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(71) Applicant(s)
Roy Willoughby
Unit 3, Station Road, STOCKTON,
Warkiskshire, CV47 8HA, United Kingdom

(72) Inventor(s)
Roy Willoughby

(74) Agent and/or Address for Service
Withers & Rogers
Goldings House, 2 Hays Lane, LONDON,
SE1 2HW, United Kingdom

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(56) Documents Cited
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US 3826544 A

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(54) Abstract Title
Marine propeller shaft bearing mount

(57) A marine propeller shaft bearing mount 10 comprises a base 16 adapted to be located in use to a boat structure and a thrust bearing carrier 20 extending from the base to a thrust bearing 4. The base may comprise a thickened plate which is mountable to the forward bracket 18 of a boat hull by means of threaded fasteners or by welding, the forward bracket also providing support for a stern tube 14. The carrier may be a single piece casting, frame or tube section or the carrier may comprise a plurality of pillars connectable directly to the bearing. Also disclosed is a water borne craft provided with such a bearing mount and a marine propeller shaft drive coupling (Fig 5 and 6).

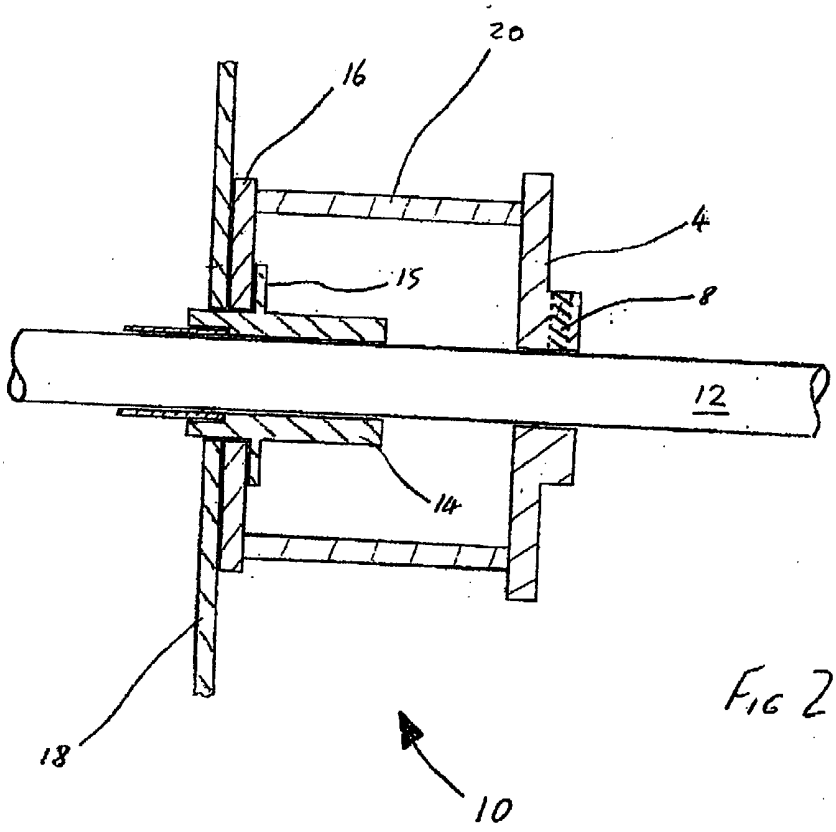

Fig 2

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The claims were filed later than the filing date but within the period prescribed by Rule 25(1) of the Patents Rules 1995.

