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CONNECTOR ASSEMBLIES FOR FLOATING SECTIONS

Field of the invention

The present invention relates to connector assemblies for connecting two or more floating sections such as pontoons and other floating platforms. However, although the description herein relates primarily to the connection of two or more floating platforms, it should be appreciated that the invention is capable of wider application to any two or more buoyant members.

Background and prior art

Connection systems are required for engaging floating sections or members in an articulated manner. Floating members such as pontoons or other platforms are suitable for many marine applications, and two or more such members can be combined to form various articulated assemblies. For example, they may be articulated into barges, pontoon bridges, work platforms and the like.

Conventionally, each floating section will include a plurality of connector systems and connector systems of adjacent floating sections are aligned with one another manually. Connection systems are then engaged between connector sites of adjacent floating sections, thereby coupling the two adjacent floating sections together. Calm sea conditions for articulation of the floating sections is not always possible. A particular problem in the prior art is to manually connect adjacent floating sections under rough sea conditions, where it is more difficult to align and engage the connection systems of adjacent floating sections. An alternative is to connect the various floating sections on land and thereafter for deployment at sea, but this approach has serious limitations in terms of space and manpower requirements and time constraints.

To facilitate efficient assembly and disassembly, suitable means of connection between adjacent floating sections have been developed. One example of connection systems can be found in United States Patent No. 4,290,382 ("Connector receiver for pontoon causeways"). It provides a system for interconnecting buoyant float sections in an articulated manner, a receiver assembly for automatically engaging a connector of a type having a longitudinally inclined nose section and a pair of transverse locking grooves. It includes a receiver assembly comprising a receiver housing with interior channel, a U-shaped locking guillotine member and a locking assembly. A cable has to be run through the receiver assembly to couple it to the connector as the alignment has to be relatively precise for engagement to take place and the resultant connection is rigid.

Another example is United States Patent No. 5,664,517 ("Pontoon system and pontoon connecting system and process therefor"). It comprises pontoons coupled by cables for latch members to connect two pontoons together. The connection system is fairly complicated and needs winches to effectively draw the pontoons together since alignment has to be precise. The resultant connection is again rigid with no option for maintaining some flexibility between the pontoons. A further example is United States Patent No. 5,735,228 ("Barge linking system using flexible connectors"). It reveals a flexible connector and a chain sling mounted in a flexible sleeve adjacent thereto. It requires a winch assembly to be in-built in the barge to draw the barges together. It provides a flexible connection but no option for rigid connection is provided if additional restraint between the barges is required.

Thus, the above prior art have their problems and there is a need for connector systems that are more versatile in use to allow both flexible and rigid connection and interchanging of connections at various points of the floating platforms, quicker to connect mating sections as well as more cost-

rigid connection and interchanging of connections at various points of the floating platforms, quicker to connect mating sections as well as more cost-effective to produce.

Summary of the invention

The connecting assemblies of the present invention seek to overcome some of the disadvantages of the prior art mentioned above.

Using the invention, it is thus possible to provide connector assemblies for more versatile connection of adjacent float sections with reduced manpower requirements for such connection.

According to the first embodiment of the invention there is provided a connector system for connecting adjacent buoyant members. The connector system comprises two housings respectively adapted for mounting at a boundary of a respective the buoyant member. The first of the two housings to be mounted at a boundary of a first member, seats:

(a) a first bodily shiftable connector element, and

(b) a second bodily shiftable connector element.

The second of the two housings to be mounted at a boundary of a second buoyant member, is adapted to receive at least part of each of the first and second bodily shiftable connector elements to connect the adjacent buoyant members together on the bodily shifting of the first and second bodily shiftable connector elements relative to the first of the two housings to each engage the second of the two housings and be held captive by both. The first bodily shiftable connector element establishes a substantially rigidly connection of the two buoyant members. The second bodily shiftable connector element establishes an articulatable connection of the two buoyant members.

According to the second embodiment of the invention there is provided a pontoon system which comprises at least two pontoons incorporating the

connector system.

