed to a rear end of this end wall (12).

9. Wave generator system (1), according to claim 8, **characterised in that** the impermeable layer (27) extends to the outer edge (13) of the shore ceiling (8).

10. Wave generator system (1), according to claim 7, **characterised in that** the transverse walls (18) are triangular, with one side (19) adjacent to the shore floor (7), a second side (20) adjacent to the shore ceiling (8) and a third side (21) adjacent to the end wall (12).

11. Wave generator system (1), according to claim 1, **characterised in that** the transverse walls (18) have at least one lower supporting protuberance (28).

12. Wave generator system (1), according to claim 1, **characterised in that** the shore ceiling (8) comprises an upper mesh made out of a textile material, whereby this mesh provides an upper surface for the user of the system.

Patentansprüche

1. Wellengeneratorsystem (1) für die Freizeit- oder Sportnutzung, das einen Boden (3) umfasst, auf dem eine Wassermasse (2) mit einem Rand (5) aufgebracht wird, und das ferner ein Ufer (6) umfasst, das sich entlang des besagten Randes (5) der Wassermasse (2) erstreckt, **dadurch gekennzeichnet, dass** das Ufer (6) Folgendes umfasst:

- einen Uferboden (7), dessen Höhe in Richtung besagten Bodens (3) unter der Wassermasse (2) abnimmt, so dass Wasser auf besagtem Uferboden (7) von der Schwerkraft in Richtung der Wassermasse (2) geleitet wird;
- eine durchlässige Uferdecke (8), die den Durchfluss von Wasser von oberhalb der Uferdecke (8) in Richtung Uferboden (7) ermöglicht;
- eine Vielzahl an Kammern (17), angeordnet zwischen dem Uferboden (7) und der Uferdecke (8), wobei jede Kammer (17) mindestens eine Barriere (22) umfasst, die Widerstand gegen den Durchfluss von Wasser in Richtung der Wassermasse (2) leistet und einen Raum für den Wasserdurchfluss (24) offen lässt, der den Durchfluss von Wasser in Richtung der Wassermasse (2) ermöglicht.

2. Wellengeneratorsystem (1), gemäß Anspruch 1, **dadurch gekennzeichnet, dass** die Kammern (17) von Querwänden (18) begrenzt werden.

3. Wellengeneratorsystem (1), gemäß Anspruch 2, **dadurch gekennzeichnet, dass** die Querwände (18) sich von dem Uferboden (7) bis zu der Uferdecke (8) erstrecken.

4. Wellengeneratorsystem (1), gemäß Anspruch 1, **dadurch gekennzeichnet, dass** die Barriere (22) eine Wand umfasst, die sich von der Uferdecke (8) aus erstreckt, und dass der Raum für den Wasserdurchfluss (24) sich zwischen besagter Wand und dem Uferboden (7) erstreckt.

5. Wellengeneratorsystem (1), gemäß Anspruch 4, **dadurch gekennzeichnet, dass** die Kammern (17) von Querwänden (18) begrenzt sind, und dass besagte Wand und besagter Raum für den Wasserdurchfluss (24) sich von einer bis zur anderen der besagten zwei Querwänden (18) erstreckt, die die Kammer (17) begrenzen.

6. Wellengeneratorsystem (1), gemäß Anspruch 1, **dadurch gekennzeichnet, dass** die Uferdecke (8) eine Außenfläche (16) aufweist, die in Richtung der Wassermasse (2) geneigt ist.

7. Wellengeneratorsystem (1), gemäß Anspruch 1, **dadurch gekennzeichnet, dass** das Ufer (6) eine Stirnwand (12) umfasst, die sich zwischen einer Außenkante (13) des Uferbodens (7) und einer Außenkante (14) der Uferdecke erstreckt.

8. Wellengeneratorsystem (1), gemäß Anspruch 7, **dadurch gekennzeichnet, dass** die Kammern (17) von Querwänden (18) begrenzt sind, und dass das System eine undurchlässige Schicht (27) umfasst, die unter den Querwänden (18) platziert wird und von den Kammern (17) begrenzt wird, und die sich unter der Stirnwand (12) erstreckt und an einem Hinterteil dieser Stirnwand (12) befestigt wird.

