Jan. 11, 1944. L. G. BERQUIST 2,338,796

DRIVING UNIT FOR BOATS

Filed March 17, 1941 2 Sheets-Sheet 1

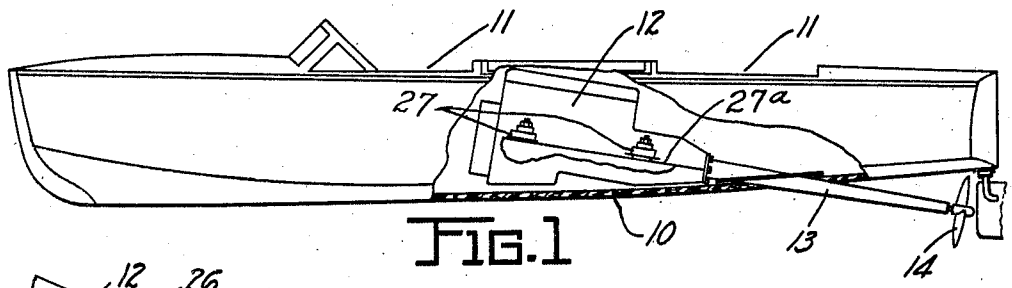


FIG. 1

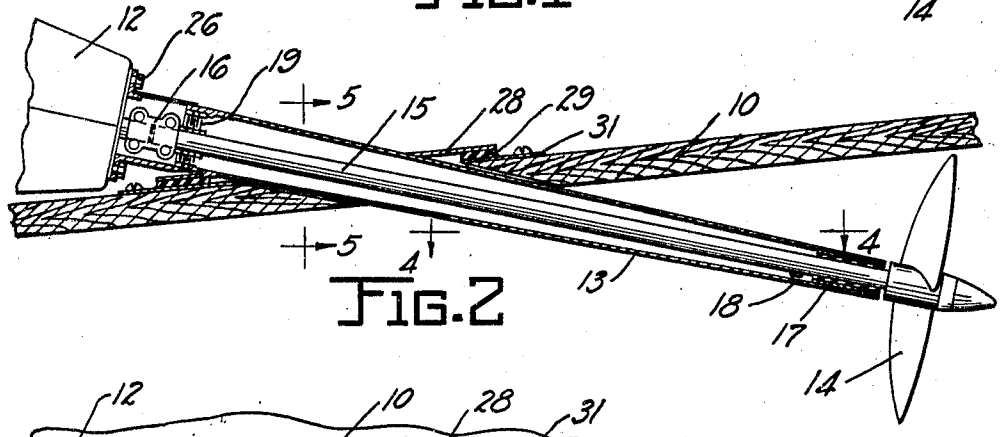


FIG. 2

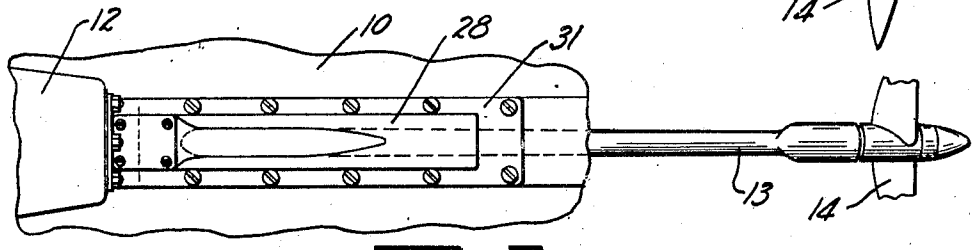


FIG. 3

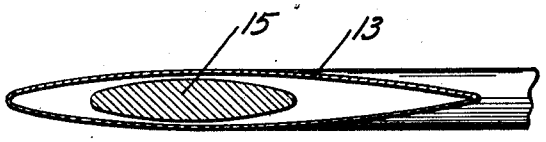


FIG. 4

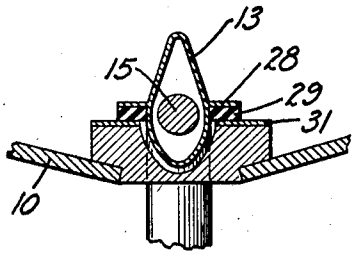


FIG. 5

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Jan. 11, 1944. L. G. BERQUIST 2,338,796

