(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
11 October 2007 (11.10.2007)

PCT

(10) International Publication Number
WO 2007/112506 A1

(51) International Patent Classification:
F01M 11/04 (2006.01) *F16N 3/00* (2006.01)
F04B 9/14 (2006.01) *F04B 9/12* (2006.01)
F16N 31/00 (2006.01) *F16N 3/08* (2006.01)
B63J 5/00 (2006.01)

(21) International Application Number:
PCT/AU2007/000448

(22) International Filing Date: 5 April 2007 (05.04.2007)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
2006901761 5 April 2006 (05.04.2006) AU
2006903788 14 July 2006 (14.07.2006) AU

(71) Applicant and
(72) Inventor: **STEVENS, Allan, Lindsay** [AU/AU]; 27 Darling Street, Wentworth, NSW 2648 (AU).

(74) Agent: **ACTUATE PATENT ATTORNEYS**; Suite 5, 13-25 Church Street, Hawthorn, VIC 3122 (AU).

(81) Designated States *(unless otherwise indicated, for every kind of national protection available)*: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, SV, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

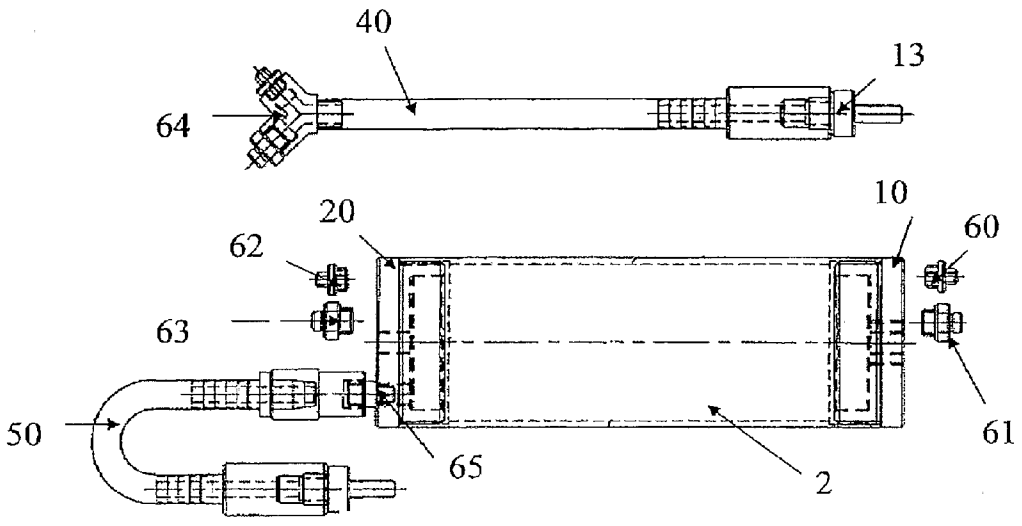
(84) Designated States *(unless otherwise indicated, for every kind of regional protection available)*: ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, LV, MC, MT, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Declarations under Rule 4.17:
— *as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))*
— *of inventorship (Rule 4.17(iv))*

Published:
— *with international search report*

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: OIL REPLACEMENT DEVICE FOR MARINE OUTBOARD MOTORS



(57) Abstract: The present invention provides an oil replacement device including a body portion, a piston, at least one oil line, at least one fitting and/or valve means and a piston driving means whereby the system provides a means for changing the oil in a marine vessel, without the need for removing the vessel from the water and/or preventing oil spillage into the water.

WO 2007/112506 A1

OIL REPLACEMENT DEVICE FOR MARINE OUTBOARD MOTORS

Field of the Invention

The invention relates to outboard gearbox compartments and motors of marine vessels, and in particular, to an oil replacement device which provides a means for changing the oil in the outboard gearbox compartments and/or motors of marine vessels without the need for removing the boat from the water and/or preventing oil spillage into the water.

Whilst the invention can be applied to the removal of fluid from any vessel using low pressure compressed air or any other suitable manual or automated means, for convenience sake, it shall be described in terms of an oil replacement system for the replacement of gearbox and engine oil in a marine vessel.

Background to the Invention

Conventionally, in order to change the oil in the gearbox compartment of a marine vessel including small to large boats/vessels and house boats or the like, it is necessary to first drain the old from the compartment and then refill the compartment with the correct amount of oil. The oil is drained from the lower drain hole by having air enter through the upper vent hole and push the oil out from the lower hole via gravitational forces. Once the oil has been drained, the new oil can be filled via a plastic bottle with a tapered nozzle which is inserted into the drain hole and squeezed until oil begins to come out of the upper vent hole to indicate that the compartment is full. The holes can then be sealed with locking screws or plugs. In order to fill the correct amount of oil, the outboard leg must be down which is achieved by either having the boat out of water or removing the lower leg. The disadvantage with this current method is the expense incurred by an owner to have their vessel taken out of the water. Removal of the lower leg can also be problematic as it is often difficult to re-align the gear selecting shaft and spline when placing components back together and thus, should only be undertaken by an authorised mechanic.

