



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
06.04.2022 Bulletin 2022/14

(51) International Patent Classification (IPC):
B63B 59/04 (2006.01)

(21) Application number: **21446502.3**

(52) Cooperative Patent Classification (CPC):
B63B 59/045

(22) Date of filing: **01.10.2021**

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME
Designated Validation States:
KH MA MD TN

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(30) Priority: **02.10.2020 SE 2030303**
29.01.2021 SE 2130027

(54) **HULL PROTECTION DEVICE**

(57) A hull protection device (10) which counters the growth of undesired organisms on underwater parts of a boat (20), comprises a floating hull protection cloth (12) onto which the boat (20) is driven. The hull protection cloth (12) has a slot (14) which allows use of the hull protection device (10) when the boat (20) is provided with a keel (22), in that the keel (22) is driven into the slot (14) when the boat is driven onto the hull protection cloth (12). The hull protection device may be provided with a stabil-

ising device (30) which prevents the slot (14) from opening when the boat (20) is driven onto the hull protection cloth (12) or is situated thereon. It may also be provided with a keel protection device (16) with two keel protection curtains (18) which, on use of the hull protection device (10) in the water, hang down from their long sides on the slot (14) in order to protect the keel (22) from the growth of undesired organisms.

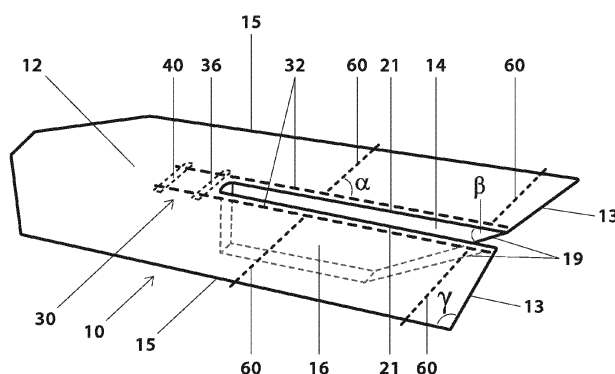


Fig. 3

Description

Technical Field

[0001] The present invention relates to a hull protection device which is designed to counter the growth of undesired organisms on underwater parts of a boat, and which comprises a floating hull protection cloth onto which the boat is intended to be driven.

Background

[0002] A well-known problem for boat owners is the growth of undesired organisms such as mussels, gastropods, algae, limpets and barnacles, which occurs on the underwater parts of a boat and leads, inter alia, to increased friction between the boat and the water, and hence to a lower speed and/or increased fuel consumption when the boat is driven. Such fouling may also make it harder to manoeuvre the boat.

[0003] The conventional way of preventing the growth of undesired organisms has been to paint the bottom of the boat with antifouling paint. This however has great environmental disadvantages as the antifouling paints used are often toxic to a varying degree.

[0004] As an alternative to painting with antifouling paint, recently various mechanical devices have been developed which are intended to counter and prevent fouling.

[0005] A type of hull protection device known as a hull protection cloth is sold under the trademark Clean Marine Tarp by Ekeröds Utvecklings AB in Löddeköpinge, Sweden. This hull protection cloth is a floating, special tarpaulin which is installed and secured to a mooring. When the boat is to be moored, it is driven onto the hull protection cloth. Direct contact between the hull protection cloth and the hull of the boat prevents the growth of undesired organisms.

[0006] Hull protection devices of this type are also known from the patent literature.

[0007] SE 527601 describes a flexible mat which, after a boat hull has been driven onto it, presses up against the base of the hull to make a tight contact with this, whereupon the contact and movement between the mat and the boat hull prevents the growth of undesired organisms.

[0008] A disadvantage with known hull protection devices of this type is that they cannot be used for boats with a keel, since such boats cannot be driven onto the hull protection cloth or hull protection mat.

[0009] WO01/81167 discloses a hull protection device which comprises a casing which is intended to substantially enclose the underwater parts of the boat. For the boat to be able to drive into the hull protection device, weights are used for pulling down parts of the casing so that its sides hang substantially vertically in the water and allow passage for the boat in-between. When the boat has been driven into the hull protection device, measures

must be taken to evacuate the water from the hull protection device and to allow the casing to lie closely against the underwater parts of the boat.

[0010] US2011/0120362 describes a hull protection device which comprises a casing intended to form a pocket with stationary water around the boat which is impermeable to light. In this case too, weights are used to weigh down parts of the casing to make it possible for the boat to be driven into the hull protection device. When the boat is in place in the hull protection device, the pocket with stationary water is created, for example in that the weights are lifted up or the open part of the casing is closed.

[0011] A disadvantage of this type of hull protection device is that measures are required to bring the casing into an active position when the boat has been driven into the hull protection device. This means that the device is complicated to use and costly to produce.

Summary

[0012] An object of the invention is to at least partly overcome one or more of the limitations of the known techniques.

[0013] Another object is to provide a hull protection device which can be used for a boat with keel.

[0014] A further object is to provide a hull protection device which protects as large portion of the underwater parts of a boat as possible.

[0015] Yet another object is to provide a hull protection device which is simple to use.

[0016] One or more of these objects, and further objects which may arise from the description, is/are achieved at least partially with a hull protection device according to the independent claim. Embodiments of the invention are defined by the dependent claims.

[0017] According to a first aspect of the invention, this concerns a hull protection device which is designed to counter the growth of undesired organisms on underwater parts of a boat, and which comprises a floating hull protection cloth onto which the boat is intended to be driven. The hull protection cloth has a slot which allows use of the hull protection device when the boat is provided with a keel, in that the keel is driven into the slot when the boat is driven onto the hull protection cloth. The hull protection device is furthermore provided with a stabilising device which prevents the slot from opening when the boat is driven onto the hull protection cloth or is situated thereon.

[0018] By providing the hull protection device with a slot, it can be used for boats with keel, and by means of the stabilising device, the width of the slot can be stabilised such that the hull protection cloth protects the parts of the hull which lie level with the keel and behind it.

[0019] Further objects, characteristics, aspects and advantages of the present invention will arise from the following detailed description, the attached claims and the drawings.

Brief Description of the Drawings

[0020] Embodiments of the invention will now be described in more detail with reference to the appended schematic drawings.

Figure 1 is a perspective view of a hull protection device viewed from above.

Figure 2 is a side view which shows how a hull protection device may be used for a boat with a keel.

Figure 3 is a perspective view of a hull protection device viewed from above, with a first embodiment of a stabilising device.

Figure 4 is a plan view from below of the hull protection device from figure 3.

Figure 5 is a side view of a first spacer element.

Figure 6 is a side view of a second spacer element.

Figure 7 is a plan view from below of a hull protection device with a second embodiment of a stabilising device.

Figure 8 is a side view of a first and a third spacer element.

Figure 9 is a perspective view of a first profile which may be used in a third embodiment of the stabilising device.

Figure 10 is a perspective view of a second profile which may be used in a third embodiment of a stabilising device.

Figure 11 is a plan view from below of a hull protection device with a fourth embodiment of a stabilising device.

Figure 12 is a plan view from below of a hull protection device with a fifth embodiment of a stabilising device.

Detailed Description of Exemplary Embodiments

[0021] In the description below, the terms "back" and "front" are used in relation to various parts of a hull protection device. The terms are used throughout such that "front" refers to a part which lies closer to the quay when the hull protection device is placed at a mooring, and closer to the bow of the boat when the boat is placed on the hull protection device, while "back" refers to a part which lies further away from the quay when the hull protection device is placed at a mooring, and closer to the stern of a boat when the boat is placed on the hull pro-

tection device. This applies when the hull protection device is placed with its short side against the quay so that the boat is intended to be placed on the hull protection device with the bow pointing towards the quay. At other positions, e.g. if the hull protection device is placed with a long side against the quay so the boat is intended to be placed on the hull protection device parallel to the quay, "front" refers to a part which lies closer to the intended placing of the bow on the hull protection device, while "back" concerns a part which lies closer to the intended placing of the stern on the hull protection device.

[0022] Figure 1 shows schematically a hull protection device 10 which is designed to counter the growth of undesired organisms on underwater parts of a boat. The hull protection device 10 comprises a hull protection cloth 12 onto which the boat is intended to be driven when the hull protection device 10 is used in the water. When the hull protection device is not used by a boat, the hull protection cloth 12 is designed to float horizontally in the water and thus extend in the plane of the water surface. The hull protection cloth 12 is provided with a slot 14 which thus forms a cutout in the hull protection cloth 12 and, as in this example, extends in the longitudinal direction of the hull protection cloth from the middle of a short side 13 of the hull protection cloth. The slot 14 allows use of the hull protection device 10 when the boat is provided with a keel, in that the keel is driven into the slot 14 when the boat is driven onto the hull protection cloth 12.