9. Wellengeneratorsystem (1), gemäß Anspruch 8, **dadurch gekennzeichnet, dass** die undurchlässige Schicht (27) sich bis zur Außenkante (13) der Uferdecke (8) erstreckt.

10. Wellengeneratorsystem (1), gemäß Anspruch 7, **dadurch gekennzeichnet, dass** die Querwände (18) dreieckig sind, wobei eine Seite (19) an dem Uferboden (7) anliegt, eine zweite Seite (20) an der Uferdecke (8) anliegt, und eine dritte Seite (21) an der Stirnwand (12) anliegt.

11. Wellengeneratorsystem (1), gemäß Anspruch 1, **dadurch gekennzeichnet, dass** die Querwände (18) mindestens einen unteren stützenden Vorsprung (28) aufweisen.

12. Wellengeneratorsystem (1), gemäß Anspruch 1, **dadurch gekennzeichnet, dass** die Uferdecke (8) eine obere Masche umfasst, die aus einem textilen Material besteht, wobei diese Masche für eine obere Fläche für den Benutzer des Systems sorgt.

Revendications

1. Système générateur de vagues (1) pour le loisir ou le sport, comprenant un sol (3) sur lequel est placée une masse d'eau (2) avec un bord (5), et qui comprend également une berge (6) qui s'étend le long du bord (5) de la masse d'eau (2), **caractérisé par le fait que** la berge (6) comprend:

- un sol de berge (7) dont la hauteur diminue vers ledit sol (3) sous la masse d'eau (2), de telle sorte que l'eau sur ledit sol de berge (7) est déplacée par gravité vers la masse d'eau (2);
- un plafond de berge perméable (8) qui permet le passage de l'eau entre le plafond de la berge (8) et le sol de la berge (7);
- plusieurs compartiments (17) disposés entre le sol de la berge (7) et le plafond de la berge (8), où chaque compartiment (17) comprend au moins une barrière (22) qui offre une résistance au passage de l'eau en direction de la masse d'eau (2) et laisse un espace pour le passage de l'eau (24) qui permet le passage de l'eau vers la masse d'eau (2).

2. Système générateur de vagues (1) selon la revendication 1, **caractérisé par le fait que** les compartiments (17) sont limités par des parois transversales (18).

3. Système générateur de vagues (1) selon la revendication 2, **caractérisé par le fait que** les parois transversales (18) s'étendent entre le sol de berge (7) et le plafond de berge (8).

4. Système générateur de vagues (1) selon la revendication 1, **caractérisé par le fait que** la barrière (22) comprend une paroi qui s'étend à partir du plafond de berge (8) et que l'espace de passage de l'eau (24) s'étend entre ladite paroi et le sol de berge (7).

5. Système générateur de vagues (1) selon la revendication 4, **caractérisé par le fait que** les compartiments (17) sont limités par les parois transversales (18) et que ladite paroi et ledit espace de passage d'eau (24) s'étendent entre l'une et l'autre de ces deux parois transversales (18) qui limitent le compartiment (17).

6. Système générateur de vagues (1) selon la revendication 1, **caractérisé par le fait que** le plafond de berge (8) a une surface extérieure (16) qui est inclinée vers la masse d'eau (2).

7. Système générateur de vagues (1) selon la revendication 1, **caractérisé par le fait que** la berge (6) comprend une paroi d'extrémité (12) qui s'étend entre un bord extérieur (13) du sol de berge (7) et un bord extérieur (14) du plafond de berge (8).

8. Système générateur de vagues (1) selon la revendication 1, **caractérisé par le fait que** les compartiments (17) sont limités par des parois transversales (18), et que le système comprend une couche imperméable (27) placée sous les parois transversales (18) et délimitée par les compartiments (17), et qui s'étend sous la paroi d'extrémité (12) et est fixée à l'extrémité arrière de cette paroi d'extrémité (12).

