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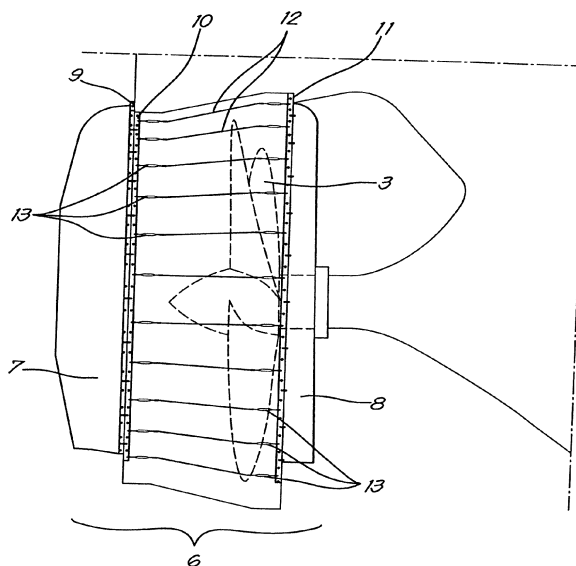
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(54) **Device for repairing a ship's propeller and method in which such a device is applied**

(57) Device that provides a ship's propeller (3) surrounded by a duct (4) with a watertight enclosure (6) that is affixed while the ship is in the water and which encloses all or part of the ship's propeller (3) and which can be filled with air under water, so that all or part of the ship's propeller (3) in the enclosure is placed in a dry condition, characterised in that the enclosure (6) consists of two circular inflatable bodies (7,8) turned towards one another that are fastened to the duct (4) whereby the circular

inflatable bodies (7,8) and the duct (4) together define a space that is closed off in a watertight way and whereby the two circular inflatable hollow bodies (7,8) turned towards one another are fastened to the duct by means of screw bolts: to the rear edge of the duct by screwing a clamping strip (9) to a supporting edge (10) for fastening the rear inflatable body (7) and to the front edge by screwing a sealing edge (11) of the duct for fastening the front inflatable body (8).



**Fig.3**

## Description

**[0001]** The present invention relates to a device for repairing a ship's propeller and a method in which such a device is applied.

**[0002]** More specifically the invention is intended for the repair or maintenance of a ship's propeller while it is under water.

**[0003]** It is known that repair or maintenance works on a ship's propeller are generally done while the ship is out of water, in a dry dock for example.

**[0004]** At that time the propeller is accessible from all sides and can be worked on with the necessary instruments, such as welding instruments or grinding machines for example.

**[0005]** A problem arises when urgent maintenance or repair works have to be done on the ship's propeller or propellers, but there is no opportunity or time available to bring the ship out of the water.

**[0006]** In such cases it will be endeavoured to perform the necessary works while the ship is still in the water, using divers provided with equipment that can operate under water.

**[0007]** This is very difficult if for example welding works have to be done under water, whereby specialised equipment and the necessary expertise to operate it are required.

**[0008]** Such devices and methods to work on the propeller or propellers of the ship under water present a number of disadvantages.

**[0009]** A disadvantage is that the workers must work with breathing equipment and diving suits during the works, which impedes the performance of the works.

**[0010]** Another disadvantage is that the visibility under water is much worse than out of water and the repairs or maintenance to be performed can be observed less well.

**[0011]** The purpose of the present invention is to provide a solution to the aforementioned and other disadvantages, by providing a ship's propeller that is surrounded by a duct with a watertight enclosure, characterised in that this enclosure is affixed while the ship is in the water and encloses all or part of the propeller and that the enclosure can be filled with air under water, so that all or part of the propeller is placed in a dry condition in the enclosure.

**[0012]** An advantage of such an enclosure is that it enables the propeller to be worked on or maintained in a dry condition without the ship having to be taken out of the water to this end.

**[0013]** Preferably the enclosure consists of two circular inflatable hollow bodies, turned towards one another, that are fastened to the duct whereby the circular inflatable hollow bodies and the duct together define a space that is closed off in a watertight way and which can be filled with air.

**[0014]** An advantage of such a space filled with air is that the ship's propeller is placed in a dry condition in order to perform the necessary works.

**[0015]** An advantage of such circular inflatable hollow bodies is that they can be made pressure-resistant with a limited weight, so that they are easy to transport and install.

5 **[0016]** Preferably the two circular inflatable hollow bodies turned towards one another are fastened by means of screw bolts: to the rear edge of the duct by screwing a clamping strip to a supporting edge for fastening the rear inflatable body and by screwing a sealing edge to the front edge of the duct for the front inflatable body.

10 **[0017]** Preferably the two inflatable bodies are connected together via rods with tensioners that connect together the rings to which the two inflatable bodies are screwed, and this over the entire periphery of the duct.

15 **[0018]** An advantage of the use of these rods with tensioners is that the space bounded by the two inflatable bodies and the duct can be placed at a higher air pressure, without giving rise to air leaks.

20 **[0019]** Preferably at least one of the circular inflatable bodies is provided with a central opening through which the shaft of the ship's propeller is positioned and is enclosed in a watertight way by a tensioning ring that is fastened around the propeller shaft in a watertight way and to which the inflatable body is screwed in a watertight way.

25 **[0020]** An advantage of this central opening is that the inflatable body can be placed around the propeller while it remains mounted on the propeller shaft and while the ship is in the water.

