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PATENT SPECIFICATION

DRAWINGS ATTACHED

L173.285

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COMPLETE SPECIFICATION

Improvements in or relating to the Design and Construction of Hulls for Marine Craft

I, JEREMY JOSEPH FRY, a British Subject, of Brassmill Lane, Lower Weston, Bath, Somerset, (formerly of Widcombe Manor, Bath, Somerset), do hereby declare the invention, for which I pray that a patent may be granted to me, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to the design and construction of hulls for marine craft, and is concerned with improvements in the design and construction of hulls for marine craft provided with some form of power propulsion.

The present thinking on the design and construction of hulls for power propelled marine craft appears to be concerned primarily with a reduction of drag in order to increase the forward speed of the craft for a given output of the power unit. Although changes in hull design to solve this problem may have reduced the drag and thereby improved the forward speed for a given output of the power unit, other more serious problems have resulted in that the load carrying capacity has been adversely affected and the stability, i.e. riding comfort more particularly in relation to slamming, pitching and rolling, is greatly reduced.

The present invention is therefore concerned with solving the above problems by an entirely new approach in the design and construction of the hull in which the stability and load carrying capacity are also greatly improved while increasing the performance of the craft for a given output of the power unit.

These improvements are basically obtained by forming the hull with a substantially flat bottom and as a substantially rectangular body having its lower surface suitably shaped from the stem of the craft so as to reduce the hydrodynamical resistance. According to the invention the efficiency of the flat bottomed hull is improved when propelled forwardly by the power unit by providing a cushion of air

beneath the hull. This cushion of air is provided without the use of mechanical means and is obtained by the forward movement of the hull when it reaches a certain speed. The air passing beneath the cutaway or turnup of the hull is trapped below the hull by providing a pair of spaced members depending from the hull and extending rearwardly from the bow of the hull towards the stern thereof. The spaced members are substantially parallel and are positioned closely adjacent the sides of the hull. The depth of the spaced members is such that it is a maximum at the bow of the hull and reduces gradually rearwardly of the hull to merge therewith at a point near the position of rise of the hull when the craft is planing.

At the planing speed the efficiency of the hull is greatly increased in that a considerable improvement is obtained in the forward speed for a given output of the power unit due to the cushioning effect of the air which reduces the hydrodynamic drag caused by skin friction. In addition, due to the flat construction of the hull its load carrying capacity is very greatly increased, while the ride is more comfortable due more particularly to a reduction in slamming, pitching and rolling.

The invention also provides a hull construction which is designed for lightness and its ability to float together with rigidity in torsion.

The invention will now be described by way of example with reference to the accompanying drawings, in which:—

Figure 1 is a sectional side elevation of a hull in accordance with the invention and illustrating thereon a suitable superstructure, power assembly and ramp board;

Figure 2 is a front view of the complete craft as shown in Figure 1 showing in particular the construction of the ramp board and the positioning of the spaced members or keel boards;

[Price 4s. 6d.]

Price 25p

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the undersurface of the hull at a point near the position of rise of the hull from the water when the craft is planing. The function of the spaced keel members 31 is to trap air passing beneath the turnup or cutaway of the hull formed by the curved portion 12 and to funnel this air beneath the hull to provide a cushion of air or aerated water beneath the stern of the hull. In this way the drag or hydrodynamic resistance due to skin friction is considerably reduced and a greater forward speed is obtained for a given output of the power unit 27.

Figure 7 illustrates one possible construction of a keel board which is shown diagrammatically by a series of Figures 7a to 7h which are sections through the keel board and lower part of the hull section as indicated

by the corresponding section lines *a— a* to *h— h* in Figure 1.

In one particular embodiment in accordance with the invention, given by way of example only, the length of the hull structure from the transom board to the stem is approximately 20 feet, while the width of the hull (excluding the strakes 21) is approximately 9ft. 2 ins. with the distance between the keel members approximately 8 ft. The depth of the hull i.e. the distance between the members 13 and 14 is approximately 9 ins.