[0023] As figure 1 shows, the hull protection device 10 may also be provided with a keel protection device 16 to protect the keel from growth of undesired organisms. The keel protection device 16 comprises two keel protection curtains 18 which are designed, on use of the keel protection device 10 in the water, to hang down from their respective long sides 21 on the slot 14 and in this way fully or partially protect the keel, in a similar manner to the protection of the underwater parts of the boat hull by the hull protection cloth 12, i.e. primarily through contact and movement/friction between the boat and the hull protection device 10.

[0024] The hull protection device 10 may furthermore be provided with a stabilising device (not shown in figures 1 and 2), which prevents the slot 14 from opening when the boat is driven onto the hull protection device, and which thus ensures the function of the hull protection device. The stabilising device will be described in more detail below with reference to figures 3 to 12.

[0025] Figure 2 shows schematically how a hull protection device 10 may be used for a boat 20 with a keel 22. The boat, which in this example is a sailing boat, is driven with its hull 24 onto the hull protection device 12, and the keel 22 is driven into the keel protection device 16 via the slot 14.

[0026] The sailing boat 20 shown in figure 2 has a fin keel. The hull protection device 10 may however also be used by boats with other types of keel, for example a centreboard, bilge keel, bulb keel, swing keel and canting keel. The person skilled in the art will understand that

certain dimensions and details of the hull protection device may need to be adapted to specific keel designs.

[0027] It is stated above that the boat 20 is driven onto the hull protection cloth 12. In some cases, it may be placed on or moved onto this in other ways. It may for example be sailed onto the hull protection cloth, dragged onto this or otherwise moved relative to this so that it is positioned on the hull protection cloth 12. For the sake of simplicity however, it is stated only that the boat is driven onto the hull protection cloth, but this expression is intended also to include other ways of placing the boat 20 on the hull protection cloth 12. Furthermore, the expressions "the boat 20 is driven onto the hull protection cloth 12" and "the boat is driven onto the hull protection device 10" are indistinguishable.

[0028] The actual hull protection cloth 12 may be formed in a similar fashion to the known hull protection cloths for a boat without keel. It may have a lower density than water so that it floats on water. To this end, for example it may be formed by a layer of foam with air-filled cells which are fully or partly covered on both sides by a protective tarpaulin made of a woven plastic material, which may consist of polyolefin plastic or another plastic material such as PVC. The thickness of the hull protection cloth 12 may for example be around 4 - 10 mm for a sailing boat of the leisure type. For other boats, the thickness may be different. The shape of the hull protection cloth may vary depending on the design of the mooring where it will be used, and the type of boat for which it is intended. Normally however it is largely rectangular, but for example the short sides 13 may have a different shape, as will be explained below. The hull protection cloth may be provided with conventional devices (not shown) for anchoring it to the mooring at one or more places.

[0029] In contrast to a conventional hull protection cloth for boats without keel, the hull protection cloth 12 for boats with keel is thus provided with a slot 14 which allows boats with keel to drive onto the hull protection cloth 12. The width and length of the slot 14 may be adapted to the type of boat and keel for which the hull protection device 10 is intended. A width of the slot 14 for a sailing boat of the leisure type may typically be 15 to 30 cm, preferably 20 to 25 cm. It is desirable that the slot is as narrow as possible, but still leaves room for the keel. The length of the slot 14 is adapted to where the keel begins on the type of boat for which the hull protection device 10 is intended.

[0030] The keel protection device 16 may in some embodiments have a density which is slightly lower than that of water so that it just floats, but has no lifting force. When the hull protection device 10 is lying in the water without being used by a boat, the keel protection device 16, as shown in figures 1 and 3, is designed to hang down from the hull protection cloth 12, preferably vertically in the water, i.e. perpendicularly to the water surface. To this end, it may be provided with weights on its lower edge. The keel protection device 16 may be made from a woven

plastic material, which may consist of polyolefin plastic or another plastic material such as PVC. It may be fastened to the hull protection cloth along the edges of the slot 14, or be formed integrally with the protective tarpaulin of the hull protection cloth 12. The keel protection device 16 may preferably have an uninterrupted surface on the respective side of the slot 14.

[0031] As the person skilled in the art will understand, the depth of the keel protection device 16 may be adapted to the type of keel concerned. In certain embodiments, the keel protection device 16 may extend down to or past the lower edge of the keel. In other embodiments, the lower edge of the keel protection device may be designed to lie at a shallower depth than the lower edge of the keel. This may for example be suitable when the keel is a bulb keel. Then the lower edges of the keel protection curtains 18 end above the bulb.

[0032] The weight or weight loading of the keel protection device 16 may be adapted such that the respective keel 22 runs smoothly in and out of the keel protection device 16, and so that contact between the keel protection device 16 and the keel 22 is maximised. Furthermore, the flexibility of the keel protection device may be adapted such that the keel protection device has sufficient contact with and movement against the keel to prevent the growth of undesired organisms, and so that the keel runs smoothly in and out of the keel protection device.

[0033] Depending on the type of keel 22 for which the hull protection device 10 is intended, the keel protection device 16 may be fully closed, partly closed/open, or fully open at the bottom.

[0034] In certain embodiments, the keel protection curtains 18 may be connected together along their lower edges directly or indirectly via a bottom part. In this way, a pocket with for example a V-shaped or U-shaped cross-section can be formed for the keel 22. The person skilled in the art will understand that the shape of the keel protection curtains 18 and the cross-section of the keel protection device 16 may be varied in other ways for adaptation to different keel types. As an alternative, the keel protection device 16 may for example be formed in one piece as a pocket which is closed at the bottom, so that the keel protection device 16 surrounds the keel on the sides and bottom. In this case, the side parts of the pocket also form part of the keel protection curtains 18. A fully or partly closed lower edge of the keel protection device 16 may contribute to holding the keel protection curtains 18 close to the keel.

[0035] Depending on various requirements for moorings for which the hull protection device is intended, the keel protection device 16 may be fully closed, partly closed/open, or fully open at its front edge, i.e. in the direction against the bow of the boat when the boat is placed on the hull protection device.

[0036] In certain embodiments, the keel protection curtains 18 may furthermore be directly or indirectly connected together at the front edges. Alternatively, the keel protection device may be formed in one piece as a pocket

which is closed at the front, and the side parts of which form the keel protection curtains 18. In this case therefore, the keel protection device 16 surrounds the keel at the front and the sides. As stated above, the pocket may also be closed at the bottom so that the keel is also enclosed underneath.

[0037] In further embodiments, the keel protection device 16 may be formed such that the keel partly extends past the front edge of the keel protection device 16.

[0038] The keel protection device 16 may in certain embodiments be provided with rods which run in horizontal channels on the outsides of the keel protection curtains 18. These rods may contribute to creating a desired cross-section of the keel protection device for adaptation to different keel types. Finally, it should be pointed out that the keel protection device may be used together with a hull protection cloth without stabilising device or together with any stabilising device.

[0039] Figure 3 and figure 4 show schematically an example of a hull protection device 10 in more detail. In this example, the hull protection cloth 12 is largely rectangular, but the corners of the front short side 13 are cut off to avoid forming a surface for birds to settle on, and to reduce the weight of the hull protection cloth. The rear short side 13 is furthermore configured so as to make it easier for the keel 22 of the boat 20 to drive into the slot 14.

[0040] As shown in figure 1, the rear opening of the keel protection device 16, or more specifically the rear edges 19 of the keel protection curtains 18, extend perpendicularly to the hull protection cloth 12 when the hull protection device 10 lies in the water without any boat 20. The rear edges in this case form an angle β which is 90° to the long sides 21 of the slot 14, or the plane of the hull protection cloth 12. To make it easier for the keel to run into the keel protection device 16, the rear edges 19 of the keel protection curtains 18 may be arranged to form an angle β in the range from 20° to 70° with the long sides 21 of the slot 14, or the plane of the hull protection cloth 12 when the hull protection device 10 is lying in the water without a boat 20. Usually, the angle β should not be smaller than necessary for the keel protection device to cover the entire keel, so as to prevent the growth of undesired organisms over the entire keel.

[0041] To further facilitate the driving of the boat 20 onto the hull protection device 10, the rear short side 13 of the hull protection cloth 12 may be configured so as to form a guide for the boat in the direction towards the slot 14, and so that the mouth of the slot 14 is visible to the boat's operator. This may be achieved by the hull protection cloth 12 being configured such that an angle γ formed between its long sides 15 and its rear edges 13 is less than 90° .