DRIVING UNIT FOR BOATS

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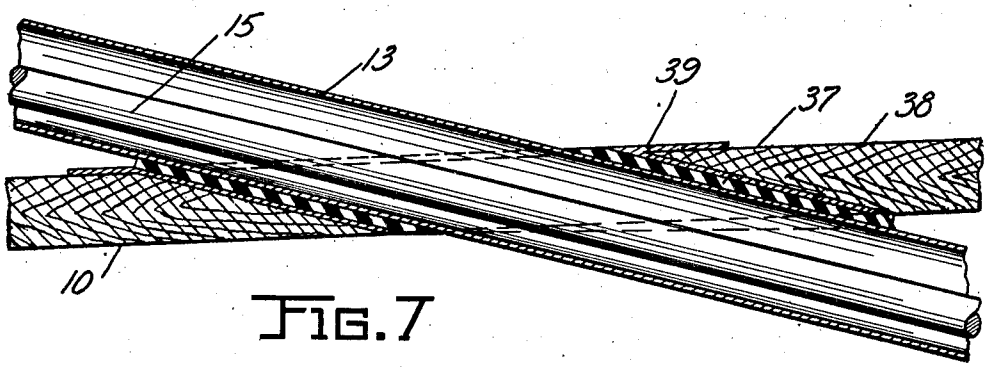


FIG. 7

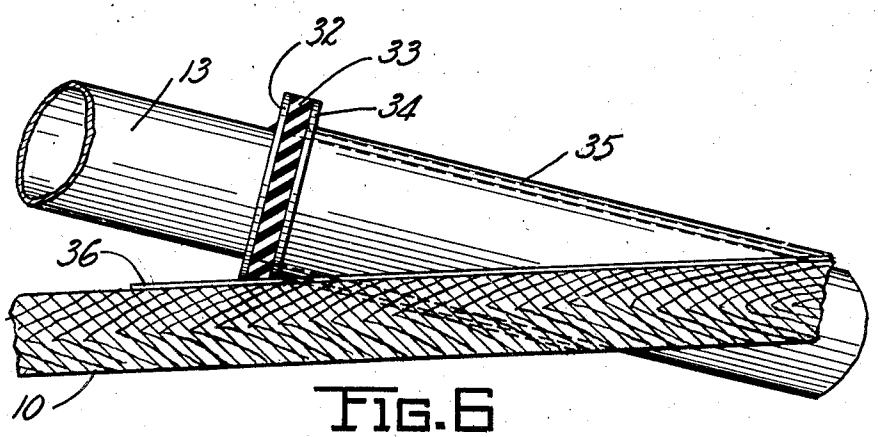


FIG. 6

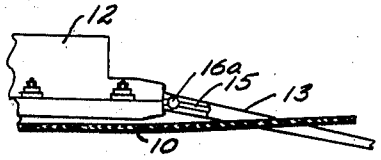


FIG. 9

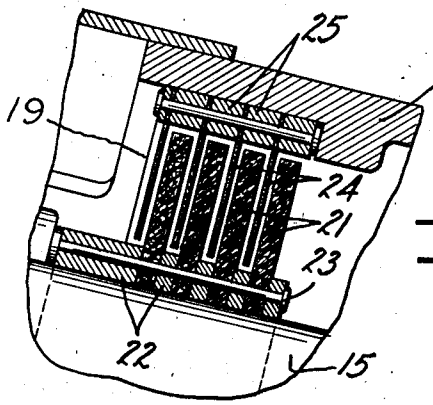


FIG. 8

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2,338,796

DRIVING UNIT FOR BOATS

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Application March 17, 1941, Serial No. 383,383

9 Claims. (Cl. 308—26)

This invention relates to a driving unit for boats and particularly to the mounting and supporting of propeller shafts for inboard motor boats.

One of the objects of the invention is to provide a driving unit for boats whereby the driving motor may be resiliently mounted by means of rubber pads or the like so that the motor vibration will be partially absorbed and the transmission of such vibrations to the structure of the boat will be substantially prevented.

Another object of the invention is to provide a supporting and mounting means for the propeller shaft of an inboard motor boat which can be secured to the boat without the necessity of any shaft packing or the like between the boat structure and the parts which project therethrough.

Another object of the invention is to provide a supporting and mounting means for the propeller shaft of an inboard motor boat which is a self-contained unit carrying the necessary bearings and seals for the propeller shaft.

Still another object of the invention is to provide a driving unit for a boat including a motor, a propeller shaft and a supporting housing for the shaft, all connected in a unit. By this construction the entire unit may be assembled in a boat merely by mounting it in place without requiring any special seals or packings in the boat structure.

Yet another object of the invention is to provide a driving unit for boats in which the propeller shaft is enclosed and supported in a tubular housing and the housing is yieldingly supported in the boat. Preferably the housing is mounted by a rubber gasket bonded to the housing or to a flange rigid therewith and to a supporting member which may be rigidly secured to the boat.

A further object of the invention is to provide a driving unit for a boat including a liquid seal construction which creates substantially no friction and yet which provides an effective seal against the flow of liquid along the propeller shaft.