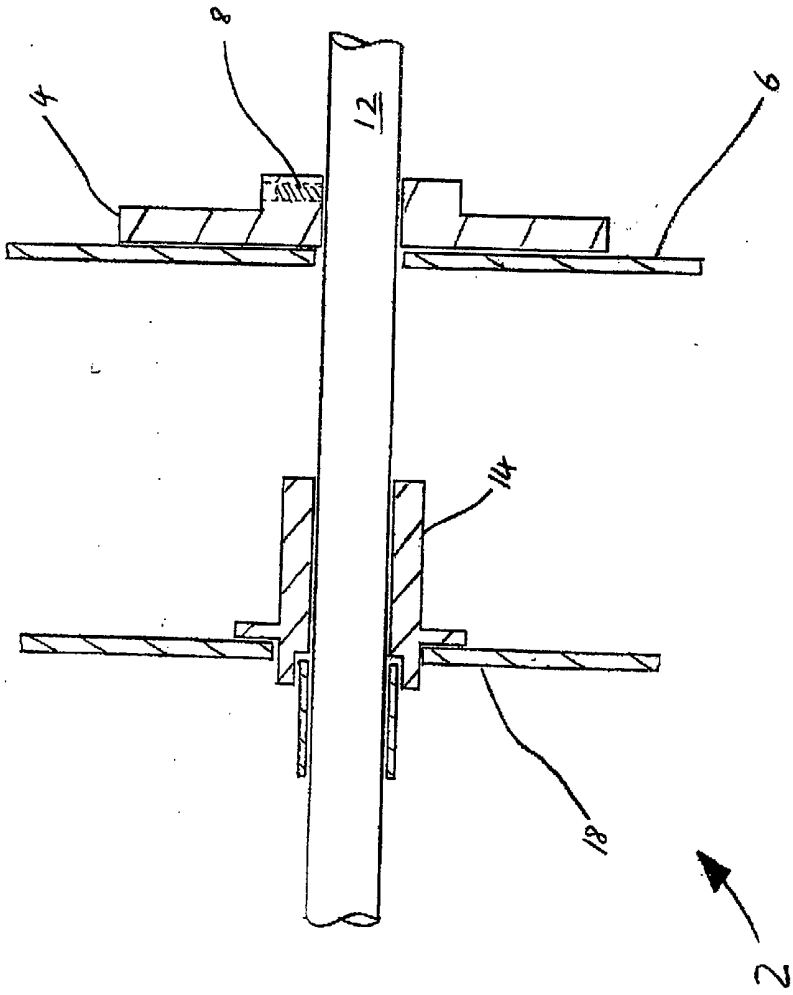

FIG 1

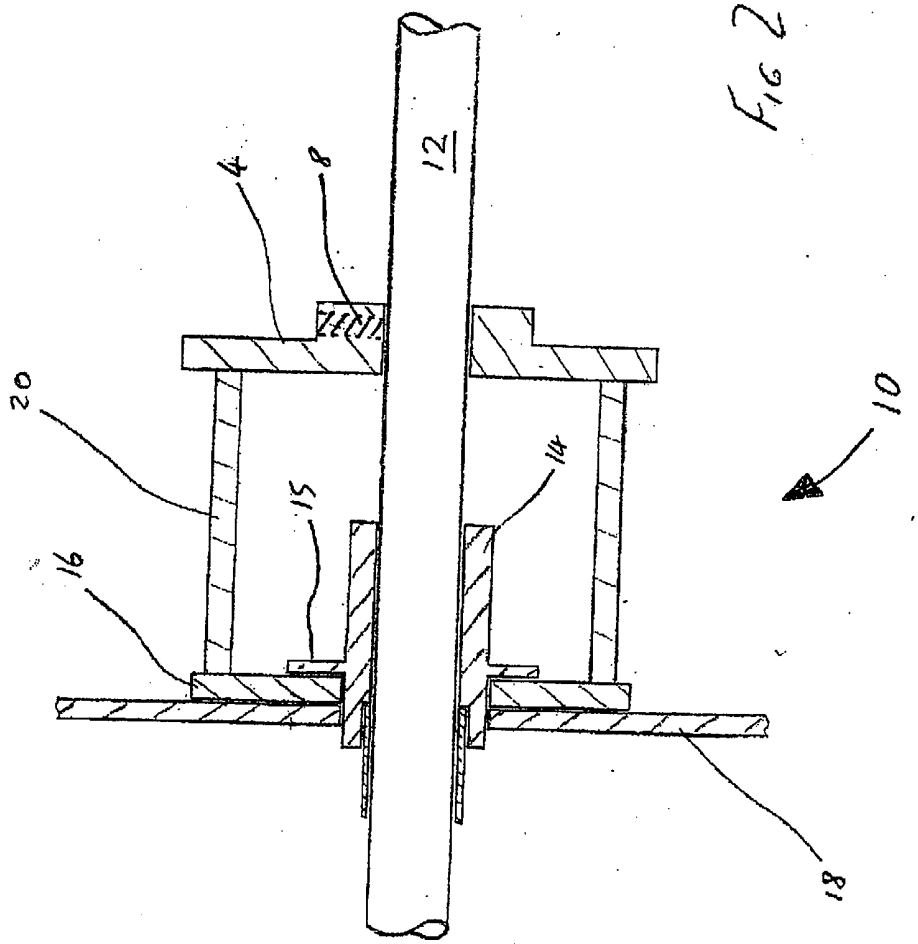

FIG 2

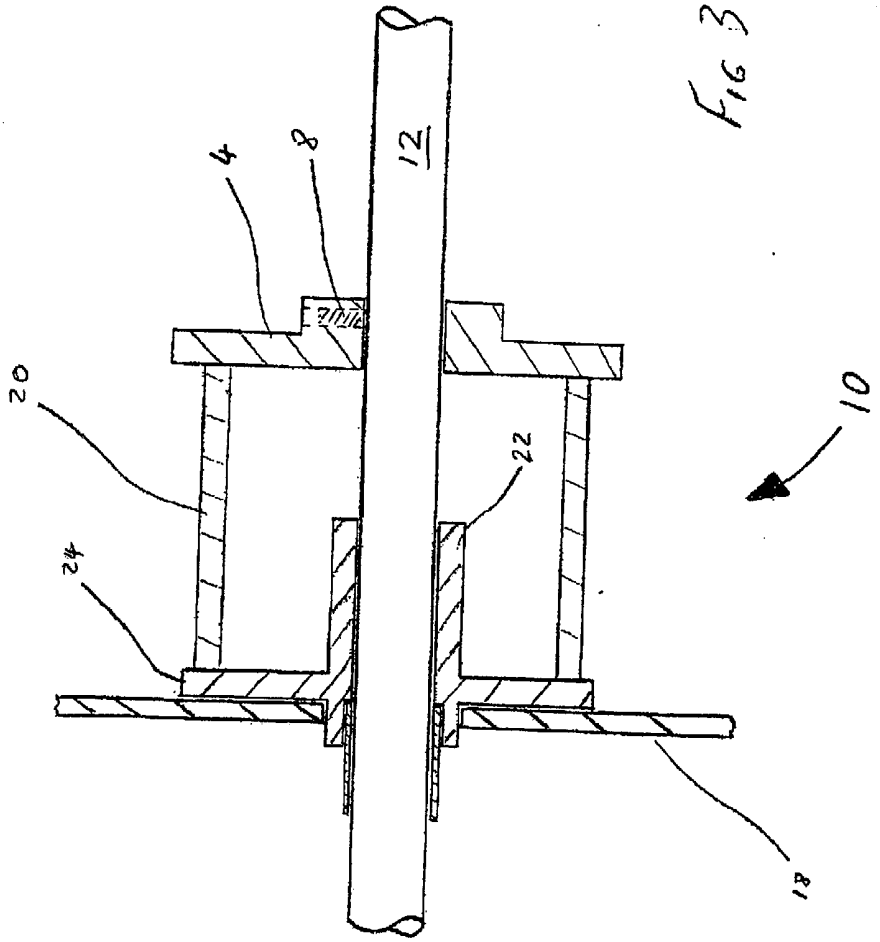