[0042] When the hull protection cloth 12 is provided with a slot 14, several different problems may occur. One problem is that the slot risks opening at the rear part when the boat is driven onto the hull protection device 10 and is situated thereon. More specifically, the slot 14 can open as an inverted V-shape, viewed in the direction towards

the front part of the hull protection cloth 12, which means that the underwater parts of the hull which lie level with and behind the keel are not covered by the hull protection cloth 12. If the hull protection device is provided with a keel protection device, the problem may also arise that the keel protection device does not lie sufficiently close to the keel and therefore does not protect this optimally. In addition, the hull protection cloth 12 risks creasing along the length of the slot 14 and floating up against the sides of the boat when the boat is driven onto the hull protection device 10. This can also contribute to the hull protection device 10 not protecting the boat optimally. A further problem may be that the slot also risks opening at its front part, which can lead to the hull protection cloth 12 breaking in that region. It is thus desirable that the hull protection device 10 is formed so that the slot 14 is held together along its entire length.

[0043] To solve the above-mentioned problems fully or partly, the hull protection device 10 may be provided with a stabilising device 30 which prevents the slot 14 from opening when a boat is driven onto or is situated on the hull protection device.

[0044] The stabilising device 30, which is shown in figure 3 and figure 4, may be mounted on the underside of the hull protection cloth 12, and may more particularly comprise two slot rods 32 which extend longitudinally along the long sides 21 of the slot 14 in order to stabilise this. It may furthermore comprise a first stabilising mechanism which is designed to prevent the slot from opening in its front part, and/or a second stabilising mechanism which is designed to prevent the slot from opening in its rear part, when the boat 20 is driven onto or situated on the hull protection device. The stabilising device is thus designed to stabilise the width of the slot 14 so that the width remains substantially constant.

[0045] The two slot rods 32 preferably have a higher bending resistance in the slot transverse direction, i.e. horizontally, than in the slot longitudinal direction, i.e. vertically. This ensures a restriction of the movement of the hull protection cloth 12 perpendicularly to the length direction of the slot 14, while retaining the flexibility and bendability of the hull protection cloth 12 in its longitudinal direction so that it can follow the hull of the boat. To this end, the slot rods 32 may for example have a rectangular cross-section and their width may be substantially greater than their height. The slot rods 32 may extend from the rear end of the slot 14 to past the front edge of the slot. In certain embodiments, the slot rods 32 may be arranged in channels 34, preferably with a close fit, so as to counter the creasing of the hull protection cloth 12. The slot rods 32 may for example consist of a composite material in which the contained fibres may be made of glass or a polymer material.

[0046] The first stabilising mechanism may comprise a first spacer element 36 which extends transversely between the slot rods 32 in front of the front end of the slot, preferably close to the front end of the slot, and which are designed to prevent the slot rods 32 from moving

apart at the front end of the slot 14 when a boat is driven onto the hull protection cloth 12 or is situated thereon. The first spacer element 36 may be flexible so as to follow the hull of the boat and allow the boat to move onto the hull protection cloth 12. It is designed to absorb traction forces which act on the slot rods 32 when the boat is driven onto the hull protection device 10 or is situated thereon. To this end, the first spacer element 36 may be made of a material with a high modulus of elasticity and very high tensile strength. It may for example be made of a strong woven plastic material which may consist of olefin plastic or another type of plastic material such as PVC. In certain embodiments, it is made in one piece with the hull protection cloth 12. The first spacer element 36 is attached to the slot rods 32.

[0047] Figure 5 shows an example of a possible design of the first spacer element 36. In this case, the spacer element at each end has an attachment 38 in the form of a loop. The first spacer element 36 may be fastened transversely between the slot rods 32 in that the slot rods 32 are threaded through the loops 38. If the slot rods are placed in channels 34, openings may need to be made therein at the point where the first spacer element 36 is to be fastened.

[0048] The stabilising device 30 may as stated also comprise a second stabilising mechanism which prevents the slot 14 from opening at its rear part. In the embodiment of the stabilising device 30 shown in figures 3 and 4, the second stabilising mechanism comprises a second spacer element 40 which extends transversely between the slot rods 32 in front of the first spacer element 36, and is designed to prevent the slot rods 32 from moving towards one another at the front parts when the boat 20 is driven onto the hull protection device or is situated thereon. The second spacer element 40 is thus designed to absorb compression forces which act on the slot rods 32 in the front part thereof when the boat is driven onto or is situated on the hull protection cloth 12. To this end, the second spacer element 40 may consist of metal or other material with a high bending strength. It may thus be rigid. To allow the boat 20 to drive onto the hull protection cloth 12, the second spacer element 40 may have a form which is adapted to a boat hull. The distance between the first spacer element 36 and the second spacer element 40 may vary depending on the size and type of boat for which the hull protection device 10 is intended.

[0049] In a variant of the embodiment of the stabilising device 30 shown in figure 3 and 4, the distance between the first spacer element 36 and the second spacer element 40 may be made larger so that the second spacer element 40 is placed in a position where the hull of a boat which is driven onto the hull protection device 10 begins to bend upward towards the bow. In such a case, the shape of the second spacer element 40 need not be adapted to the boat hull, but the second spacer element 40 may instead be straight. A straight spacer element may be easier to produce and allow a wider choice of

materials. With a greater distance between the first and second spacer elements 36, 40, the stress on the second spacer element 40 is also reduced, which in turn may also have an advantageous effect on the production and choice of material. Furthermore, the channels 34 may terminate directly after the first spacer element 36 in the direction towards the front end of the hull protection device, and the slot rods 32 may extend out of and past the channels 34 in the direction towards the front end of the hull protection device so that they run clear of the channels for a short distance in front of the first spacer element 36. Therefore the hull cloth 12 may be fully smooth above the second spacer element 40. Since the second spacer element 40 prevents the slot rods 32 from being pressed towards one another at their front ends, the slot 14 cannot widen at its rear part when a boat is driven onto the hull protection cloth 12 or is situated thereon.

[0050] In the embodiment shown in figure 4, the hull protection device is furthermore provided with one or more pairs of transverse rods 60 which extend in channels 62 from a respective side edge 15 of the hull protection cloth 12, transversely across the hull protection cloth 12, to the respective long side 21 of the slot 14. The transverse rods 60 and channels 62 may more particularly preferably extend to the respective edge of the slot rods 32. The design of the transverse rods 60 and channels 62 is preferably selected so that they together prevent the hull protection cloth 12 from creasing when a boat is driven onto or is situated on the hull protection cloth 12.

[0051] The transverse rods 60 may have a rectangular cross-section. In certain embodiments, they may be made of a composite material in which the contained fibres may be made of glass, or a polymer material, and it is desirable that they have a bending strength which makes them sufficiently rigid to prevent creasing but sufficiently flexible to follow the curved surface of the hull up to the waterline. The bending resistance for the transverse rods 60 may need to be varied depending on the design of the hull of the sailing boat, and the angle α of the channels 62 (see figure 3) against the long sides 21 of the slot 14 may vary depending on the design of the boat hull.

[0052] Figure 6 shows an example of a possible design of the second spacer element 40. In the same way as the first spacer element 36, the second spacer element 40 has an attachment 42 at each end which takes the form of a loop. The second spacer element 40 may be fastened transversely between the slot rods 32 in that the slot rods 32 are drawn through the loops.

[0053] Figure 7 shows schematically a second embodiment of the stabilising device 30 which is suitable for moorings with Y-shaped beams 50 and associated floats 52 at the rear ends of the Y-shaped beams, or for other moorings which have a form of equivalent support at the rear part of the mooring, e.g. posts which are anchored at the bottom and extend up over the water surface. In this embodiment, in the same way as in figures 3 and 4,

the stabilising device 30 comprises slot rods 32 which extend along the long sides 21 of the slot 14, and a first stabilising mechanism in the form of a first spacer element 36 which extends transversely between the slot rods 32 in front of the front end of the slot, and which is designed to prevent the slot rods 32 from moving apart at the front ends of the slot 14 when a boat is driven onto the hull protection cloth 12 or is situated thereon. The second stabilising mechanism comprises two side edge rods 70 which extend along the side edges 15 of the hull protection cloth 12, and a third spacer element 72 which extends transversely between the side edge rods 70 and which is designed to limit the distance between the side edge rods 70, i.e. hold these together, at the front end of the slot when the boat is driven onto the hull protection cloth 12 or is situated thereon. The second stabilising mechanism may also comprise at least one pair of transverse rods 60 of similar type to those shown and described in connection with figure 4.

[0054] The side edge rods 70, as shown in figure 7, may extend from the rear end of the hull protection cloth 12 to at least past the front ends of the slot rods 32. They may be anchored at one or more points against the side edges 15 of the hull protection cloth 12. The rear ends of the side edge rods 70 are designed to lie close to or against the inside of the respective float 52 when the hull protection device 10 is mounted at the mooring, as shown in figure 7. In other embodiments, the rear ends of the side edge rods 70 may lie against posts which form part of the mooring. The length of the side edge rods 70 may in certain cases have to be adapted to the length of the mooring, so that they extend past the rear short side 13 of the hull protection cloth 12. In certain cases, the mooring may also be adapted in various ways to the size of the hull protection device so that it functions optimally.