30 **[0021]** Preferably the circular inflatable body around the propeller shaft consists of two halves that are placed against one another along either side of the propeller shaft, and which are closed off together in a watertight way.

35 **[0022]** The advantage of these two halves is that the shaft can easily be enclosed by these two halves.

**[0023]** Preferably the circular inflatable body is provided with a wide manhole at the bottom at the back of the duct, such that air can be introduced into the watertight space of the enclosure, and such that a diver can enter the enclosure from the water, in order to perform the necessary works on the ship's propeller while it is completely water-free.

40 **[0024]** Preferably the wide manhole enables the necessary equipment for the works to be brought up to the ship's propeller, so that the work on it can be done in the dry in the enclosure while the ship is in the water.

**[0025]** The manhole also enables defective components of the ship's propeller, such as a defective propeller blade, to be taken out through the wide manhole, after it has been detached in the dry space from its anchor point in the propeller spinner.

45 **[0026]** Such heavy components can be removed by means of a tackle or put back in place by positioning a tackle in four eyes that are fastened to the duct wall.

50 **[0027]** The advantage of this method is that repairs or maintenance on the ship's propeller or propellers can be done while the ship is in the water without having to take

the ship out of the water.

**[0028]** With the intention of better showing the characteristics of the invention, a preferred embodiment of a device for repairing a ship's propeller according to the invention is described hereinafter by way of an example, without any limiting nature, with reference to the accompanying drawings, wherein:

Figure 1 schematically shows a side view of the stern of a ship in the water without a device for repairing the ship's propeller;

figure 2 schematically shows a rear view of the afterdeck of the ship in figure 1;

figure 3 shows a side view of an enclosure of the ship's propeller in a duct according to the invention; figure 4 shows a side view of figure 3 placed on a ship;

figures 5 and 6 show details on a larger scale that are indicated in figure 4 by F5 and F6;

figures 7 and 8 show the supporting frames according to the invention that are affixed in the front and rear edge respectively of the duct.

**[0029]** Figure 1 schematically presents the stern 1 of a ship on which a rudder 2 is mounted and a ship's propeller 3 surrounded by a duct 4, and the water line 5 of the water in which the ship lies.

**[0030]** Figure 2 shows a rear view of figure 1, whereby in this case the ship is provided with two propellers 3,3', each provided with a duct 4,4' that are each fastened immovably to the hull.

**[0031]** Figure 3 shows an enclosure for a ship's propeller 3 according to the invention, consisting of two circular inflatable hollow bodies 7,8 that are fastened by means of screw bolts: to the rear edge of the duct by screwing a clamping strip 9 to a supporting edge 10 for fastening the rear inflatable body 7, and to the front edge of the duct by screwing a sealing edge 11 for the front inflatable body 8.

**[0032]** The two circular inflatable bodies 7,8 are connected together by connecting the front sealing edge 9 to the rear supporting edge 10 together by means of bars 12 that are tensioned with tensioners 13.

**[0033]** Figure 4 shows a side view of the enclosure 6 for a ship's propeller 3, formed by the duct 4 and two circular inflatable bodies 7,8 fastened to it, with the hollow side turned towards one another, and which are fastened to the duct 4 by means of screw bolts. One of the inflatable bodies 8 encloses the propeller shaft, which extends through a central opening 14 of the cylindrical inflatable body 8.

**[0034]** Figure 5 shows a side view on a larger scale of the edge 15 of an inflatable body 7 that is screwed to a tensioning ring 9 that is fastened to a folded-back ring 10 by means of hooks 15 to which tensioners 13 are also fastened by one end, while the other end is fastened to a bar 12, that is further connected to the folded-back ring 11 of the other edge of the duct 4 as is shown in detail

in figure 6, such that both inflatable bodies 7,8 and the duct 4 together form a watertight space.

**[0035]** Figure 7 shows a perspective view of the front edge of the duct, in which 3 transverse rods 16, 17, 18 are screwed, which together form a supporting frame for the circular inflatable body 8 still to be affixed.

**[0036]** Figure 8 shows a perspective view of the rear edge of the duct 4 in which eight rods 19, 20, 21, 22, 23, 24, 25, 26 form a basket-forming frame to support the circular inflatable body 7 still to be affixed, whereby the frame ensures that a wide manhole is kept open at the bottom of the inflatable body 7, through which the enclosure filled with air can be entered from the water and through which a large component such as a detached propeller blade can be removed or introduced.

**[0037]** The device for repairing a ship's propeller 3 consisting of a watertight enclosure 6 for the ship's propeller and the method in which such a device is applied, are simple and as follows.

**[0038]** The watertight enclosure 6 is affixed around the ship's propeller 3 while the ship is in the water.

**[0039]** To this end the following method according to the invention is followed, which consists of:

- The affixing of screw bolts in the front and rear edge (bow side and afterdeck side) of the duct 4;
- the attachment of folded-back rings 11 and 10 to the front and rear edges of the duct 4 by means of these screw bolts;
- the affixing of a sealing edge 9 by means of hooks fastened to the folded-back rings;
- the affixing of a tensioning ring around the propeller shaft at a suitable distance from the front edge 11 of the duct 4 and the screwing down of this tensioning ring in a watertight way;
- the affixing of a frame of rods 16,17,18 between support points on the front edge of the duct 4;
- the affixing of a supporting edge 9 at the rear edge of the duct to the folded-back ring 10 of the rear edge of the duct 4 and the attachment thereof by means of screw bolts;
- the affixing of a basket-forming frame 19-26 to the bottom half of the rear edge of the duct 4 to support the circular inflatable body 7 still to be affixed, with an opening on the underside of the rear opening of the duct;
- the affixing of the rear circular inflatable body 7 to this basket-forming frame and the fastening of it with a clamping strip that is screwed to the supporting edge 9 of the rear duct opening;

