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Hydraulic device for removing and inserting marine bushings.

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Description

The present invention relates to a hydraulic device by which it is possible to remove and insert marine bushings without need of demounting other components of the transmission on screw propelled boats.

It is indeed well known that removal of marine bushings mounted on supports of shafts for propeller motion, presently faces great difficulties.

These are due to the presence of supports mounted at non easily accessible positions, the different size related to the shaft, the difficulty of removing the bushings axially without damages to the shaft or the support.

Sometimes it is also necessary to replace them in spots which are not close to shipyards or dry docks, that can however carry out the entire operation of bushing replacement in a far lower time, so as to attain a considerable economic advantage either for them or for the user.

US—A—3,638,294 discloses a wheel puller based on a cylinder containing at least two telescoping pistons, wherein the cylinder has a peripheral flange, a U-shaped collar slips over the cylinder and engages the flange, a second U-shaped collar slips over a shaft and engages a wheel to be pulled, and the rods connect the two collars and a piston rod connected to one of the pistons engages the shaft end, but this apparatus is designed for removing propellers and cannot deal with the difficulties arising in removing the propeller shaft bushing, consists of a number of mechanical members subject to wear and rust, is difficult to be regulated and handled by one operator and has no means for returning the apparatus to the starting position.

Starting from an apparatus of the type disclosed in US—A—3 638 294, the problem is solved by a hydraulic device for removing and inserting marine bushings according to the invention, which is characterized by the fact of comprising two self-centering forks, the one being fixed to the two hydraulic cylinders, the other being slidable together with the moving piston rods of the hydraulic cylinders for a simplified positioning of the device on the driving shaft of the boat, as well as two lateral air cylinders arranged parallel to and outwardly of the hydraulic cylinders, for providing the thrust to return the device to the inoperative position.

The device preferably also comprises a set of gauge blocks to match the forks to the diameter of the propeller shaft and of the bushing to be extracted or inserted, as well as a set of pushing half sleeves to be positioned on the propeller shaft and having a size calibrated to the diameter of the bushings and of their seat in the shaft support.

The device being the subject matter of the present invention may also be used for underwater bushing replacement, thus without being compelled to raise the boat in the dry dock. Simply by operating on the deck with a hydraulic

pump, the device may be employed by the divers without the aid of other components and obtaining the very same operative and technical advantage.

It is also to be pointed out that only one operator is required to carry out replacement of the bushings, as the use of the device of the present invention is very simple and practical.

The objects and advantages of the present invention will be better understood from the following detailed description of a preferred embodiment, given as a non limiting example only, and taken together with illustrative the figures of the accompanying drawings in which:

Fig. 1 is an exploded view of the device of the invention;

Fig. 2 a view of a guide sleeve divided in two halves, for inserting the bushings;

Fig. 3 is a view of two examples of gauge blocks for removing the bushings;

Figs. 4, 5, 6, 7, 8 and 9 show the logical sequence of operations for removing a bushing; and

Figs. 10, 11, 12 and 13 show the logical sequence of operations for inserting a bushing.

With reference now to Fig. 1, the device 1 of the present invention comprises two self-centering forks 2 and 3 for positioning the device on the propeller shaft of the boat; fork 2 is fixed to the rods 4 of two hydraulic cylinders 5 while fork 3 is fixedly secured to flanges 6 of said cylinders 5.

In order to obtain back thrust for returning the device to the inoperative position, two air cylinders 7 are arranged on either side and are fixed to cylinders 5 and to the sliding fork 2.

The force required for extraction and insertion of the bushings is obtained through a manual hydraulic pump 8 actuating said device by the pressure obtained by acting on the control lever 9.

With reference now to Figs. 2 and 3, in order to extract the bushing from a support, the two half sleeves 10 and 11 are leant on the shaft 15.

As the outer diameter of said sleeve is slightly less than the support diameter, it is clear that a particularly precise axial thrust may be effected on the metal part of the bushing to be replaced.

It is also necessary to use the gauge blocks 12 and 13 to carry out the operative matching between the forks of the device and the diameter of the propeller shaft of the boat on which the bushings are to be replaced.

Referring now to Figs. 4 through 9, the various operative stages of the bushing extraction are now illustrated.

After having removed the screw propeller 14 from the shaft 15, the device of the present invention is positioned astride the support 16 with the sliding fork 2 on the side of the screw connection.

Then the two sleeve halves 10 and 11 and a gauge block 12 or 13 according to the shaft diameter are mounted.

After having connected the hose 20 of the manual hydraulic pump 8 to the fitting 21 of the cylinders, when pressure is delivered, the sliding

fork 2 through the gauge block 12 or 13 abuts on support 16 and consequently through the sleeve halves 10 and 11 the bushing 22 to be replaced is axially pushed until the extraction is complete.