FIG 3

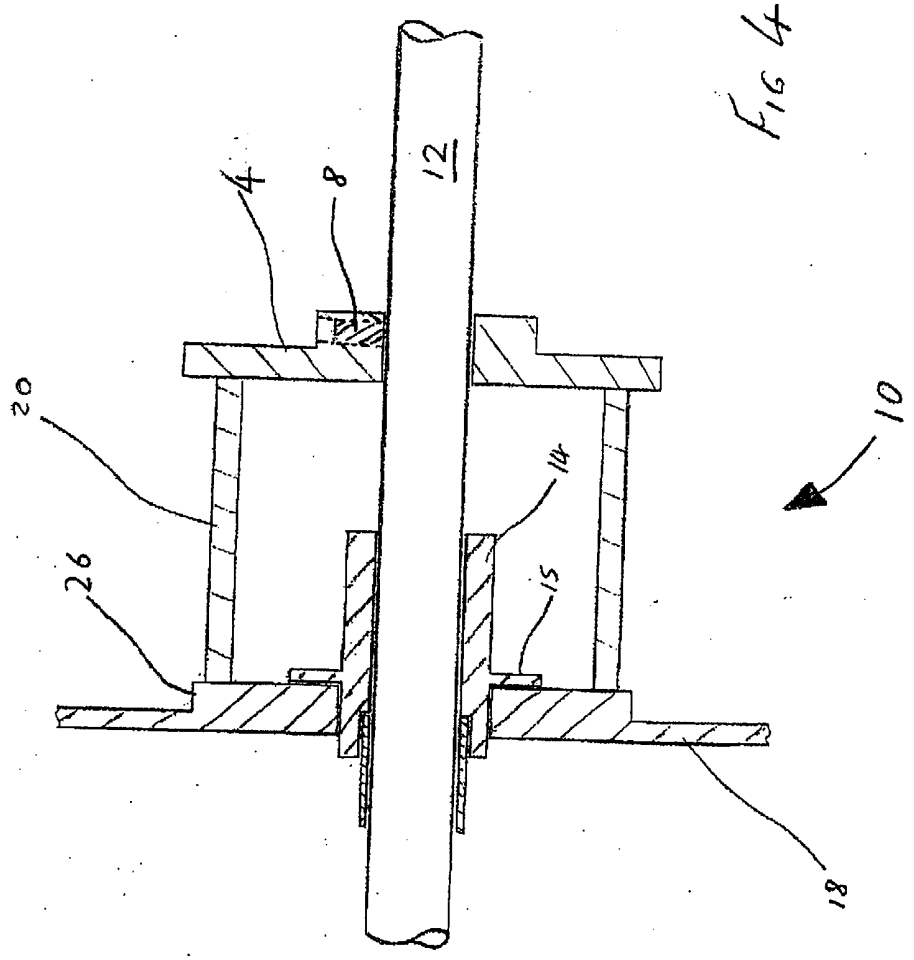

FIG 4

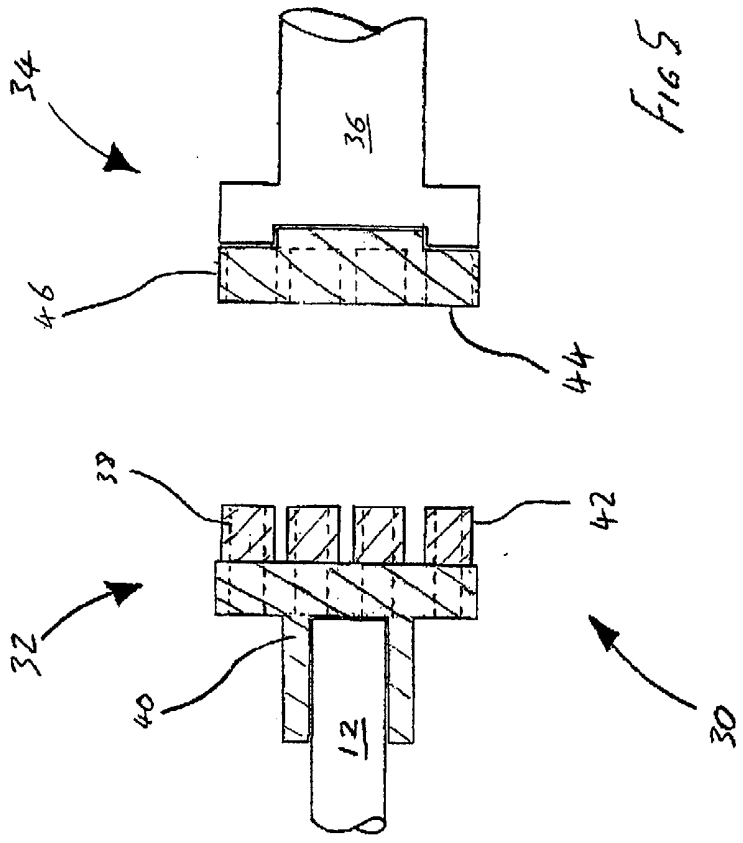

FIG 5

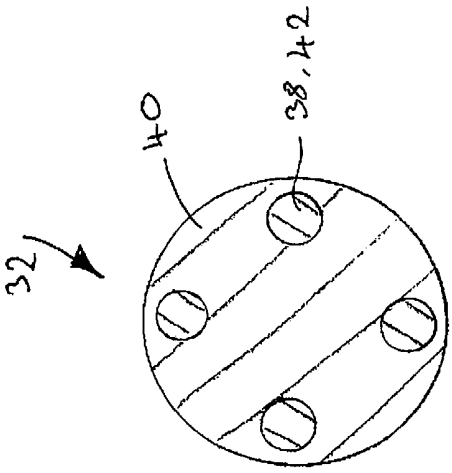

FIG 6

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Improved Mounting for Marine Propeller Shaft Bearing

