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(54) **IMPROVED DOCKING APPARATUS**

DOCKVORRICHTUNG

AMELIORATIONS APPORTEES A UN DISPOSITIF D'AMARRAGE

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(73) Proprietor: **Airberth International Pty. Ltd.**
Broadbeach, Queensland (AU)

(72) Inventors:
• **McKEAN, David Alexander**
Ashmore, QLD 4214 (AU)
• **MARRIOTT, Graig Thomas**
Ashmore QLD 4214 (AU)

• **MEEK, Michael Kilpatrick**
Broadbeach QLD 4218 (AU)

(74) Representative: **Gee, Steven William et al**
1 South Lynn Gardens,
London Road
Shipston on Stour, Warwickshire CV36 4ER (GB)

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Description

[0001] This invention relates to a docking apparatus of the type which is capable of lifting marine craft above the surrounding water level for storage or other purposes for example for maintenance or repair purposes.

Background Art

[0002] A number of different designs of docking apparatus which lift water craft above the surrounding water level are currently available. Docking apparatus of this type normally comprises a pair of spaced apart bodies which can contain air so that the bodies may float and support a water craft above the water level but which may be filled or partially filled with water to sink the bodies to enable the water craft to be launched or to enable a water craft to be located over the apparatus for subsequent lifting. A major disadvantage of the known apparatus is that they are generally rigid structures and therefore usually only suitable for lifting water craft having a hull design which matches the structure unless a series of adjustments are made. Thus docking apparatus of this type, to overcome the above disadvantage, has to be manufactured to suit the particular water craft with which it is to be used.

[0003] JP 3 125 691 discloses a docking apparatus comprising a pair of spaced apart primary buoyancy bodies, said buoyancy bodies being capable of floating to support a water craft above the water level or submerged to allow water craft to be placed onto or released from said apparatus, the apparatus including cradle means mounted on said buoyancy bodies and extending transversely between said buoyancy bodies for supporting the water craft, said cradle means being adapted to adjust to the shape of the hull of said water craft when subject to the weight of said water craft thereon.

[0004] Document US 4 732 102 describes a docking apparatus according to the preamble of claim 1.

[0005] The present invention aims to overcome or alleviate the above disadvantages or at least provide an alternative to known docking apparatus by providing apparatus which is capable of lifting water craft above the water for storage or other purposes which will adjust to suit a range of water craft of different hull configurations.

Summary of the Invention

[0006] According to this invention there is provided a docking apparatus comprising a pair of spaced apart primary buoyancy bodies, said buoyancy bodies being capable of floating to support a water craft above the water level or submerged to allow water craft to be placed onto or released from said apparatus, the apparatus including cradle means mounted on said buoyancy bodies and extending transversely between said buoyancy bodies for supporting the water craft, said cradle means being adapted to adjust to the shape of the hull of said water

craft when subject to the weight of said water craft thereon, characterised in that one or more transverse members extend between and join said buoyancy bodies beneath the cradle means wherein the transverse spacing between the buoyancy bodies is substantially maintained.

[0007] The one or more transverse members may join the buoyancy bodies on their lower side. Specifically the buoyancy bodies may be able to pivot about a substantially horizontal axis relative to the transverse member or members when the weight of said water craft is supported on said cradle means, eg to perform said adjustment of said cradle means to conform to the shape of the hull.

[0008] The buoyancy bodies may be connected to said transverse member or members by means of a hinge connection to perform said pivoting about a horizontal axis.

[0009] Alternatively, the hinged movement may be provided by live or integral hinges at or adjacent the connection between the transverse members and buoyancy bodies.

[0010] The cradle means may comprise at least one member in the form of a sheet extending between the buoyancy bodies which is fixed at opposite ends to the buoyancy bodies and the sheet may be adapted to adjust to the shape of the hull of the water craft by being formed of a material that is capable of flexing to conform substantially to the shape of the underside of a water craft hull supported thereon.

[0011] The sheet may be semi-stiff, eg formed of a stiff plastics material that does not corrode in water, and the sheet may have a substantially V-shaped configuration in cross section. This assists it to receive and centralise the V-shaped hull of the watercraft. A particularly suitable material for the cradle member is high density polyethylene. Other plastics however may be suitable for this purpose.

[0012] The apparatus may further include a pair of spaced secondary buoyancy bodies which assist with the flotation of the apparatus and support the primary buoyancy bodies when the primary buoyancy bodies are submerged.

[0013] Conveniently both said primary and secondary buoyancy bodies may be of elongate tubular form and said secondary buoyancy bodies may extend substantially parallel to said primary buoyancy bodies. The secondary buoyancy bodies are typically supported above said primary buoyancy bodies by a support.

[0014] Each cradle member may have two opposed ends and each buoyancy body may have a pedestal member mounted thereon corresponding to each cradle member with each end of each cradle member mounted on a said pedestal member.

[0015] Each said pedestal member may incline inwardly as it extends upwardly from said buoyancy body. Each cradle member may extend away from the associated pedestal member, eg an upper surface thereof,

at substantially a right angle to the axis of the pedestal member.

[0016] The primary buoyancy bodies include exhaust openings for exhausting water from said primary buoyancy bodies. The exhaust openings are optionally connected to tubes which may be lowered so as to be in communication with the water in which the bodies are located or alternatively which may be raised above the water level.

[0017] The primary buoyancy bodies are conveniently formed of a stiff plastics material that is high-density polyethylene and in a preferred form are spaced laterally quite far apart, eg forming lateral extremities of the apparatus.