According to the third embodiment of the invention there is provided a connector system for connecting adjacent buoyant members. The connector system comprises two housings respectively adapted for mounting at a boundary of a respective the buoyant member. The first of the two housings to be mounted at a boundary of a first the member, seats a first bodily shiftable connector element. The second of the two housings to be mounted at a boundary of a second the buoyant member, seats a second bodily shiftable connector element. The first of the two housings is adapted to receive at least part of the second bodily shiftable connector element to connect the adjacent buoyant member together on the bodily shifting of the second bodily shiftable connector elements relative to the second of the two housings to engage with the first of the two housings and be held captive thereby. The second of the two housings is adapted to receive at least part of each the first bodily shiftable connector element to connect the adjacent buoyant member together on the bodily shifting of the first bodily shiftable connector elements relative to the first of the two housings to engage to the second of the two housings and be held captive thereby. The first bodily shiftable connector element establishes a substantially rigidly connection of the two buoyant members. The second bodily shiftable connector element establishes an articulatable connection of the two buoyant members.

According to the fourth embodiment of the invention there is provided a pontoon system which comprises at least two independent but connectable pontoons each pontoon including sides to be adjacent each other when in a connected condition. The connected condition being established by;

a. a first bodily shiftable connector element located by a first housing provided at the side of a first of the pontoons, to be engaged and be captive with a second housing provided at the side of a second of the pontoons; and

b. a second bodily shiftable connector element located by a third housing provided at the side of a first of the pontoons, to be engaged and be captive with a fourth housing provided at the side of a second of the pontoons.

The first and second housings are provided to the first and second pontoons respectively to be in juxtaposition to each other when the third and fourth housings are in juxtaposition with each other. The first bodily shiftable connector element establishes a substantially rigidly connection of the two pontoons. The second bodily shiftable connector element establishes an articulatable connection of the two pontoons.

According to the fifth embodiment of the invention there is provided a pontoon system which comprises at least two independent but connectable pontoons each pontoon including sides to be adjacent each other when in a connected condition. The connected condition being established by;

c. a first bodily shiftable connector element located by a first housing provided at the side of a first of the pontoons, to be engaged and be captive with a second housing provided at the side of a second of the pontoons; and
d. a second bodily shiftable connector element located by a third housing provided at the side of a second of the pontoons, to be engaged and be captive with a fourth housing provided at the side of a first of the pontoons.

The first and second housings are provided to the first and second pontoons respectively to be in juxtaposition to each other when the third and fourth housings are in juxtaposition with each other. The first bodily shiftable connector element establishes a substantially rigidly connection of the two pontoons. The second bodily shiftable connector element establishes an articulatable connection of the two pontoons.

Connector assemblies embodying the invention are hereinafter described, by

way of example, with reference to the accompanying drawings. It is to be understood that the particularity of the drawings and the related description is not to be understood as superseding the generality of the broad description of the invention as defined in the claims.

Brief Description of the Drawings

Figure 1 is a perspective view of a first floating platform wherein there are affixed a plurality of connector slots capable of accommodating connector assemblies according to the invention.

Figures 2a to 2c are perspective views of a second floating platform that is articulated with the first floating platform in end-to-end, side-to-side and end-to-side configurations respectively.

Figure 3 is a side view of a rigid connector and housing according to the preferred embodiment of the invention wherein the rigid connector is engaged in the first platform and disengaged from the second platform.

Figure 4 is a side view of the rigid connector and housing of Figure 3 but with the rigid connector engaging both the first and second platforms so that rigid connection is provided between the first and second platforms.

Figure 5 is a side view of the rigid connector and housing of Figures 3 and 4, wherein the rigid connector is lifted and is about to engage the first and second platforms.

Figure 6 is a side view of a flexible connector and housings according to the preferred embodiment of the invention, wherein the flexible connector is lifted into a vertical position and is about to engage the first platform for flexibly connecting the first and second platforms.

Figure 7 is a side view of the flexible connector of Figure 6 wherein the flexible connector has been swung over to engage the first platform.

Figure 8 is an exploded perspective view of the male component of a housing capable of accommodating both the rigid connector and flexible connector.

Figure 9 illustrate views of the front and side elevations of the housing according to Figure 8.

Figure 10 is an exploded perspective view of the female component of the connector housing capable of accommodating both the rigid connector and flexible connector.

Figure 11 illustrate views of the front and side elevations of the housing according to Figure 10.

Figure 12 is a perspective view of a rigid connector box frame.

