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(54) Rubber Inflatable Boat

(57) The present invention discloses a boat (4) comprising at least one expandable pontoon tube (1), which is provided to extend along at least a part of the perimeter of the boat. A boat part is, by means of a gripping part (3), connectable with the expandable pontoon tube (1). The expandable pontoon tube (1) has on the inside a

string shaped grip part (2) which is adapted to be caught together with there to adjacent wall material of the pontoon by said gripping part (3). Further a strain force in the wall of the pontoon tube (1) is, during use of the boat, provided for releasable attachment of the pontoon tube (1) to the gripping part (3).

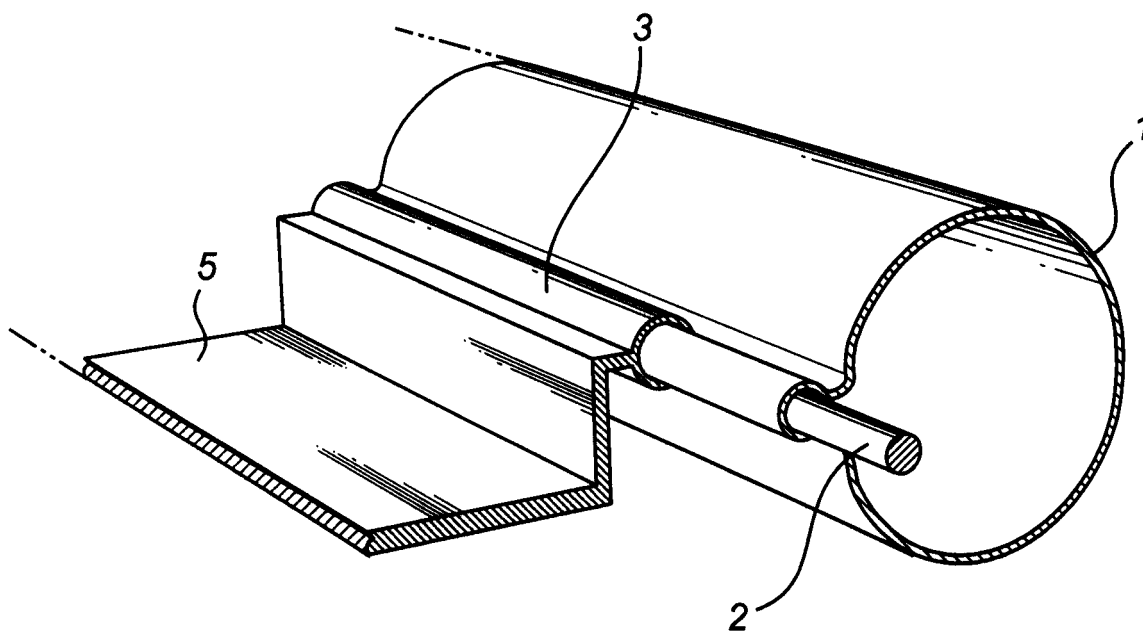


Fig. 3

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Description

Field of the invention

[0001] The present invention relates to a boat comprising at least one expandable pontoon tube, which is arranged to extend along at least a part of the perimeter of the boat. A part of the boat is connectable by a gripping part with the expandable pontoon tube.

Technical background

[0002] The above mentioned boats are already known and exist in different embodiments. Usually they are provided with a U-shaped inflatable pontoon, or alternatively a number of pontoons forming the U-shape. Further this kind of boats are called rubber boats or RIB (Rigid Inflatable Boat) and they can be provided with a rigid hull between the U-shaped shanks of the pontoon made of for example glass fiber reinforced plastic. In other embodiments the hull can constitute of a flooring on top of a more flexible sheet material. This kind of boats are used in a variety of applications, for example as a dinghy, jolly boat, larger pleasure boat, life raft or professional boat etc.