[0018] The buoyancy bodies may each define one or more compartments. Such bodies may float or be submerged due to the interchange of air and water within those compartments by way of an air pumping and exhaust system. When air is forced into the buoyancy bodies, water is discharged from the bodies through exhaust openings suitably provided in the underside of the bodies such that buoyancy and consequently lift is achieved. When air is released from the buoyancy bodies, water may enter through the underside exhaust openings to allow the buoyancy bodies to submerge.

[0019] The tubes may be substantially rigid tubes which are connected through a pivot connection to each body whereby they may be pivotally raised or lowered.

[0020] The apparatus may include air valves through which air is pumped into the buoyancy bodies for discharging water therefrom.

[0021] The secondary buoyancy bodies remain buoyant and support the apparatus when the buoyancy bodies are submerged, thereby limiting the depth below the water surface of the support member. For this purpose, the secondary buoyancy bodies also define one or more compartments. The secondary buoyancy bodies are normally substantially smaller in diameter than the buoyancy bodies.

[0022] The secondary buoyancy bodies are supported on supports in the form of substantially vertical struts mounted on said buoyancy bodies towards the lateral extremities thereof.

[0023] For releasing air from the buoyancy bodies, air valves may be connected to each buoyancy body, whereby when the valves are open, air is capable of being exhausted therefrom. Alternatively for this purpose, a single valve may be connected to each buoyancy body such that operation of the valve may simultaneously connect those bodies to atmosphere.

[0024] When the tubes are lowered and the valve or valves are opened, the buoyancy bodies will fill with water through the tubes to submerge the buoyancy bodies. When the tubes are raised above water level, opening of the valve or valves will not result in the buoyancy bodies submerging.

[0025] For elevating the docking apparatus and the water craft supported thereon, air is pumped into the

buoyancy bodies through the aforementioned valves to cause water in the bodies to be discharged through the tubes.

5 Brief Description of the Drawings

[0026] In order that the invention may be more readily understood and put into practical effect, reference will now be made to the accompanying drawings which illustrate a preferred embodiment of the invention and wherein:

- Fig. 1 is a perspective view from the rear of docking apparatus according to the present invention;
- Fig. 2 is a rear view of the apparatus of Fig. 1;
- Fig. 2A is an enlarged sectional view of the region designated A in Fig. 2;
- Fig. 3 is a plan view of the docking apparatus of Fig. 1;
- Fig. 4 illustrates a typical exhaust duct of the apparatus;
- Figs. 5 to 7 illustrate schematically the operation of the apparatus of the invention; and
- Fig. 8 is a rear view of an alternative form of apparatus according to the invention.

Detailed Description of the Invention

[0027] Referring to the drawings and firstly to Fig. 1 to 3, there is illustrated docking apparatus 10 according to the present invention, comprising a pair of elongated spaced apart substantially tubular primary buoyancy bodies 11. Extending between the bodies 11 are a pair of cradles 12, each of which includes a sheet 13 which is of a V-shaped configuration about a valley 14 arranged centrally of the bodies 11. The sheets 13, at each end, are provided with downwardly extending tubular sockets or skirts 15 which are adapted to locate over, in a telescopic fashion, upwardly directed hollow spigots 16 which extend from the buoyancy bodies 11, the spigots 16 being inclined inwardly towards each other.

[0028] The bodies 11 are also joined on their lower side by one or more transversely extending members 17 which in this embodiment are of tubular form. A member 17 extends at each end into tubular sockets 18 which are fixed to a lower side of the buoyancy bodies 11 and extend somewhat tangentially therefrom and towards each other. The tubular sockets 18 are of a larger diameter than the diameter of the member 17 such that the member 17 is free for some movement in the sockets 18. Pivot pins 19 extend transversely through each socket 18 and through openings 20 in an end of the member 17 located therein to form a pivot connection allowing hinged movements of the bodies 11 about substantially horizontal axes towards and away from each other. The pivot pins 19 are a relatively loose fit in the ends of the members 17 being smaller than the diameter of the openings 20.

[0029] Hinged movement of the bodies 11 is accompanied by deformation of the sheet 13 providing a sharper or shallower V configuration to match the hull 21 of a water craft supported thereon as shown in Fig. 2. The V-shaped cradles 12 can thus conform to the shape of the hull 20 without any need for external adjustments.

[0030] Mounted above the bodies 11 via supports 22 are secondary buoyancy bodies 23 which are of tubular form and which extend longitudinally of and substantially parallel to each body 11. The bodies 23 are sealed and limit the depth to which the apparatus 10 is submerged when the primary bodies 11 are flooded.

[0031] Exhaust openings 24 are provided on the lower side of each body 11 and are connected through a hollow pivot joint 25 to exhaust tubes 26. The tubes 26 are thus capable of being pivoted between a lower position illustrated in dotted outline where the end 27 of a tube 26 is submerged and a raised position where the end 27 of the tube 26 is above the water level. Movement of the tubes 26 between these positions may be simply achieved by means of suitable manual means such as a boat pole to push the tube 26 downwardly and a rope or cable 28 connected to the tubes 26 which enables the tubes 26 to be pulled upwardly to the raised position.

[0032] In an alternative simplified arrangement, the exhaust openings 24 do not have the extending tubes 26 but are open all the time. A disadvantage of this arrangement however is that if an air leakage occurs in one of the bodies 11, water will fill that body 11 through the opening 24 and thus tipping the apparatus 10 to a possible unstable attitude.

[0033] Air valves for raising and lowering of the apparatus may be mounted on the apparatus 10 or adjacent thereto, such as on a jetty or pontoon. In one form, the air valves comprise a pair of manually actuatable valves 29 connected to the respective primary buoyancy bodies 11 and to a common main air valve 30. The valves 29 and 30, as shown in Fig. 1 may be mounted on one of the secondary buoyancy bodies 23. This arrangement allows the user to select whether both bodies can receive air or release air simultaneously by opening both valves 29 and the main valve 30 or whether one valve 29 should be opened earlier than the other valve 29, for example to exhaust one body 11 of water to level the apparatus 10 in the event that excess weight is on one side. The valve 30 is connectable to a source of air, for example from a compressor, through an air supply line 31.