Figure 13 illustrate plan and elevation sectional views of the rigid connector, particularly showing in more detail the slider element of the rigid connector.

Figures 14a to 14c illustrate front, plan and side elevation views of the flexible connector according to the preferred embodiment of the invention.

Detailed description of a preferred embodiment of the invention

Figure 1 is a perspective view of a first floating platform 10 wherein there are affixed a plurality of housings or connector slots 12,14 capable of accommodating connector assemblies according to the invention. In the preferred embodiment, there are two types of connector slots, namely

connector slots 12 for providing a flexible or articulated connection of the platform 10 with a similar platform 10', and connector slots 14 for providing a substantially rigid connection of the platform 10 with a similar platform 10'.

The connector slots 12,14 can be located at any position along the edges of the floating platform, but they are preferably arranged in a standardized fashion in relation to other floating platforms so that each connector slot corresponds in position to a connector slot located on an adjacent floating platform for articulation purposes. As a result, the points of connection between platforms 10, 10' can be interchangeable to produce a variety of articulation configurations as shown in Figures 2a to 2c.

The main functional difference between the flexible connector slots 12 and the rigid connector slots 14 is that the flexible connector slots 12 contain assemblies which allow some relative vertical movement between the platforms 10,10'. As a consequence, they are easier to engage in more volatile water conditions. They are also more appropriate for use in connecting the ends of platforms. On the other hand, the rigid connector slots 14 have assemblies which allow little or no relative movement between the platforms 10,10'. They are more appropriate for connecting the sides of platforms. Moreover, the flexible connector is also used as a first step to restrain motion between the platforms so as to facilitate rigid connection. Thus, the flexible connector slots 12 and rigid connector slots 14 can be used in combination, such that the flexible connector slots 12 (which are more easily engaged) can be used for to substantially restrain the relative movement between the two platforms before the rigid connector slots 14 are engaged.

Figures 2a to 2c are perspective views of a second floating platform 10' that is articulated with the first floating platform 10 in end-to-end, side-to-side and end-to-side configurations respectively. It illustrates the interchangeability of the connections. Figure 2a shows the first floating platform 10 and the

second floating platform 10' joined at their respective ends. It would be noted that the ends are joined at the flexible connector

slots 12, which in this case, is preferable so that some relative movement between the respective floating platforms 10,10' is allowed.

Figure 2b shows the first floating platform 10 and the second floating platform 10' joined at their sides. In this case, it is preferable that both the rigid and flexible connector slots 14 are engaged to provide rigidity to the articulation. Figure 2c shows the end of the second floating platform 10' joined to the side of the first floating platform 10. In this arrangement, it is preferable that only the corresponding flexible connector slots 12 are engaged.

Figure 3 is a side view of a rigid connector and housing according to the preferred embodiment of the invention wherein the rigid connector 20 in the form of a box-like articulation member is engaged in a housing 14 in the first platform 10 and disengaged from the second platform 10'. The rigid connector 20 sits in the male connector housing 22 located in the first platform 10. There is a corresponding female rigid connector housing 24 located in the second floating platform 10' for engagement by the rigid connector 20. Fenders 26 are located at the sides of each floating platform 10,10' to avoid collision damage between the two platforms. Additionally, the fenders 26 are also used to set the distance between the platforms so that they are adequately separated to utilise the flexible and rigid connectors 12,14, during a connection operation.

The rigid connector 20 includes means in the form of a shaft 30 to assist lifting. The shaft 30 is pivotally connected to the rigid connector 20 at a position near the top 33 of the shaft and to the first platform at a position at the bottom end 34 of the shaft. To aid in the lifting of the rigid connector 20 by applying a lifting force to the lifting bar 38, a helical spring 32 providing

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biaising force in the direction of the said lifting force is included to the shaft 30. The second platform 10' can be moved towards the first platform 10 for positioning of the connector slots 12,14 by the use of any conventional means, such as the use of ropes.

Figure 4 is a side view of the rigid connector and housing of Figure 3 but with the rigid connector 20 engaging both the first and second platforms 10,10' so that rigid connection is provided between the first and second platforms. It is to be noted that one stud 94 of the rigid connector 20 sits in a socket in the lower block housing 72 of the first platform 10 and the other stud 94 of the rigid connector 20 sits in a socket in the lower block housing 72' of the second platform 10'. In this position, relative movement between the first platform 10 and the second platform 10' is minimized or restrained.