The present invention relates to an improved marine propeller shaft bearing mount.

It has long been known to provide a mounting for a marine propeller shaft bearing generally indicated 2 in Figure 1. Such a mounting is typically sited in a boat hull towards the stern. The propeller shaft 12 extends between the propeller and a gearbox, both of conventional construction and not shown in Figure 1. The shaft 12 is sealed against the ingress of water with a stern tube 14 of known kind. The stern tube 14 is generally tubular and is provided with a flange so as to enable it to be fixed to a part of the boat hull known as the forward bracket 18 by, for example a pair of nuts and bolts. A thrust bearing 4 is mounted on the shaft by any suitable means such as a taper lock fit or a grub screw 8. The grub screw prevents the shaft 12 from axial movement relative to the thrust bearing 4. The load generated by a propeller on the shaft 12 is therefore transferred to the thrust bearing 4 which is attached to an internal member 6 of the boat separate from that to which stern tube 14 is mounted. The internal member 6 is typically a vertical plate extending from the hull of the boat.

Several disadvantages are associated with the prior art mounting. Firstly, the location of the shaft 12 through holes in the forward bracket 18 and the internal member 6 require accurate alignment. This alignment can be costly and difficult to achieve. If the holes are not accurately aligned an undesirable transverse load is placed on the shaft 12 which can potentially cause premature wear and damage to the stern tube 14 and the thrust bearing 4. The transverse load can then transfer to the gearbox and engine potentially causing further wear and damage which is very costly to repair.

Secondly, because the internal member 6 is a vertical plate connected to the hull it can act as a cantilever. Such cantilever action is pronounced when the direction of rotation of the shaft is changed quickly which can cause a severe whip effect of the shaft.

A third problem associated with the prior art shaft is the static sag due to its mass. The sag can cause misalignment of the shaft with the gearbox which places an undesirable transverse load on the shaft.

It is an object of the present invention to overcome the problems described above by providing an improved marine propeller shaft bearing mount.

It is a further object of the present invention to overcome the problems associated with static sag by providing a two-part drive coupling with a large amount of play between the two parts.

According to a first aspect of the present invention there is provided a marine propeller shaft bearing mount, the mount comprising a base adapted to be located in use to a boat structure and a carrier extending from the base to a thrust bearing,

In a preferred embodiment the mount is adapted to locate to a boat structure commonly referred to as a forward bracket or chatter plate typically utilised to mount a propeller shaft stern tube. The benefit of such a propeller shaft bearing mount is that the need to provide and align two separate holes for the shaft in two separate hull members as is known in the prior art is eliminated. The concentricity and squareness of the shaft and bearing is improved since their alignment is referenced from the stern tube. A reduction in the time required to fit the shaft is also achieved since the shaft and the bearing alignment is automatically achieved from the forward plate and stern tube.

In one embodiment the base may comprise a flange of a stern tube adapted to be located in use to a boat structure, typically a forward bracket or chatter plate. In such an embodiment the stern tube flange serves the purposes of enabling the stern tube to be secured to the chatter plate and providing the base for the thrust bearing carrier. The flange also served to strengthen the chatter plate so as to make it more resistant to deflection under load.

In an alternative embodiment the base may comprise a thickened section of a boat hull. In such an embodiment said section of the boat hull may comprise a thickened chatter plate. Such a thickened chatter plate may be incorporated into a boat hull during it's initial build or, alternatively may be retrofitted during a refit. The thickened chatter plate may in addition to being a base for the thrust bearing carrier may also support the propeller stern tube.