- the affixing of the front circular inflatable body 8 between the tensioning ring around the propeller shaft and the sealing edge 11 of the front duct opening and the screwing down thereof; 5
- the connecting of the front sealing edge 11 to the rear supporting edge 9 by means of bars 12 that are tensioned with tensioners 13; 10
- the filling of the space between the two inflatable bodies 7,8 and the duct 4 with air; 15
- the fastening of four lifting eyes in the top section of the duct 4 to support a hoisting apparatus; 20
- if need be, the detachment of a propeller blade that must be replaced; 25
- the harnessing of the propeller blade to be replaced between the four affixed lifting eyes; 30
- the lowering of the propeller blade to be replaced through the wide manhole provided in the rear inflatable body 7 on the underside of the duct 4; 35
- the hoisting up of a new or repaired propeller blade in the space between the two inflatable bodies; 40
- the lowering of the new propeller blade in the anchor point provided for this purpose and the fastening of it with the screws provided for this purpose; 45
- the release of the air pressure between the two inflatable bodies 7,8 so that the space between them can fill with water; 50
- the removal of the inflatable bodies 7,8 and their supporting frames; 55
- the removal of the affixed sealing edge and supporting edge, as well as the folded-back rings that were screwed onto the edges of the duct; 60
- the release of the repaired propeller 3 for sailing without the ship having been out of the water. 65

**[0040]** The present invention is by no means limited to the embodiment described as an example and shown in the drawings, but a device according to the invention with which a watertight enclosure can be formed around a ship's propeller with duct for the repair or maintenance of a ship's propeller can be realised in all kinds of forms and dimensions, without departing from the scope of the invention.

## Claims

1. Device that provides a ship's propeller (3) surrounded by a duct (4) with a watertight enclosure (6) that is affixed while the ship is in the water and which encloses all or part of the ship's propeller (3) and which can be filled with air under water, so that all or part of the ship's propeller (3) in the enclosure is placed in a dry condition, **characterised in that** the enclosure (6) consists of two circular inflatable bodies (7,8) turned towards one another that are fastened to the duct (4) whereby the circular inflatable bodies (7,8) and the duct (4) together define a space that is closed off in a watertight way and whereby the two circular inflatable hollow bodies (7,8) turned towards one another are fastened to the duct by means of screw bolts: to the rear edge of the duct by screwing a clamping strip (9) to a supporting edge (10) for fastening the rear inflatable body (7) and to the front edge by screwing a sealing edge (11) of the duct for fastening the front inflatable body (8).
2. Device according to claim 1, **characterised in that** the two inflatable bodies (7,8) are connected together via rods (12) with tensioners (13), that connect together the rings (10,11) to which the two inflatable bodies are screwed, and this over the entire periphery of the duct (4).
3. Device according to any one of the claims 1 or 2, **characterised in that** at least one of the circular inflatable bodies (7,8) is provided with a central opening that is affixed around the propeller shaft of the ship's propeller (3) in a watertight way by a tensioning ring that is fastened in a watertight way around the propeller shaft and to which the inflatable body is screwed in a watertight way.
4. Device according to claim 3, **characterised in that** the circular inflatable body (7) that is affixed around the propeller shaft consists of two halves, that can be placed against one another on either side of the propeller shaft and which are closed off together in a watertight way by means of a seal.
5. Device according to any one of the previous claims, **characterised in that** the enclosure (6) is provided with a manhole (19) at the bottom, through which air can be introduced into the watertight space of the enclosure (6), and through which a diver can enter the enclosure (6) from the water in order to perform the necessary works on the ship's propeller (3), while this propeller is entirely or partially clear of the water.
6. Device according to claim 5, **characterised in that** the manhole (19) enables the necessary tools for the works to be brought up to the ship's propeller (3), so that the work on it can be done in the dry in the en-