Figure 5 is a side view of the rigid connector and housing of Figures 3 and 4, wherein the rigid connector 20 is lifted and is about to engage the first and second platforms 10,10'. The positions whereat the rigid connector 20 was at rest before being lifted by the lifting bar 38 is illustrated in shadow outline. It should be appreciated that the shaft 30 has been rotated about the pivot point 34, and during the lifting movement, the spring 32 aids the lifting of the rigid connector 20 from the "LIFT' position to the "RELEASE" position by providing an upwards force against the top end of the shaft 30. The compressiblity of the spring 32 is approximately equivalent to the weight of the rigid connector 14, so that the weight of the rigid connector 14 to a user becomes substantially reduced when lifted.

Figure 6 is a side view of a flexible connector 50 and housing 52,54 according to the preferred embodiment of the invention, wherein the flexible connector 50 in the form of a pivotable link is lifted into a vertical position and is about to engage the first platform 10 for flexibly connecting the first

and second platforms 10,10'. The flexible connector 50 is initially housed in 30 the male flexible connector housing 52 (as shown in shadow outline). It has a first end 56, which is pivotally connected to a shoot bolt 60, such that the flexible connector 50 is capable of pivoting about the shoot bolt 60. The respective floating platforms 10,10' enable the engagement of the respective platforms 10,10' by the flexible connector 50.

Figure 7 is a side view of the flexible connector 50 of Figure 6 wherein the flexible connector 50 has been swung over to engage the first platform 10. The second end 58 of the flexible connector 50 has been engaged by a second shoot bolt 62, thereby flexibly connecting the first platform 10 and the second platform 10'. It would be appreciated that the flexible connector 50 allows some flexibility in the connection as the platforms 10,10' are allowed relative heaving movement. In this position, it would also be easier to engage the rigid connector 20 since the platforms 10,10' are already adjacent to each other. As previously described, this can be used as a first step to restrain the platforms for rigid connection. Alternatively, the user has the option of only having a flexible connection as that situation requires.

Figure 8 is an exploded perspective view of the male component of a housing 22 capable of accommodating both the rigid connector 20 and flexible connector 50. The rigid connector 20 is positioned within the male connector housing 22 with its base and studs 94 resting within the lower block housing 72. The rigid connector 20 can be secured in the male connector housing by locking means in the form of a shoot bolt 66 located within the shoot bolt housing 70.

The flexible connector 50 can be positioned in the male connector housing 22 at the position of the shoot bolt 62, to which the second end 58 of the flexible connector 50 is pivotally engaged. Another shoot bolt 64 enables the flexible connector 50 to be fully secured within the male connector housing 22, if that

is desired.

Figure 9 illustrate views of the front and side elevations of the male connector housing 22 according to Figure 8. The rigid connector 20 and the flexible connector 50 are contained within the male connector housing 22. (For the flexible connector, 50, there is technically not differentiation between a male or female housing since its position is fully interchangeable either way. The stud 94 at the base of the rigid connector 20 is resting on the lower block housing 72. A pair of sliders 76 engage the sides of the rigid connector 20 and rest on slide guides 78 supported by tension springs 32. There are slide guide supports 80 to support the slide guides 78 with respect to the male connector housing 22.

As previously mentioned, the tension springs 32 bias the rigid connector 20 in an upwards direction against the weight of the rigid connector 20, but since the force is only slightly less than the weight of the rigid connector 20, it rests on the base of the male connector housing 22. Therefore, when the rigid connector 20 is to be lifted from engagement with the lower block housing 72, the weight is reduced by the assisting force provided by the tension springs 32, thereby assisting in the lifting process. In prior art, it would require at least two strong men to operate such a rigid connector in calm sea. The design of the invention allows one man to operate the device up to sea-state 3.

