Title: OIL DISTRIBUTION BOX OF CONTROLLABLE PITCH PROPELLER SYSTEM

Abstract: Therefore it is primary object of the present invention to provide new OD box for controllable pitch propeller, which is of simplified construction having reduced number of the parts particularly elastic seals. OD box comprises supply nonrotative liner with astern port and ahead port. Nonrotative liner is closed by flange having seals on both sides. Inside of supply nonrotative liner the twin tube is inserted. In twin tube the ahead channel and the astern channel are made. On right side of the twin tube guide carrier is arranged on the bearing and supported by the cap. In guide carrier the groove is made for sliding block, which connected through pin with the fork. The fork is fixed through the fork sleeve on the feedback shaft by the dowel. The shaft is installed on box bearing in feedback box with the box seals arranged in the boss of the feedback box, which is closed by the cover.
OIL DISTRIBUTION BOX OF CONTROLLABLE PITCH PROPELLER SYSTEM

[Technical Field]

The present invention relates to an oil distribution box for a marine controllable pitch propeller of the type in which a hydraulic servo in the propeller hub controls the pitch position of the propeller blades.

[Background Art]


The box is intended for use with a marine controllable pitch propeller of the type having a main hydraulic servo within a hub for controlling the pitch of propeller blades rotatably carried by the hub and including a directional valve actuated by a tubular valve rod extending through the propeller shaft from the oil distribution box.

It comprises an outer stationary housing, a shaft received within the housing and coupled to the propeller shaft and an auxiliary servo chamber cylinder coupled to the shaft. A piston received in the servo chamber is coupled to the valve rod. Oil is supplied to the valve rod through an elongated annular supply chamber defined between the shaft and the valve rod by spaced-apart seals, a port in the valve rod opening to the supply chamber, a port in the shaft opening to the supply chamber and a journal clearance seal between the housing and shaft in register with the port in the shaft.

Oil distribution (OD) box described in a book Controllable Pitch Propellers of Keith Brownlie (page, 43, Fig. 21 published by the institute of Marine Engineers1998) is mounted at forward end of the reduction gear and connected to twin tube.

Jointed to twine tube the stub shaft cares OD bush having the seal bearings. The OD bush is jointed with to supply and return lines through system of the swivels and hinges. The feedback is provided by connection of
the OD bush through rod to shaft. The shaft cares the link connected with potentiometer to send signal to control valve of the hydraulic unit. That OD box has near twenty elastic seals.

[Disclosure]

[Technical Problem]

For all OD boxes for controllable pitch propeller the critical disadvantage is using significant amount of the parts and particularly elastic seals. As known elastic seals are more vulnerable details of machines.

[Technical Solution]

In order to accomplish the above-mentioned objective, the present invention provides 'oil distribution box (OD box) of controllable pitch propeller system'.

OD box comprises supply nonrotative liner with astern port and ahead port; nonrotative liner closed by flange having seals on both sides; inside of nonrotative liner the twin tube is inserted, in twin tube the ahead channel and the astern channel are made, on one side of the twin tube the guide carrier is arranged on the bearing and supported by the cap; in the guide carrier the groove is made for sliding block, which connected through pin with the fork, which is fixed through the fork sleeve on the feedback shaft by the dowel, the feedback shaft is installed on box bearing in feedback box with the box seals arranged in the boss of the feedback box, which is closed by the cover.

And OD box comprises supply nonrotative thick walled liner with astern port and ahead port locate on one side; inside of nonrotative liner the twin tube is inserted, in twin tube the ahead channel and the astern channel are made, on one side of the twin tube the guide carrier is arranged on the bearing and supported by the cap; in the guide carrier the groove is made for sliding block, which connected through pin with the fork, which is fixed through the fork sleeve on the feedback shaft by the dowel, the feedback shaft is installed on box bearing in feedback box with the box seals arranged
in the boss of the feedback box, which is closed by the cover.
[Advantageous Effects]

According to the present invention, we can reduce the quantity of OD box components especially elastic seals, and we can simplify the structure of OD box.

[Description of Drawings]

FIG.1 is the top view and B-B section view of the OD box in condition of full astern.

FIG.2 is the top view and A-A section view of the OD box in condition of full astern.

FIG.3 is the top view and B-B section view of the OD box in condition of full astern.

FIG.4 is the top view and F-F section view of the OD box in condition of ahead.

FIG.5 is the scheme of oil supply to hub space of controllable pitch propeller controllable.

FIG.6 is longitudinal section view of the OD box with thick liner in condition of ahead.

[Best Mode]

OD box comprises supply nonrotative liner 1 with astern port 4 and ahead port 5. Nonrotative liner 1 closed by flange 18 having seals 8 and 25. Inside of supply nonrotative liner 1 twin tube 3 is inserted. In twin tube 3 ahead channel 6 and astern channel 7 are made. On right side of twin tube 3 guide carrier 11 is arranged on bearing 24 and supported by cap 19. In guide carrier 11 groove 16 is made for sliding block 12 connected through pin 15 with fork 14. Fork 14 is fixed through fork sleeve 23 on feedback shaft 13 by dowel 20. Shaft 13 is installed on box bearing 21 in feedback box 10 with box seals17 arranged in boss 22 of the feedback box 10 closed by cover 26.

During operation for providing ahead conditions the oil is pressed (for example 6 MPa) to ahead port 5 (FIG.1) and follows through channel 6 and line A to space A of the hub.

Channel 6 is located in twin tube 3, which is rotated together with
propeller shaft S. Pressed oil in space A of the hub pushes piston P to right side and customizes assigned blade pitch.

Piston P pushes lines A and B, which are rigidly connected with twin tube 3. Lines A and B typically are manufactured as pipe is located concentrically inside other pipe.