Referring now to Figs. 10 through 13, the various operative stages of the bushing insertion are illustrated.

After having slipped a fresh bushing 22 on the shaft 15, the device of the present invention is so positioned that the sliding fork 2 is between said bushing 22 and the support 16.

On the fixed fork 2 the gauge block is positioned, then pressure is delivered to the cylinders 5, the device abuts on the support 16 and the sliding fork 3 pushes axially the bushing 22 until it is completely inserted into its seat.

It is therefore apparent that the device of the present invention attains the above mentioned objects and solves in an optimal and practical way the problems relating to the replacement of bushings for driving shafts of screw propellers for boats, and it has to be pointed out that the foregoing detailed description of a preferred embodiment does not limit the scope of the invention, but on the contrary it has to be understood that many modifications, variations, additions or substitutions of elements may be resorted to the parts and structures of the device, without departing from its scope of protection, as it is defined in the appended claims.

Claims

1. Hydraulic device for removing and inserting marine bushings, comprising two parallel hydraulic cylinders (5) to be arranged on either side of the propeller driving shaft (15) and carrying out an axial thrust either extracting said bushings (22) from their seat in a propeller shaft support (16) or inserting said bushings (22) into said seat, characterized by the fact of comprising two self-centering forks (2, 3), the one (3) being fixed to the two hydraulic cylinders (5), the other (2) being slidable together with the moving piston rods (4) of the hydraulic cylinders (5), for a simplified positioning of the device (1) on the driving shaft (15) of the boat, as well as two lateral air cylinders (7) arranged parallel to and outwardly of the hydraulic cylinders (5) for providing the thrust to return the device (1) to the inoperative position.

2. Hydraulic device according to Claim 1, characterized by the fact of comprising a set of gauge blocks (12, 13) to match the forks (2, 3) to the diameter of the propeller shaft (15) and of the bushings (22) to be extracted or inserted.

3. Hydraulic device according to Claim 1, characterized by the fact of comprising a set of pushing half sleeves (10, 11) to be positioned on the propeller shaft (15), having a size calibrated to the diameter of the bushings (22) and of their seat in the shaft support (16).

Patentansprüche

1. Hydraulische Vorrichtung zum Abziehen und Einsetzen von Schiffslagerhülsen mit zwei parallelen, hydraulischen Zylindern (5), die

— beiderseits der Schraubenantriebswelle (15) angeordnet sind und

— eine axiale Triebkraft ausüben, um entweder die Lagerhülsen (22) aus ihrem Lagersitz in einer Schraubenwellenlagerung (16) herauszuziehen oder in dem Lagersitz einzusetzen, gekennzeichnet durch

— zwei selbstzentrierende Gabeln (2, 3),

— deren eine (3) mit den beiden hydraulischen Zylindern (5) verbunden ist und

— deren andere (2) zusammen mit den sich bewegenden Kolbenstangen (4) der hydraulischen Zylinder (5) verschiebbar ist, um eine vereinfachte Positionierung der Vorrichtung (1) auf der Antriebswelle (15) des Bootes zu erzielen, sowie

— zwei seitliche, pneumatische Zylinder (7), die parallel und außerhalb der hydraulischen Zylinder (5) angeordnet sind, um eine Triebkraft zur Rückführung der Vorrichtung in die Ruhe-Stellung zu erzeugen.

2. Hydraulische Vorrichtung nach Anspruch 1, gekennzeichnet durch

zwei Kalibrierblöcke (12, 13) zur Anpassung der Gabeln (2, 3) an den Durchmesser der Schraubenwelle (15) und der herausziehenden bzw. einzusetzenden Lagerhülsen (22).

3. Hydraulische Vorrichtung nach Anspruch 1, gekennzeichnet durch

einen Satz von halbzyklindrischen Schieberhülsen (10, 11), die

— auf der Schraubenwelle (15) angeordnet sind und

— eine Größe aufweisen, die zum Durchmesser der Lagerhülsen (22) und ihres Lagersitzes in der Wellenlagerung (16) kalibriert ist.

Revendications

1. Dispositif hydraulique pour l'extraction ou la mise en place de bague de roulement de bateaux comprenant deux cylindres hydrauliques parallèles (5) disposés de part et d'autre de l'arbre (15) d'entraînement de l'hélice et exerçant une poussée axiale extrayant lesdites bagues de roulement (22) de leur siège dans un support d'arbre d'hélice 16 ou insérant lesdites bagues dans ledit siège, caractérisé par le fait qu'il comprend deux étriers (2, 3) à auto-centrage, l'étrier (3) étant fixé aux deux cylindres hydrauliques (5), l'autre étrier (2) étant coulissant avec les tiges de piston mobiles (4) des cylindres hydrauliques (5), pour un positionnement simplifié du dispositif (1) sur l'arbre (15) du bateau, et deux cylindres (7) pneumatiques, disposés parallèlement à, et à l'extérieur des cylindres hydrauliques (5), pour fournir une poussée de retour du dispositif (1) dans sa position de repos.