[0003] A problem with rubber boats or RIB can be that there is tolerance problems at the attachment between the pontoons and the hull, which can cause wear and leakage. Among prior art techniques there are solutions to solve these tolerance problems for example devices for adjustment or two ropes mounted on the outside of the pontoon to achieve good fit for the attachment of a boat part to the hull. However this demand very good precision and therefore very good tolerances at the attachment, which makes this kind of boat expensive to produce.

Summary of the invention

[0004] One object of the present invention is to provide an improved connection of boat parts to pontoons of so called RIB. Another object of the present invention is to achieve an economically advantageous production of connections to pontoons for boats provided with pontoons. A further object of the present invention is to achieve a simple mounting and, when it occurs, demounting of this kind of boat for example during transportation.

[0005] The above objects, and other objects that will be evident from the following description, are achieved by a boat according to the appended claims.

[0006] The invention is based on a principle that the expansion of the pontoon can be used to achieve a locking function for coupling of parts to the pontoon.

[0007] According to one aspect of the present invention a boat is disclosed comprising at least an expandable pontoon tube which is arranged extending along at least a part of the perimeter of the boat, wherein a boat part is connectable by a gripping part with the expandable

pontoon tube, wherein the interior of the expandable pontoon tube has a string shaped grip part, which is adapted, together with adjacent wall material of the pontoon, to be gripped by said gripping part and the straining force in the wall of the pontoon during usage of the boat is provided for releasable attaching the pontoon tube to the gripping part.

[0008] This way of connecting boat parts to a pontoon gives, in comparison with prior art, less or no problems with tolerances between the pontoon and the boat part since possible tolerances will be absorbed during the expansion and strain of the pontoon. The expression "expandable" does not primary relate to specific material characteristics but to the fact that the volume surrounded by the pontoon can be increased. Straining relates to apply a straining force in/to the wall of the pontoon tube, which is expanded and releasable attaches the pontoon tube to the boat part. The strain force can be achieved in different ways, for example by applying a higher pressure to the interior volume of the pontoon tube than the surrounding atmosphere, by straining the pontoon tube by means of a spring or other expanding material.

[0009] Further two sealing surfaces are achieved between the gripping part and the outer surface of the material of the pontoon when the pontoon is expanded and consequently the pressure is increased for these sealing surfaces along the extension of the gripping part. By means of these both sealing surfaces a waterproof connection is achieved, for example between a pontoon and other hull portions. The time needed for manufacturing and assembling will be considerably shorter with the technique according to the present invention since the tolerance between the gripping part and the grip part with adjacent wall of the pontoon can be permitted to be worse than for prior art. Further the gripping power, or the attaching force, between the pontoon tube and the boat part can easily be adjusted by a change of the strain force in the pontoon tube. The higher strain force, the higher attachment force between said parts. Driving a boat in high speed causes considerable forces from the water to the boat, while a slower boat is not loaded in the same way. A boat according to the inventive concept can be used at both higher and lower speed, if the rest of the components are designed for this load, with out other changes than adjustment of the pressure within the pontoon. In other words a boat according to the inventive concept is very flexible in the way it can be used.

[0010] Said boat part is preferably a rigid hull part. It is of course possible to connect different kind of boat parts to a pontoon by use of the technique according to the present invention. It is desirable to achieve a good connection between a hull and a pontoon, for example U-shaped. This kind of hull can be formed in many different ways, for example they can be rigid, inflatable or a combination of flexible and rigid hull materials.

[0011] Preferably the pontoon tube according to the present invention is expandable by inflation. It is also possible to achieve the expansion of the pontoon in other

ways, for example to use a spring means inside a pontoon to suck gas in, to use an expandable foam for increase of the volume of the pontoon, to use a gas tank with high pressure for increase of the pressure inside the pontoon or to use a gas generated by a pyrotechnical device to fill the pontoon.

[0012] Advantageously the grip part is a rope which is provided inside the expandable pontoon tube. In this way the rope is protected by the surrounding pontoon material. In this way wear and other loads on the rope is minimized. The grip part can be wire or for example an elongated profile of another material.

