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COMBINATION SHAFT STRUT AND HOUSING

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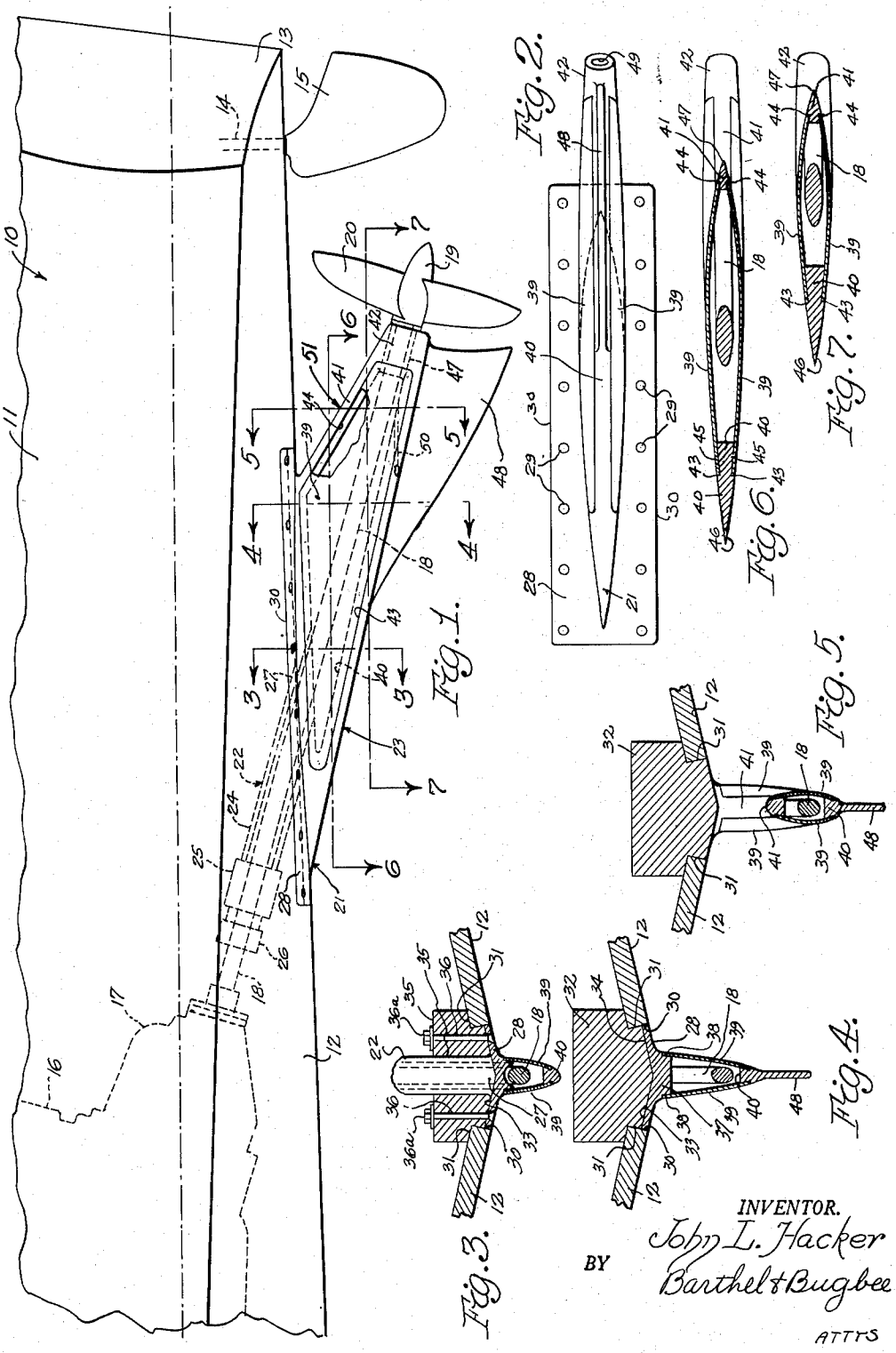


Fig. 1.