In yet a further embodiment the base may comprise a thickened plate. The plate may be fitted to a chatter plate of a boat hull by any appropriate means such as, for example, by the provision of threaded fasteners or welding. In a preferred embodiment the plate may be fittable to a chatter plate which also supports the stern tube. In such an embodiment the plate is provided with an aperture or recess for the stern tube and is able to accommodate fixings of the stern tube.

In one embodiment of the present invention the base and carrier are arranged such that tensile and compressive loads experienced by the thrust bearing are transmitted to the boat hull through the stern tube via a flange thereof. The tubular nature of the stern tube imbues it with a very favourable tensile load capacity.

In one embodiment the carrier may be a single piece construction having a recess to receive the bearing, wherein said single piece is a casting, a tube section or a frame. In the embodiment where the carrier is a casting or a tube, there may be provided one or more apertures in the wall thereof so as to allow access to the stern tube.

In an alternative embodiment the carrier may comprise a plurality of pillars connectable directly to the bearing. In yet a further embodiment the carrier may comprise a plurality of pillars and a seat for the bearing.

According to a second aspect of the present invention there is provided a water borne craft having a hull, and engine and a propeller connected to said engine via a shaft, the shaft passing through a thrust bearing and a stern tube carried by a hull structure wherein said thrust bearing is provided in a bearing mount comprising a base located to a hull structure and a carrier extending from the base to the thrust bearing.

In a preferred embodiment the base is located to the same hull structure as the stern tube. The base may be embodied by a thickening in said hull structure, a plate connected to said hull structure or a portion of the stern tube such as, for example , a flange.

According to a third aspect of the present invention there is provided a marine propeller shaft drive coupling, the coupling being adapted to connect a drive shaft and a driven shaft, the coupling comprising a first member having a plurality of projections and a second member having a plurality of recesses adapted to receive said projections, wherein said recesses accommodate said projections in the manner of a loose fit.

The benefit of such a drive coupling is that it can cope with a degree of misalignment of the propeller shaft and the gearbox output and hence reduce undesirable transverse load on the shaft. The further problem of static sag is reduced because each part of the drive coupling takes its support from the gearbox bearing and the thrust bearing respectively. These benefits are provided because there is no connection extending between the two members of the coupling.

In one embodiment each of the members has a plurality of projections and recesses. The projections and recesses may be cylindrical. A polymer cushion may be provided between the projections and recesses. The projections may be provided with polymer cushion sleeves. The sleeves may be made from any suitable plastics material such as, for example, polypropylene.

The features of the device to which the invention relates will be described in more detail with reference to the appended drawings in which:

Figure 1 is a diagrammatic representation of a prior art propeller shaft mounting;

Figure 2 is a diagrammatic representation of the improved propeller shaft bearing mount;

Figure 3 is a diagrammatic representation of a second embodiment of the improved propeller shaft bearing mount;

Figure 4 is a diagrammatic representation of a third embodiment of the improved propeller shaft bearing mount;

Figure 5 is a diagrammatic representation of the drive coupling;

Figure 6 is a diagrammatic representation of one part of the drive coupling.

Referring firstly to Figure 2 there is shown an improved marine propeller shaft bearing mount according to a first embodiment of the present invention, generally designated 10. Features common to the embodiment of Figure 1 are shown with like reference numerals. The propeller shaft 12 is provided with a conventional stern tube 14 to seal the shaft 12 from the ingress of water. The stern tube 14 is mounted on a plate 16 which in turn is mounted on a forward bracket 18 of a boat. The plate 16 may be mounted by any appropriate means such as, for example, welding or nuts and bolts. The plate 16 carries two pillars 20 which in turn carry a thrust bearing 4. The shaft 12 is attached to the thrust bearing 4 with any suitable means such as a taper lock fit or a grub screw 8. The thrust bearing 4 is designed to transfer the fore and aft load generated by the propeller to the pillars 20 and to the plate 16 which in turn transfers load to the forward bracket 18 of the boat. The forward bracket 18, pillars 20, plate 16 and thrust bearing 4 provide support to the shaft 12 against tensile, torsional and bending loads.