Whilst the oil can be changed when the outboard leg is only partially out of the water ie. on an inclined angle, this is not recommended as it does not allow the full capacity of the oil to be replaced which may lead to gear failure. In addition, changing the oil

when the leg is on an inclined position heightens the risk of oil overflowing into the water presenting a major environmental threat to marine and waterborne life.

Accordingly, it is an object of the invention to provide an oil replacement system which provides a means of enabling oil to be changed, without the need to remove a marine vessel from the water and/or remove the lower outboard leg.

It is a further object of the invention to provide a means whereby both the new and old oil and contaminants being changed can remain fully contained within the unit.

Summary of the Invention

The present invention provides an oil replacement device including:
a body portion;
a piston;
at least one oil line;
at least one fitting and/or valve means;
and a piston driving means whereby the system provides a means for changing the oil in a marine vessel, without the need for removing the vessel from the water and/or preventing oil spillage into the water.

The body portion is preferably cylindrical in shape. The body portion preferably has provided a threaded portion at an upper end and a lower end of the body portion.

Preferably, the body portion has provided at least one end cap including an upper end cap and a lower end cap. The end caps preferably have provided at least one aperture which is adapted to receive a fitting and/or valve means therethrough.

It is preferred that the fitting enables a first end of an oil line to be connected thereto.

It is preferred that a first valve means is an air valve.

It is further preferred that a second valve means is an air release/bleed valve.

The oil line(s) of the device preferably have provided at least one stop means in the form of a valve which is adapted to prevent the unwanted passage of fluid (oil) or air through the line(s).

The piston is preferably in the form of a circular disc or the like. The piston preferably has provided at least one sealing means which is adapted to provide a hydraulic and pneumatic seal between the piston and the body portion of the device whereby the sealing means may be in the form of an o-ring or washer or the like.

In a first aspect of the invention, the piston driving means is preferably a piston pin connected to the piston which is adapted to manually control vertical movement of the piston. The piston pin is preferably connected to a handle which assists a user in driving movement of the piston.

In a second aspect of the invention, the piston driving means is preferably low pressure compressed air. The low pressure compressed air is preferably provided by an external compressed air source whereby the device can be connected to said air source via a Y valve assembly and/or air line.

In order that the invention may be more readily understood we will describe by way of non-limiting example of a specific embodiment thereof.

Brief Description of the Drawings Figures

Figure 1 shows a side view of the oil replacement device according to a preferred embodiment of the invention.

Figure 2 shows a top plan view of the upper end cap of the oil replacement device according to a preferred embodiment of the invention.

Figure 3 shows a top plan view of the lower end cap of the oil replacement device according to a preferred embodiment of the invention.

Figure 4 shows a Y-valve assembly of the oil replacement device according to a preferred embodiment of the invention.

Figure 5 shows the body portion of the oil replacement device according to a preferred embodiment of the invention.

Figure 6 shows a perspective view of the oil replacement device using a manual piston driving means according to a preferred embodiment of the invention.

Description of an Embodiment of the Invention

Figures 1 to 6 to show an oil replacement device according to a preferred embodiment of the invention.

In this preferred embodiment, the invention provides an oil replacement device 1 which provides a means for changing the oil. The oil replacement device 1 shall be described herein in terms of replacing the oil of outboard gearbox compartments and/or motors of marine vessels, utilizing low pressure compressed air, without the need for removing the boat from the water and/or preventing oil spillage into the water. It is envisaged that the shape, style and dimensions of the oil replacement device 1 and/or its components may be varied as required to suit different vessels and/or applications.