Fig. 2.

Fig. 6.

Fig. 7.

Fig. 5.

Fig. 4.

Fig. 3.

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COMBINATION SHAFT STRUT AND HOUSING

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4 Claims. (Cl. 115—34)

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This invention relates to marine craft and in particular to propeller shaft housings for such craft.

One object of this invention is to provide a combination shaft housing and strut for marine craft which will support and enclose the propeller shaft and at the same time reduce resistance to a minimum as the craft travels through the water.

Another object is to provide a combination shaft housing and strut for marine craft which is attached to the bottom of the hull and which is very efficiently streamlined along both its forward and rearward edges so that greater speed will be obtained than with a conventional exposed shaft and strut, as well as a saving of a great amount of power.

Another object is to provide a combination shaft housing and strut for marine craft which is specially configured to part the water as the craft moves along and to guide the water rearwardly so that the maximum portion of the water reaches the propeller on the end of the shaft.

Another object is to provide a combination shaft housing and strut for marine craft of the foregoing character which may be either fabricated or cast and which thereby encloses the propeller shaft and at the same time provides the necessary bearing support for the shaft while configured to present the minimum resistance to the water while the craft is in operation.

Another object is to provide a combination shaft housing and strut for marine craft of the foregoing character which also includes a shaft log in a single unit, the shaft housing and strut being streamlined to minimize the resistance thereof.

In the drawing:

Figure 1 is a side elevation of the after portion of the hull of a marine craft showing the combination strut and shaft housing of this invention;

Figure 2 is a bottom plan view of the structure shown in Figure 1;

Figure 3 is a vertical section along the line 3—3 in Figure 1;

Figure 4 is a vertical section along the line 4—4 in Figure 1;

Figure 5 is a vertical section along the line 5—5 in Figure 1;

Figure 6 is a horizontal section along the line 6—6 in Figure 1; and

Figure 7 is a horizontal section along the line 7—7 in Figure 1.

Hitherto, in marine craft such as power boats,

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the propeller shaft in the conventional form employing an exposed shaft and strut has offered a large amount of resistance as the craft is driven through the water by the propeller. At the same time, the water is diverted by the shaft and strut so that a large proportion of it does not reach the propeller. This, in turn, necessitates the use of propellers of relatively large diameters in order to obtain reasonable efficiency. In particular, a conventional exposed shaft thrusts aside the water leaving a void in its wake which is approximately four times the diameter of the shaft. The resistance of the conventional shaft and strut, moreover, amounts to ten to fifteen per cent of the resistance of the craft as a whole. This resistance is particularly detrimental in all types of boats, particularly at high speeds, where it actually changes the trim of the boat. In conventional form, the propeller receives only about 60 per cent of the water, the remainder being thrust aside by the resistance of the shaft and the strut.

The present invention provides a combination shaft housing and strut which is so perfectly streamlined that it offers the minimum resistance to the water while the craft is travelling through the water. This results in the fact that the minimum amount of water is thrust aside so that most of the water reaches the propeller allowing the use of a smaller diameter propeller for equal performance with the conventional exposed shaft and strut. The combination shaft housing and strut of the present invention is preferably fabricated or cast in its hollow streamlined form so that it closely hugs the shaft and keeps the breadth of the structure at a minimum. The present invention also contains bearing support for the propeller shaft and it preferably provides a shaft log which is combined with it. A fin to protect the propeller is also optionally provided at the bottom of the structure.

Referring to the drawings in detail, Figure 1 shows a portion of a hull 10 of a marine craft, such as a motor boat, having side planking 11, bottom planking 12 and a transom stern 13. The hull 10 is conventional and may be of any suitable type, the type shown being selected merely for purposes of illustration. The hull 10 is provided with a vertically mounted rudder post or shaft 14 which is rotatably mounted in the usual rudder pipe or tube or in a stuffing box (not shown) and at its lower end carries a rudder 15. The hull 10 is propelled by any suitable engine 16 with or without the usual clutching and reverse gear box 17 and having the usual

propeller shaft 18 upon the lower end of which is mounted the hub 19 of a propeller 20. All of the foregoing parts are conventional and their details form no part of the present invention.