Figure 10 is an exploded perspective view of the female component of the connector housing 24 capable of accommodating both the rigid connector 20 and flexible connector 50. The female connector housing 24 includes stopper guides 82 to guide the rigid connector 20 to the correct position in the base of the female connector housing 24 when the rigid connector 20 is lifted from the lower block housing 72 of the first platform 10 into engagement with the lower block housing 72' of the second platform 10'. The female connector housing 24 similarly has a number of shoot bolts

60,64',66' corresponding to the shoot bolts found on the male connector housing 22. A corresponding shoot bolt housing 52' for the flexible connector 50 and a corresponding shoot bolt housing 70' for the rigid connector 20 are also found on the female connector housing 24.

Figure 11 illustrate views of the front and side elevations of the female connector housing 24 according to Figure 10. It further illustrates the location of the stopper guides 82 from a front perspective. Shoot bolt supports 74' that support the shoot bolts 68' are also illustrated.

Figure 12 is a perspective view of the box frame of a rigid connector 20. It includes an upper block 90 that includes a lifting bar 38 for lifting the rigid connector 20 in order to engage an adjacent platforms 10,10'. There is also a lower block 92 including a pair of studs 94 to engage corresponding depressions in the lower block housings 72,72' of the male connector housing 22 and female connector housing 24 respectively.

Figure 13 illustrate plan and elevation sectional views of the rigid connector 20, particularly showing in more detail the slider element of the rigid connector 20. The plan view of the rigid connector 20 shows the body frame 102 having a swivel rod 104 located in between its two sides. There are sliders 76 outside the opposite sides of the body frame 102 for facilitating sliding movement of the rigid connector 20. A slider guide 78 is located adjacent the slider 76 for guiding the sliding action.

The elevation view shows the body frame 102 and the slider 76 that is attached to it. The sliders 76 are each supported on a compression spring 32 which biaises the sliders 76 in an upwards direction to oppose the weight of, amongst other things, the body frame 102 and slider 76. The sliding action of the slider 76 is guided by its relative movement along the slider guide 78.

Figures 14a to 14c illustrate front, plan and side elevation views of the flexible connector 50 according to the preferred embodiment of the invention. Figure 14a is a front elevation view of the flexible connector 50 including a first end 56 and a second end 58 consisting of cheek plates. There are holes at each end 56,58 of the flexible connector 50 to accommodate shoot bolts 60,62 to engage either or both ends of the flexible connector 50 when the flexible connector 50 is located in. adjacent shoot bolt housings 52,52'. A number of handles 110 are positioned on the body of the flexible connector 50 to aid in the lifting of the flexible connector 50 during pivotal or other movement of the flexible connector 50.

Figure 14b and 14c show the different perspectives of the flexible connector 50 of Figure 14a.

Due to the type of connectors, the number of connectors that can be affixed to floating sections, and their versatility and interchangeability, it is possible to envisage their use on different shapes and sizes of floating sections. It would be appreciated that the use of the various alignment mechanisms (eg. fenders, flexible connectors and rigid connectors) in combination speeds up the connection of the floating sections.

While a particular embodiment of the invention has been shown and described, it will be appreciated by those skilled in the art that changes and modifications of the present invention may be made without departing from the invention in broadest aspects. As such, the scope of the invention should not be limited by the particular embodiment and specific construction described herein but should be defined by the appended claims and equivalents thereof. Accordingly, the aim in the appended claims is to cover all such changes and modifications as fall within the spirit and scope of the invention.

CLAIMS:

1. A connector system for connecting adjacent buoyant members, said connector system comprising:

two housings respectively adapted for mounting at a boundary of a respective said buoyant member,

wherein a first of said two housings to be mounted at a boundary of a first said member, seats:

(c) a first bodily shiftable connector element, and

(d) a second bodily shiftable connector element, and

wherein a second of said two housings to be mounted at a boundary of a second said buoyant member, is adapted to receive at least part of each said first and second bodily shiftable connector elements to connect the adjacent buoyant members together on the bodily shifting of said first and second bodily shiftable connector elements relative to said first of said two housings to each engage the second of said two housings and be held captive by both,

wherein said first bodily shiftable connector element establishes a substantially rigidly connection of the two buoyant members and

wherein said second bodily shiftable connector element establishes an articulatable connection of the two buoyant members.

2. A connector system according to claim 1, wherein the first bodily shiftable connector element comprising a box-like member housed when in its non connecting condition, in said first of said two housings and movable relative thereto in a manner so that the box-like member is liftable at least in part from its housed condition with said first housing, substantially vertically and is then shiftable laterally so part of the box-like member is received in the second of said two housings whereby to secure the two members together substantially rigidly.