9. Système générateur de vagues (1) selon la revendication 8, **caractérisé par le fait que** la couche imperméable (27) s'étend entre le bord extérieur (13) du plafond de berge (8).

10. Système générateur de vagues (1) selon la revendication 7, **caractérisé par le fait que** les parois transversales (18) sont triangulaires, avec un côté (19) jouxtant le sol de berge (7), un second côté (20) jouxtant le plafond de berge (8) et un troisième côté (21) jouxtant la paroi d'extrémité (12).

11. Système générateur de vagues (1) selon la revendication 1, **caractérisé par le fait que** les parois transversales (18) ont au moins une protubérance de support inférieure.

12. Système générateur de vagues (1) selon la revendication 1, **caractérisé par le fait que** le plafond de berge (8) comprend un filet supérieur en matériau textile, ce filet fournissant une surface supérieure pour l'utilisateur du système.

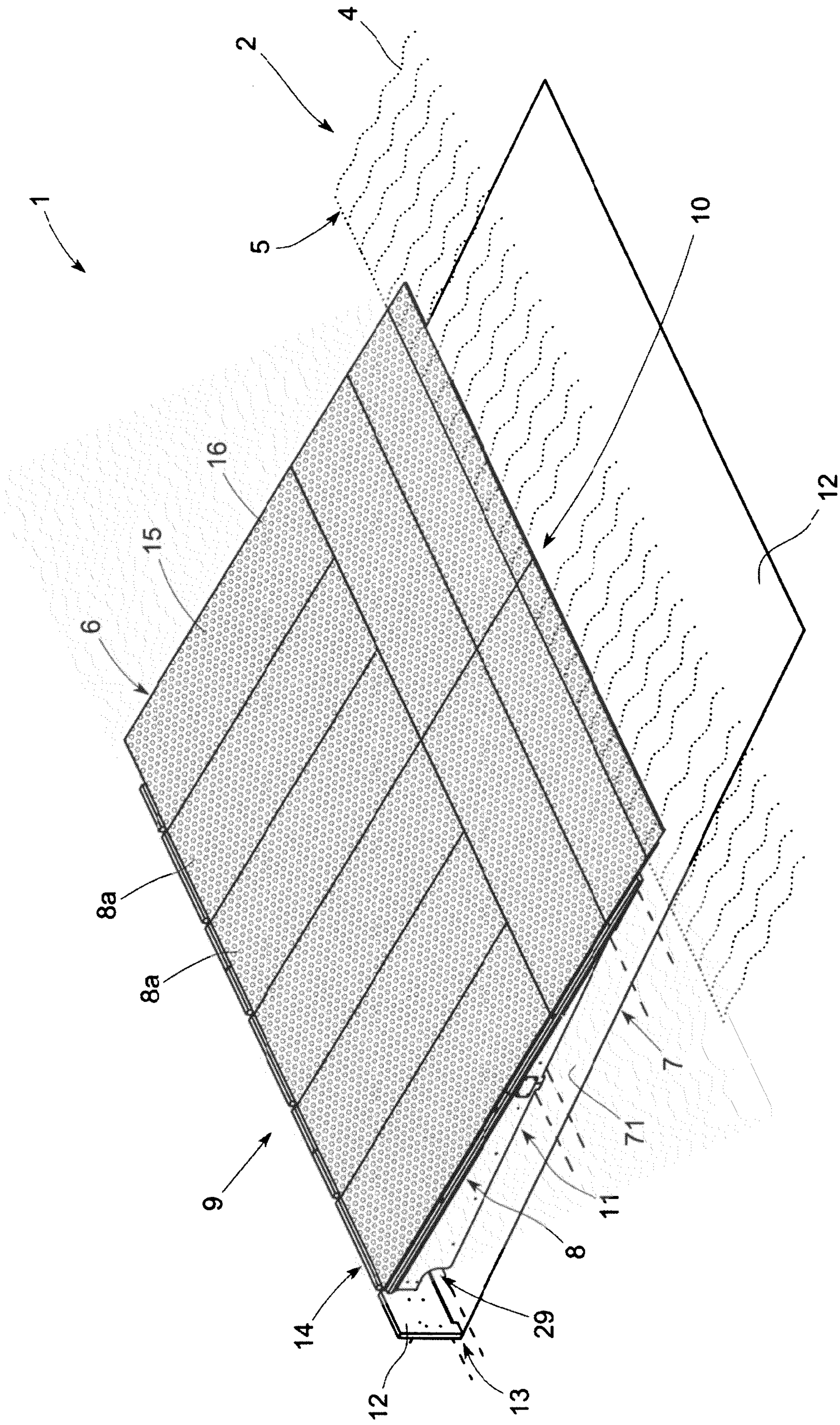

FIG. 1

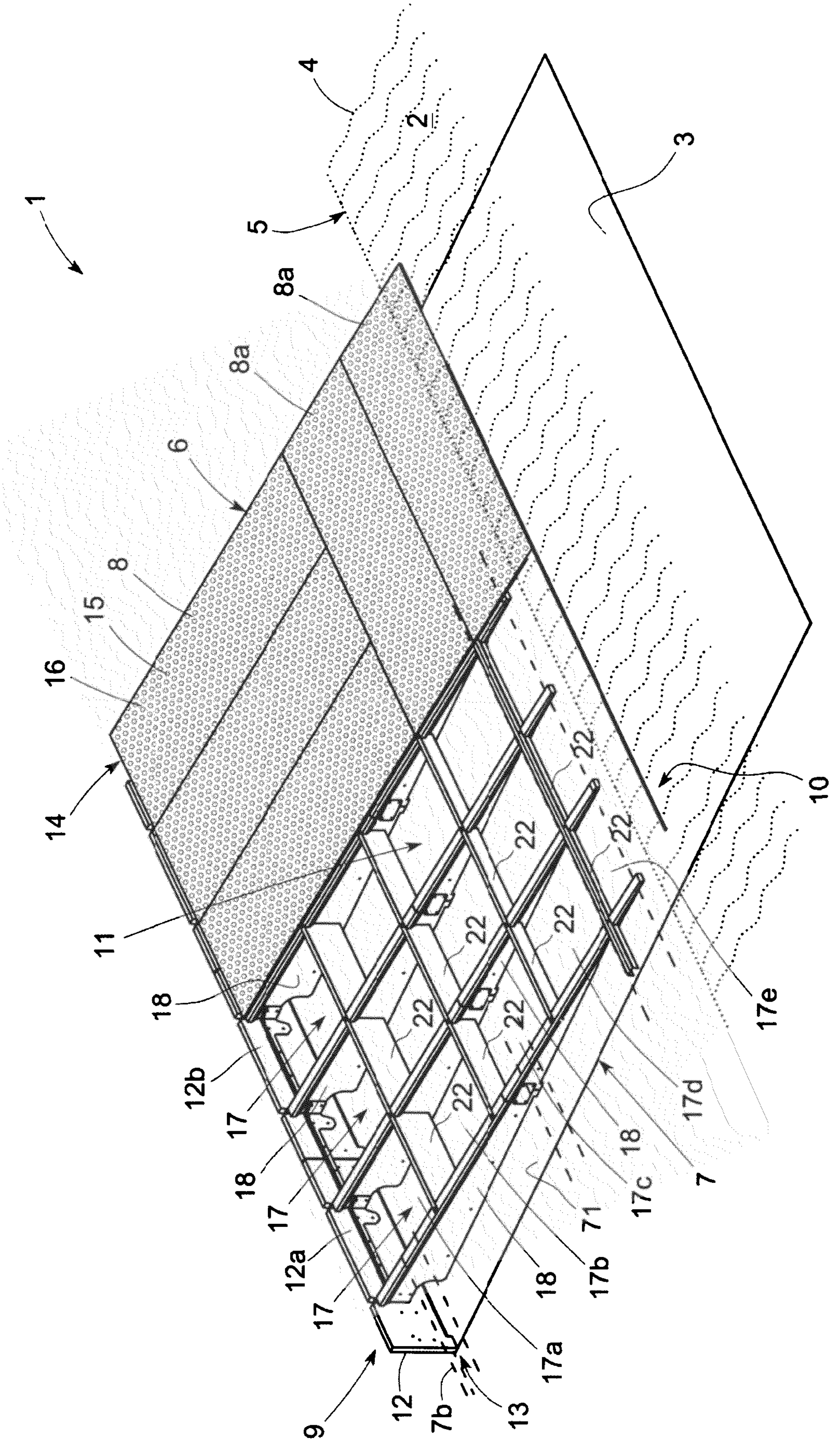
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FIG. 2