[0034] In use and as shown in Figs. 5 to 7, where it is desired to lift a water craft 32 having a V-shaped hull 21 from the water, the apparatus 10 is lowered by lowering the tubes 26 and opening the bodies 11 to the atmosphere through the valves 29 and 30. This will permit water to fill both the bodies 11 through the tubes 26 and exhaust openings 24 to submerge the bodies 11 to a level where the secondary buoyancy bodies 23 are at or adjacent the water level 33 and supporting the bodies 11.

[0035] The craft 32 is then moved over the apparatus 10 and cradles 12 and then air forced into the bodies 11 via the line 31 and valves 30 and 29 to expel water therefrom. This will increase the buoyancy of the bodies 11 causing the apparatus 10 to rise. In this movement, the keel of the water craft 32 will locate initially in the valley 14. Further elevating of the apparatus 10 will cause the sheets 13 to flex and conform to the underside shape of the hull 21 of the water craft 32 as shown in Fig. 6 and 7. To allow this to occur the bodies 11 will move in a hinge like fashion toward each other about the pivot pins 19, whilst being restrained from moving outwardly by the members 17. Further or continued application of air to the bodies 11 will cause the bodies 11 to elevate the water craft 32 clear of the water level 33 with the hull 21 nesting within the sheets 13 and being supported at the chines by the spigots 16. Lowering of the water craft 32 into the water is the reverse of the above procedure.

[0036] The docking apparatus illustrated in Fig. 1 and 2 is shown to have two cradles 12. It may however incorporate more than two cradles or only a single cradle and a further means for example a fixed cradle to support the remainder of the hull. In yet an alternative configuration the sheet like cradle 12 may be extended to support the full length of the water craft hull 21.

[0037] As stated above, the sheets 13 are provided with spaced apart sockets or skirts 15 of tubular form which are capable of being located over the upstanding spigots 16 on the main buoyancy bodies 11. To hold the skirts 15 in position, bolts or screws 34 may be located in spaced apart circumferential positions around the skirt 15 to secure the skirt 15 to the spigots 16. Removal of the bolts 34 allows the skirts 15 to be detached from the spigots 16. Similarly, the pivot pins or bolts 19 can be removed to enable detachment of the transverse members 17. This allows the apparatus 10 to be disassembled into a convenient form for transport and reassembly as required. All the components of the apparatus 10 are preferably formed of a plastics material such as polyethylene and permanent joints formed by plastics welding.

[0038] In an alternative arrangement shown in Fig. 8, in which like components have been given like numerals, the transverse members 17 are replaced by a planar sheet or sheets 35, similar to the sheet 13 and joined to each body 11 at 36 by adhesives or welding. The sheet 35 is braced by an upstanding member 37 which terminates short of the bodies and at the bodies 11 by further braces 38. The braced sheet 35 provides a relatively rigid support between the bodies 11 on their underside but permits some pivotal or hinged movement of the bodies 11 about the regions 39 which act as integral hinges, the regions 39 comprising regions of the sheet 35 which are unsupported. This is shown in dotted outline in Fig. 8 where the position of the bodies 11 prior to the supporting of the water craft 32 is shown.

[0039] Whilst the above has been given by way of illustrative embodiment of the invention, all such modifi-

cations and variations thereto would be apparent to persons skilled in the art are deemed to fall within the broad scope and ambit of the invention as herein defined in the appended claims.

Claims

1. Docking apparatus (10) comprising a pair of spaced apart primary buoyancy bodies (11), said bodies (11) being capable of floating to support a water craft above the water level or submerged to allow water craft to be placed onto or released from said apparatus, the apparatus (10) including cradle means (12) mounted on said buoyancy bodies (11) extending transversely between said buoyancy bodies (11) for supporting the water craft, said cradle means (12) being adapted to adjust to the shape of the hull of said water craft when subject to the weight of said water craft thereon, **characterised in that** one or more transverse members (17) extend between and join said buoyancy bodies (11) beneath the cradle means (12) wherein the transverse spacing between the buoyancy bodies is substantially maintained.
2. Docking apparatus according to claim 1, wherein said one or more transverse members (17) join the buoyancy bodies (11) on their lower side.
3. Docking apparatus according to claim 2, wherein said buoyancy bodies (11) can pivot about a substantially horizontal axis relative to the transverse member or members (17) when the weight of said water craft is supported on said cradle means (12) to perform said adjustment of said cradle means (12) to the shape of the hull.
4. Docking apparatus according to claim 3, wherein said buoyancy bodies (11) are connected to said transverse member or members (17) by means of a hinge connection to perform said pivoting about a horizontal axis.
5. Docking apparatus according to any one of claims 1 to 4, wherein the cradle means (12) comprises at least one member in the form of a sheet (13) extending between the buoyancy bodies (11) which is fixed at opposite ends to the buoyancy bodies (12), the sheet (13) being adapted to adjust to the shape of the hull of the water craft by being formed of a material that is capable of flexing to conform substantially to the shape of the underside of a water craft hull supported thereon.
6. Docking apparatus according to claim 5, wherein said sheet (13) is semi-stiff and has a substantially V-shaped configuration in cross section.
7. Docking apparatus according to claim 6, wherein said sheet (13) is formed of a stiff plastics material.
8. Docking apparatus according to any one of claims 1 to 7, further including a pair of laterally spaced apart secondary buoyancy bodies (23) which assist with flotation of the apparatus when the primary buoyancy bodies (11) are submerged.
9. Docking apparatus according to claim 8, wherein both said primary and secondary buoyancy bodies (11, 23) are of elongate tubular form, and said secondary buoyancy bodies (23) extend substantially parallel to said primary buoyancy bodies (11).
10. Docking apparatus according to claim 9, wherein each secondary buoyancy body (23) is supported above the associated primary buoyancy body (11) by means of a support (22).
11. Docking apparatus according to any one of claims 5 to 10, wherein each cradle member (13) has two opposed ends and each buoyancy body (11) has a pedestal member (16) mounted thereon corresponding to each cradle member (13), and each end of each cradle member (13) is mounted on a said pedestal member (16).
12. Docking apparatus according to claim 11, wherein each said pedestal member (16) inclines inwardly as it extends upwardly from said buoyancy body (11).
13. Docking apparatus according to claim 12, wherein each cradle member (13) extends away from the associated pedestal member (16) at substantially a right angle to the axis of the pedestal member (16).
14. Docking apparatus according to any one of claims 1 to 13, wherein said primary buoyancy bodies (11) include exhaust openings (24) for exhausting water from said primary buoyancy bodies (11).
15. Docking apparatus according to claim 14, wherein said exhaust openings (24) are connected to tubes (26) which can be lowered so as to be in communication with the water in which the buoyancy bodies (11) are located or alternatively can be raised above the water level.
16. Docking apparatus according to any one of claims 1 to 15, wherein said primary buoyancy bodies (11) are formed of a stiff plastics material that is high-density polyethylene.