The oil replacement device 1 is preferably in the form of an oil injector unit which is adapted to extract old oil and contaminants from an outboard gearbox compartment and/or motor and insert new oil into the gear box compartment and/or motor of a marine vessel. The injector unit 1 preferably has provided a body portion 2 which is cylindrical in shape. The body portion 2 of the device 1 is preferably made from an extruded steel or plastics material. However, it is envisaged that any other suitable material which is durable and meets the requirements of the invention may also be employed. The size, dimensions and shape of the body portion 2 may be predetermined such that the body portion 2 is adapted to hold a specific amount of fluid/oil and enables a user to know exactly how much fluid/oil is being filled or replaced at any given time. For example, a body portion 2 with an external diameter of 81mm with a precision ground diameter of 75mm and an overall length of 300mm would ensure a volume capacity of 1.3 litres for the oil replacement device 1. It is envisaged that these dimensions and shape may be varied to alter the capacity of the injector unit accordingly to suit the different requirements of a vessel or user. Provided at the upper and lower end of the body portion 2 is preferably a threaded portion 3, 4 which is adapted to receive an end cap 10, 20 which can be engageable with and connected thereon. The threaded portions 3, 4 are preferably adapted to have at least one thread having a fine pitch which is adapted to be positioned on the

inner surface adjacent the upper and lower edges of the body portion 2 and extend about the perimeter of the body portion 2.

The oil replacement device 1 preferably has provided an upper end cap 10 and a lower end cap 20 which is adapted to be engageable with, and connected to, the corresponding ends of the body portion 2. The end caps 10, 20 are preferably made of a mild steel material. However, it is envisaged that any other suitable material may also be employed which may be the same or different to the material that is used for the body portion 2 of the device 1. It is preferred that the end caps 10, 20 are substantially cylindrical in shape and/or complimentary in shape to the body portion 2, having a similar external and internal diameter to the body portion 2 of the device 1. It is preferred that the end caps 10, 20 may be slightly larger or smaller in diameter so that they can be received over, or within, either end of the body portion 2 respectively.

The end caps 10, 20 are preferably cup-shaped so that they are closed at one end and open-ended at the other end. In this way, they are able to provide a seal for the device 1 when they are attached to either side of the body portion 2 of the device 1. In order to enable the end caps 10, 20 to be connected to the body portion 2 of the device 1, the end caps have provided a threaded portion 11, 21. The threaded portion is adapted to be positioned adjacent to the open edge and extend about the perimeter of the end cap 10, 20. The threaded portions 11, 21 are adapted to have at least one thread which is complimentary in shape to the threaded portions 3, 4 of the body portion 2 of the device 1. It is further preferred that the threads have a fine pitch. The fine pitched threaded portions 11, 21 are adapted to be complimentary in shape to the fine pitched threaded portions 3, 4 provided on the upper or lower edge of the body portion 2 so that they are adapted to be engageable with, and connected to, either end of the body portion 2 via rotation of the corresponding members 2, 10, 20. In a further embodiment, it is envisaged that the end caps 10, 20 may be integrally formed with the body portion 2 or connected via another suitable connection/attachment means.

The end caps 10, 20 preferably have provided a sealing means (not shown). The sealing means is adapted to extend along the inner perimeter/circumference of the end caps 10, 20. The sealing means is preferably in the form of an o-ring or any other suitable sealing means which can be provided separately or be integrally formed with the end caps 10, 20 and be adapted to provide an airtight chamber

within the body portion 2 of the device 1 when the end caps 10, 20 are attached at either end of the body portion 2 of the device 1.

The end caps 10, 20 preferably have provided at least one fitting 13, 23 which is adapted to receive a first end of an oil hose or pipeline 40, 50 thereto. However, it is envisaged that these fittings 13, 23 could just as easily by provided on, or attached to, any other location on the body portion 2 of the device 1 as required. The fittings 13, 23 are preferably in the form of a plug having an elongated portion, such as a threaded nipple or the like, and is adapted to be located on the closed end of each cap 10, 20 and fitted to a rubber line 40, 50. The threaded nipples 13, 23 are adapted to extend outwardly from the surface of the end caps 10, 20 so that they can receive a first end of a rubber line 40, 50 thereover.

The oil lines 40, 50 are preferably made of a rubber material. However, it is envisaged that a plastics material or any other suitable material may also be employed. It is envisaged that a second end of the rubber lines 40, 50 may have provided a threaded fitting (not shown) which is adapted to enable the oil line 40, 50 to be connected to an upper/lower drain hole/vent on the outboard gearbox compartment/motor and may be variable depending on the type of outboard leg/motor that is being attended to. It is envisaged that these fittings may vary such that they are adapted to suit the different brands of outboard legs/motors. Each oil line 40, 50 may preferably have provided a stop valve (not shown) located at a predetermined position along the oil line 40, 50. The stop valve may preferably be any suitable valve or the like which is adapted to prevent any unwanted passage of fluid or air through the oil line to ensure that any oil remaining within the lines will not spill into the water upon removal of the lines.