A second embodiment of the present invention is presented in Figure 3. Features common to the embodiment of Figures 1 and 2 are again shown with like reference numerals. In this embodiment there is provided a modified stern tube 22 with a flange

24 of increased thickness and width. The flange 24 carries two pillars 20 which in turn carry the thrust bearing 4. The shaft 12 is attached to the thrust bearing 4 with any suitable method such as a taper lock fit or the grub screw 8. The thrust bearing 4 transfers the fore and aft load generated by the propeller to the pillars 20 and to the flange 24 which in turn transfers the load to the forward bracket 18 of the boat. The forward bracket 18, pillars 20, flange 24 and thrust bearing 4 provide support to the shaft 12 against tension, torsion and bending loads.

A third embodiment of the present invention is presented in Figure 4. Again features common to the embodiment of Figures 1, 2 and 3 are shown with like reference numerals. In this embodiment there is provided a thickened section 26 of the forward bracket 18. The thickened section 26 carries two pillars 20 which in turn carry the thrust bearing 4. The propeller shaft 12 is provided with any conventional stern tube 14 to seal the shaft 12 from the ingress of water. The shaft 12 is attached to the thrust bearing 4 with any suitable method such as a taper lock fit or the grub screw 8. The thrust bearing 4 transfers fore and aft load generated by the propeller to the pillars 20 and to the thickened section 26 of the forward bracket 18 of the boat. The pillars 20, thickened section 26 and thrust bearing 4 provide support to the shaft 12 against tension, torsion and bending loads.

The propeller shaft bearing mount in Figures 2, 3 and 4 eliminates the requirement to align two separate holes for the shaft 12 as in the prior art shaft of Figure 1. The shaft and bearing in the improved bearing mount are consequently always concentric and square. A reduction in the time required to fit the shaft is also achieved since the shaft 12 and the bearing 4 alignment take place from one hole in the forward plate 18.

A further aspect of the present invention is presented in Figure 5 which illustrates a two-part drive coupling, generally designated 30. The two parts of the coupling 30 are a male part 32 and a female part 34 which are connected to respective input and output drive shafts. In this embodiment the male part 32 is connected to the propeller shaft 12 and the female part 34 is connected to a gearbox coupling 36. The male part 32 has four pins 38 connected to a body 40 whereby each pin has a polypropylene polymer sleeve 42. Each pin 38 and sleeve 42 co-operate with corresponding holes 44 in a body 46 of the female part 34. The layout of the pins and the holes is illustrated in Figure 6. It will be appreciated that the male and female parts could have any number of pins and holes in any arrangement to perform the same function. Each part could also have any number of pins and holes which co-operate with pins and holes on the other part to perform the same function.

Each sleeve 42 can be easily replaced when worn out. If the sleeve 42 wears out too quickly it can be replaced by a sleeve 42 with a greater Shaw hardness. Such sleeves 42 are colour coded for a given Shaw hardness to provide an easy reference method for customers wishing to purchase sleeves for replacement due to wear or replacement to change the Shaw hardness.

Each pin 38 locates in the hole 44 with a slack fit to provide a large amount of clearance. This clearance is desirable to provide the coupling with tolerance to cope with axial misalignment of the shaft 12 and the gearbox coupling 36.

Claims

1. A marine propeller shaft bearing mount, the mount comprising a base adapted to be located in use to a boat structure and a thrust bearing carrier extending from the base to a thrust bearing.

2. A marine propeller shaft bearing mount according to claim 1 wherein the mount is adapted to locate to a forward bracket of the boat structure.

3. A marine propeller shaft bearing mount according to claim 1 or claim 2, wherein the shaft bearing mount includes a stern tube and the base comprises a flange of a stern tube.

4. A marine propeller shaft bearing mount according to claim 1 wherein the base is a thickened section of a boat hull.

5. A marine propeller shaft mount according to claim 4 wherein said thickened section of the boat hull comprises a thickened forward plate.

6. A marine propeller shaft mount according to claim 4 or claim 5 wherein said thickened section is incorporated into the boat structure during manufacture of the boat hull.

7. A marine propeller shaft mount according to claim 4 or claim 5 wherein said thickened section is retrofittable to the boat hull.

8. A marine propeller shaft bearing mount according to claim 2, wherein the base comprises a thickened plate.

9. A marine propeller shaft bearing mount according to claim 9, wherein the is fittable to the forward bracket of a boat hull by threaded fasteners.

10. A marine propeller shaft bearing mount according to claim 9, wherein the plate is fittable to the forward bracket of a boat hull by welding.