Each keel board 31 has a width at its lower end which is indicated in Figures 7a to 7h by the dimension "X" and a depth indicated by the dimension "Y". The values are tabulated as follows:

TABLE

Figure	Distance from Transom Board (ft)	Width of Keel Board "X" (inches)	Depth of Keel Board "Y" (inches)
7a	0.3	Slight curve	$\frac{1}{4}$
7b	5.0	$\frac{5}{8}$	$\frac{3}{8}$
7c	10.0	$\frac{7}{8}$	2
7d	16.0	1	4
7e	17.0	$1\frac{1}{16}$	$3\frac{1}{2}$
7f	18.0	$1\frac{1}{8}$	$3\frac{1}{4}$
7g	19.0	$1\frac{1}{4}$	$2\frac{3}{4}$
7h	20.0	$1\frac{1}{2}$	$2\frac{1}{4}$

The width of the keel board at its upper end at its junction with the lower member 14 is indicated by the dimension "Z" and in the example given above remains constant throughout its length at 3 inches.

Due to the flat construction of the hull the load carrying capacity of the craft is also very greatly increased e.g. about four times that of a hull of conventional shape and with a comparable overall length. A more comfortable ride is also obtained as the usual slamming of conventional power boats is avoided when the craft is planing. Finally, the stability of the craft is also improved, due more particularly to a reduction in pitching and rolling.

As previously mentioned, a suitable structure can be built up on to the flat body of the hull to provide a suitable marine craft. Due to its exceptional load carrying ability the hull can be designed completely or partially to carry equipment, such as road vehicles, and

as such the hull is particularly applicable for drive-on conditions at the waters edge due to its shallow draught.

The embodiment shown in the drawings has a deck structure which comprises side frames 32 shown more clearly in Figure 4. The side frames 32 are connected to side members 20 and to deck member 13 by brackets 33. The strakes 21 are bolted to the lower end of the side frames by spaced bolts 34. Each side frame 32 is completed by a handrail 35 which extends longitudinally thereof and abuts a similar handrail 36 on the top of the transom board 25. At the stem of the craft the side frames are suitably shaped to form prow portions 37, the prow portions being suitably curved as shown in Figure 5 so as to provide side protection and support for a ramp board 38 hingedly mounted therebetween on nose member 23.

Each prow portion 37 of the side frames

32 is formed with stowage boxes 39 extending inwardly therefrom at the front of the hull of the craft. As shown more clearly in Figure 5 the stowage boxes are provided with a top closure member 39a and the forward portion of each stowage box is inclined to conform to the position of the ramp board 38 when raised between the boxes as shown in full lines.

Each stowage box has a butt strip 40 mounted thereon (see Figure 6) and which incorporates a sealing member 41 for engagement by the abutting chamfered edge 42 of the ramp board when raised.

A plurality, for example, three hinge members 43 (see Figure 2) are mounted on the ramp board and attached to the nose member 23 along its length. A handrail 44 extends along the front of the hull between the stowage boxes and includes a sealing member 45 engageable by the lower inner edge of the ramp board when in its raised position. The ramp board is completed by a rubberised anti-spray strip 46 which runs the full width of the board and is clamped thereon by a galvanised strip 47, the lower free end of the anti-spray strip 46 abutting the nose member 23 (see Figure 5). The ramp board is retained in its raised position by a suitable cable 48 connected to top rail 49 and engageable in a jamming cleat 50. The lowered position of the ramp board is shown in chain lines in Figure 5.

A mooring arrangement may be provided as shown in chain lines in Figure 5 and which comprises a mooring eyebolt 51 which is fixed through the main front member 22 with a wedge washer 52 on top and an eye plate 53 to attach a shock cord 54 which extends over rail 49 to engage and hold a stainless steel mooring lash 55 which is spliced and eye-letted permanently to the eye bolt 51.

The hull is provided with spaced lifting lugs 56 one of which is shown in Figure 5.

A modified and preferred layout and construction of the hull assembly is shown in Figures 8 to 11 of the drawings. In these figures similar parts are given the same reference numerals with the addition of a prime mark.