The end caps 10, 20 preferably have provided at least one aperture which is adapted to receive a valve therethough. The aperture(s) are preferably in the form of tapped holes having threads which are adapted to suit the threads provided on a fitting or valve received therethrough. The valve(s) may be provided separately and/or be integrally formed with the end caps 10, 20. The upper end cap 10 preferably has provided a centrally located aperture 14 which is adapted to enable a pin 71 connected to a piston 70 and/or a fitting 13 or bolt member or the like to be received therethrough. It is preferred that the central aperture of the upper end cap 10 may have provided at least one sealing means (not shown) which may preferably be an o-ring or the like which is adapted to accommodate and provide an adequate seal

about a piston pin 71. Alternatively, the upper end cap 10 may not have a central aperture in an embodiment where there is no piston and/or manual piston pin/driving means provided. A second aperture 15 may preferably be adapted to receive an air valve 60 therethrough whilst a third aperture 16 is preferably adapted to receive an air release valve 61 therethrough. The lower end cap 20 preferably has provided a first aperture 24 which is adapted to receive an air valve 62 therethrough whilst a second aperture 15 is preferably adapted to receive an air release valve 63 therethrough. In addition, a third aperture 26 is preferably provided which is adapted to receive a fitting 23/non-return valve 65 therethrough.

The oil replacement device 1 preferably has provided a piston 70 which is adapted to produce the vacuum and compression effect for the device 1. The internal piston 70 of the device 1 is preferably in the form of a circular disc or any other suitably shaped disc to suit the shape of the body portion 2 of the device 1. It is envisaged that in an alternate embodiment of the invention, a solid cylindrical member could also be similarly adopted. It is preferred that the diameter of the piston 70 be only slightly smaller than the internal diameter of the body portion 2. The piston 70 is adapted to have at least one sealing means 72 which may preferably be an o-ring or the like located around the perimeter/circumference of the piston 70 to guarantee a quality hydraulic and pneumatic seal between the piston 70 and the inner wall of the body portion 2 of the device 1. It is envisaged that washers (not shown) or any other suitable sealing means placed on either side about the piston 70 may also employed to provide an adequate seal.

In a first aspect of the invention, movement of the piston 70 may occur via a manually driven means. The piston 70 may preferably have provided a piston pin 71 which is adapted to be an elongated pin member that is passed through the central aperture 14 provided on the upper end cap 10 and is located internally of the body portion 2 of the device 1. The piston pin 71 is adapted to function as a plunger shaft which may be forced upwardly or downwardly to achieve the compression or suction of the fluid (oil) or air. Provided at either end of the piston pin 71 may preferably be a pitched threaded portion (not shown) which is adapted to enable the piston pin 71 to be attached to adjacent components. The upper end of the piston pin 71 is preferably adapted to be attached to a handle 73 which is adapted to make it easier to use the plunger and control movement of the piston 70 and piston pin 71 in either direction.

The piston 70 preferably has provided a centrally located aperture which may extend partially or entirely through the piston 70. The aperture preferably has provided a threaded portion (not shown) along the inner wall which is complimentary in shape to the threaded portion provided on the end of the piston pin 71 so that the piston can be engageable with, and connected to, the bottom end of the piston pin 71.

The handle 73 is preferably made of an aluminium material to provide a smoother feel for the handle component. However, it is envisaged that any other suitable material may also be employed. The handle 73 is preferably substantially rectangular in shape and may have provided at least one grooved portion 73a on the underneath surface of the handle 73 in order to provide a comfortable grip for a user. Provided underneath the handle portion may be an attachment portion (not shown) for the handle 73 which preferably has provided an aperture (not shown) having an internal threaded portion (not shown) which is adapted to be complimentary in shape to the pitched threaded portion provided on the upper end of the piston pin and thus, enables the handle portion 73 to be engageable with, and connected to, the upper portion of the piston pin 71.

In a second aspect of the invention, movement of the piston 70 may be driven by an external compressed air source. In this embodiment, the device may have provided a Y valve assembly 64 which is adapted to be attached to an air vent hole of an outer leg line 40 to enable the oil replacement system to be connected to a source (not shown) for providing compressed air. It is envisaged that any suitable source for providing compressed air may be adopted such as a compressor, hand pump or foot pump or the like.

The Y valve assembly 64 may preferably have provided a lower connecting portion 64a which is adapted to connect to one end of an upper line 40. The upper portion of the connector member 64 may preferably be divided to provide at least one valve connection.

A first valve connection is preferably an air valve 64b which is adapted to be connected to a source for providing compressed air, via a hose or pipe or other suitable connection, to allow compressed air to enter into the gearbox compartment/motor. A second valve connection 64c is preferably an air bleed/lock valve which is adapted to release air from within the gearbox compartment/motor. The valve connection(s) 64b, 64c may preferably be provided with a lock nut (not

shown) which is adapted to control the air flow rate passing through the valve connection 64b, 64c. The compressed air may be used to drive the piston 70 in a downward direction whilst release of the air bleed valve 61 results in the piston and any fluid contained within the body portion 2 of the device 1 being drawn in an upward direction.