[0013] Another advantage with the present invention is that the gripping part is formed for waterproof fit with the outer surface of the pontoon tube. In this way there is no need for extra sealing of the connection between different hull portions that require a waterproof connection.

[0014] The idea for the present invention is based on the prerequisite that the cross section of the gripping portion has an opening that is larger than twice the thickness of the wall material of the pontoon but less than the sum of the thickness of the grip part and twice the thickness of the wall material of the pontoon. In this manner the grip part and the surrounding wall material of the pontoon is kept inside the gripping part across the longitudinal direction of the grip part by geometrical locking. The gripping part and the pontoon is kept in position in relation to each other in the longitudinal direction by friction locking. The friction force will increase when the pressure between the gripping part and the pontoon material increases during expansion and strain of the pontoon.

[0015] Preferably the position of the grip part is fixed inside the expandable pontoon tube. This fixation of position can be provided by a weld, seam, glue, or other adhesive material to keep the grip part in position on the inside of the pontoon wall material.

[0016] Usually the present invention is used by a grip part and/or gripping part extending essentially along the whole length of the pontoon. This is advantageous to avoid variations in the diameter of the pontoon tube that would be the case if the grip part and the gripping part is applied on a shorter length of the pontoon tube with constant diameter.

Brief description of drawings

[0017] By way of example, currently preferred embodiments of the present invention will now be described with reference to the accompanying figures of drawings in which;

Fig 1 discloses a rubber boat or RIB in perspective view.

Fig 2a shows in cross section a pontoon in a non connected position.

Fig 2b shows in cross section a pontoon in a connected position.

Fig 2c shows in cross section an expanded pontoon in a connected position.

Fig 3 shows in perspective view an expanded pontoon in a connected position.

Description of Preferred Embodiments

[0018] Figure 1 shows a boat 4 where the complete or a part of the hull can be provided by expandable pontoons 1. Usually this kind of boats are provided with a continuous U-shaped pontoon 1 that is connected to the hull 5. The pontoon part of a hull can be provided by a number of separate pontoons or one continuous pontoon that is divided by interior walls to provide cells. The technique according to the present invention can of course also be applied on other kind of floating equipment and shall not be limited to the above described boats with U-shaped pontoon. The present invention can be used for connection of pontoons with different kind of boat parts, like for example steering console, floor plate, seats, stern etc.

[0019] In figure 2a-c it is shown step by step how the connection of a boat part is performed with a pontoon. The material of the pontoon wall is preferably of a traditionally kind of pontoon, i.e. of a strong and relatively stiff in comparison to the forces the material is exposed to during use. The material in the preferred embodiment has approximately no stretch, to avoid a balloon effect when the pontoon 1 is inflated. Figure 2a shows a non expanded pontoon 1 with interior grip part 2. Figure 2b shows how the grip part 2 together with adjacent wall material of the pontoon has been slid in the longitudinal direction into the gripping part 3. Preferably the grip part 2 is slid, together with the adjacent pontoon tube material, into the gripping part 3 from the stem to the stern of the boat 4. Finally in figure 2c is shown, during use of the boat 4, how sealing and locking is achieved between the pontoon 1 and the gripping part 3 by expansion of the pontoon and in the preferred embodiment is provided with a positive pressure in relation to the surrounding air by inflation.

[0020] The gripping part 3 can be formed with different kind of alternative cross sections. A prerequisite for keeping the pontoon 1 and the boat part connected is that the cross section of the gripping part has an opening that is small enough or has a shape that the grip part and adjacent wall material of the pontoon can not escape. Figure 2c further shows how the pressure increase between the wall material of the pontoon and the gripping part 3 when the pontoon is expanded and pressurized at the same time as the grip part 2 is forced towards the opening of the cross section profile of the gripping part 3. A further prerequisite for the function of the present invention is that the grip part 2 and the surrounding wall material of the pontoon can be accommodated inside the cross section profile of the gripping part 3.