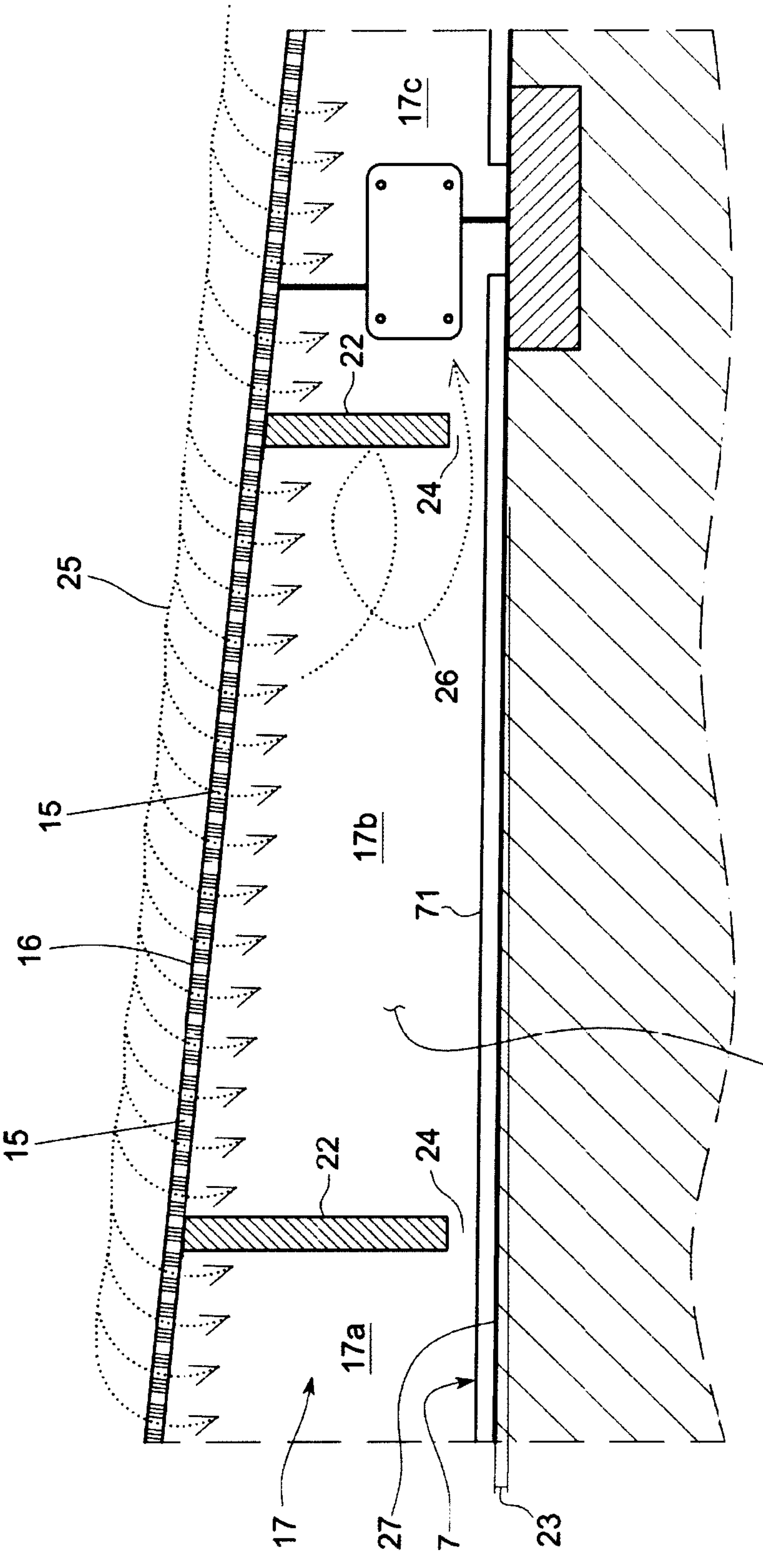

FIG. 3

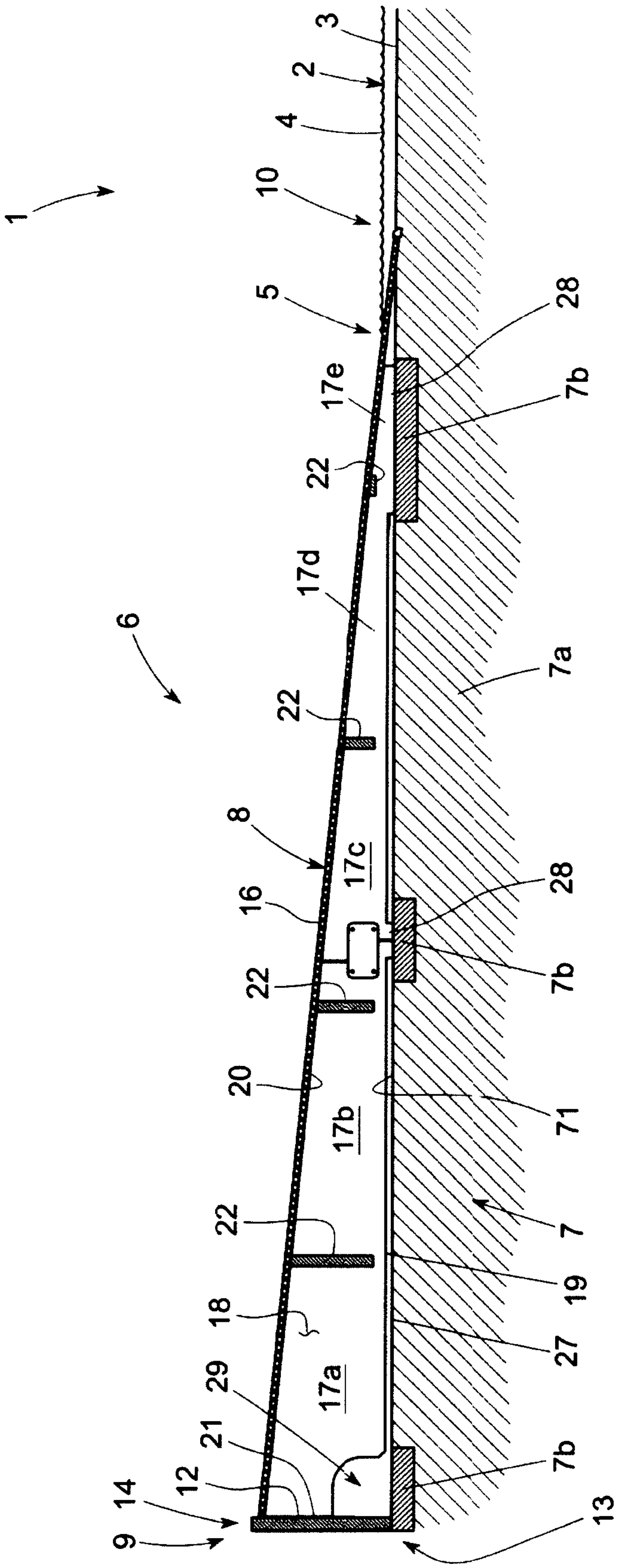
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FIG. 4

REFERENCES CITED IN THE DESCRIPTION

Patent documents cited in the description

- WO 03092460 A1 **[0005]**
- US 3431734 A **[0006]**