Patentansprüche

1. Dockvorrichtung (10), umfassend ein paar mit Zwischenraum zueinander angeordneter Hauptauftriebskörper (11), wobei die genannten Körper (11) schwimmfähig sind, um ein Wasserfahrzeug über dem Wasserspiegel oder untergetaucht zu tragen, sodass ein Wasserfahrzeug auf die genannte Vorrichtung platziert oder von ihr freigesetzt werden kann, wobei die Vorrichtung (10) eine an den genannten Auftriebskörpern (11) montierte Wiegenvorrichtung (12) hat, die sich zum Tragen des Wasserfahrzeugs quer zwischen den genannten Auftriebskörpern (11) erstreckt, wobei die genannte Wiegenvorrichtung (12) die Aufgabe hat, sich an die Form des Rumpfs des Wasserfahrzeugs anzupassen, wenn sie dem Gewicht des genannten Wasserfahrzeugs auf ihr ausgesetzt ist, **dadurch gekennzeichnet, dass** sich ein oder mehrere Querelemente (17) unterhalb der Wiegenvorrichtung (12) zwischen den genannten Auftriebskörpern (11) erstrecken und sie miteinander verbinden, wobei die Querbeabstandung zwischen den Auftriebskörpern im Wesentlichen aufrecht erhalten wird.
2. Dockvorrichtung nach Anspruch 1, bei der genannte(s) eines oder mehrere Querelement(e) (17) die Auftriebskörper (11) an ihrer unteren Seite verbinden.
3. Dockvorrichtung nach Anspruch 2, bei der die genannten Auftriebskörper (11) sich um eine im Wesentlichen horizontale Achse relativ zu dem Querelement oder den Querelementen (17) drehen können, wenn das Gewicht des genannten Wasserfahrzeugs auf der genannten Wiegenvorrichtung (12) getragen wird, um die genannte Anpassung der genannten Wiegenvorrichtung (12) an die Form des Rumpfes durchzuführen.
4. Dockvorrichtung nach Anspruch 3, bei der die genannten Auftriebskörper (11) durch eine gelenkige Verbindung mit dem genannten Querelement oder den genannten Querelementen (17) verbunden sind, um das genannte Drehen um eine horizontale Achse durchzuführen.
5. Dockvorrichtung nach einem der Ansprüche 1 bis 4, bei der die Wiegenvorrichtung (12) wenigstens ein Element in der Form einer sich zwischen den Auftriebskörpern (11) erstreckenden Tafel (13) aufweist, die an entgegengesetzten Enden an den Auftriebskörpern (11) befestigt ist, wobei die Tafel (13) dadurch, dass sie aus einem Material gebildet ist, das biegefähig ist, ausgeführt ist, um sich an die Form des Rumpfes des Wasserfahrzeugs anzupassen, um der Form der Unterseite eines darauf getragenen Wasserfahrzeugrumpfs im Wesentlichen zu entsprechen.
6. Dockvorrichtung nach Anspruch 5, bei der die genannte Tafel (13) halbsteif ist und im Querschnitt eine im Wesentlichen V-förmige Gestalt hat.
7. Dockvorrichtung nach Anspruch 6, bei der die genannte Tafel (13) aus einem steifen Kunststoff hergestellt ist.
8. Dockvorrichtung nach einem der Ansprüche 1 bis 7, die ferner ein Paar seitlich mit Zwischenraum zueinander angeordneter sekundärer Auftriebskörper (23) hat, die die Schwimmfähigkeit der Vorrichtung unterstützen, wenn die Hauptauftriebskörper (11) untergetaucht sind.
9. Dockvorrichtung nach Anspruch 8, bei der sowohl die genannten Haupt- als auch die genannten sekundären Auftriebskörper (11, 23) eine längliche Röhrenform haben und die genannten sekundären Auftriebskörper (23) sich im Wesentlichen parallel zu den genannten Hauptauftriebskörpern (11) erstrecken.
10. Dockvorrichtung nach Anspruch 9, bei der jeder sekundäre Auftriebskörper (23) durch einen Träger (22) über dem assoziierten Hauptauftriebskörper (11) gehalten ist.
11. Dockvorrichtung nach einem der Ansprüche 5 bis 10, bei der jedes Wiegenelement (13) zwei entgegengesetzte Enden hat und jeder Auftriebskörper (11) ein daran montiertes Sockelelement (16) entsprechend jedem Wiegenelement (13) hat und jedes Ende jedes Wiegenelements (13) an einem genannten Sockelelement (16) montiert ist.
12. Dockvorrichtung nach Anspruch 11, bei der jedes genannte Sockelelement (16) sich im Erstrecken von dem genannten Auftriebskörper (11) nach oben nach innen neigt.
13. Dockvorrichtung nach Anspruch 12, bei der jedes Wiegenelement (13) sich im Wesentlichen in einem rechten Winkel zu der Achse des Sockelelements (16) von dem assoziierten Sockelelement (16) weg erstreckt.
14. Dockvorrichtung nach einem der Ansprüche 1 bis 13, bei der die genannten Hauptauftriebskörper (11) Auslassöffnungen (24) zum Ablassen von Wasser aus den genannten Hauptauftriebskörpern (11) haben.
15. Dockvorrichtung nach Anspruch 14, bei der die genannten Auslassöffnungen (24) mit Röhren (26) verbunden sind, die gesenkt werden können, um