In practice, the system can be used for a single or double oil change process as described below.

Single action oil change (Submerged)

The piston 70 is pushed toward the bottom of the body portion 2 and then raised to draw up the required amount of new oil from your container via an upper line 40 connected to the top of the cylinder 2 locking off both line valves to lock the new oil within the body portion 2 above the piston 70. The outboard leg is then lifted to the tilt position to remove the vent hole screw, and the other end of the upper oil line 40 is connected to the vent hole for a gearbox oil change, or engine oil refiller cap or dipstick orifice for an engine oil change, until it seals.

The oil drain screw is then removed and a lower oil line 50 fitted to the bottom of the body portion 2 at one end with the other end fitted to the drain hole of the outboard leg for a gearbox oil change, or the engine oil drain plug for an engine oil change. When both lines are connected and sealed both line valves can be opened and the leg can be lowered into the normal upright position.

The piston 70 is drawn back to draw the old contaminated oil into the body portion 2 beneath the piston 70 as the new oil in the top of the cylinder is injected into the gear box through the vent hole. When all the new oil has been transferred, the leg can be lifted to the tilt position and both line valves locked off. The oil lines 40, 50 can then be removed and the locking screws or plugs replaced.

Dual action oil change (Submerged)

The outboard leg is lifted to the tilt position to remove the vent hole screw, and one end of the upper oil line 40 is connected to the vent hole for a gearbox oil change, or engine oil refiller cap or dipstick orifice for an engine oil change, until it seals, whilst the other end of the upper oil line 40 is connected to the connecting portion 64a of

the Y valve assembly 64. Both line valves are opened and the piston 70 is pushed all the way to the bottom of the body portion with the air bleed valve 61 on the top end cap in an open position and/or the air bleed valve 64c on the Y valve assembly 64 is in a closed position and low pressure compressed air is pumped into the air valve 64b on the Y valve assembly 64.

The oil drain screw is then removed and a lower oil line 50 is fitted to the bottom of the body portion 2 at one end with the other end fitted to the drain hole of the outboard leg for a gearbox oil change, or the engine oil drain plug for an engine oil change. When both lines are connected and sealed, both line valves can be opened and the leg be lowered into the normal upright position.

In order to empty old oil from the unit, the low pressure compressed air entering through the upper vent hole will force the oil from the drain hole into the device 1 via the lower oil line 50 which will consequently force the piston 70 up as oil enters into the lower part of the body portion 2 beneath the piston 70. Where compressed air is not utilised as the primary driving force, the piston 70 can be drawn back to draw the old contaminated oil into the lower portion of the cylinder 2 via suction generated by the air bleed valve 61 being open thus, allowing air in to displace the oil being withdrawn. The outboard leg can then be lifted to the tilt position and both line valves closed prior to removing both lines from the outboard leg. Both line valves can then be opened, and by forcing down the piston, the old contaminated oil can be ejected into a suitable container for later disposal. It is envisaged that removal and refilling of the oil via the piston 70 and/or plunger is optional if there is no source of compressed air available.

The piston 70 is drawn back until the correct measure of new oil is drawn into the lower portion of the cylinder 2 from a container of new oil and both valves are locked off, locking the new oil within the body portion 2 under the piston 70. The upper 40 and lower 50 oil lines are reconnected from the Y valve assembly 64 to the vent plug hole ensuring that it has fully sealed and from the lower portion of the cylinder to the drain hole again ensuring that it is fully sealed. Both line valves are then opened and the outboard leg is lowered to an upright vertical position.

The air bleed valve 61 on the top end cap 10 is in a closed position. Low pressure air is then injected into the body portion 2 of the device 1 via the air valve 60 provided on the top end cap 10 in order to force the piston 70 down and push the new oil into the

lower leg of the gearbox compartment/motor. The air within the lower leg/motor can escape through the upper oil line 40 from the vent hole via the air bleed valve 64c of the Y valve assembly 64 which should be in an open position. Where compressed air is not used, the piston 70 can be forced down using manual force to the bottom of the body portion 2 to inject the new oil into the gear box/motor assisted by suction provided via the oil vent line 50. The air bleed valve 61 on the top end cap 10 is preferably open to allow air into the body portion 2 to avoid a vacuum being created in the top of the body portion 2. When completed the outboard leg is lifted to the tilt position, both line valves are locked off and the oil lines 40, 50 can then be removed and the locking screws or plugs replaced.