3. A connector system according to claim 1 or 2, wherein said second of said two housings and said first bodily shiftable member each provide complementary means to interlock with each other, said means to interlock being of a stud and socket arrangement.

4. A connector system according to any one of claims 1 to 4, wherein said first bodily shiftable member includes two downwardly projecting spaced apart studs spaced apart sufficiently to each be able to be received into a respective complementary socket, when said buoyant members are in an adjacent condition one socket corresponding to a said stud being provided in the base of each of said two housings.

5. A connector system according to any one of claims 1 to 4, wherein there is provided means to assist manual lifting of the first bodily shiftable connector element.

6. A connector system according to claim 5, wherein said means to assist lifting comprising a shaft pivotably connected

(a) proximate a first end of said shaft being an upper region of said shaft, to the first bodily shiftable connector element, and

(b) at the opposite end of said shaft, to one of (i) the first housing and (ii) the buoyant member which includes said first housing.

7. A connector system according claim 6 wherein first bodily shiftable member is connected to said shaft, in a manner to be slidable relative to and along said shaft, by at least one sliding shaft bearing wherein a means to bias is provided acting between said opposite end and said sliding shaft bearing to bias said bodily shiftable member in an upward direction, at least during the action of manual lifting.

8. A connector system according to claim 7, wherein said means to bias is

a helical spring mounted about the shaft.

9. A connector system according to any of claims 6 to 8, wherein there are a pair of means to assist lifting of the first bodily shiftable connector element.

10. A connector system according to claim 9, wherein the first bodily shiftable connector element comprising a box-like member and there are said means to assist lifting are provided alongside each two opposed vertical sides of the box-like member.

11. A connector system according to any of claims 1 to 10, wherein there is provided a handle device to aid bodily shifting of the said first bodily shiftable connector member during a connecting operation.

12. A connector system according to claim 11, wherein the first bodily shiftable connector element comprising a box-like member and the handle device comprising a U-shaped handle mounted by legs thereof atop the box-like member and extending in a direction parallel to the planes of the major planar surfaces of the box-like member.

13. A connector system according to any one of claims 1 to 12 wherein the second bodily shiftable connector element comprises an elongate member, the elongate member being pivotably mounted to said first of said two housings and capable of rotationally lifting therefrom towards a vertical direction prior to pivoting to engage an opposite to its pivot providing or defining end in the second of said two housings for flexibly connecting of the two adjacent buoyant members.

14. A connector system according to claim 13, wherein the elongate element comprising a link member having a body with like through bores at

each of its opposite ends whereby the link member is reversibly mountable in one or other of the two housings.

15. A connector system according to claim 14, wherein there is provided a locking member through one through bore about which the link member is pivotable so that the opposite through bore is received in the second of said two housings and by a further locking member in the second of said two housings whereby the link member is secured in the second of said two housings for securing the two adjacent members in an articulated manner.

16. A connector system according to claim 15, wherein the locking members each comprises a shoot bolt.

17. A connector system according to claim 15 or claim 16, wherein a handle device, to aid bodily shifting of the link member during a connecting operation, is provided.

18. A connector system according to claim 16, wherein there are a plurality of handle devices carried by each link member.

19. A connector system according to claim 18, wherein each handle device comprising a U-shaped handle mounted by legs thereof for pivoting between a stowed position and a deployed position for aiding movement of the link member.

20. A connector system according to any of claims 1 to 19, wherein each housing is of a substantially T-configuration (when viewed in a horizontal plane and in a direction parallel to the direction of movement of said first and second bodily shiftable members relative to the first housing) and wherein there is provided a plate-like member to be housed and received in the upright limb of the respective T-members.

21. A connector system according to claim 20, wherein the second bodily shiftable connector element is located at the cross-bar portion of the T-shaped housing.

22. A connector system according to claim 20 or 21, wherein a locking member of the second of said two housings is adapted to secure the first bodily shiftable connector element when in a connecting condition, to both of the said two housings.

23. A connector system according to claim 22, wherein the locking member comprising a shoot bolt.

24. A pontoon system comprising at least two pontoons incorporating the connector system as claimed in any one of claims 1 to 23.