Secured to the bottom planking 12 is a combination shaft log, housing and strut unit, generally designated 21 according to a preferred form of the present invention. The unit 21 in turn consists of the shaft log 22 which is joined to or integral with the shaft housing 23. The shaft log 22 consists of a tubular member 24 through which the propeller shaft 18 passes and which is provided at its upper end with a stuffing box 25 having a gland 26 for compressing a packing (not shown) around the shaft 18 and thereby preventing leakage along the shaft. The shaft log 22 at its lower end 27 (Figure 3) is secured as by welding or brazing to an elongated mounting plate 28 which extends fore and aft of the bottom planking 12 and which is provided with rows of holes 29 for receiving suitable fasteners (not shown). The mounting plate 28 is of any suitable shape depending upon the shape of the bottom of the hull 10 so as to be faired smoothly into the hull on all sides. As the hull 10 is shown, for purposes of example, as a V-bottom hull (Figures 3 and 4), the mounting plate 28 is of a shallow V-shaped cross-section to merge properly with the hull. The bottom planking 12 terminates at the opposite side edges 30 of the mounting plate 28 and is fitted into angle grooves 31 in the keel 32, (Figures 3, 4 and 5). The top surface 33 of the mounting plate 28 is configured to fit the bottom surface 34 of the keel 32, the keel 32 being provided with a downwardly inclined bore 35 for the pasage of the shaft log portion 22. The keel 32 is also provided with vertical holes 36 for bolts or other fasteners 36a (Figure 3).

The mounting plate 28 is provided with a downwardly-extending mid-portion or ridge 37 (Figure 4) which is grooved as at 38 to receive the upper edges of side plates 39. Extending downward and rearward from longitudinally-spaced locations along the mounting plate 28 in its mid-portion 37 are forward and rearward frame members 40 and 41 respectively which meet one another in a bridge portion or bearing supporting members 42 at their lower rearward ends. The shaft log tubular member 24, mounting plate 28, frame members 40 and 41, and bridge portion 42 are preferably cast in a single unit so as to provide strength combined with rigidity. The frame members 40 and 41 are similarly grooved as at 43 and 44 respectively (Figure 6) to receive the edges of the side plates 39 which are secured thereto by suitable fasteners 45 or by welding or brazing. The forward or leading edge 46 of the frame member 40 and the rearward or trailing edge 47 of the frame member 41 are relatively sharp, whereas the side plates 39 are curved outward and also downward toward one another (Figures 3 to 7 inclusive) so that a streamlined configuration results. At the same time, the frame members 40 and 41 sweep rearwardly as well as downwardly toward the bridge member or bearing supporting member 42. A downwardly and rearwardly-extending fin 48 is optionally secured to the frame member 40 and bearing supporting member 42 to protect the propeller 20.

The bearing supporting member 42 is tubular in form (Figure 2) and contains a bore 49 for the shaft 18. It also contains a suitable outboard bearing (not shown) for the outer end of the shaft 18. A conventional rubber bearing is suitable for this purpose and, when it is used, the frame member 40 is provided with passageways 50 for admitting water to the rubber bearing in order to lubricate it. The forward and rearward frame members 40 and 41 and the bearing supporting member 42 cooperate with the mounting plate 28 to form an approximately triangular strut, generally designated 51, for the outboard shaft bearing mounted in the bearing supporting member 42.

The foregoing construction thus provides a combination shaft log, housing and strut unit which is of streamlined configuration both vertically and horizontally and which for this reason greatly reduces the drag of the shaft set up by the resistance of the water as the boat moves through it. In the case of a speed boat operating at high speeds, of course, the hull planes so that the boat moves along near the surface of the water rather than deeply in it, leaving the propeller 20 and the unit 21 submerged.

