Nov. 5, 1957 B. S. HALVORSEN 2,812,028

PROPELLER FOR SHIPS

Filed March 11, 1955

FIG. 1.

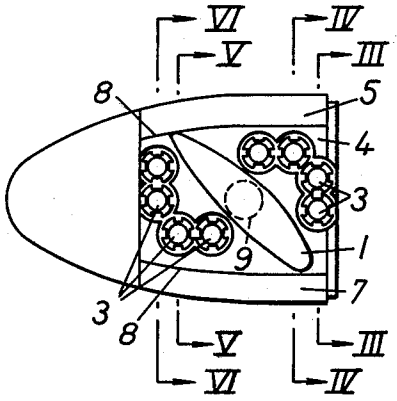


FIG. 2.

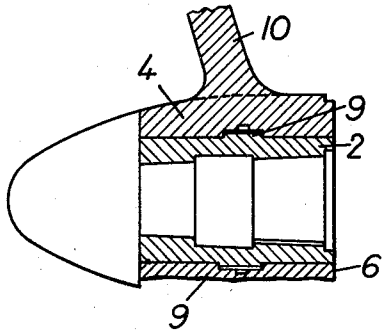


FIG. 3.

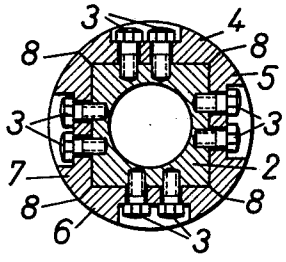


FIG. 4.

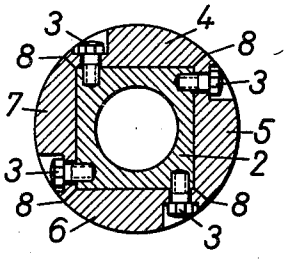


FIG. 5.

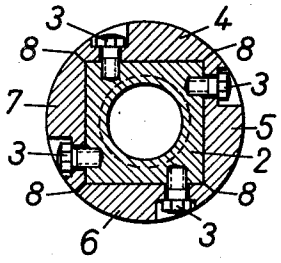
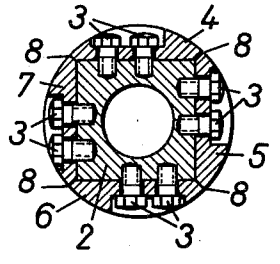


FIG. 6.



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United States Patent Office 2,812,028 Patented Nov. 5, 1957

2,812,028

PROPELLER FOR SHIPS

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Application March 11, 1955, Serial No. 493,598

Claims priority, application Norway March 27, 1954

2 Claims. (Cl. 170—160.58)

The present invention relates to a screw propeller for ships, the propeller being provided with detachable and replaceable propeller blades.

Propellers with detachable blades offer many advantages above propellers which are cast in one piece, as one blade may be replaced if it is damaged, and in addition propellers with detachable blades may be manufactured according to a considerably simpler method than one-piece propellers.

The previously known constructions of propellers for ships, with detachable propeller blades, have, however, not in any way been successful as the advantages obtained have been more than counterbalanced by the disadvantages caused by the above-mentioned known constructions.

The propeller blades together with the flanges have usually been cast of a non-corrodible material, as for example bronze, and these blades were by means of the flanges and bolts secured to a boss made of a sufficiently strong material. The material in the boss was usually steel, and this would, after a comparatively short time, be so much corroded by the water, that it would no longer be safe to sail with such a propeller where the boss might develop fractures, so that the vessel might lose the propeller.

If the boss is made of a non-corrodible material, for example bronze, the propeller would firstly be far more costly, and secondly the advantage of replacement of propeller blades in many cases would not be attained because the material of the boss would not be sufficiently strong, thus giving rise to the possibility that the bolts may be torn out from their threads in the boss when a propeller blade is subjected to great strains.

The propeller blade which then will be torn off from the boss and will be lost in the sea, might quite well be fully usable, while a damaged boss is left on the propeller shaft. In addition to the provision of a new propeller blade even a new boss would have to be provided, and the expenses involved therein have hitherto exceeded the advantages obtained in a propeller with replaceable blades, where each blade even may be finely adjusted separately.

A propeller with replaceable propeller blades will thus be required to have a sufficiently strong boss as support for the propeller blades, so that the boss will remain undamaged even if a propeller blade is subjected to such great strains that the blade is broken off and lost.

However, great difficulties are involved in providing a material for the boss, which is as non-corrodible as propeller blades of for example bronze, and which in addition has sufficient strength and is inexpensive.

Regarding the strength of the boss, the use of steel would be most advantageous, but since this material, as mentioned above, is corroded by the sea water far more rapidly than the propeller blades, propellers of this kind have been of no great importance in the shipping field in spite of the advantages offered.