25. A pontoon system according to claim 24 wherein there is provided spacer devices for spacing adjacent pontoon apart a desired distance during the connecting operation.

26. A pontoon system according to claim 25 wherein the spacer devices comprising fenders carried by at least on of said adjacent pontoons.

27. A pontoon system according to claim 24 wherein each pontoon includes a plurality of said housings, spaced apart, at its boundary.

28. A combination of adjacent buoyant members incorporating and connected by a connector system according to any one of claims 1 to 23.

29. A connector system for connecting adjacent buoyant members, said connector system comprising:

two housings respectively adapted for mounting at a boundary of a respective said buoyant member,

wherein a first of said two housings to be mounted at a boundary of a first said member, seats a first bodily shiftable connector element, and

wherein a second of said two housings to be mounted at a boundary of a second said buoyant member, seats a second bodily shiftable connector element,

said first of said two housings is adapted to receive at least part of said second bodily shiftable connector element to connect the adjacent buoyant member together on the bodily shifting of said second bodily shiftable connector elements relative to said second of said two housings to engage with the first of said two housings and be held captive thereby, and

said second of said two housings is adapted to receive at least part of each said first bodily shiftable connector element to connect the adjacent buoyant member together on the bodily shifting of said first bodily shiftable connector elements relative to said first of said two housings to engage to the second of said two housings and be held captive thereby,

wherein said first bodily shiftable connector element establishes a substantially rigidly connection of the two buoyant members and

wherein said second bodily shiftable connector element establishes an articulatable connection of the two buoyant members.

30. A pontoon system comprising at least two independent but connectable pontoons each pontoon including sides to be adjacent each other when in a connected condition, said connected condition being established by;

a. a first bodily shiftable connector element located by a first housing provided at the side of a first of said pontoons, to be engaged and be captive with a second housing provided at the side of a second of said pontoons; and

b. a second bodily shiftable connector element located by a third

housing provided at the side of a first of said pontoons, to be engaged and be captive with a fourth housing provided at the side of a second of said pontoons,

wherein said first and second housings are provided to said first and second pontoons respectively to be in juxtaposition to each other when said third and fourth housings are in juxtaposition with each other; and

wherein said first bodily shiftable connector element establishes a substantially rigidly connection of the two pontoons and

wherein said second bodily shiftable connector element establishes an articulatable connection of the two pontoons.

31. A pontoon system as claimed in claim 30 wherein said first and third housings are spaced apart towards opposite ends of the side of said first pontoon.

32. A pontoon system as claimed in claim 30 wherein said first and third housings are spaced apart but provided at or towards one end of the side of said first pontoon.

33. A pontoon system comprising at least two independent but connectable pontoons each pontoon including sides to be adjacent each other when in a connected condition, said connected condition being established by;

a. a first bodily shiftable connector element located by a first housing provided at the side of a first of said pontoons, to be engaged and be captive with a second housing provided at the side of a second of said pontoons; and
b. a second bodily shiftable connector element located by a third housing provided at the side of a second of said pontoons, to be engaged and be captive with a fourth housing provided at the side of a first of said pontoons,

wherein said first and second housings are provided to said first and second pontoons respectively to be in juxtaposition to each other when said third and fourth housings are in juxtaposition with each other; and

wherein said first bodily shiftable connector element establishes a substantially rigidly connection of the two pontoons and

wherein said second bodily shiftable connector element establishes an articulatable connection of the two pontoons.

34. A pontoon system as claimed in claim 33 wherein said first and fourth housings are spaced apart towards opposite ends of the side of said first pontoon.

35. A pontoon system as claimed in claim 34 wherein said first and fourth housings are spaced apart but provided at or towards one end of the side of said first pontoon.

36. A pontoon system comprising at least two pontoons incorporating the connector system as claimed in claim 29.

37. A pontoon system according to claim 36 wherein there is provided spacer devices for spacing adjacent pontoon apart a desired distance during the connecting operation.

38. A pontoon system according to claim 37 wherein the spacer devices comprising fenders carried by at least on of said adjacent pontoons.

39. A pontoon system according to claim 38 wherein each pontoon includes a plurality of said housings, spaced apart, at its boundary.

40. A combination of adjacent buoyant members incorporating and connected by a connector system according to claim 29.