[0055] The side edge rods 70 may have a high bending resistance in both directions, i.e. both vertically and horizontally. They may for example have a rectangular or circular cross-section. In certain embodiments, they may be made of composite material in which the contained fibres may be made of glass or a polymer material. Alternatively, they may be made of a pure polymer material or wood.

[0056] The third spacer element 72 may consist of a material which has a high modulus of elasticity and very high tensile strength. It may for example be made of a strong woven plastic material, which may consist of olefin plastic or another type of plastic material such as PVC. In certain embodiments, the third spacer element 72 is fastened to the side edge rods 70 in front of the front edge of the slot 14. The first spacer element 36 may then be fixedly connected to the third spacer element 72. It may e.g. be welded to this. In other embodiments, the first spacer element 36 and the third spacer element 72 may be placed at different distances from the front edge of the slot 14, i.e. at different locations.

[0057] The transverse rods 60, which may be arranged in channels 62 in the same way as in figure 4, in this

embodiment are fastened to the side edge rods 70. A first pair of transverse rods 60 is placed at the rear ends of the hull protection cloth 12. One or more further pairs of transverse rods 60 may be placed between the rear-most pair and the third spacer element 72. At least the rear pair of transverse rods 60 may be dimensioned and arranged so as to prevent the rear part 14 of the slot from opening. Other pairs may contribute to maintaining a constant width of the slot. All transverse rods 60 may also be arranged so as to prevent creasing of the hull cloth 12.

[0058] In the embodiment of the stabilising device 30 shown in figure 7, the side edge rods 70 via their contact against the floats 52, together with the transverse rods 60, prevent the slot 14 from opening at its rear part when a boat is driven onto the hull protection cloth 12 or is situated thereon. At the same time, the third spacer element 72 prevents the front parts of the side edge rods 70 from being moved apart, and thus ensures that the side edge rods 70 remain lying against the floats 52.

[0059] Figure 8 shows a possible design of the third spacer element 72 with the first spacer element 36 fastened thereto. The third spacer element 72 has at each end an attachment 74 in the form of a loop through which the respective side edge rod 70 may be threaded.

[0060] In a third embodiment of the stabilising device 30, the second stabilising mechanism may comprise a fourth spacer element in the form of a profile 90 which is designed to be anchored in the rear part of the hull protection cloth 12 or at the rear edge of the keel protection device 16. The profile 90 may have a form which follows the cross-section of a keel of the boat for which the hull protection device 10 is intended, and thus has a shape which corresponds to a desired cross-section of the keel protection device 16. The profile 90 serves to stabilise the slot 14 and prevent this from opening when a boat is driven onto or is situated on the hull protection device. It may also contribute to allowing the keel to run in and out of the keel protection device. In certain embodiments, the profile 90 may consist of a composite material in the form of a rectangular or round rod, in which the contained fibres may be made of glass or a polymer material. Alternatively, it may consist of a pure polymer material.

[0061] Figures 9 and 10 shows schematically two possible embodiments of the profile 90. The profile 90 shown in figure 9 has substantially a U-shape with two side arms 92 which are designed to extend in the transverse direction relative to the longitudinal direction of the slot 14. The profile 90 shown in figure 10 is formed accordingly but is rounded at its lower part in order to be used for example for a bulb keel.

[0062] Figure 11 shows schematically a fourth embodiment of the stabilising device 30 which is a variant of the embodiment shown in figure 7. In this embodiment, in the same way as the embodiment shown in figure 4 and figure 7, the stabilising device 30 comprises slot rods 32 which extend along the long sides 21 of the slot 14, and a first stabilising mechanism in the form of a first spacer element 36 which extends transversely between the slot

rods 32 in front of the front end of the slot, and is designed to prevent the slot rods 32 from moving apart at the front end of the slot 14 when a boat is driven onto the hull protection cloth 12 or is situated thereon. The second stabilising mechanism, in the same way as in figure 7, comprises side edge rods 70 which in this embodiment form part of a frame 100 which extends along the side edges of the hull protection cloth 12 and at the edge of its front part. If the hull protection cloth 12 is rectangular, the frame may thus consist of two side edge rods 70 which extend along the side edges 15 of the hull protection cloth 12, and a front edge rod 104 which extends along the front short side 13 of the hull protection cloth 12. If the hull protection cloth 12 has a different form in its front part, the frame 100 may comprise, in addition to two side rods 70 and a front edge rod 104, further rods which follow the edges of the hull protection cloth in the front part of the hull protection cloth. Figure 11 shows an example where the frame 100 comprises two slanting edge rods 106 which frame the front pointed part of the hull protection cloth 12. The various rods used in the frame 100 may be formed in a similar fashion to that described for the side edge rods 70 in connection with figure 7. The frame 100 may preferably be floating. In a similar manner to the embodiments of the second stabilising mechanism shown in figure 7, this embodiment may comprise a third spacer element 72 which extends between the side edge rods 70 and is designed to limit the distance between the side edge rods 70 at the front end of the slot 14, and at least one pair of transverse rods 60 which are fastened to the side edge rods 70 and placed at the rear ends of the hull protection cloth 12 in order to prevent the slot 14 from opening at its rear end.

[0063] The embodiment shown in figure 11 may be suitable for use when the hull protection device 10 is to be used at a quay where there are neither posts, Y-beams nor other similar devices. As the frame 100 is rigid and the hull protection cloth 12 is anchored therein, the side edge rods 70 together with the transverse rods 60 prevent the slot 14 from opening at its rear part when a boat is driven onto or is situated on the hull protection cloth 12. The third spacer element 72 can absorb forces which act to move the side edge rods 70 apart, but may also be used so as to smoothly fasten the hull protection cloth 12 to the frame 100. The hull protection cloth 12 may however be fastened to the frame 100 in another way and the third spacer element 72 omitted.

[0064] Figure 12 shows schematically a further variant of the hull protection device 10. The stabilising device 30 in this case comprises a frame 100 which is of the same type as that shown in figure 11, and in which the hull protection cloth 12 is fastened, and one or more pairs of transverse rods 60, which are of the same type and arranged in the same way as previously described in connection with the embodiment shown in figures 7 and 11. A first pair of transverse rods 60 may be placed at the front part of the slot 14 and is designed to prevent the slot 14 from opening at its front part. They thus constitute

a first stabilising mechanism. A second pair of transverse rods 60 is placed at the rear end of the hull protection cloth 12 and is designed to prevent the slot 14 from opening at its rear part. They thus constitute a second stabilising mechanism. One or more further pairs of transverse rods 60 may be placed between the rear pair and the front pair so as to further stabilise the width of the slot.

[0065] In the embodiment shown in figure 12, thus the stabilising device 30 comprises no transverse rods 32 or spacer elements 36, 40, 72 of the type found in the embodiments in figures 4, 7 and 11. This means an increased load on the transverse rods 60, which may mean that the material and dimensions thereof must be adapted. The embodiment in figure 12 may naturally be supplemented with slot rods 32.

[0066] It should finally be stated that the profile 90 described in connection with figures 9 and 10 may be used in combination with other embodiments of the second stabilising mechanism in order to contribute to holding together the rear part of the slot 14 and to allow the boat 20 to be driven into this.

Claims

1. Hull protection device (10) which is designed to counter the growth of undesired organisms on underwater parts of a boat (20) and which comprises a floating hull protection cloth (12) onto which the boat is intended to be driven,
characterized in that

the hull protection cloth (12) has a slot (14) which allows use of the hull protection device (10) when the boat (20) is provided with a keel (22), **in that** the keel is driven into the slot (14) when the boat is driven onto the hull protection cloth; and
the hull protection device is provided with a stabilising device (30) which prevents the slot (14) from opening when the boat is driven onto the hull protection cloth (12) or is situated thereon.

2. Hull protection device (10) according to Claim 1, **characterized in that** the hull protection cloth (12) is designed to float horizontally in the water when the hull protection device is not used by the boat.
3. Hull protection device (10) according to Claim 1 or 2, **characterized in that** the stabilising device (30) comprises a first stabilising mechanism which is designed to prevent the slot from opening in its front part when the boat (20) is driven onto the hull protection cloth (12) or is situated thereon.
4. Hull protection device (10) according to any of Claims 1 to 3, **characterized in that** the stabilising device (30) comprises a second stabilising mecha-

nism which is designed to prevent the slot from opening in its rear part when the boat (20) is driven onto the hull protection cloth (12) or is situated thereon.