Figure 9 shows the construction and assembly of the longitudinal stringers 15' with the cross stringers 16'. Each stringer is formed with interlocking slots 57, 58 respectively which fit together throughout the length and width of the hull assembly 10'. The stringers are cut as required, and preferably the central area of the cross stringers is of greater depth so as to provide a deck area sloping gently to the sides of the craft. Similarly a greater depth can be provided at the front of the hull to give increased strength.

The junction 59 of two interlocking sections 15', 16' are first provided with fillets 60 of foamed plastics or like materials to

reduce the angles of the corners. The whole assembly is then mounted on the lower member 14' of the hull 10' by bonding the strips 15', 16' thereto using, e.g. polystyrene, as shown at 61 in Figure 11.

The interlocking members 15', 16' form cores which are now covered with a metal overlay 62 bent into Z-form as shown in Figures 10 and 11. The metal overlay 62 abuts the side of the core members 15' or 16' and its bottom flange 63 fits against the lower member 14' while its upper flange 64 fits over the top of the core and has its end portion 65 bent over. The cavities 17' between the stringers is then filled in situ with foamed plastics material 30' which is levelled off as shown so that the upper deck member 13' engages intimately with the top flanges 64 of the overlays 62.

As previously mentioned, any suitable structure can be built on to the flat body of the hull to provide a suitable craft. For example, cabin structures can be provided and the power unit can be positioned fore or aft of the hull. The hull has exceptional load carrying ability and can be designed completely for loading at the waters edge due to its shallow draught. To facilitate such an operation the undersurface at the stem of the hull may be provided with runners.

It will be appreciated that the invention provides a more efficient and greatly improved design and construction of a hull for a marine craft. Not only is the efficiency, i.e. forward speed, improved by reducing the drag, but its load carrying capacity is greatly increased together with its stability so that a more comfortable ride is obtained due particularly to the resulting reduction in slamming, pitching and rolling of the craft.

WHAT I CLAIM IS:—

1. A power propelled marine craft comprising a hull in the form of a rectangular body having a substantially flat undersurface provided with a pair of spaced members depending therefrom, said members extending substantially parallel from the bow of the hull towards the stern thereof, wherein the said spaced members are positioned closely adjacent the sides of the hull and the undersurface of the body is curved at the stem of the hull to provide a cutaway or turnup so that air passing thereunder is trapped below the hull between the spaced members, and wherein said spaced members have a depth which is a maximum at the bow of the hull and which reduces gradually rearwardly of the hull to merge therewith at a point near the position of rise of the hull when planing.

2. A marine craft as claimed in claim 1, wherein the hull is a flat rectangular body having a depth which is relatively small compared with the length and width thereof and the stern thereof is provided with a ramp board for loading at the waters edge.



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2. A marine craft as claimed in claim 1, wherein the hull is a flat rectangular body having a depth which is relatively small compared with the length and width thereof and the stem thereof is provided with a ramp board for loading at the waters edge.



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3. A marine craft as claimed in either preceding claim, comprising longitudinal and cross stringers assembled to form cavities therebetween for receiving foamed plastics material, top and bottom members attached to said stringers, said spaced members being positioned adjacent the outer edges of said bottom member and depending therefrom, and side members inclined outwardly from said bottom member and connecting with said top member.

4. A marine craft as claimed in claim 3, having side frames attached to said side members and strakes attached to said side frames and extending outwardly from the side members of said hull.

5. A marine craft as claimed in claim 3, in which the longitudinal and cross stringers are formed by core members having interlocking slots.

6. A marine craft as claimed in claim 9,

in which the core members are mounted on said bottom member, said core members being each provided with an overlay having a lower flange engaging said bottom member and a top flange engaging over said core member.

7. A marine craft as claimed in any preceding claim having a structure mounted thereon comprising side frames, a transom board, a front ramp board and, if desired, a cabin assembly.

8. A power propelled marine craft substantially as described and as shown in Figures 1 to 7 of the accompanying drawings or as modified by Figures 8 to 11 of the accompanying drawings.

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