The oil replacement device 1 can be utilised with the outboard leg or components submerged out of the water or alternatively, when the outboard leg and/or vessel is in the water providing a great advantage in comparison to current methods. Most importantly, the oil can be changed at any time without any spillage into the waterway because the old oil and contaminants is completely contained and secure within the unit.

While we have described herein a particular embodiment of the oil replacement device 1, it is further envisaged that other embodiments of the invention could exhibit any number and combination of any one of the features previously described. However, it is to be understood that any variations and modifications can be made without departing from the spirit and scope thereof.

I claim:

1. An oil replacement device including:
   a body portion;
   a piston;
   at least one oil line;
   at least one fitting and/or valve means;
   and a piston driving means whereby the system provides a means for changing the oil in a marine vessel, without the need for removing the vessel from the water and/or preventing oil spillage into the water.

2. An oil replacement device as claimed in claim 1 wherein the body portion is cylindrical in shape.

3. An oil replacement device as claimed in claim 2 wherein the body portion has a threaded portion provided at an upper end and a lower end.

4. An oil replacement device as claimed in claim 1 wherein the body portion has provided at least one end cap including an upper end cap and a lower end cap.

5. An oil replacement device as claimed in claim 4 wherein the end caps have provided at least one aperture which is adapted to receive a fitting and/or valve means therethrough.

6. An oil replacement device as claimed in claim 1 wherein the fitting enables a first end of an oil line to be connected thereto.

7. An oil replacement device as claimed in claim 1 wherein a first valve means is an air valve.

8. An oil replacement device as claimed in claim 1 wherein a second valve means is an air release/bleed valve.

9. An oil replacement device as claimed in claim 1 wherein the oil line(s) have provided at least one stop means in the form of a valve which is adapted to prevent the unwanted passage of fluid or air through the line(s).

10. An oil replacement device as claimed in claim1 where the piston is in the form of a circular disc or the like.

11. An oil replacement device as claimed in claim 10 wherein the piston has provided at least one sealing means which is adapted to provide a hydraulic and pneumatic seal between the piston and the body portion of the device.

12. An oil replacement device as claimed in claim 1` wherein the sealing means is in the form of an o-ring or washer or the like.

13. An oil replacement device as claimed in claim 1 wherein the piston driving means is a piston pin connected to the piston which is adapted to manually control vertical movement of the piston.

14. An oil replacement device as claimed in claim 13 wherein the piston pin is connected to a handle which assists a user in driving movement of the piston.

15. An oil replacement device as claimed in claim 1 wherein the piston driving means is low pressure compressed air.

16. An oil replacement device as claimed in claim 15 wherein the low pressure compressed air is provided by an external compressed air source.

17. An oil replacement device as claimed in claim 16 wherein the device is connected to an external compressed air source via a Y valve assembly and/or air line.

18. An oil replacement device as substantially described herein with reference to the above examples and drawing figures.