5. Hull protection device (10) according to any of Claims 1 to 4, **characterized in that** the stabilising device (30) comprises two slot rods (32) which extend in the longitudinal direction along the long sides (21) of the slot (14). 5
6. Hull protection device (10) according to Claim 5, **characterized in that** the stabilising device (30) comprises a first spacer element (36) which extends transversely between the slot rods (32) in front of the front end of the slot (14) and is designed to prevent the slot rods (32) from moving apart at the front end of the slot (14) when the boat (20) is driven onto the hull protection cloth (12) or is situated thereon. 10
7. Hull protection device (10) according to Claim 6, **characterized in that** the stabilising device (30) comprises a second spacer element (40) which extends transversely between the slot rods (32) in front of the first spacer element (36) and is designed to prevent the slot rods (32) from moving towards one another at their front ends when the boat (20) is driven onto the hull protection cloth (12) or is situated thereon. 20
8. Hull protection device (10) according to any of Claims 1 to 6, **characterized in that** the stabilising device (30) comprises two side edge rods (70) which extend along the side edges (15) of the hull protection cloth (12). 30
9. Hull protection device (10) according to Claim 8, **characterized in that** the stabilising device (30) comprises a third spacer element (72) which extends transversely between the side edge rods (70) and is designed to limit the distance between the side edge rods (70) at the front end of the slot when the boat (20) is driven onto the hull protection cloth (12) or is situated thereon. 35
10. Hull protection device (10) according to Claim 8 or 9, **characterized in that** the stabilising device (30) comprises a front edge rod (104) which extends between the side edge rods (70) at the front end of the hull protection cloth (12), whereby the side edge rods (70) and the front edge rod (104) form a frame (100) for the hull protection cloth (12). 40
11. Hull protection device (10) according to any of Claims 8 to 10, **characterized in that** the stabilising device (30) comprises at least one pair of transverse rods (60) which extend between the side edge rods (70) and the side edges (21) of the slot (14) at the rear end of the hull protection cloth (12), and are 45

designed to prevent the slot (14) from opening in its rear part.

12. Hull protection device (10) according to any of the preceding claims, **characterized in that** the stabilising device (30) comprises a fourth spacer element (90) which is designed to limit the distance between the side edges of the slot (14) in the rear part of the slot (14), and which have a shape which allows the keel (22) of the boat (20) to pass the fourth spacer element (90). 50
13. Hull protection device (10) according to any of the preceding claims, **characterized in that** the hull protection device comprises a keel protection device (16) with two keel protection curtains (18) which are configured such that, on use of the hull protection device (10) in the water, they hang down from their long sides on the slot (14) in order to protect the keel (22) from the growth of undesired organisms when the boat (20) is situated on the hull protection cloth (12). 55
14. Hull protection device (10) according to Claim 13, **characterized in that** the rear edges of the keel protection curtains (18) form an angle β with the long sides of the slot (14), wherein the angle β is 30 to 90°. 25
15. Hull protection device (10) according to any of the preceding claims, **characterized in that** the hull protection cloth (12) is provided with two transverse rods (60) between the side edges (21) of the hull protection cloth (12) and the side edges of the slot (14), said transverse rods being placed in channels (62) and arranged so as to counter the creasing of the hull protection cloth (12). 30