Return oil from space B of the hub is pushed by piston P through line A and astern channel 7 to astern port 4 and further to tank of hydraulic unit (not shown).

Feedback signal about blade pitch is sent to control unit (not shown) through linkage including guide carrier 11 supported by cap 19 and having groove 16.

During motion of the twin tube 3, which is pushed by piston P carrier 11, which is mounted on rotated twin tube 3 by bearing 24 (FIG. 2), which is moved also in that case to right side. During motion of guide carrier 11 sliding block 12 is slid in groove 16, provides turning of fork 14 fixed by sleeve 23 and dowel 20 (FIG. 3) on shaft 13.

Fork 14 rotates feedback shaft 13 can be connected for example with potentiometer to regulate electric signal for control unit. Beside that on shaft 13 can be arranged indicator of blade pitch in typical manner. Because twin tube 3 is rotated together with propeller shaft but nonrotative liner 1 is not rotated interaction between them is arranged through bearing-seal, which work as bearing for twin tube 3 and seal to prevent inadmissible leakage from high pressure side to low pressure side.

Thickness of nonrotative liner 1 is designed to prevent creation by high oil pressure of the gap between nonrotative liner surface and bearing surface.

Seals 8, which are arranged in nonrotative liner 1, prevent oil leakage from space between channels 6 and 7.

Optionally seal 9 can be arranged between nonrotative liner 1 and feedback box 10. Feedback box 10 is covered by cover 26 and has bearing 21 for fork shaft 13.
Depend on preference inside feedback box 10 can operate with oil or without oil. In case of operation with oil in boss 22 of feedback box 10 seals 17 can be arranged.

During operation for providing astern conditions the oil is pressed (for example 6 MPa) to astern port 4 (FIG. 3) and follows through channel 7 and line B to space B of the hub (FIG. 5).

Channel 7 is located in twin tube 3, which is rotated together with propeller shaft S (FIG. 5). Pressed oil in space B of the hub pushes piston P to left side and customizes assigned blade pitch. Piston P pushes lines A and B, which are rigidly connected with twin tube 3.

Return oil from space A of the hub is pushed by piston P through line B and ahead channel 6 to ahead port 5 and further to tank of hydraulic unit (not shown).

Feedback signal about blade pitch is sent to control unit (not shown) through linkage including guide carrier 11 supported by cap 19 and having groove 16.

During motion of the twin tube 3, which is pushed by piston P carrier 11, which is mounted on rotated twin tube 3 by bearing 24 (FIG. 2), which is moved also in that case to left side. During motion of guide carrier 11 sliding block 12 is slid in groove 16, provides turning of fork 14 fixed by sleeve 23 and dowel 20 on shaft 13. Fork 14 rotates feedback shaft 13 connected with potentiometer to regulate electric signal for control unit.

Represented on FIG. 6 OD box with thick walled liner having ahead port 5 and astern port 4 on one. In that case the OD box can be inserted for example in gear box case or inside gear wheel shaft dependent on design solution. Assembly components are some as described regarding FIG. 1 and FIG. 2, operational procedure is also same.

While there are shown and described present preferred embodiments of the invention, it is to be distinctly understood that the invention is not limited thereto, but may be otherwise variously embodied and practiced within the scope of the following claims.
According to the present invention, we can reduce the quantity of OD box components especially elastic seals, and we can simplify the structure of OD box. Accordingly, if the present invention is introduced into the shipbuilding or machine industry, its practical and economic value can be sufficiently accomplished.
[CLAIMS]

[Claim 1]
OD box comprises supply nonrotative liner with astern port and ahead port; nonrotative liner closed by flange having seals on both sides; inside of nonrotative liner the twin tube is inserted, in twin tube the ahead channel and the astern channel are made, on one side of the twin tube the guide carrier is arranged on the bearing and supported by the cap; in the guide carrier the groove is made for sliding block, which connected through pin with the fork, which is fixed through the fork sleeve on the feedback shaft by the dowel, the feedback shaft is installed on box bearing in feedback box with the box seals arranged in the boss of the feedback box, which is closed by the cover.

[Claim 2]
OD box comprises supply nonrotative thick walled liner with astern port and ahead port locate on one side; inside of nonrotative liner the twin tube is inserted, in twin tube the ahead channel and the astern channel are made, on one side of the twin tube the guide carrier is arranged on the bearing and supported by the cap; in the guide carrier the groove is made for sliding block, which connected through pin with the fork, which is fixed through the fork sleeve on the feedback shaft by the dowel, the feedback shaft is installed on box bearing in feedback box with the box seals arranged in the boss of the feedback box, which is closed by the cover.
[Figure 6]
INTERNATIONAL SEARCH REPORT

International application No
PCT/KR2007/001970

A. CLASSIFICATION OF SUBJECT MATTER

B63H 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)
IPC O B63H 3/08

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
Korean utility models and applications for utility models since 1975
Japanese utility models and applications for utility models since 1975

Electronic database consulted during the international search (name of database and, where practicable, search terms used)
eKIPASS (KIPO internal) & keywords "propeller", "controllable", "pitch", "oi distribution" & "box"

C. DOCUMENTS CONSIDERED TO BE RELEVANT

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  "O" document referring to an oral disclosure use, exhibition or other means
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Date of the actual completion of the international search

Date of mailing of the international search report

Name and mailing address of the ISA/KR
Korean Intellectual Property Office
920 Dunsan-dong, Seo-gu, Daejeon 302-701, Republic of Korea
Facsimile No 82-42-472-7140

Authorized officer
PARK, SUNG WOO
Telephone No 82-42-481-8140

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