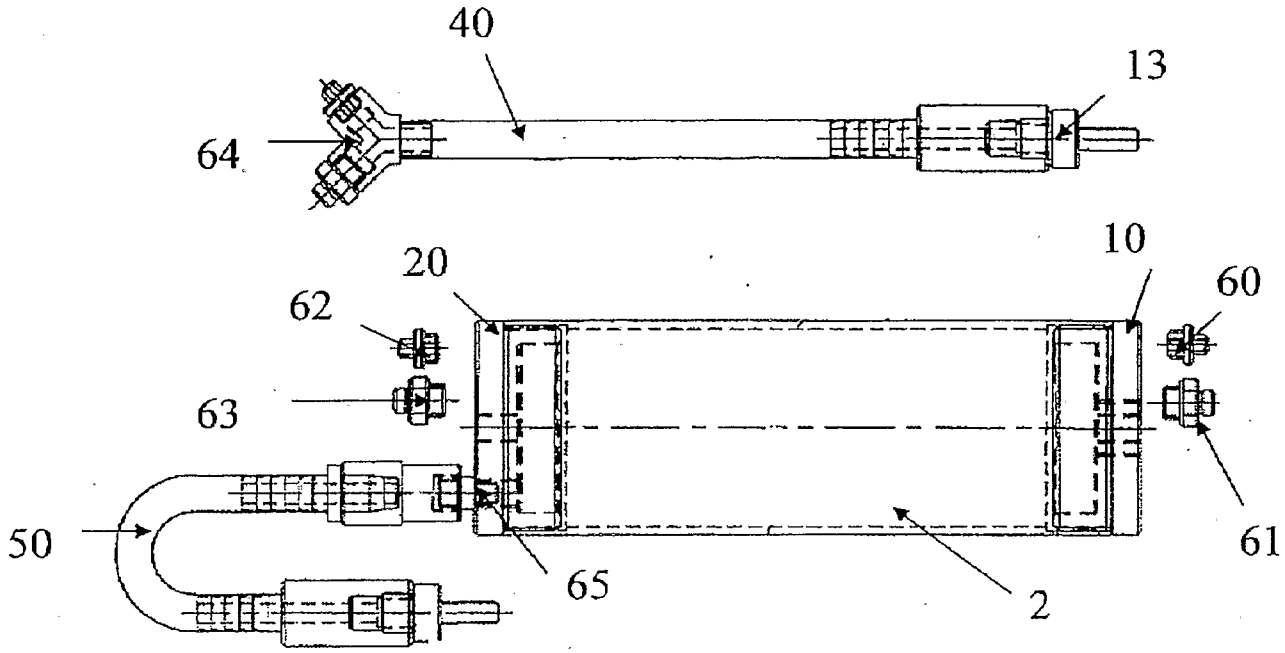


Figure 1

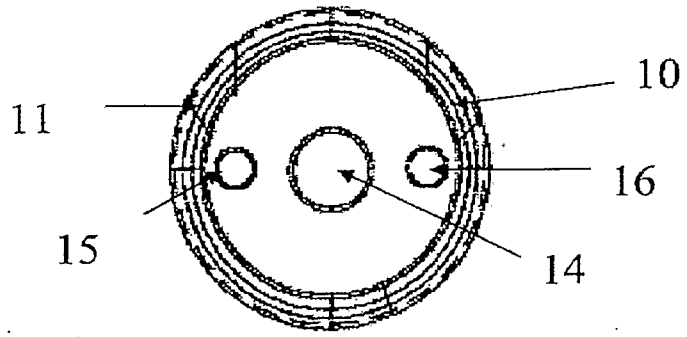


Figure 2

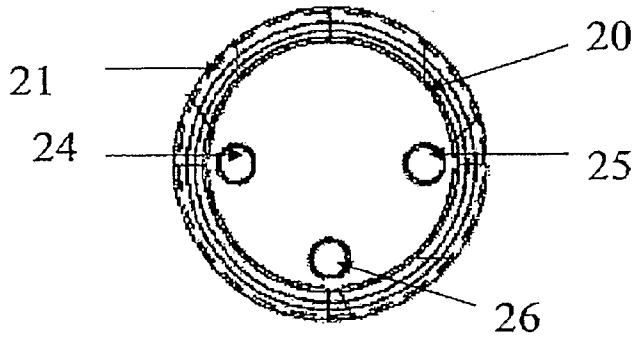


Figure 3

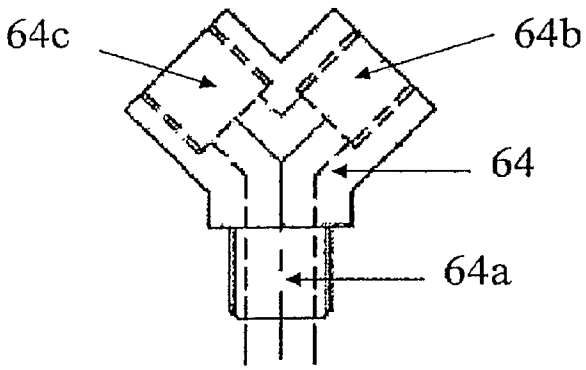


Figure 4

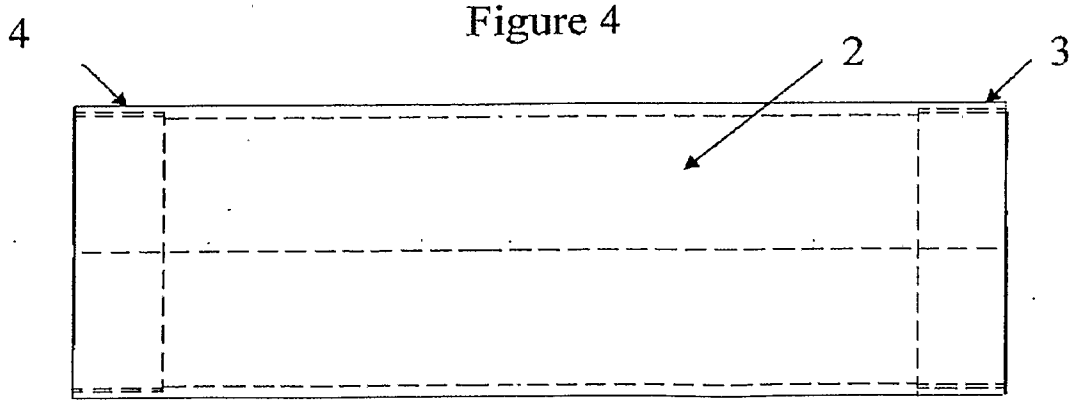


Figure 5

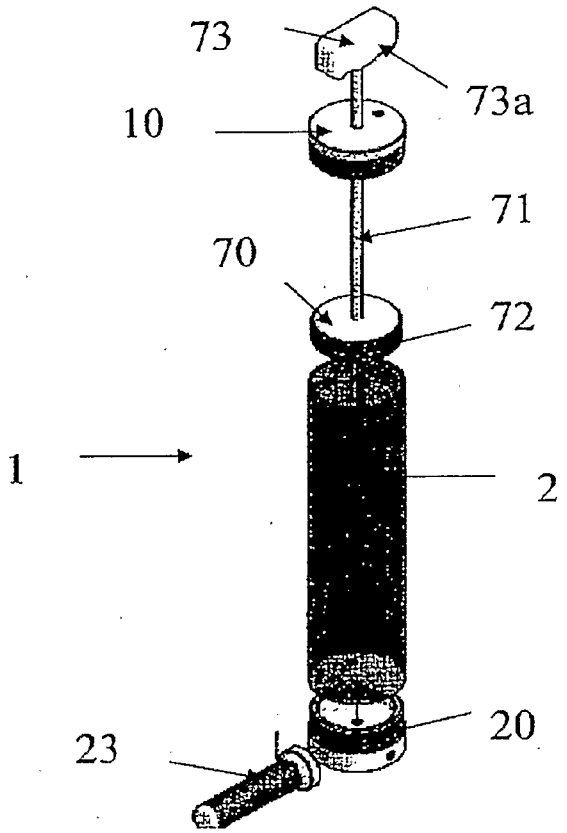


Figure 6

INTERNATIONAL SEARCH REPORT

International application No.
PCT/AU2007/000448

A. CLASSIFICATION OF SUBJECT MATTER

Int. Cl.

F01M 11/04 (2006.01) ***F04B 9/14*** (2006.01) ***F16N 31/00*** (2006.01) ***B63J 5/00*** (2006.01) ***F16N 3/00*** (2006.01) ***F04B 9/12*** (2006.01) ***F16N 3/08*** (2006.01)

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
DWPI: keywords like: OIL, LUBRICANT, CHANGE, REPLACEMENT, DRAIN, PISTON, PUMP and IPC: F01M 11/-, F16N/-, B67D/-, F04B 9/-, B63/-

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DE 19756589 A1 (OLIVEIRA) 25 June 1998 See whole document	1-18
X	CA 2193137 A1 (OLIVEIRA) 18 June 1998 See whole document	1-18
X	US 6357492 B1 (HSU) 19 March 2002 See whole document	1-18

[X] Further documents are listed in the continuation of Box C [X] See patent family annex

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier application or patent but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
12 July 2007	18 JUL 2007