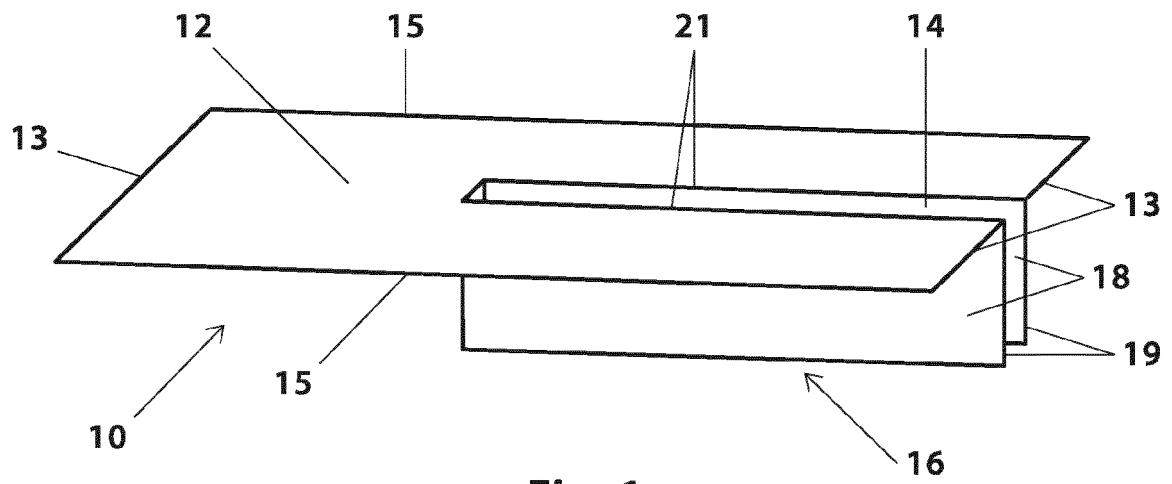


Fig. 1

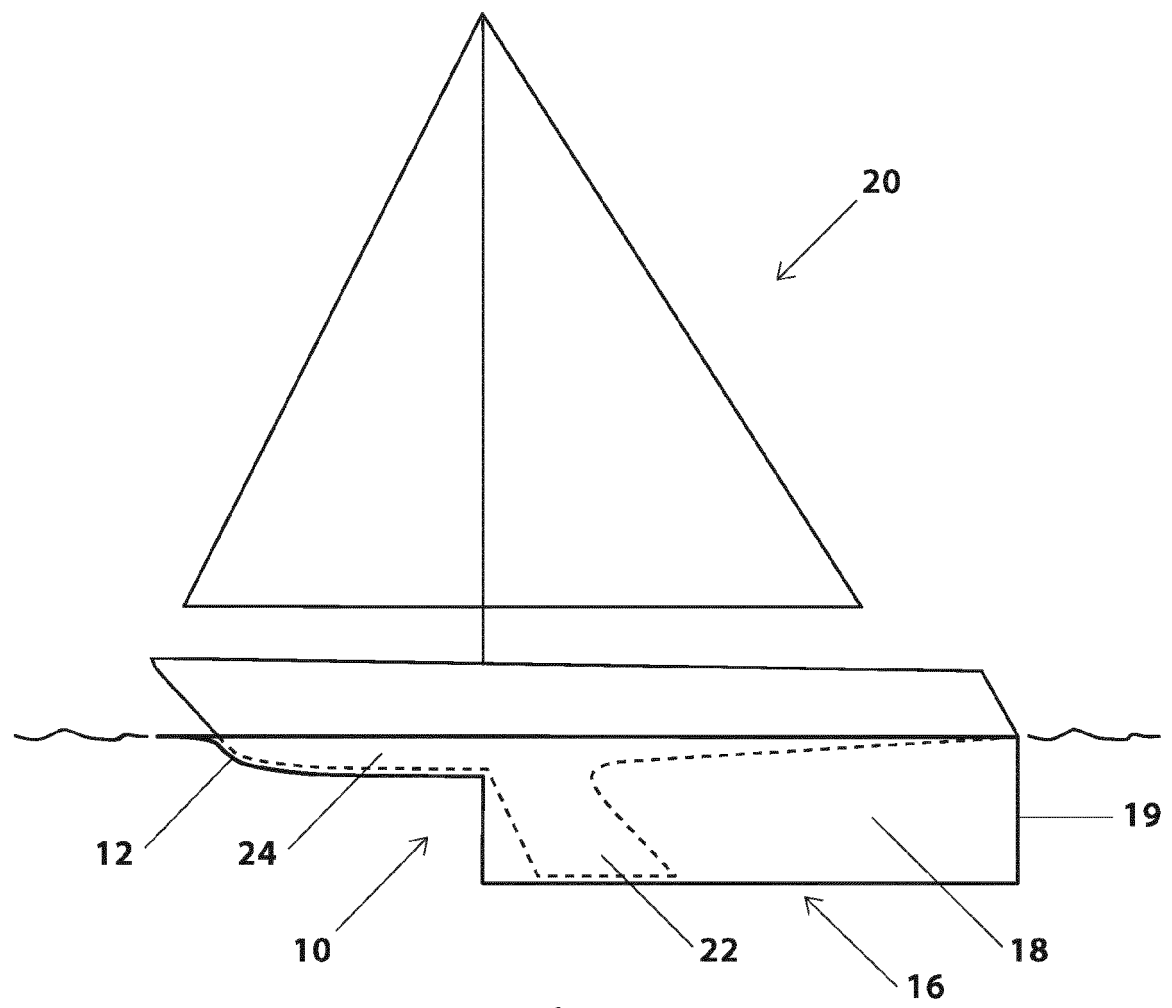


Fig. 2

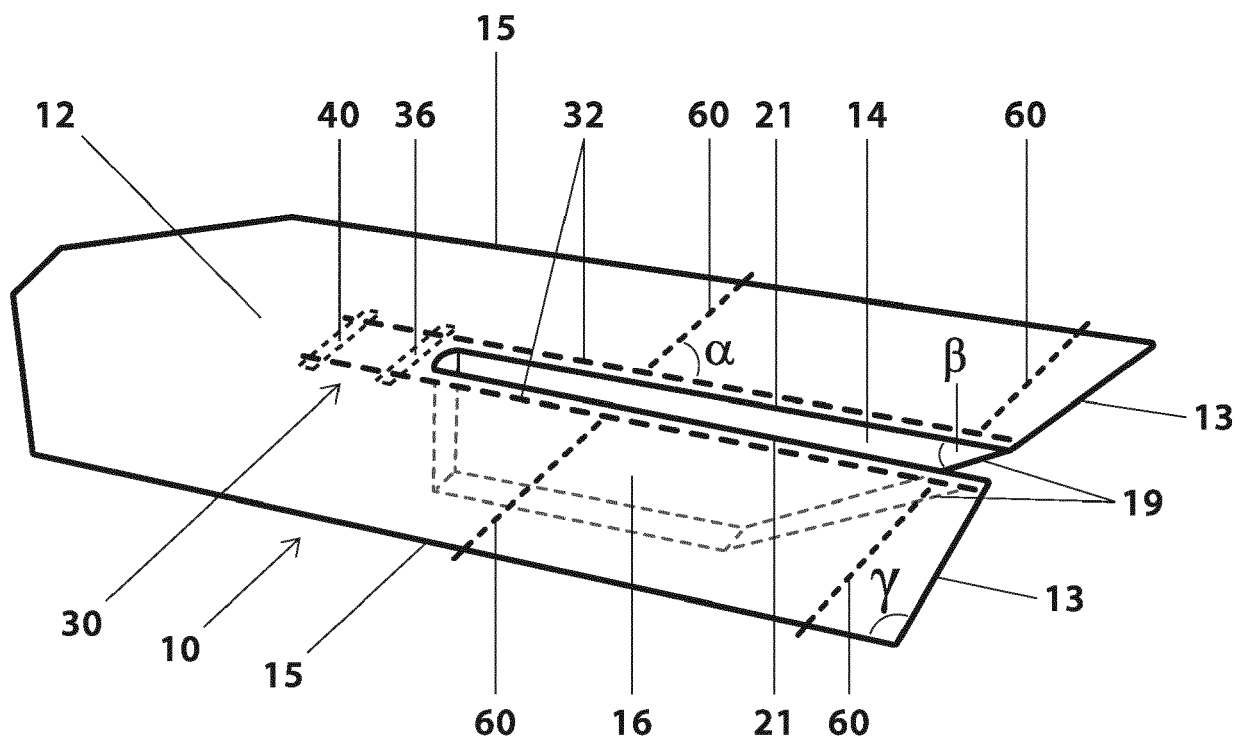


Fig. 3

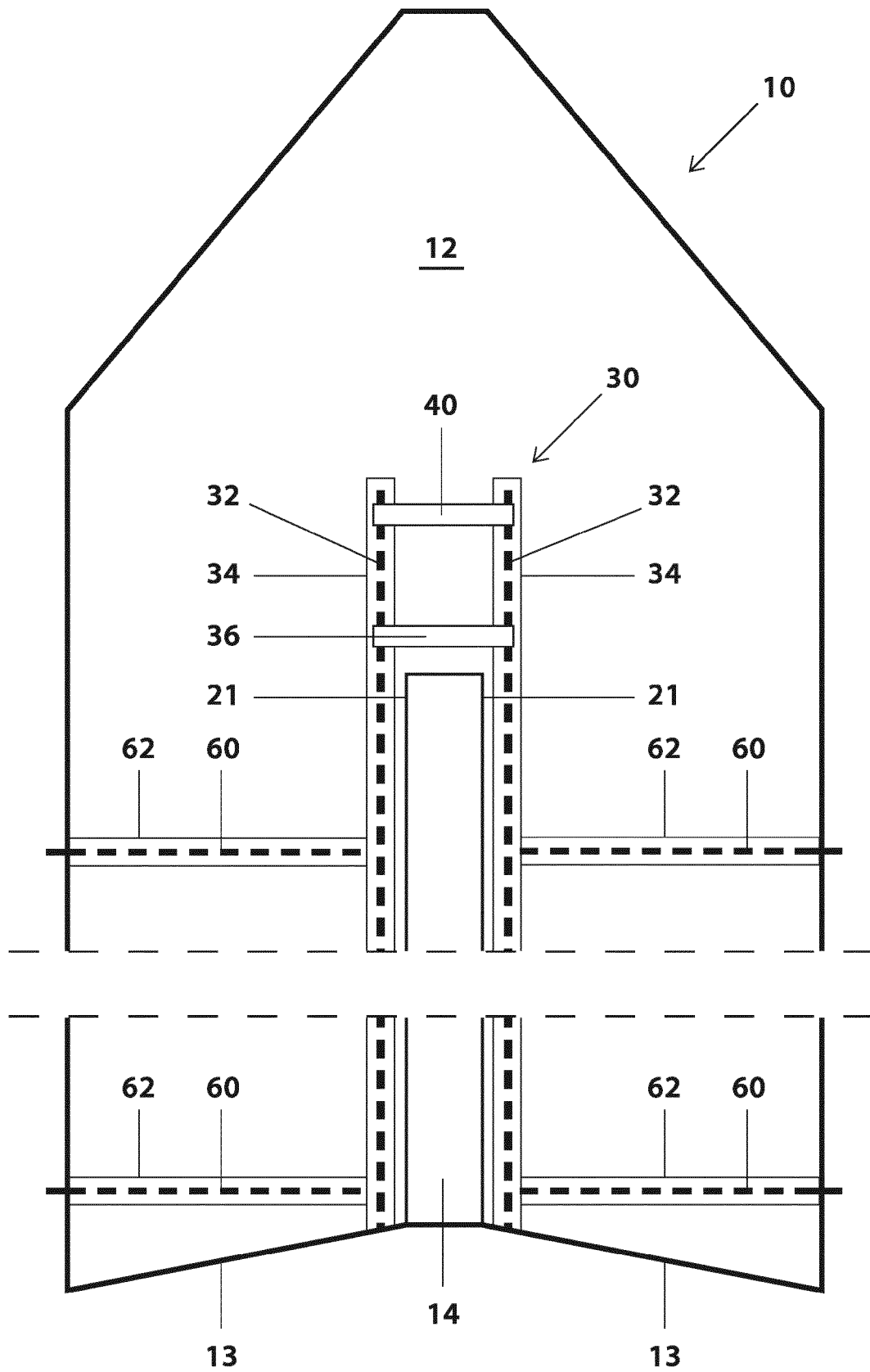


Fig. 4

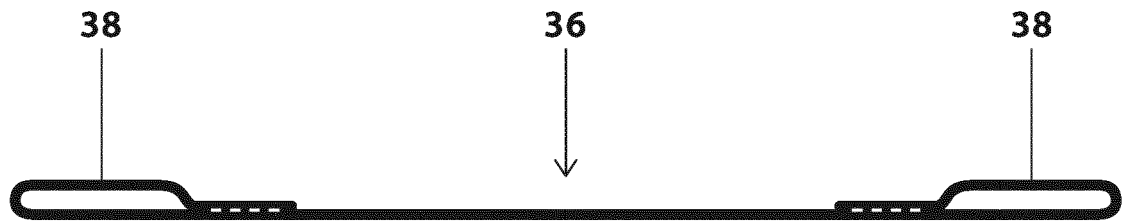


Fig. 5

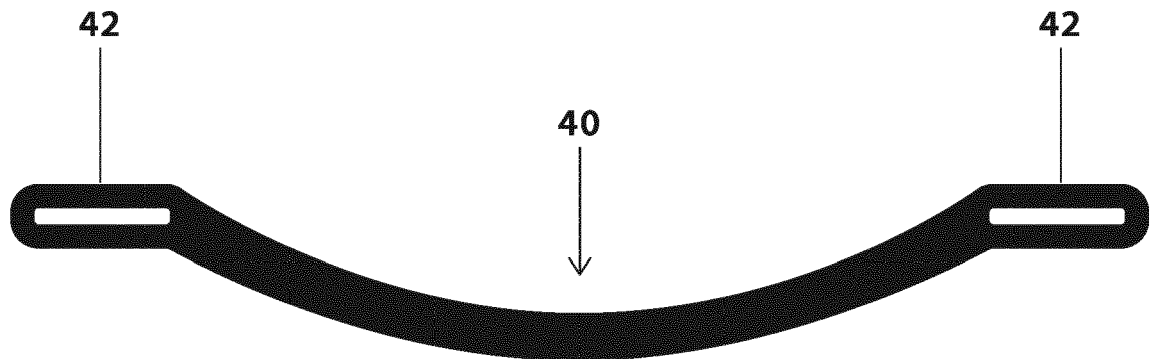


Fig. 6

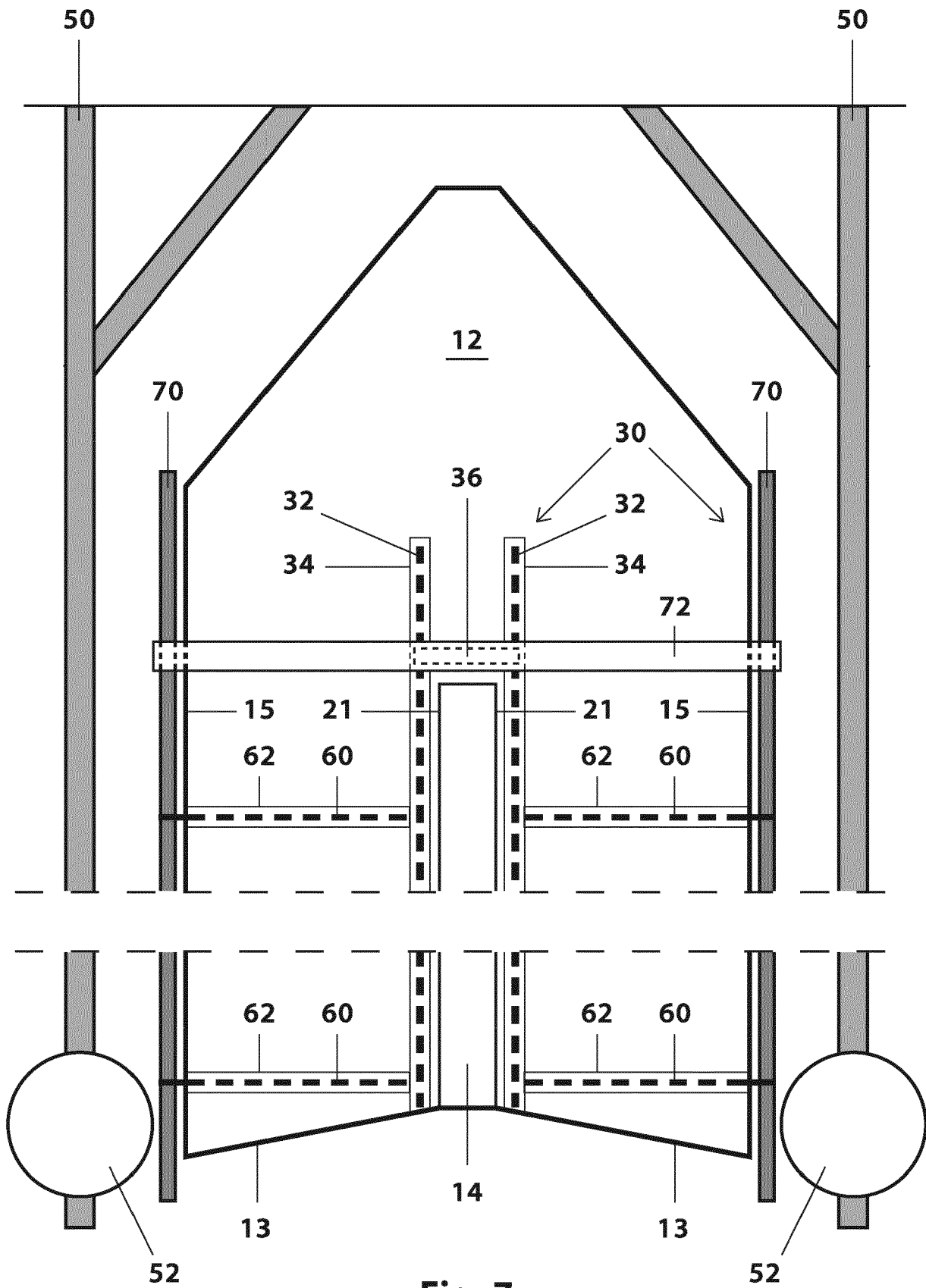


Fig. 7

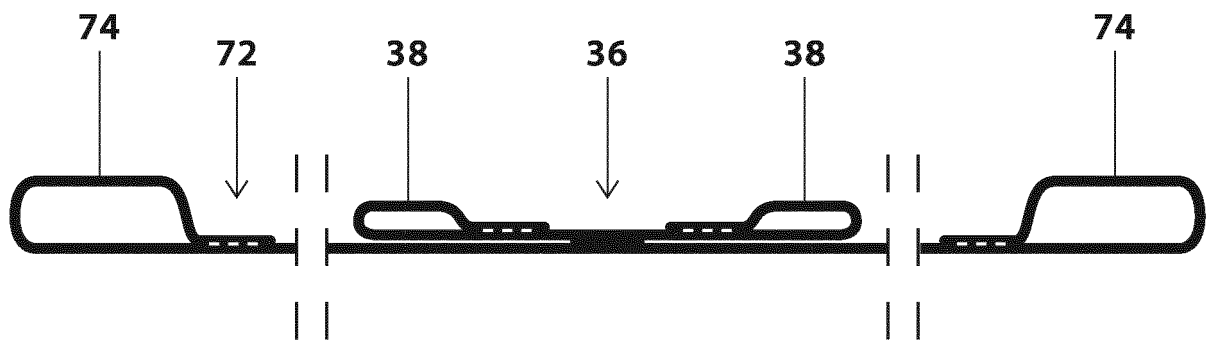


Fig. 8

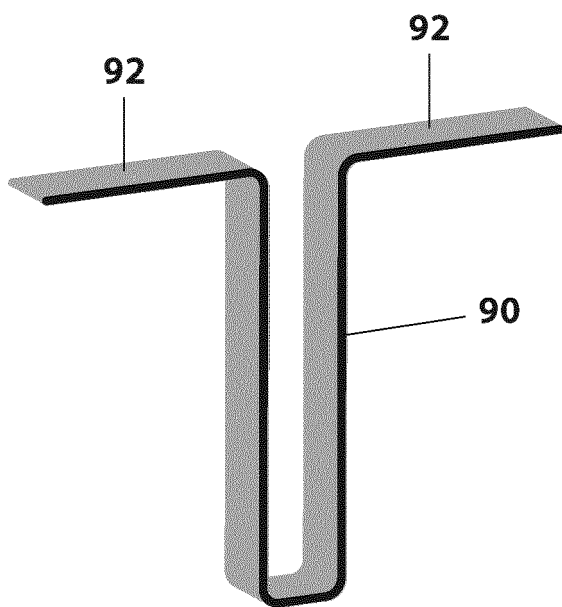


Fig. 9

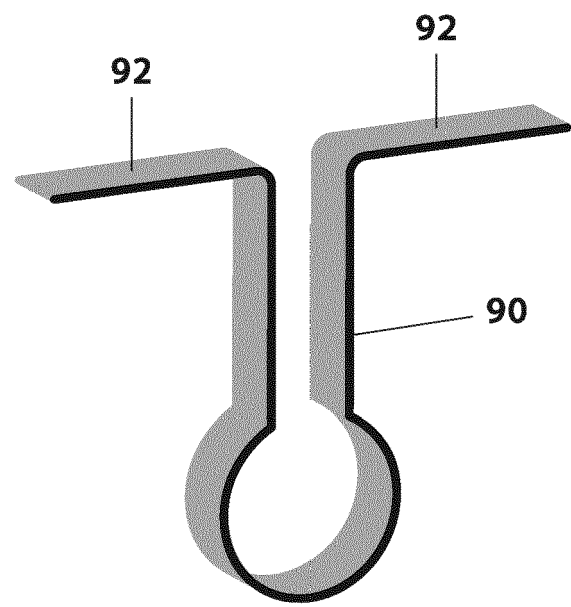


Fig. 10

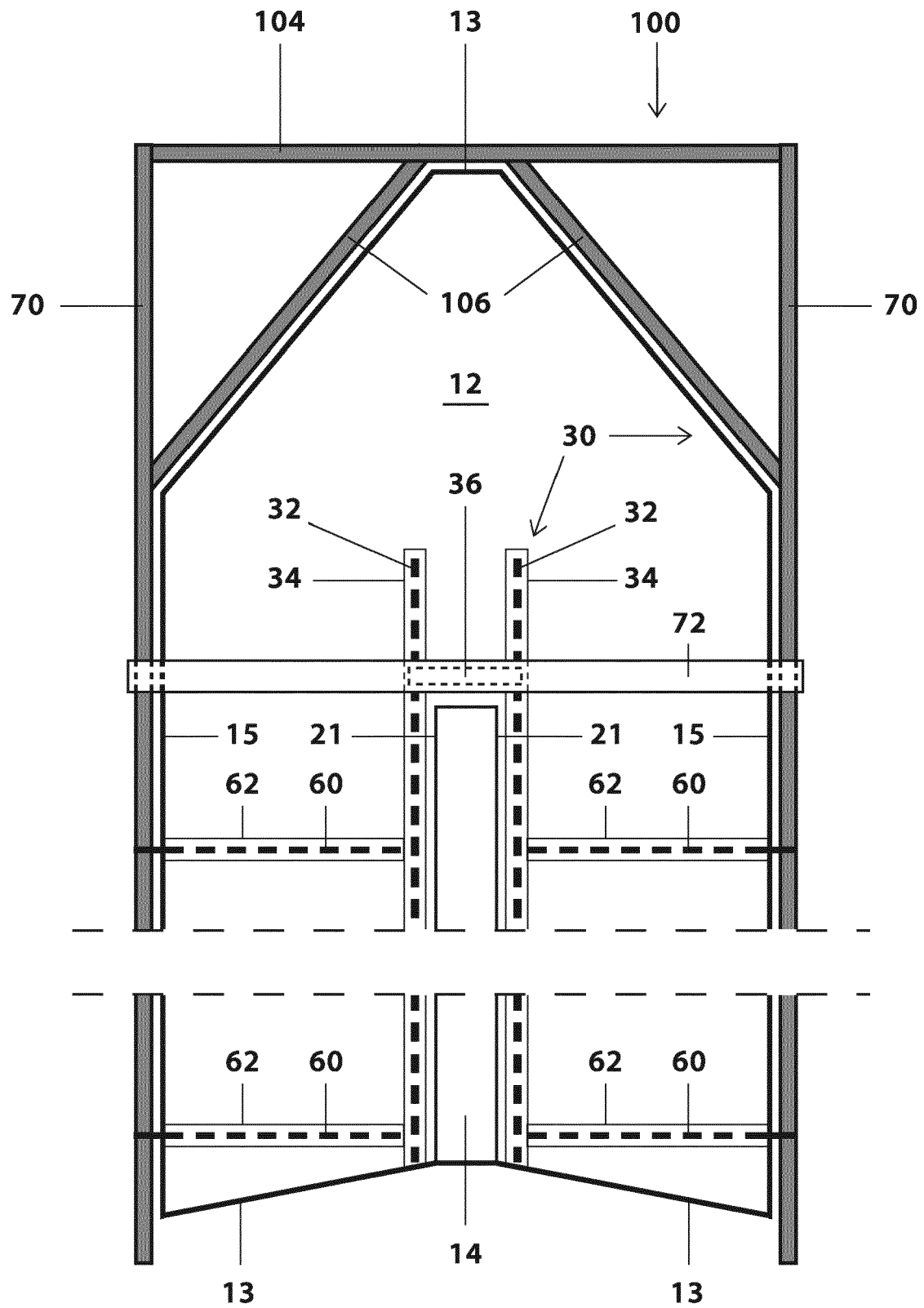


Fig. 11

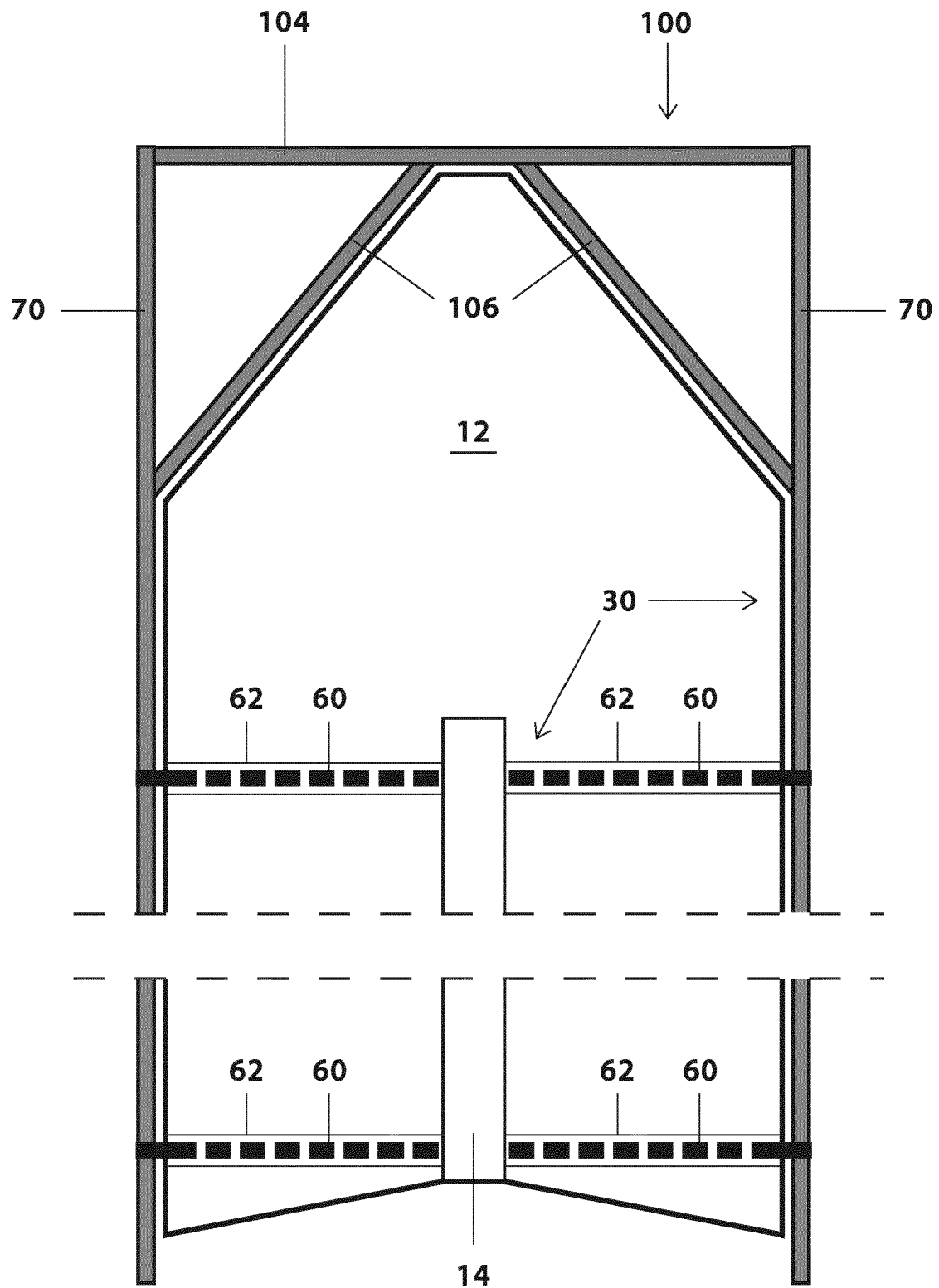


Fig. 12



EUROPEAN SEARCH REPORT

Application Number

EP 21 44 6502

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EPO FORM 1503 03.82 (P04C01)