mit dem Wasser in Verbindung zu stehen, in dem sich die Auftriebskörper (11) befinden, oder die alternativ über den Wasserspiegel gehoben werden können.

16. Dockvorrichtung nach einem der Ansprüche 1 bis 15, bei der die genannten Hauptauftriebskörper (11) aus einem steifen Kunststoffmaterial sind, das ein Polyethylen hoher Dichte ist.

Revendications

1. Dispositif d'amarrage (10) comportant une paire de corps de flottabilité primaires séparés l'un de l'autre (11), lesdits corps (11) étant capables de flotter pour supporter une embarcation marine au-dessus du niveau de l'eau ou submergée pour permettre à l'embarcation marine d'être placée sur ledit dispositif ou retirée dudit dispositif, le dispositif (10) comprenant des moyens de type berceau (12) montés sur lesdits corps de flottabilité (11) se prolongeant de manière transversale entre lesdits corps de flottabilité (11) pour supporter l'embarcation marine, lesdits moyens de type berceau (12) étant adaptés pour s'ajuster à la forme de la coque de ladite embarcation marine lorsqu'ils sont soumis au poids de ladite embarcation marine qui s'exerce dessus, **caractérisé en ce qu'un** élément transversal ou plusieurs éléments transversaux (17) se prolongent entre les corps de flottabilité (11) et les relient sous les moyens de type berceau (12) où l'espace transversal entre les corps de flottabilité est dans une large mesure maintenu.
2. Dispositif d'amarrage selon la revendication 1, dans lequel un ou plusieurs desdits éléments transversaux (17) relient les corps de flottabilité (11) sur leur côté inférieur.
3. Dispositif d'amarrage selon la revendication 2, dans lequel lesdits corps de flottabilité (11) peuvent pivoter autour d'un axe dans une large mesure horizontale par rapport à l'élément transversal ou les éléments transversaux (17) quand le poids de ladite embarcation marine est supporté sur lesdits moyens de type berceau (12) pour effectuer ledit ajustement desdits moyens de type berceau (12) à la forme de la coque.
4. Dispositif d'amarrage selon la revendication 3, dans lequel lesdits corps de flottabilité (11) sont connectés audit élément transversal ou auxdits éléments transversaux (17) au moyen d'une connexion à articulation pour effectuer ledit pivotement autour d'un axe horizontal.
5. Dispositif d'amarrage selon l'une quelconque des

revendications 1 à 4, dans lequel les moyens de type berceau (12) comportent au moins un élément ayant la forme d'une tôle (13) se prolongeant entre les corps de flottabilité (11) qui est fixée par des extrémités opposées aux corps de flottabilité (12), la tôle (13) étant adaptée pour s'ajuster à la forme de la coque de l'embarcation marine par le fait qu'elle est formée à partir d'un matériau qui est capable de fléchir pour se conformer dans une large mesure à la forme de la face inférieure de la coque d'une embarcation marine qui y est supportée.

6. Dispositif d'amarrage selon la revendication 5, dans lequel ladite tôle (13) est semi-rigide et a une configuration dans une large mesure ayant une forme en V lorsque vue en coupe.
7. Dispositif d'amarrage selon la revendication 6, dans lequel ladite tôle (13) est formée à partir d'un matériau plastique rigide.
8. Dispositif d'amarrage selon l'une quelconque des revendications 1 à 7, comprenant par ailleurs une paire de corps de flottabilité secondaire séparés l'un de l'autre de manière latérale (23) qui contribuent à la flottaison du dispositif lorsque les corps de flottabilité primaires (11) sont submergés.
9. Dispositif d'amarrage selon la revendication 8, dans lequel lesdits corps de flottabilité à la fois primaires et secondaires (11, 23) sont de forme tubulaire allongée, et dans lequel lesdits corps de flottabilité secondaires (23) se prolongent dans une large mesure de manière parallèle par rapport auxdits corps de flottabilité primaires (11).
10. Dispositif d'amarrage selon la revendication 9, dans lequel chaque corps de flottabilité secondaire (23) est supporté au-dessus du corps de flottabilité primaire connexe (11) au moyen d'un support (22).
11. Dispositif d'amarrage selon l'une quelconque des revendications 5 à 10, dans lequel chaque élément de berceau (13) a deux extrémités opposées et dans lequel chaque corps de flottabilité (11) a un socle (16) qui y est monté correspondant à chaque élément de berceau (13), et dans lequel chaque extrémité de chaque élément de berceau (13) est montée sur undit socle (16).
12. Dispositif d'amarrage selon la revendication 11, dans lequel chaque dit socle (16) présente une inclinaison vers l'intérieur alors qu'il se prolonge vers le haut par rapport audit corps de flottabilité (11).
13. Dispositif d'amarrage selon la revendication 12, dans lequel chaque élément de berceau (13) se prolonge à distance du socle connexe (16) dans

une large mesure à angle droit par rapport à l'axe du socle (16).