Name and mailing address of the ISA/AU AUSTRALIAN PATENT OFFICE PO BOX 200, WODEN ACT 2606, AUSTRALIA E-mail address: pct@ipaustralia.gov.au Facsimile No. (02) 6285 3929	Authorized officer **ADRIAN GIACOBETTI** AUSTRALIAN PATENT OFFICE (ISO 9001 Quality Certified Service) Telephone No : (02) 6283 2579

INTERNATIONAL SEARCH REPORT

International application No.
PCT/AU2007/000448

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	GB 2272948 A (TSENG) 01 June 1994 See whole document	1-18
X	US 2029781 A (McLEAN) 04 February 1936 See whole document	1-18
X	US 5002154 A (CHEN) 26 March 1991 See whole document	1-18
X	US 6474443 B2 (KEARNS et al) 05 November 2002 See whole document	1-18
A	US 5738499 A (EVANS) 14 April 1998 See whole document	1-18
A	US 1439295 A (CRAIG) 19 December 1922 See whole document	1-18

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.
PCT/AU2007/000448

This Annex lists the known "A" publication level patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent Document Cited in Search Report		Patent Family Member			
DE	19756589	CA	2193137		
US	6357492				
GB	2272948				
US	2029781				
US	5002154	AU	53912/90	DE	4018916
US	6474443	US	2001050199		
US	5738499				
US	1439295				

Due to data integration issues this family listing may not include 10 digit Australian applications filed since May 2001.

END OF ANNEX