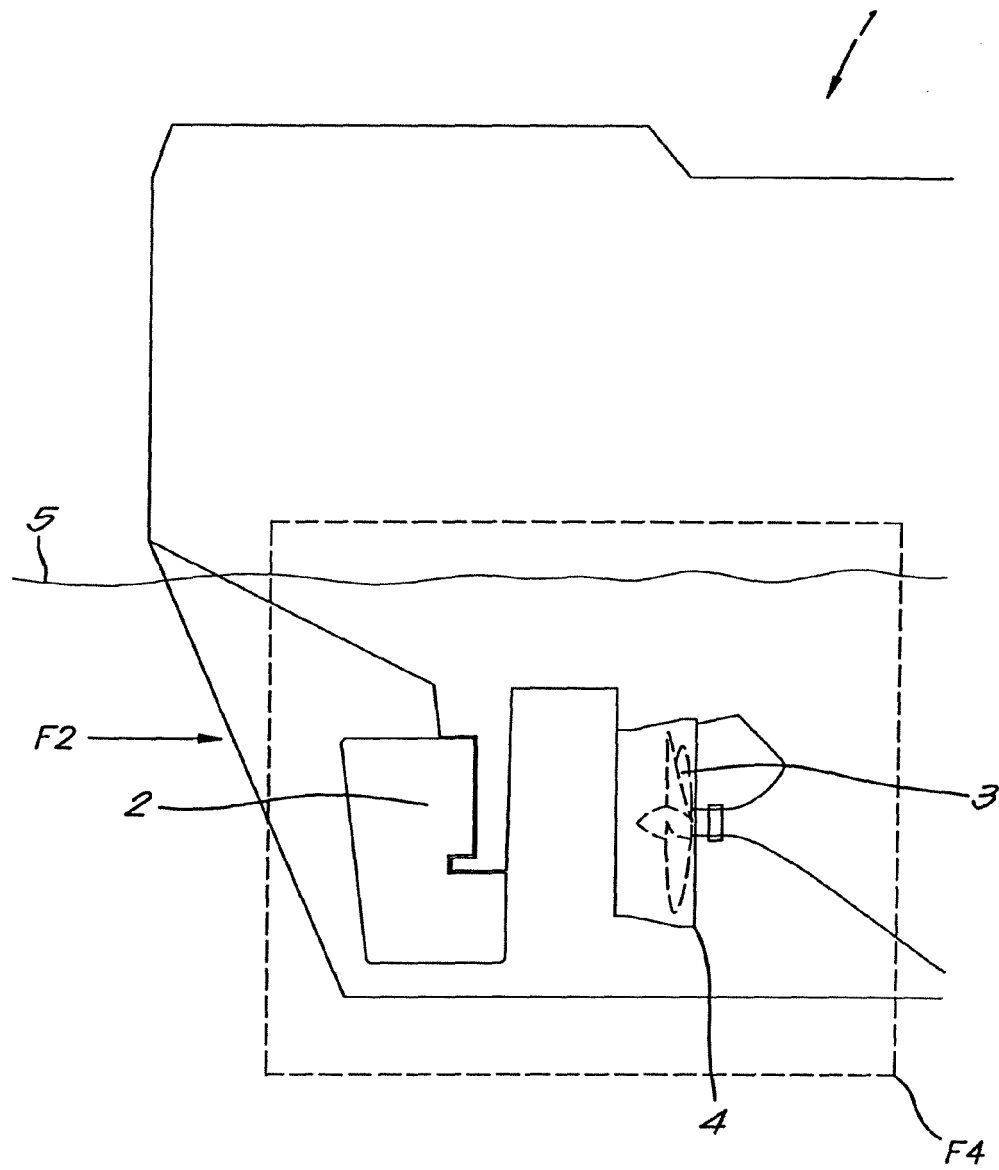
closure (6) while the ship is in the water.

7. Method for repairing or servicing a ship's propeller (3), **characterised in that** it consists of the following steps:

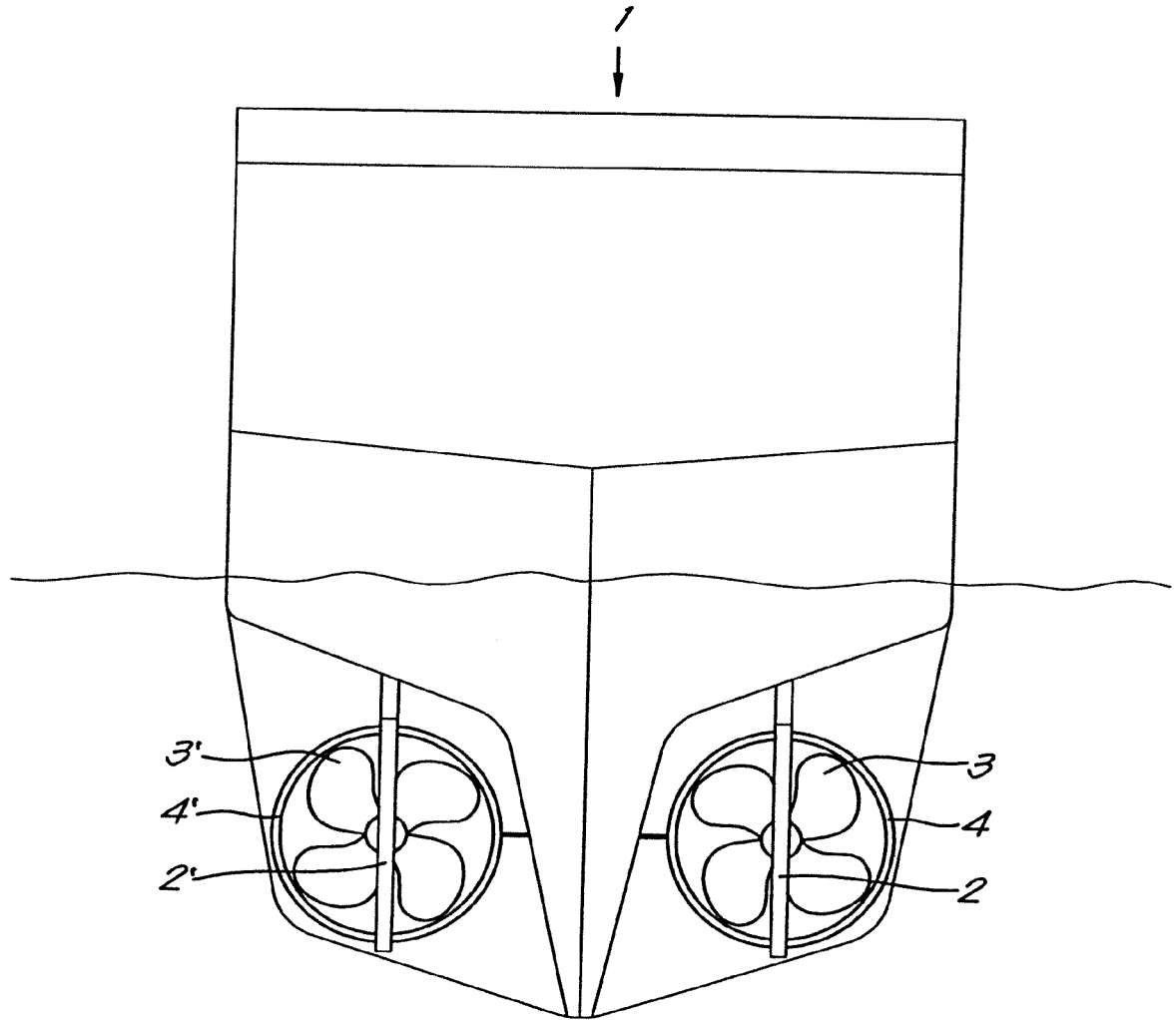
- The affixing of screw bolts in the front and rear edge of the duct (4);
- the attachment of a folded-back ring (11,10) to the front and rear edge (bow side and afterdeck side) of the duct (4) by means of these screw bolts;
- the affixing of a sealing edge (9) by means of hooks fastened to the folded-back ring (10);
- the affixing of a tensioning ring around the propeller shaft at a suitable distance from the front edge of the duct (4) and the screwing down of this tensioning ring in a watertight way;
- the affixing of a frame of rods (16,17,18) between support points on the front edge of the duct (4);
- the affixing of a supporting edge (9) at the rear edge of the duct (4) to the folded-back ring (10) of the rear edge of the duct and the attachment thereof by means of screw bolts;
- the affixing of a basket-forming frame (21,22,23,24,25,26) to the bottom half of the rear edge of the duct to support the circular inflatable body 7 still to be affixed, with an opening on the underside of the rear opening of the duct;
- the affixing of the rear circular inflatable body (7) to this basket-forming frame and the fastening of it with a clamping strip that is screwed to the supporting edge of the rear duct opening;
- the affixing of the front circular inflatable body (8) between the tensioning ring around the propeller shaft and the sealing edge of the front duct opening and the screwing down thereof;