14. Dispositif d'amarrage selon l'une quelconque des revendications 1 à 13, dans lequel lesdits corps de flottabilité primaires (11) comprennent des ouvertures d'évacuation (24) destinées à évacuer l'eau desdits corps de flottabilité primaires (11). 5
15. Dispositif d'amarrage selon la revendication 14, dans lequel lesdites ouvertures d'évacuation (24) sont connectées à des tubes (26) qui peuvent être abaissés de manière à être en communication avec l'eau dans laquelle les corps de flottabilité (11) sont situés ou bien peuvent être relevés au-dessus du niveau de l'eau. 10 15
16. Dispositif d'amarrage selon l'une quelconque des revendications 1 à 15, dans lequel lesdits corps de flottabilité primaires (11) sont formés d'un matériau plastique rigide qui est du polyéthylène haute densité. 20

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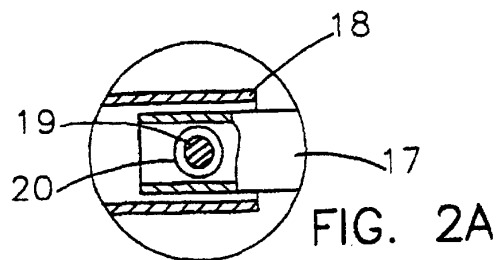
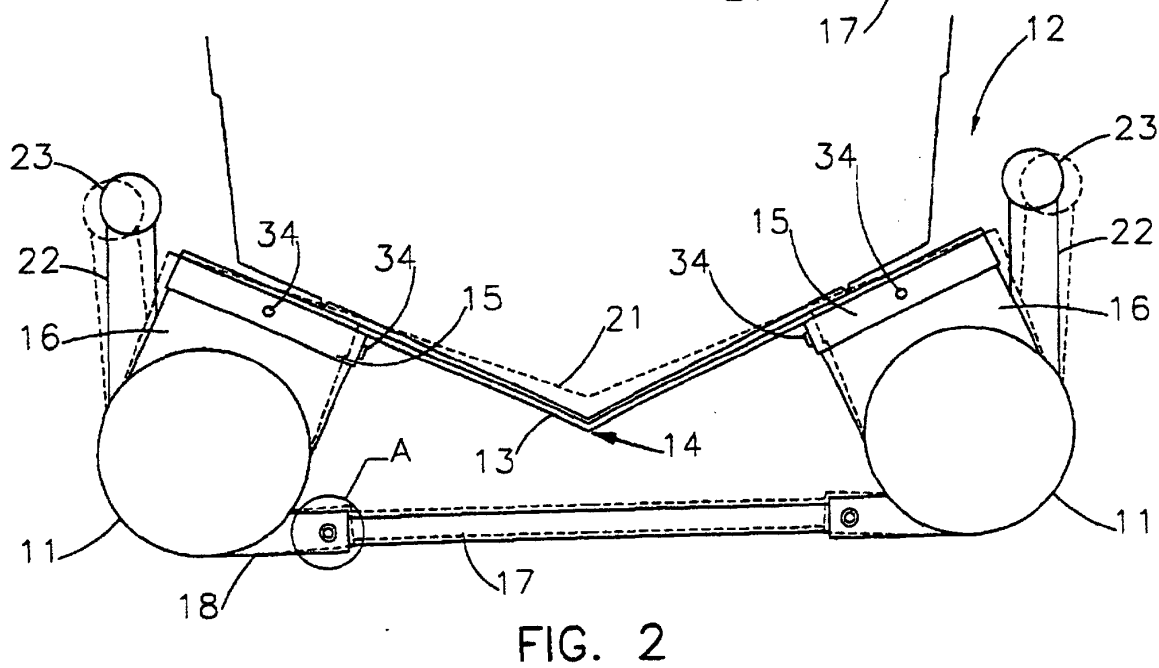
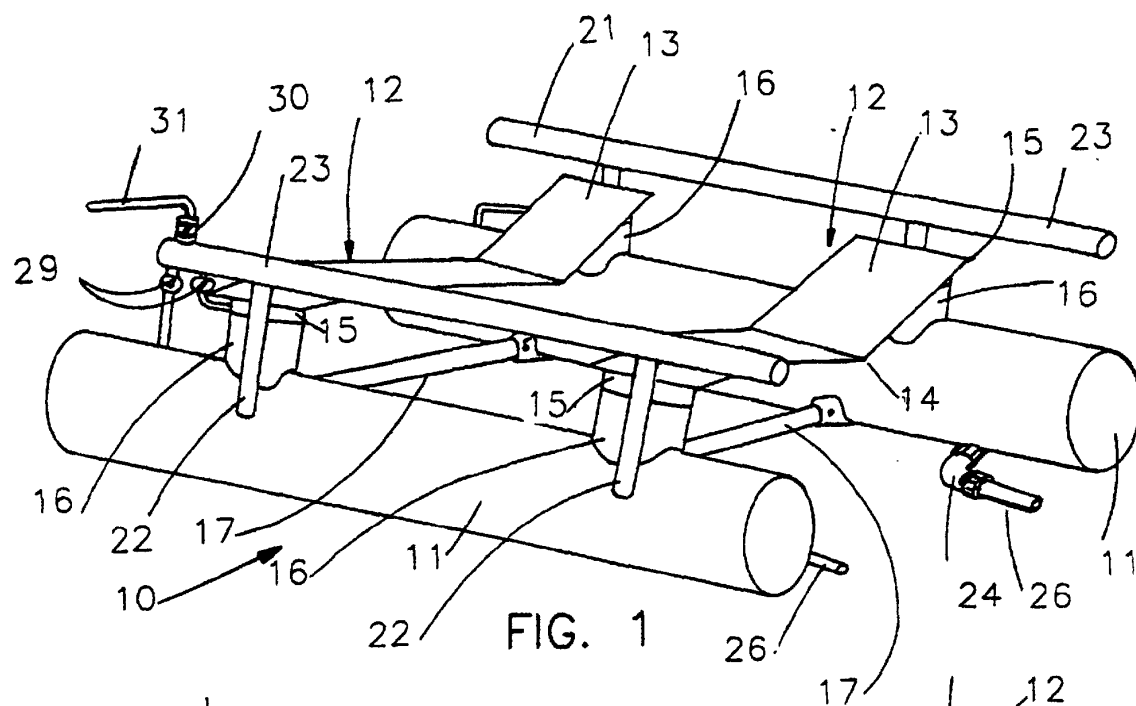
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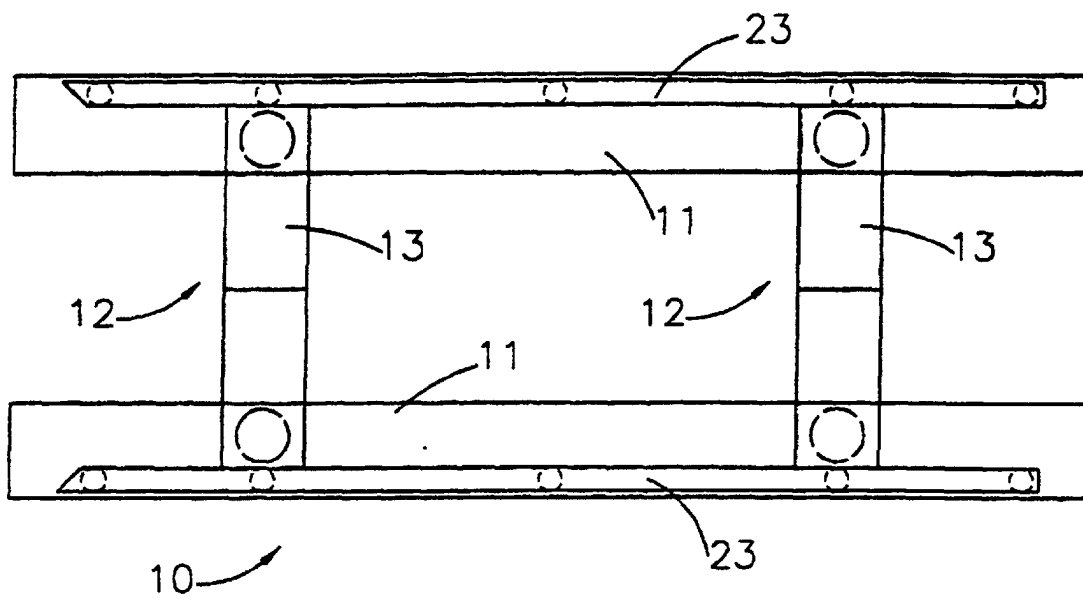