2. Dispositif hydraulique selon la revendication 1, caractérisé en ce qu'il comprend un ensemble

de blocs de jauge (12, 13) pour ajuster les étriers (2, 3) au diamètre de l'arbre d'hélice (15) et des bagues (22) à extraire ou insérer.

3. Dispositif hydraulique selon la revendication 1, caractérisé en ce qu'il comprend un ensemble

de demi-manchons de poussée (10, 11) à positionner sur l'arbre d'hélice (15) ayant une dimension calibrée en fonction du diamètre des bagues de roulement (22) et de leur siège dans le support d'arbre (16).

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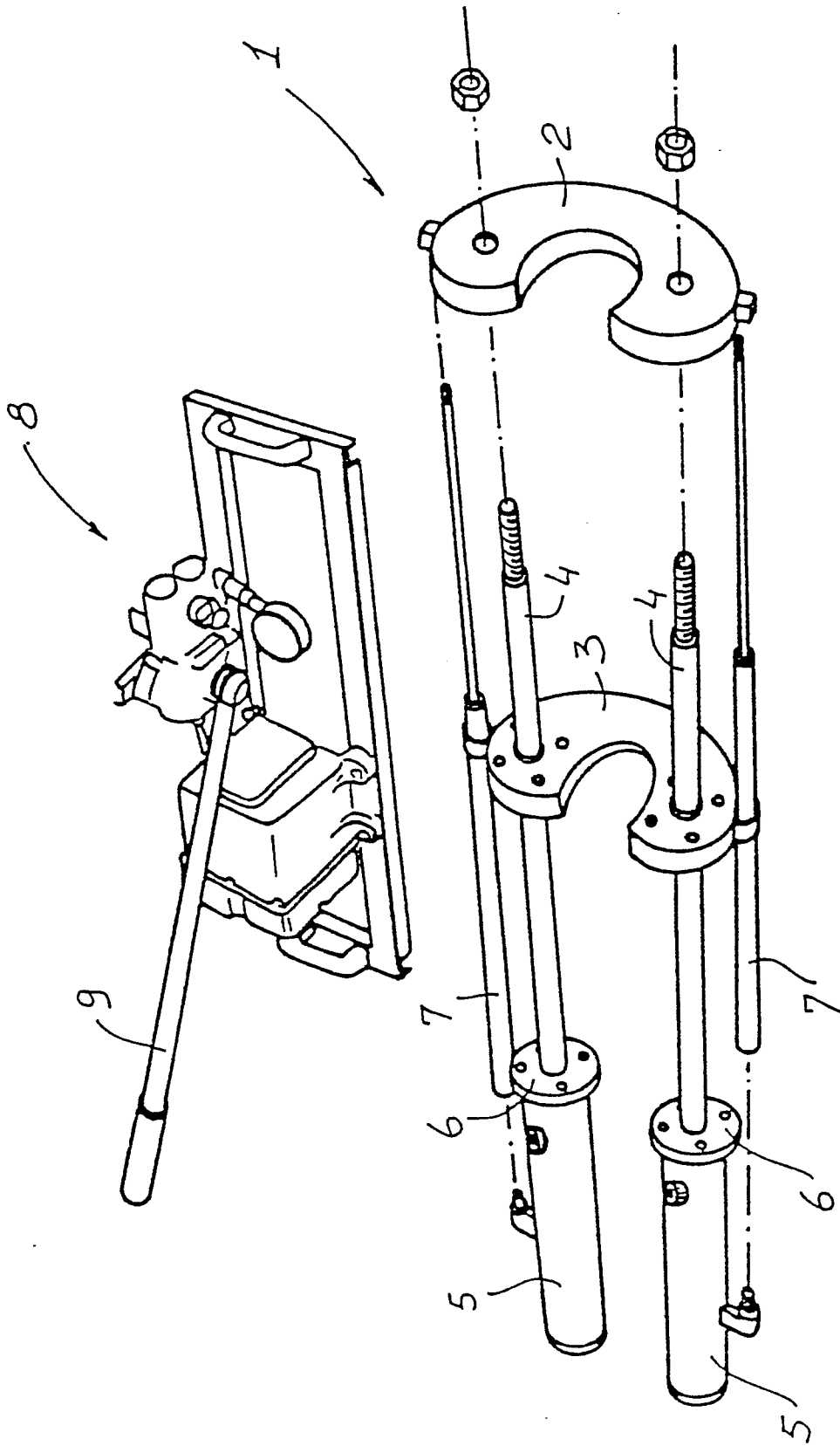