The above and other objects, advantages and novel features of the invention will be more readily apparent from the following description when read in connection with the accompanying drawings, in which:

Figure 1 is a side elevation of a boat embodying the invention, with parts broken away;

Figure 2 is a central section along the propeller shaft of the boat of Figure 1;

Figure 3 is a partial plan view;

Figures 4 and 5 are sections on the lines 4—4 and 5—5 respectively of Figure 2;

Figures 6 and 7 are partial views similar to Figure 2, illustrating an alternative construction;

Figure 8 is an enlarged section through the liquid seal of Figure 2; and

Figure 9 is a partial diagrammatic view showing an alternative arrangement.

The invention is applicable to any type of boat having an inboard motor and is illustrated in Figure 1 in connection with a runabout or speed boat having a slightly curved keel 10 and two cockpits 11. A motor 12 is mounted inboard between the cockpits at an angle to the horizontal and the motor drive shaft is connected to a propeller shaft extending through a tubular housing 13 passing through the keel. A propeller 14 is mounted at the rearward end of the housing 13 and is driven by the propeller shaft.

As best seen in Figure 2, the motor drive shaft is arranged substantially in alignment with the propeller shaft 15 and is connected thereto through a coupling 16. If desired, as for example when the propeller shaft and motor shaft cannot be mounted in exact alignment, the coupling 16 may be a flexible coupling such as a universal joint. This construction is illustrated in Figure 9 which shows the motor 12 mounted horizontally with the housing 13 and propeller shaft 15 at an angle thereto, and with a universal joint 16a between the motor shaft and the propeller shaft. The propeller shaft 15 is rotatably supported at the outer end of the housing 13 in a bearing 17 which may be of rubber or the like. Openings 18 in the tubular housing enable water to circulate over and around the bearing to cool and to lubricate it. It will be noted that no additional bearings for the propeller shaft 15 are required, the forward end thereof being supported by the motor driving shaft.

A liquid seal, indicated generally at 19, is mounted between the propeller shaft 15 and the tubular housing 13 adjacent the inner end thereof, and at a point closely spaced from the coupling 16.

As best seen in Figure 8, the seal comprises a series of spaced discs 21 formed of flexible material such as felt or fabric impregnated with graphite or the like. The discs 21 are supported in spaced relation on the propeller shaft 15 by metal collars 22 fitting closely on the propeller shaft and squeezed together against the discs by bolts 23. Interleaved with the discs 21 there are a series of spaced metal discs 24 supported

by collars 25 fitting closely against the inner surface of the tubular housing 13.

The discs 21 and 24 are normally spaced slightly apart as seen in Figure 8. If water should attempt to rise through the tubular housing 13, it would press the discs 21 into sealing contact with the discs 24 so as to seal the spaces against the passage of water. At high speeds, centrifugal force acting on the discs 21 tends to straighten them out and also tends to throw the water from the outer periphery thereof so that it cannot flow past the seal. Thus this construction provides an effective seal at all times and imposes substantially no friction on the propeller shaft, particularly during high speed operation.

The housing 13 is rigily secured by means of bolts 26 or similar fastenings to the rearward end of the motor casing 12. Thus the housing, the motor and the propeller shaft form a unitary assembly which is entirely self contained so that no external bearings or seals are required for the propeller shaft. This assembly may be supported in the boat by the usual mounting brackets 27 on the motor and by yieldingly fastening the tubular housing 13 to the keel or other structure of the boat through which it projects.

In accordance with the most modern practice for mounting engines in boats, automobiles or the like, the brackets 27 may be secured to the boat by means of rubber or resilient pads 27A, providing a relatively flexible mounting adapted to partially absorb the motor vibrations and prevent the transmission of such vibrations to the boat. Thus the unitary structure just described with the tube or housing 13 flexibly sealed and supported where it passes through the structure of the boat overcomes the many difficulties which have arisen in attempts to provide flexible mounting in boats having propeller shafts mounted in bearings and stuffing boxes rigidly secured to the boat.

As seen in Figures 1 and 2, the housing 13 projects through the angular opening in the keel of the boat, the opening being slightly larger than the tubular housing so as to permit limited movement thereof. The housing is formed with an annular flange 28 extending therearound and lying at such an angle as to be substantially parallel to the keel of the boat. A rubber gasket or bushing 29 is bonded at one side to the under surface of the flange 28, and on its other side to a supporting plate 31. In assembling the structure in a boat, it is necessary only to secure the engine on its mountings and to fasten the supporting plate 31 rigidly to the keel of the boat. The plates 28 and 31 together with the rubber gasket 29 form a water tight connection to the boat keel which will permit slight movement of the housing 13 caused by vibration of the motor or of the propeller. While the mounting and supporting structure has been illustrated on the upper surface of the keel, it will be understood that it could equally well be placed on the outside surface or that, if desired in the case of larger boats, similar supporting structures could be provided on both sides of the keel.