[0021] The cross section in figure 2 does only show a preferred embodiment of the invention where the cross section of the gripping part is C-shaped and the sealing

between pontoon and gripping part is provided by geometrical locking when the grip part 2 and the adjacent wall material of the pontoon is inserted into the gripping part. Further when the force in the pontoon is increased, this will help to expand and strain the pontoon as the same time as it helps the friction force between the gripping part 3 and the wall material of the pontoon. This lead to that the pontoon 1 will be "locked" in relation to the longitudinal direction of the gripping part 3. All together the geometrical locking and the friction locking provides the hull 5 and the pontoon 1 to form a stable boat 4.

[0022] The grip part 2 has preferably a circular cross section, but also other cross section profiles can be used. The grip part 2 can be provided as rope, wire or being integrated in the wall material of the pontoon as a swelling on the inside of the pontoon wall. In those cases when the grip part 2 is constituted of a rope or a wire it is preferable that the rope/wire is attached to the inside of the pontoon wall. This can be achieved by attaching the rope/wire with a seam or with a loop at the wall of the pontoon, further methods can be to glue or spot weld the rope/wire on the inside of the wall of the pontoon.

[0023] As disclosed in figure 3 the diameter of the pontoon will decrease by using a part of the wall material of the pontoon as it is wrapped around the grip part. In fact the design of the pontoon is facilitated and it is easier to achieve an attachment with good appearance (no fold or wrinkles) if the attachment extends along the whole length of the pontoon. But it is also possible to use the technique according to the present invention at isolated spots or shorter lengths.

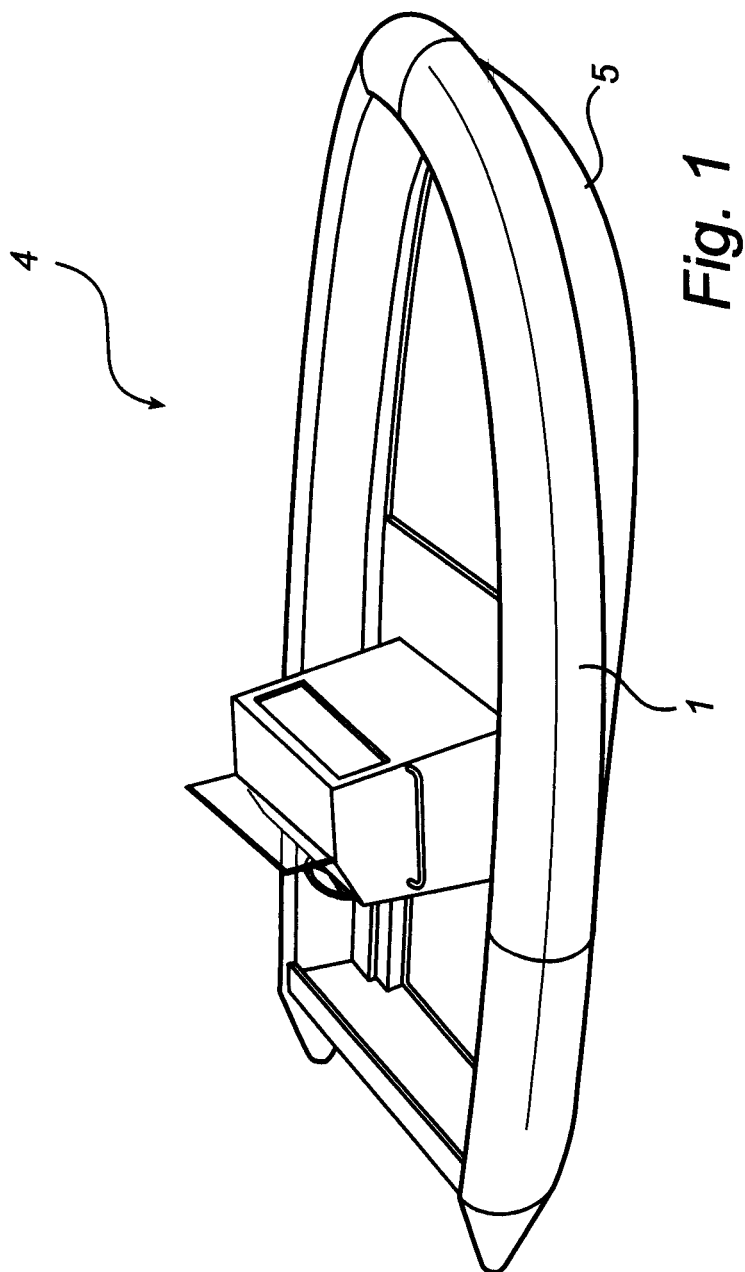
[0024] It is of course possible to apply the gripping part and the grip part on pontoons with different kind of cross section. The present technique can also be used for pontoon tubes with varying diameter along the length.