- the connecting of the front sealing edge (11) to the rear supporting edge (10) by means of bars (12) that are tensioned with tensioners (13);
- the filling of the space between the two inflatable bodies (7,8) and the duct (4) with air;
- the fastening of four lifting eyes in the top section of the duct (4) to support a hoisting apparatus;
- if need be, the detachment of a propeller blade that must be replaced;
- the harnessing of the propeller blade to be replaced between the four affixed lifting eyes;
- the lowering of the propeller blade to be replaced through the bottom opening provided in the rear inflatable body (7) on the underside of the duct (4);
- the hoisting up of a new or repaired propeller blade in the space between the two inflatable bodies (7,8);
- the lowering of the new propeller blade in the

anchor point provided for this purpose and the fastening of it with the screws provided for this purpose;

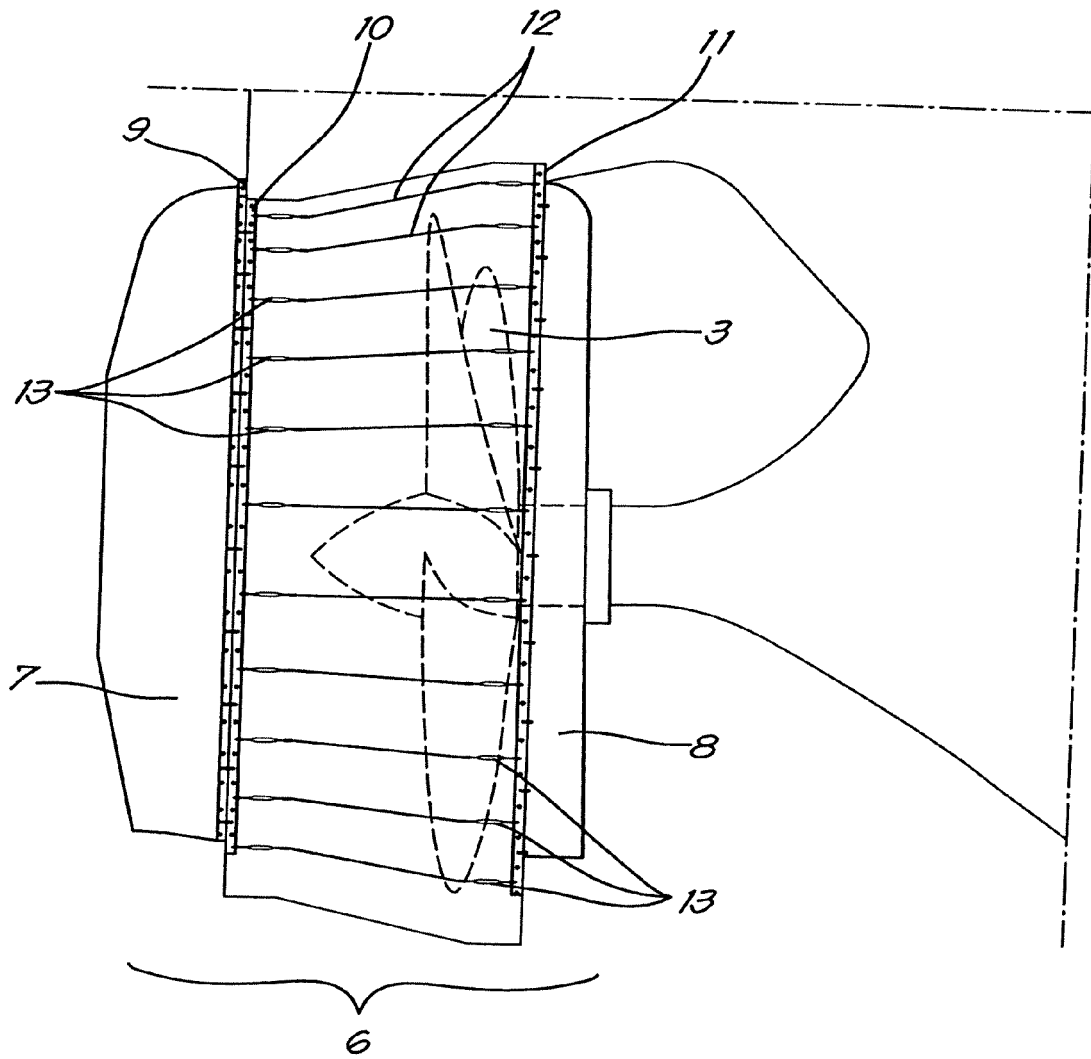
- the release of the air pressure between the two inflatable bodies (7,8) so that the space between them can fill with water;
- the removal of the inflatable bodies (7,8) and their supporting frames;
- the removal of the affixed sealing edge and supporting edge, as well as the folded-back rings that were screwed onto the edges of the duct;
- the release of the repaired propeller (3) for sailing without the ship having been out of the water.