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X,D	US 2011/120362 A1 (COSTAS DAN NICOLAUS [US]) 26 May 2011 (2011-05-26)	1-5, 8-11, 13-15	INV. B63B59/04
A	* figure 5 * * paragraphs [0043] - [0045] * -----	6,7,12	
A	AU 2005 222 514 A1 (DE WAAL ALEXANDER [AU]) 26 April 2007 (2007-04-26) * the whole document * -----	1-15	
A	US 2005/039659 A1 (SAKURAI JIRO [JP]) 24 February 2005 (2005-02-24) * paragraphs [0037] - [0039] * * figures * -----	1-15	
A	WO 2012/020182 A1 (BUZIT GERARD LE [FR]) 16 February 2012 (2012-02-16) * the whole document * -----	1-15	
A	JP H05 54198 U (N/A) 20 July 1993 (1993-07-20) * see machine translation enclosed * * figures * -----	1,13,14	TECHNICAL FIELDS SEARCHED (IPC) B63B
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 21 February 2022	Examiner Gardel, Antony
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 21 44 6502

5

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2011120362 A1	26-05-2011	US 2011120362 A1	26-05-2011
		WO 2012015448 A1	02-02-2012
AU 2005222514 A1	26-04-2007	NONE	
US 2005039659 A1	24-02-2005	CA 2466472 A1	15-05-2003
		JP 3974579 B2	12-09-2007
		JP WO2003039947 A1	24-02-2005
		US 2005039659 A1	24-02-2005
		WO 03039947 A1	15-05-2003
WO 2012020182 A1	16-02-2012	EP 2603425 A1	19-06-2013
		FR 2963775 A1	17-02-2012
		US 2013139744 A1	06-06-2013
		WO 2012020182 A1	16-02-2012
JP H0554198 U	20-07-1993	NONE	

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- SE 527601 [0007]
- WO 0181167 A [0009]
- US 20110120362 A [0010]