Claims

1. A boat (4) comprising at least one expandable pontoon tube (1), which is provided to extend along at least a part of the perimeter of the boat, wherein a boat part by means of a gripping part (3) is connectable with the expandable pontoon tube (1) **characterized in that** the expandable pontoon tube (1) has on the inside a string shaped grip part (2) which is adapted to be caught together with there to adjacent wall material of the pontoon by said gripping part (3), and **in that** a strain force in the wall of the pontoon tube (1) during use of the boat is provided for releasable attachment of the pontoon tube (1) to the gripping part (3).
2. A boat (4) according to claim 1, wherein said boat part is a rigid hull part.
3. A boat (4) according to any of the preceding claims, wherein said pontoon tube (1) is expandable by in-

flation.

4. A boat (4) according to any of the preceding claims, wherein the grip part (2) is a rope which is provided inside the expandable pontoon tube (1).
5. A boat (4) according to any of the preceding claims, wherein the gripping part (3) is provided for water-proof abutment against the outer surface of the pontoon tube (1) when the pontoon tube is expanded.
6. A boat (4) according to any of the preceding claims, wherein the cross section of the gripping part (3) has an opening that is larger than twice the thickness of the wall material of the pontoon, but smaller than the sum of the thickness of the grip part (2) and twice the thickness of the wall material of the pontoon.
7. A boat (4) according to any of the preceding claims, wherein the grip part (2) has a fixed position inside the expandable pontoon tube (1).
8. A boat (4) according to any of the preceding claims, wherein the grip part (2) and/or the gripping part (3) extend along essentially the whole length of the pontoon tube (1).