*Fig. 1*

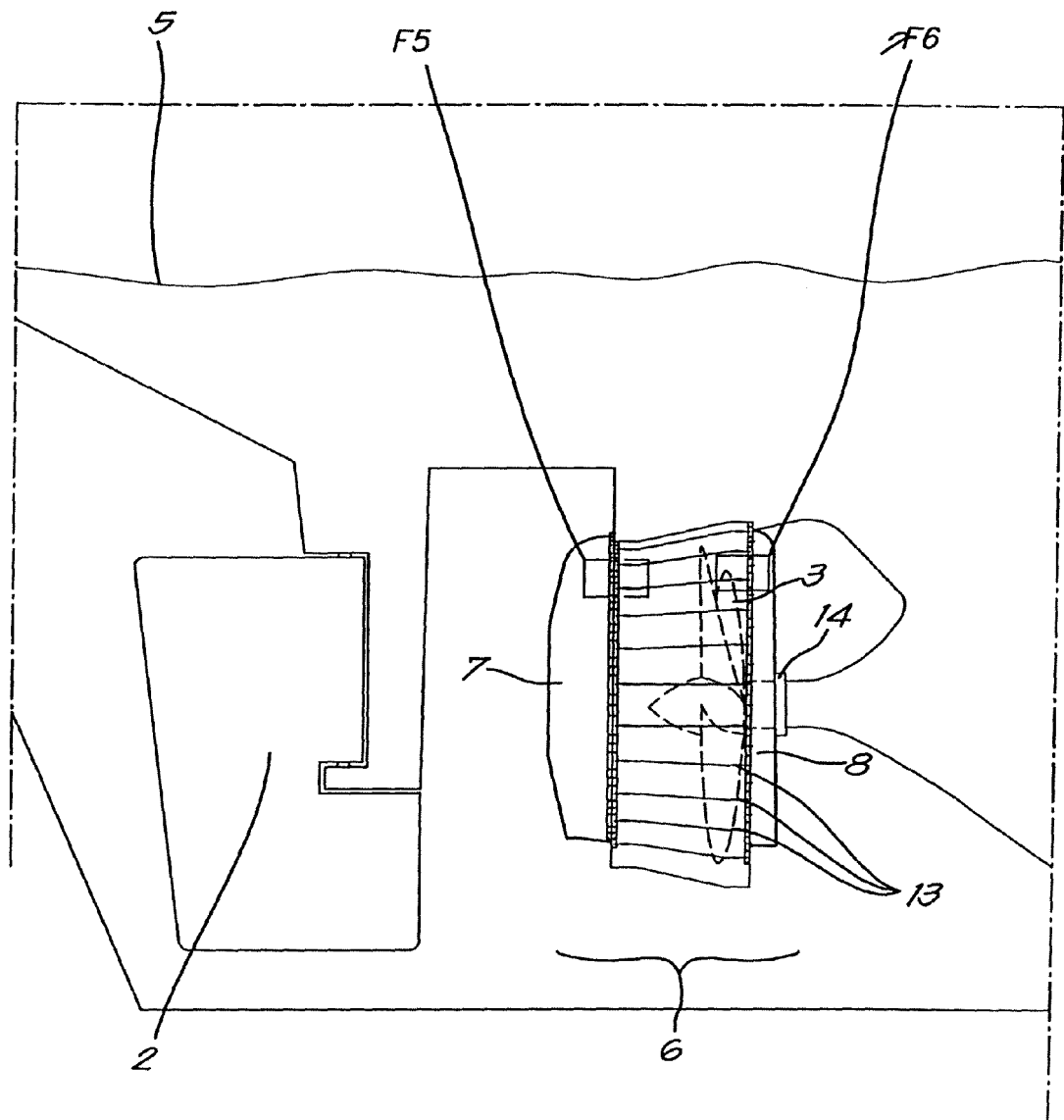


*Fig. 2*

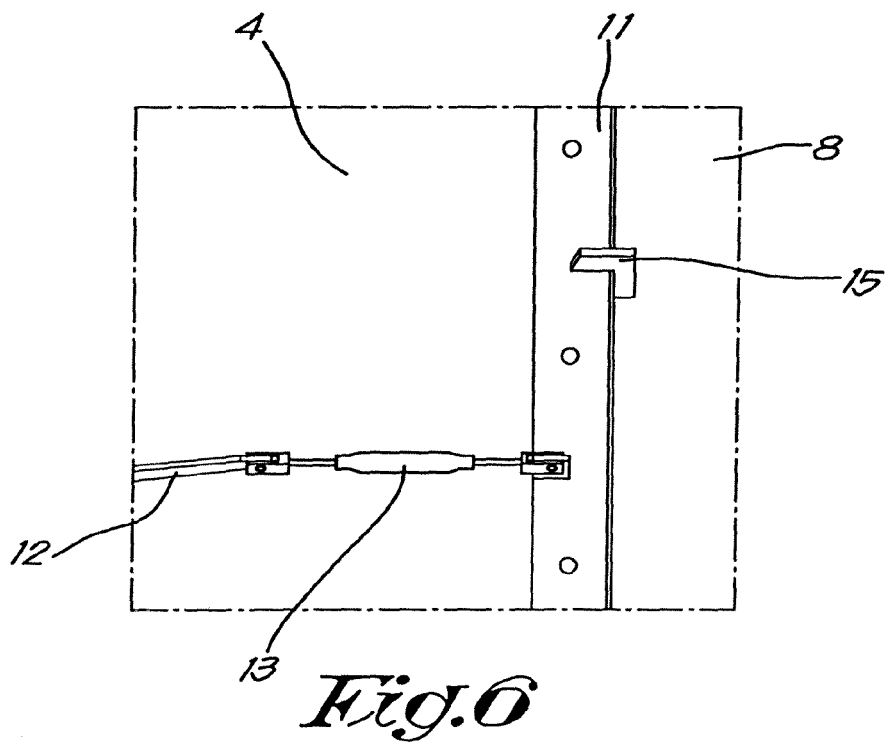
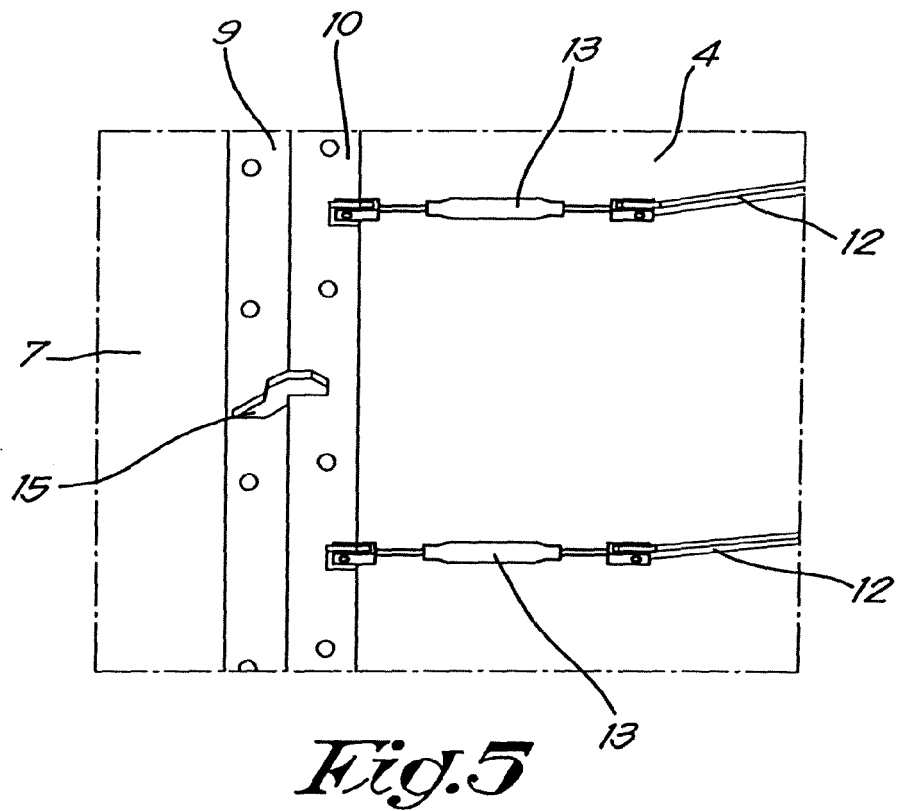