FIG. 3

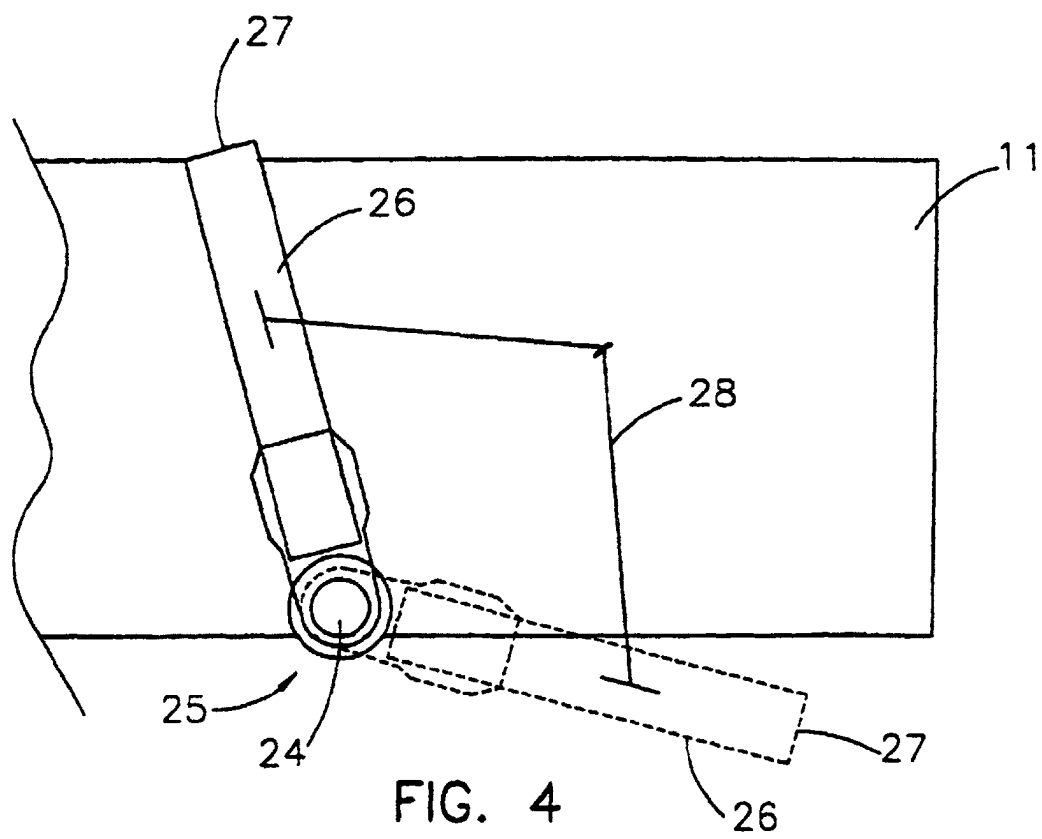


FIG. 4

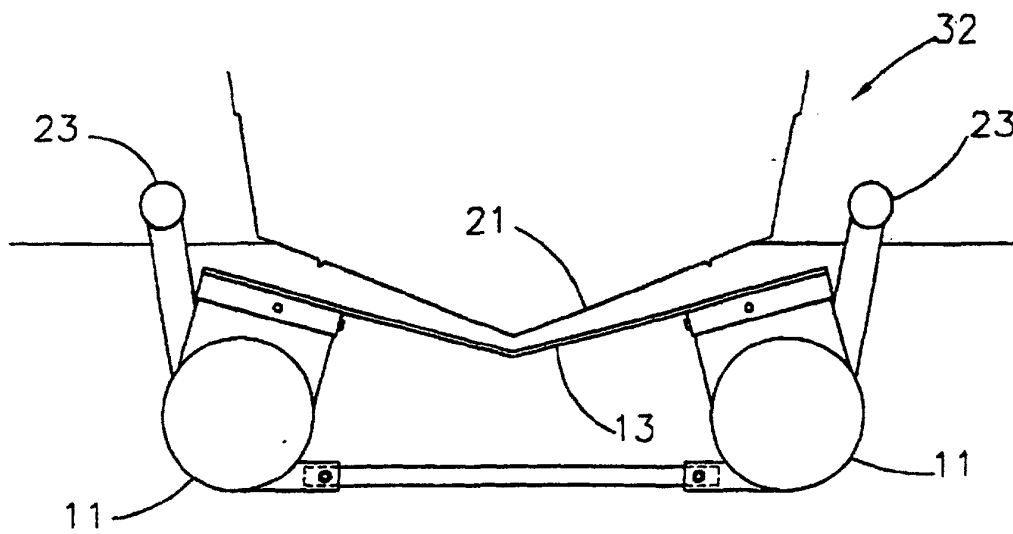


FIG. 5

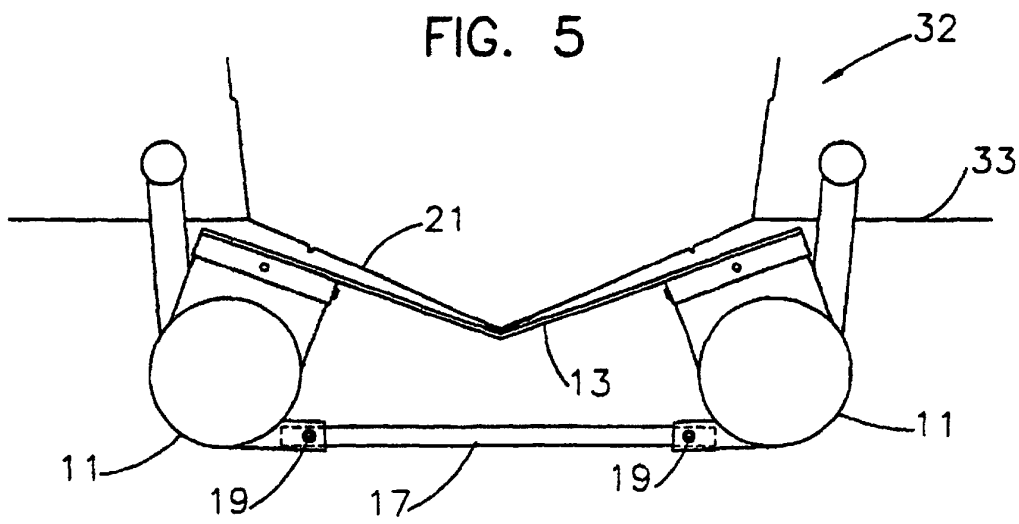


FIG. 6

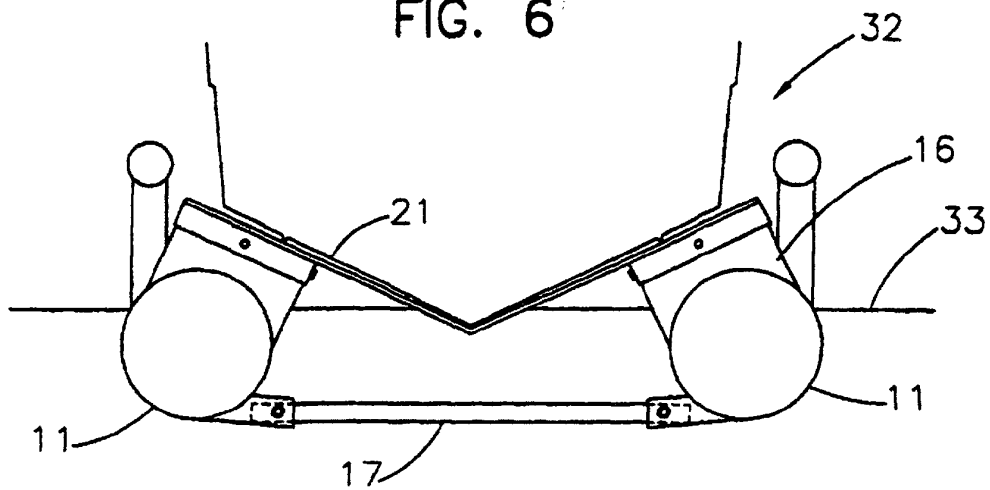


FIG. 7

