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J. M. LANGHAM

3,244,236

MARINE PROPELLERS

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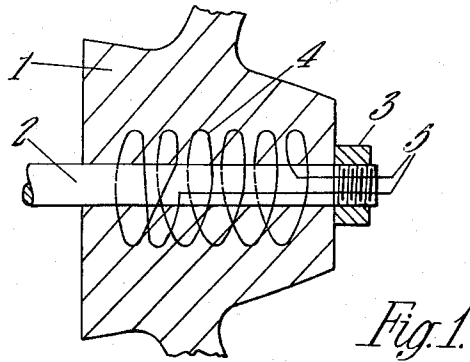


Fig. 1.

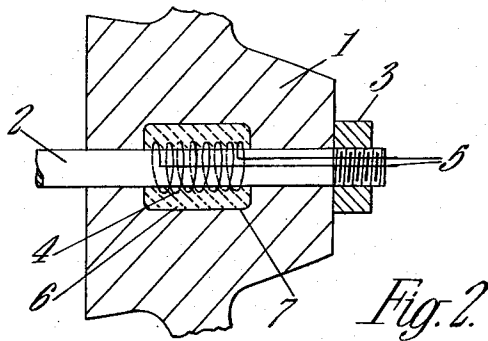


Fig. 2.

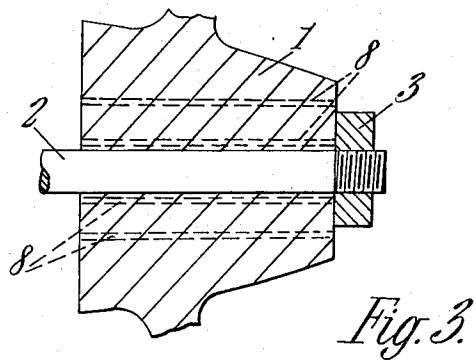


Fig. 3.

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MARINE PROPELLERS

John Michael Langham, 21 Beechcroft,
Chislehurst, England

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6 Claims. (Cl. 170-173)

This invention relates to marine propellers. More particularly the invention is concerned with an improved construction of a marine propeller enabling it to be easily removed from its propeller shaft.

At present, it is standard practice for a marine propeller to be fitted to a shaft on a taper with a key and keyway to ensure that there is no angular movement. The propeller is driven up hard on the taper and is held there by means of a conventional nut. Almost invariably to remove the propeller from the shaft it is necessary to heat the propeller boss causing it to expand, releasing it from the shaft.

The known method has two disadvantages, firstly the fact of cutting a keyway in the shaft causes local stress raisers and leads to shaft failure, particularly in large single screw vessel. Secondly, uneven and locally intense heating of the propeller boss by external means often gives rise to cracks which, in many cases, result in the propeller having to be scrapped. Furthermore, because of the different coefficient of expansion of the steel shaft and bronze and alloy propeller, it is common for the propeller to slide along the keyway in a longitudinal direction when the ship and vessel is operating in waters where the temperature is greater than where the propeller was fitted.

An object of the invention is to overcome the above mentioned disadvantages and provide an improved propeller construction which enables the propeller to be readily removed from a propeller shaft without the risk of damage to the propeller or shaft.

A further object of the invention is to avoid the longitudinal movement which occurs due to the differential expansion.

The invention consists in a marine propeller comprising, an electric heating element, encased in refractory material embedded in the propeller boss in the region of the shaft receiving bore of the propeller, so that by passing an electric current through the electric heating element the said region of the boss is caused to expand in a uniform and controlled manner.

Preferably the electric heating element comprises a helically wound resistance wire.

Alternatively the electric heating element comprises resistive tracking elements placed in internal longitudinally drilled holes.

The invention will be further described by way of example with reference to the accompanying drawings showing two preferred embodiments of a marine propeller, in which:

FIGURE 1 is an axial section through a marine propeller boss mounted on a shaft;

FIGURE 2 is a similar view to FIGURE 1 of a modified form of heating element;

FIGURE 3 is a similar view to FIGURES 1 and 2 of a second embodiment of a marine propeller according to the invention.

Referring to the drawings the marine propeller illustrated in FIGURE 1 comprises a boss 1 mounted on a shaft 2. The propeller boss 1 and the end portion of the shaft 2 on which the propeller is mounted are suitably locked to provide a driving connection between the propeller and shaft, while the propeller is prevented from

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any axial movement by a power operated nut 3. This power operated nut 3 also serves to drive the propeller hard up onto the propeller shaft when this has the conventional taper connection.

5 Cast into the propeller boss 1 in the region surrounding the shaft receiving bore is a helically wound electrical resistance wire 4 encased in a covering of refractory material. This resistance wire 4 is lead out via connections 5 in the end of the shaft 2 by means of which it can be connected to an electrical supply.

10 To remove the propeller from the shaft 2 the nut 3 is removed and the connections 5 are joined up to an electrical supply. A current is passed through the resistance wire 4 heating the propeller boss 1 and causing it to expand in a uniform and controlled manner sufficient to release the propeller from the shaft, thus enabling the propeller to be easily withdrawn from the shaft.

15 FIGURE 2 illustrates a modification of the heating element shown in FIGURE 1 in which the resistance wire 4 is set in an annular block of refractory material 6 located in a lightning chamber 7 formed in the boss 1. Other constructional features and the method of removing the propeller from the shaft are the same as that described with reference to the embodiment of FIGURE 1.

20 A second embodiment of the invention is illustrated in FIGURE 3 in which like reference numerals have been used for similar components of the first described embodiment. In this second embodiment the helically wound resistance wire 4 is replaced by a plurality of resistive tracking elements (not shown) which are placed in longitudinal drilled holes 8 which run parallel to the shaft 2. These tracking elements are connected to suitable terminal connections to which the electric supply is connected for uniformly heating the propeller boss 1 for removing it from the shaft 2.

25 Various modifications may be made to the invention within the scope of the appended claims.

I claim:

40 1. A marine propeller comprising, a propeller boss, an electric heating element and refractory material encasing the heating element which is embedded in the propeller boss in the region of a shaft receiving bore of the propeller so that by passing an electric current through the electric heating element the said region of the boss is caused to expand in a uniform and controlled manner.

45 2. A marine propeller as claimed in claim 1, in which the electric heating element is in the form of a helically wound electrical resistance wire encircling the shaft receiving bore of the propeller.

50 3. A marine propeller as claimed in claim 2, in which an outer covering of refractory material encases the electric resistance wire.

55 4. A marine propeller as claimed in claim 2, in which an annular block of refractory material encases the electrical resistance wire and is located in a lightning chamber formed in the propeller boss.

60 5. A marine propeller as claimed in claim 1, in which the electric heating element is in the form of a plurality of resistive tracking elements located in longitudinal holes drilled in the region of the propeller boss surrounding the shaft receiving bore.

65 6. A marine propeller as claimed in claim 1, in which the propeller is driven onto and retained against axial movement on the shaft by a power operated nut.

No references cited.

70 SAMUEL LEVINE, *Primary Examiner.*

E. A. POWELL, JR., *Assistant Examiner.*