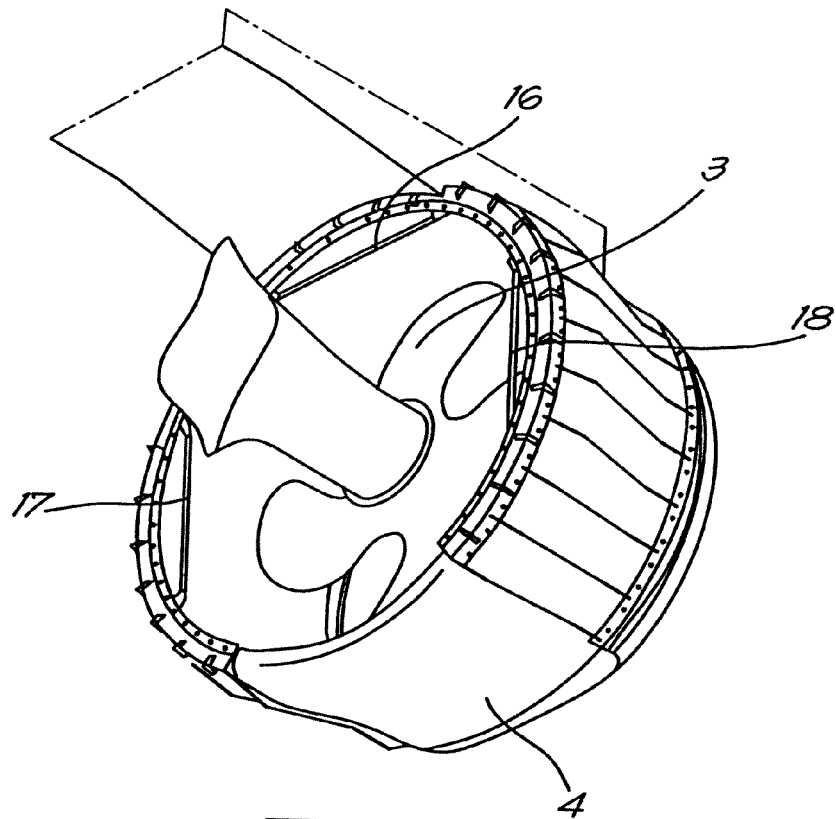
*Fig.3*



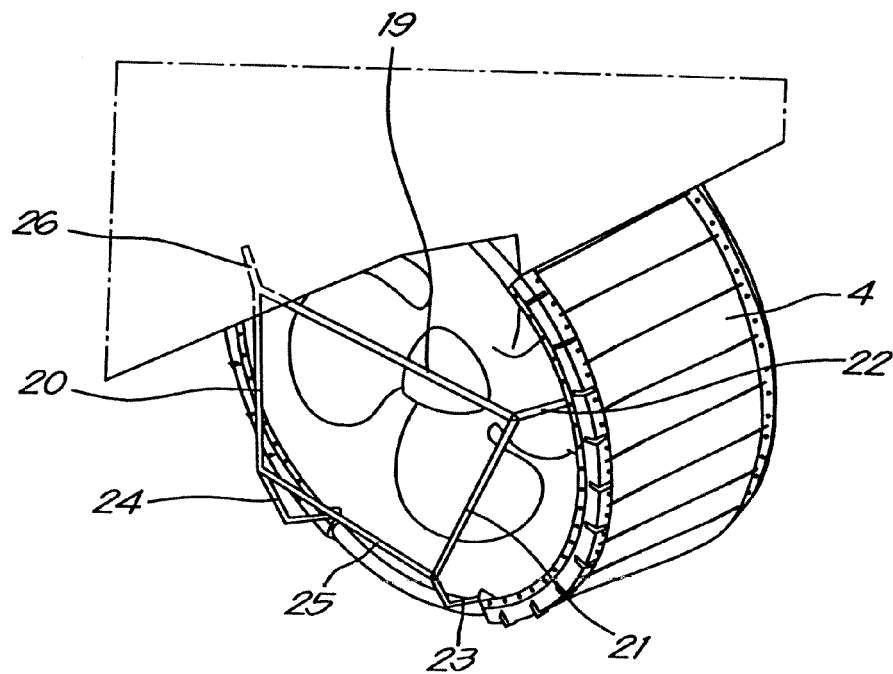


*Fig. 4*





*Fig. 7*



*Fig. 8*



## EUROPEAN SEARCH REPORT

Application Number  
EP 14 00 0760

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	WO 98/07619 A1 (KVAERNER ASA [NO]; PAULSEN KIM [NO]) 26 February 1998 (1998-02-26) * page 4, line 18 - page 5, line 23; figures 1-3 *	1-7	INV. B63B17/00 B63H5/14 B63H5/15
A	US 412 697 A (CLARKE) 8 October 1889 (1889-10-08) * the whole document *	1-7	
A	GB 2 220 019 A (MCNALLY FREDERICK JOSEPH) 28 December 1989 (1989-12-28) * the whole document *	1-7	
A	GB 2 255 582 A (MCNALLY FREDERICK JOSEPH) 11 November 1992 (1992-11-11) * the whole document *	1-7	
			TECHNICAL FIELDS SEARCHED (IPC)
			B63B B63H
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 30 June 2014	Examiner De Sena Hernandorena
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ON EUROPEAN PATENT APPLICATION NO.**

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 9807619	A1	26-02-1998	AU 713421 B2 02-12-1999
		AU 4035197 A	06-03-1998
		FI 990352 A	18-02-1999
		NO 963451 A	20-02-1998
		SE 9900551 A	14-04-1999
		WO 9807619 A1	26-02-1998
-----			
US 412697	A	08-10-1889	NONE
-----			
GB 2220019	A	28-12-1989	NONE
-----			
GB 2255582	A	11-11-1992	NONE
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