The object of the invention is to provide a propeller for ships, with detachable and replaceable propeller blades,

in which the said disadvantages are eliminated in that the boss of the propeller is of a sufficiently strong material and in that this material will be unable to be corroded.

The material used for the boss will preferably be steel, since this material has the required strength, and in accordance with the invention the flanges of the propeller blades are so shaped that they will cover as much as possible of the surface of the boss, whereby the water and particularly sea water, will be prevented from exerting its corrosive action upon the steel.

Since the flanges of the propeller blades, as mentioned above, form a shell around the boss of the propeller, the flanges are further, in accordance with the invention, given such a shape that they offer the smallest possible resistance to motion through the water.

In the previously known types of propellers with detachable propeller blades, the blades have been secured to the boss by means of bolts, which are positioned evenly distributed around the flange along the outer edge of same. In propellers for ships the strains which are created will, however, mainly have one definite direction, so that one or two of the bolts for each of the propeller blades would be subjected to considerably larger strains than the rest of the bolts, and for larger propellers and engine powers it would therefore be necessary to employ impractically large securing bolts, to prevent same from fracturing due to fatigue.

To eliminate this disadvantage, the bolts which secure the propeller blades in position on the boss are according to the invention arranged in groups in those areas of the flange at which the largest strains occur according to experience while, contrary to previous constructions, there are only a few or no bolts in the neutral zones.

Further details of the invention will be evident from the following description, and from the drawing, which shows one embodiment of the invention.

Fig. 1 shows a propeller having four propeller blades, not shown, the position of only one of the propeller blades being indicated.

Fig. 2 shows a longitudinal partial section through the propeller of Fig. 1.

Figs. 3, 4, 5 and 6 are sectional views taken respectively along the lines III—III, IV—IV, V—V and VI—VI in Fig. 1.

For the sake of simplicity the propeller blades proper are not shown, except for the broken portion of the blade **10** in Fig. 2, but their positions on their flanges are indicated in one instance in Fig. 1 by the outline **1**.

The propeller comprises a boss **2** which for a propeller with four blades is square.

On the boss **2**, four propeller blade flanges **4**, **5**, **6**, **7**, each carrying a propeller blade, are secured by means of bolts **3**.

The flanges **4**, **5**, **6** and **7** are so shaped that each of the flanges covers the adjacent side of the boss **2** and protects same against corrosive actions from the sea water.

Between adjacent flanges there may, however, if desired, be provided narrow slots or joints at **8**.

If necessary the slots or joints at **8** may be filled with some kind of water repellent or excluding substances, which will prevent the water from coming into contact with the corners of the boss **2**.

Since the slots or joints **8** are very narrow and comparatively deep, the erosive action of the sea water on this substance will be of no great importance. This substance may in addition be refilled with small costs when the ship is docked. The drawings show that the securing bolts **3** are grouped in those areas of the propeller blade flanges where the largest forces, which according to experience, will arise, while the remaining parts of the

flanges have a smooth even surface which offer a very small resistance to motion through the water.

The boss **2** is, as shown in Fig. 2 for the flange **4**, provided with a cylindrical projection **9** on each side, the flange **4** for the propeller blade **10**, and the other flanges, being provided with a corresponding bore. The example shown will only serve to illustrate the invention, and for propellers with for example three blades the boss **2** will have a triangular cross-section.

What I claim is:

1. A screw propeller for ships comprising a boss of square cross section and having four corners and four flat rectangular-shaped exterior surfaces, said boss being made of steel which would normally be corroded by sea water, a detachable and replaceable propeller blade secured to each of said surfaces of the boss thereby providing a propeller assembly, each blade including a flange at its root having a flat surface substantially completely covering the one of said rectangular-shaped surfaces of the steel boss to which the blade is secured, the adjacent edges of adjacent propeller blade flanges of the propeller assembly at the position of one of the corners of the boss being spaced apart slightly to provide a narrow slot extending along that corner of the boss, and a water repellent substance filling the four slots provided in the propeller blade assembly, the flanges of the propeller blades secured to the steel boss in conjunction with the water-repellent substance completely covering said exterior surfaces and corners of the boss and preventing access of sea water to and consequent corrosion of said exterior surfaces of the steel boss.

2. A screw propeller for ships comprising a boss of polygonal cross section having substantially flat rectangular-shaped exterior surfaces and corners extending in the general direction of the axis of the boss, said boss being made of steel which would normally be corroded by sea water, and a detachable and replaceable propeller blade secured to each of said surfaces of the boss thereby providing a propeller assembly, each blade including a flange at its root having a substantially flat surface completely covering the one of said rectangular-shaped surfaces of the steel boss to which the blade is secured, the adjacent edges of adjacent propeller blade flanges of the propeller assembly at the position of one of the corners of the boss extending therealong, the flanges of the propeller blades secured to the steel boss completely covering said exterior surfaces and preventing access of sea water to and consequent corrosion of said exterior surfaces of the steel boss.

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