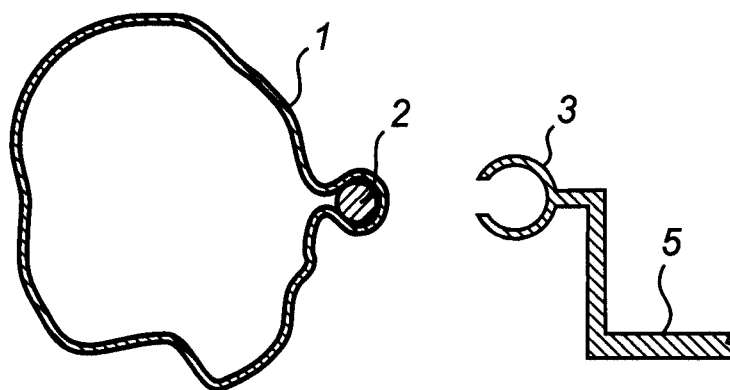


Fig. 2a

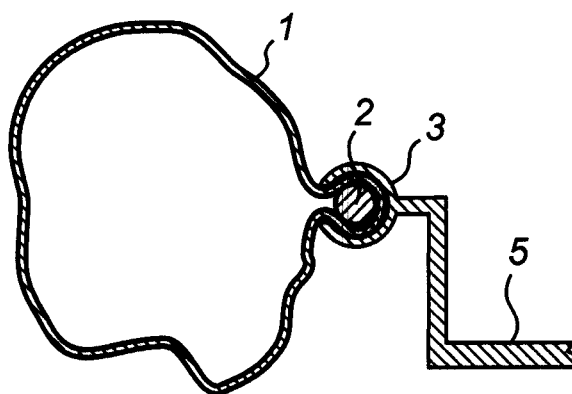


Fig. 2b

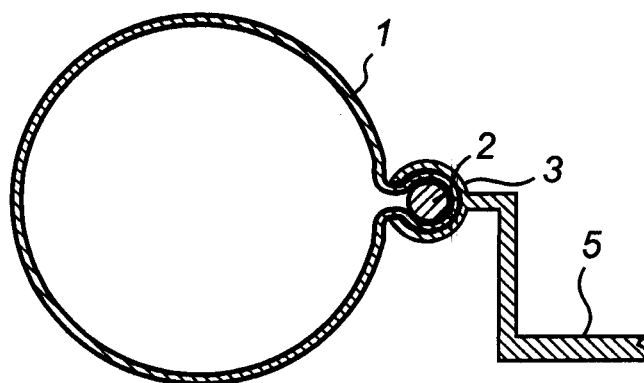


Fig. 2c

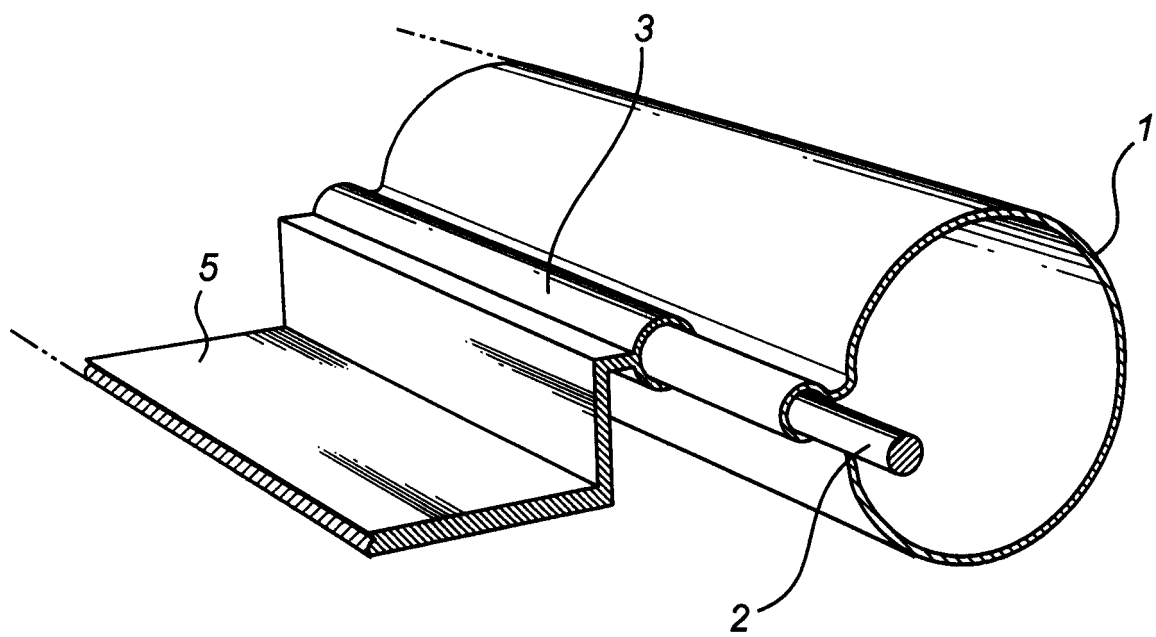


Fig. 3



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The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 27 January 2006	Examiner Nicol, Y
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	

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EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
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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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27-01-2006

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