11. A marine propeller shaft bearing mount according to any of claims 8, 9 or 10, wherein the plate is fittable to the forward bracket, which forward bracket also support a stern tube.

12. A marine propeller shaft bearing mount according to claim 11, wherein the plate is provided with an aperture for the stern tube and is adapted to accommodate fixings of the stern tube.

13. A marine propeller shaft bearing mount according to any preceding claim, wherein the carrier is of a single piece construction having a recess to receive the bearing.

14. A marine propeller shaft bearing mount according to claim 13, wherein said single piece is a casting.

15. A marine propeller shaft bearing mount according to claim 13, wherein said single piece is a tube section.

16. A marine propeller shaft bearing mount according to any of claims 13, 14 or 15, wherein said carrier is provided with one or more apertures in a wall thereof so as to allow access to a stern tube.

17. A marine propeller shaft bearing mount according to claim 14, wherein said single piece is a frame.

18. A marine propeller shaft bearing mount according to any of claims 1 to 12, wherein the carrier comprises a plurality of pillars connectable directly to the bearing.

19. A marine propeller shaft bearing mount according to any of claims 1 to 12, wherein the carrier comprises a plurality of pillars and a seat for the bearing.

20. A water borne craft having a hull, an engine and a propeller connected to said engine via a shaft, the shaft passing through a thrust bearing and a stern tube carried by a hull structure wherein said thrust bearing is provided in a bearing mount comprising a base located to a hull structure and a carrier extending from the base to the thrust bearing.

21. A water borne craft according to claim 20 wherein the base is located to the same hull structure as the stern tube.

22. A water borne craft according to claim 20 or claim 21, wherein the base is embodied by one of a thickening in said hull structure, a plate connected to said hull structure and a portion of the stern tube.

23. A water borne craft according to claim 22 wherein said portion of said stern tube is a flange.

24. A marine propeller shaft drive coupling, the coupling being adapted to connect a drive shaft and a driven shaft, the coupling comprising a first member having a plurality of projections and a second member having a plurality of recesses adapted to receive said projections, wherein said recesses accommodate said projections in the manner of a loose fit.

25. A marine propeller shaft drive coupling according to claim 24 wherein each of the members has a plurality of projections and recesses.

26. A marine propeller shaft drive coupling according to claim 24 or claim 25 wherein the projections and recesses are cylindrical.

27. A marine propeller shaft drive coupling according to claim 24, 25 or 26, wherein a polymer cushion is provided between the projections and recesses.

28. A marine propeller shaft drive coupling according to claim 24, 25 or 26, wherein the projections are provided with polymer cushion sleeves.

29. A marine propeller shaft drive coupling according to claim 27 or claim 28, wherein the sleeves are made from a plastics material.

30. A marine propeller shaft drive coupling according to claim 29, wherein the plastics material is polypropylene.

31. A marine propeller shaft bearing mount substantially as hereinbefore described with reference to figures 2, 3 or 4.

32. A marine propeller shaft drive coupling substantially as hereinbefore described with reference to figure 5 or figure 6.

Application No: GB 0202548.4
Claims searched: 1 to 23 & 31

Examiner: Richard Collins
Date of search: 6 March 2003

Patents Act 1977 : Search Report under Section 17

Documents considered to be relevant:

Category	Relevant to claims	Identity of document and passage or figure of particular relevance	
X	1,20 at least	GB 0620564 A	(ABLETT) see thrust bearing mounted on carrier in figure 1.
X	1,20 at least	US 4342488 A	(ANDERSON) see thrust bearing mounted on carrier 9 in figure 1.
X	1,20 at least	US 3826544 A	(ANDERSON) see thrust bearing mounted on carrier 8 in figure 3.
X	1,20 at least	GB 0138891 A	(KINGSBURY) see thrust bearing mounted on a carrier in figure 1.
X	1,20 at least	DE 4326558 A	(SCHAEFER) see thrust bearing 7 supported on a thrust bearing carrier with a base in figure 1.

Categories:

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.

Field of Search:

Search of GB, EP, WO & US patent documents classified in the following areas of the UKC[V]:

B7V

Worldwide search of patent documents classified in the following areas of the IPC[7]:

B63H

The following online and other databases have been used in the preparation of this search report:

Online EPODOC, JAPIO, WPI.