Fig. 1

Fig. 2

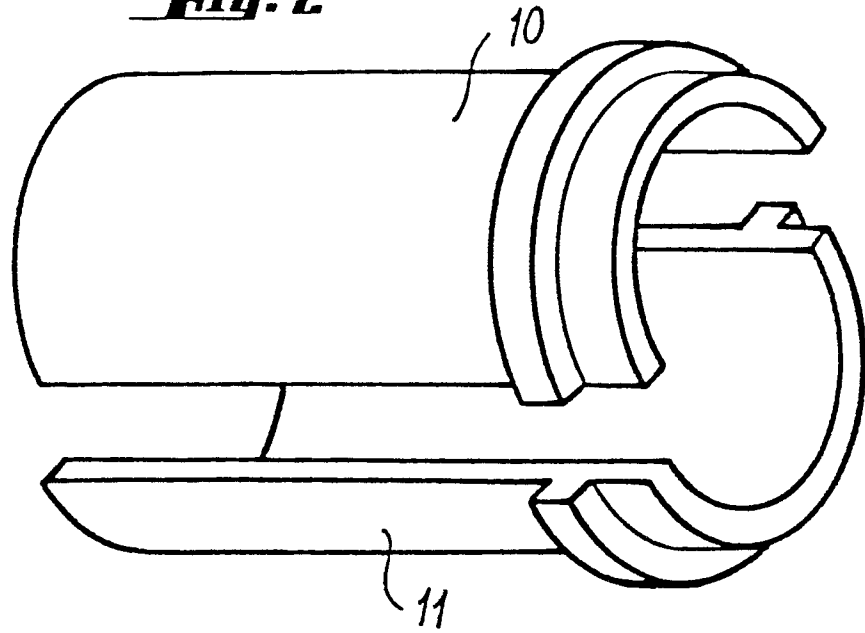


Fig. 3

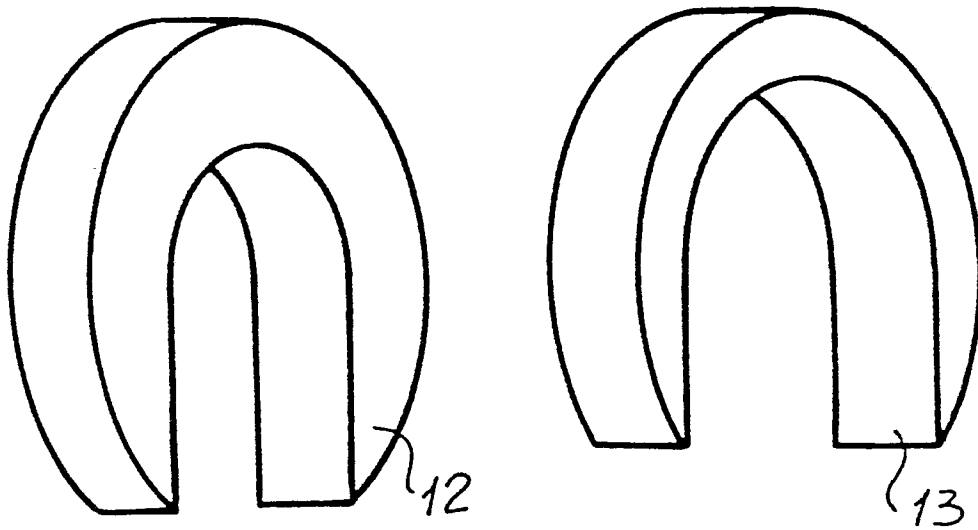


Fig. 4

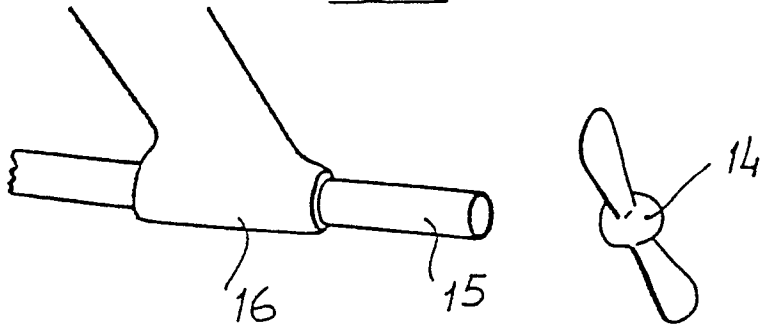


Fig. 5