What I claim is:

1. A combination shaft housing and strut for the shaft and outboard shaft bearing of a marine craft, comprising an elongated stream-lined hollow structure of approximately the width of a shaft to be housed therein and having substantially sharp forward and rearward edges, said hollow structure including an elongated mounting member adapted to be secured to the bottom of the craft, a shaft bearing supporting member disposed below and spaced away from said mounting member, forward and rearward frame members having their upper ends attached to said mounting member, said rearward frame member having its upper end attached to said mounting member at a place remote from the place of attachment thereto of the upper end of said forward frame member and also remote from the place of entry of said shaft into the upper portion of said hollow structure, said frame members converging downwardly and rearwardly from said mounting member toward said bearing supporting member and having their lower ends connected thereto, said frame members and said mounting member forming an open frame-like strut of substantially triangular outline for said outboard shaft bearing, and side plates secured to said members and closing the opposite sides of the open space of said strut to form a shaft chamber therein.

2. A combination shaft housing and strut for the shaft and outboard shaft bearing of a marine craft, comprising an elongated stream-lined hollow structure of approximately the width of a shaft to be housed therein and having substantially sharp forward and rearward edges, said hollow structure including an elongated mounting member adapted to be secured to the bottom of the craft, a shaft bearing supporting member disposed below and spaced away from said mounting member, forward and rearward frame members of approximately triangular cross-section having their upper ends attached to said mounting member, said rearward frame member having its upper end attached to said mounting member at a place remote from the place of attachment thereto of the upper end of said forward frame member and also remote from the place of entry of said shaft into the upper portion of said hollow structure, said frame members converging downwardly and rearwardly from said mounting member toward said bearing support-

ing member and having their lower ends connected thereto, said frame members and said mounting member forming an open frame-like strut of substantially triangular outline for said outboard shaft bearing, and side plates secured to said members and closing the opposite sides of the open space of said strut to form a shaft chamber therein.

3. A combination shaft housing and strut for the shaft and outboard shaft bearing of a marine craft, comprising an elongated stream-lined hollow structure of approximately the width of a shaft to be housed therein and having substantially sharp forward and rearward edges, said hollow structure including an elongated mounting member adapted to be secured to the bottom of the craft, a shaft bearing supporting member disposed below and spaced away from said mounting member, forward and rearward frame members having their upper ends attached to said mounting member, said rearward frame member having its upper end attached to said mounting member at a place remote from the place of attachment thereto of the upper end of said forward frame member and also remote from the place of entry of said shaft into the upper portion of said hollow structure, said frame members converging downwardly and rearwardly from said mounting member toward said bearing supporting member at an acute angle to one another and having their lower ends connected thereto, said frame members and said mounting member forming an open frame-like strut of substantially obtuse-angled triangular outline for said outboard shaft bearing, and side plates secured to said members and closing the opposite sides of the open space of said strut to form a shaft chamber therein.

4. A combination shaft housing and strut for the shaft and outboard shaft bearing of a marine craft, comprising an elongated stream-lined hollow structure of approximately the width of a shaft to be housed therein and having substantially sharp forward and rearward edges, said hollow structure including an elongated mounting member adapted to be secured to the bottom of the craft and having a longitudinally-extending ridge projecting downwardly therefrom, a shaft bearing supporting member disposed below and spaced away from said mounting member, forward and rearward frame members having their upper ends attached to said mounting member, said rearward frame member having its upper end attached to said mounting member at a place remote from the place of attachment thereto of the upper end of said forward frame member and also remote from the place of entry of said shaft into the upper portion of said hollow structure, said frame members converging downwardly and rearwardly from said mounting member toward said bearing supporting member and having their lower ends connected thereto, said frame members and said mounting member forming an open frame-like strut of substantially triangular outline for said outboard shaft bearing, and side plates secured to said members and closing the opposite sides of the open space of said strut to form a shaft chamber therein.

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