In the embodiment of Figure 6, the flange 28 is replaced by a flange 32 extending around the housing 13 at substantially a right angle thereto. A rubber gasket 33 is bonded on one side to the flange 32 and on its opposite side to an annular flange 34. The flange 34 is supported by a semi-tubular structure 35, terminating in a flange 36 adapted to overlie and to be secured to the keel of the boat. This construction is similar to that of Figures 1 to 5 except that a smaller rubber gasket is required, limited movement of the tube 13 due to yielding of the gasket, however, being provided as in Figures 1 to 5.

In the embodiment of Figure 7, the tubular housing 13 does not require any flange, but has bonded to its outer surface a rubber gasket or bushing 37, the opposite side of which is bonded to a metal sleeve 38 adapted to fit securely in the opening in the keel. The sleeve 38 is preferably formed with a flange 39 overlying and secured to the keel surface. This construction likewise provides for limited movement of the housing 13 due to yielding of the rubber gasket 37, and is otherwise similar to the embodiments described above.

While several embodiments of the invention have been shown and described in detail, it will be understood that these are illustrative only and are not intended as a definition of the scope of the invention, reference being had for this purpose to the appended claims.

What is claimed is:

1. A driving unit for a boat comprising a propeller shaft extending through the keel of the boat, a tube around the shaft and extending loosely through the keel of the boat, a bearing for the shaft carried by said tube adjacent its outer end, a flange on the tube, a rubber gasket bonded on one side to the flange, and a supporting member secured to the boat and having a surface engaging and bonded to the other side of the gasket.

2. A driving unit for a boat comprising a propeller shaft extending through the keel of the boat, a tube around the shaft and extending loosely through the keel of the boat, a bearing for the shaft carried by said tube adjacent its outer end, a flange around said tube at an angle thereto so as to lie substantially parallel to the keel of the boat, a supporting plate secured to the keel of the boat and underlying the flange, and a rubber gasket bonded to the flange and the supporting plate and yieldingly connecting the tube to the boat.

3. A driving unit for a boat comprising a propeller shaft extending through the keel of the boat, a tube around the shaft and extending loosely through the keel of the boat, a bearing for the shaft carried by said tube adjacent its outer end, a flange around the tube at substantially a right angle to the axis thereof, a second flange loosely surrounding the tube, means rigidly connecting the second flange to the boat, and a rubber gasket bonded to said flanges.

4. A driving unit for a boat comprising a propeller shaft extending through the keel of the boat, a tube around the shaft and extending loosely through the keel of the boat, a bearing for the shaft carried by said tube adjacent its outer end, a metal sleeve extending through the keel of the boat and spaced from the tube, and a rubber gasket member lying between and bonded to the metal sleeve and the tube.

5. In a driving unit for a boat having a propeller shaft and a tube surrounding the shaft, a liquid seal comprising an annular disc of flexible material, an annular metal disc spaced slightly from the first named disc, the first named disc being adapted to be pressed into sealing contact with the metal disc by the pressure of liquid, one of said discs being secured to the shaft at its inner edge and the other disc being secured to the tube at its outer edge.

6. In a driving unit for a boat having a propeller shaft and a tube surrounding the shaft, a liquid seal comprising a series of annular discs of flexible material, a series of annular metal discs interleaved with the flexible discs and normally spaced slightly therefrom, one series of discs being secured to the shaft and the other series being secured to the tube.

7. A driving unit for a boat comprising a motor having a casing and a drive shaft, a propeller shaft drivably connected to the drive shaft, a tube surrounding the propeller shaft and rigidly secured at one end to the motor casing, a bearing carried by said tube adjacent its other end rotatably supporting the propeller shaft, a liquid seal in the tube for preventing passage of water between the tube and the shaft, and resilient means carried by said unit for resiliently mounting it in a boat.

8. A driving unit for a boat comprising a motor having a casing and a drive shaft, a propeller shaft drivably connected to the drive shaft, a tube surrounding the propeller shaft and rigidly secured at one end to the motor casing, a bearing carried by said tube adjacent its other end rotatably supporting the propeller shaft, and a liquid seal in the tube for preventing passage of water between the tube and the shaft, and supporting means yieldingly carried by said tube and formed for connection to a boat yieldingly to support the tube in the boat.

9. A driving unit for a boat comprising a motor having a casing and a drive shaft, a propeller shaft drivably connected to the drive shaft, a tube surrounding the propeller shaft and rigidly secured at one end to the motor casing, a bearing carried by said tube adjacent its other end rotatably supporting the propeller shaft, a liquid seal in the tube for preventing passage of water between the tube and the shaft, and supporting means for yieldingly connecting the tube to a boat including a supporting member formed for rigid connection to the boat and a rubber gasket bonded to said supporting member and to a part rigid with the tube.

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