P. C. HEWITT.

APPARATUS AND METHOD RELATING TO HIGH SPEED MOTOR CRAFT.

APPLICATION FILED NOV. 12, 1906. RENEWED MAR. 15, 1913.

1,084,578. Patented Jan. 13, 1914.

2 SHEETS—SHEET 1.

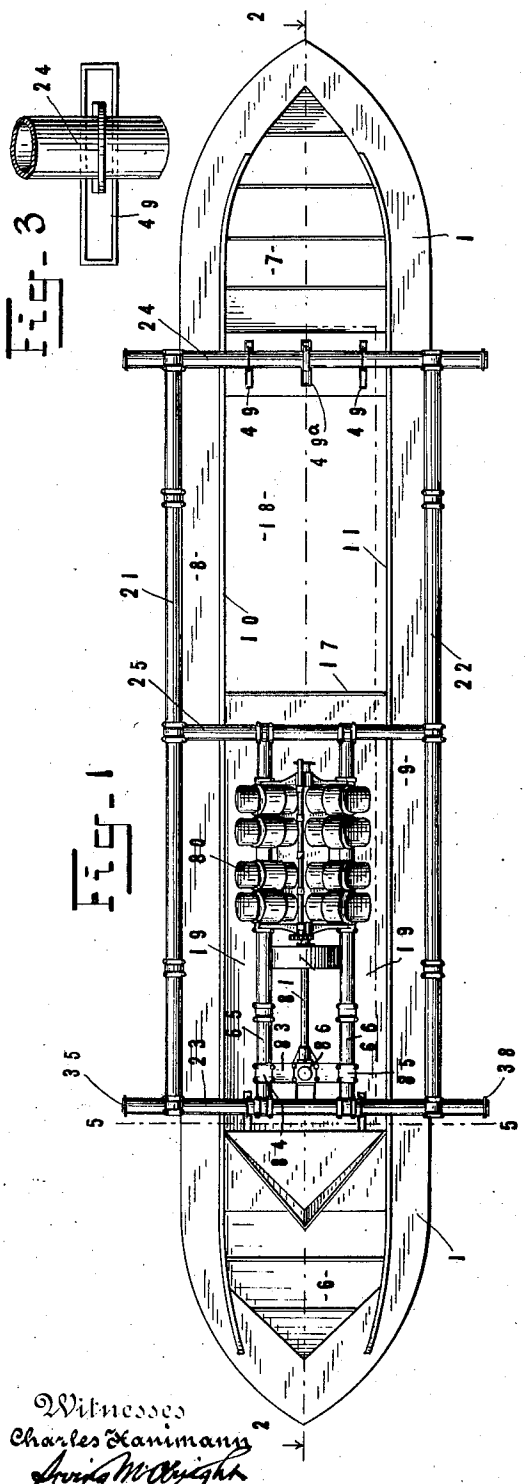

Fig. 1.

Fig. 3.

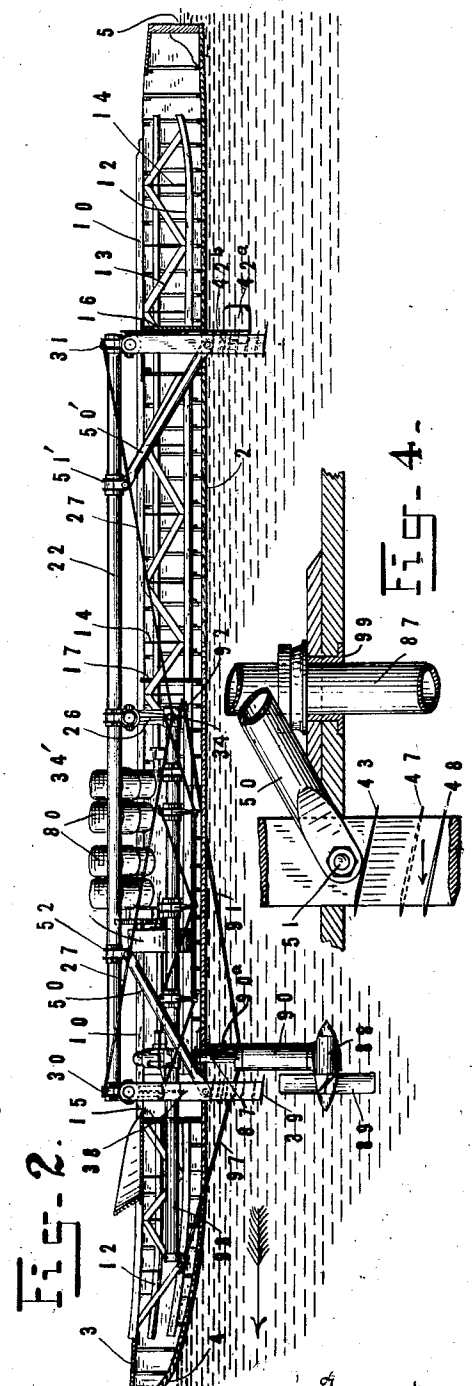

Fig. 2.

Fig. 4.

Witnesses
Charles Hanimann
Irving McKnight

Inventor
Peter Cooper Hewitt
By his Attorney
P. C. Dean

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2 SHEETS—SHEET 2.

Fig. 5.

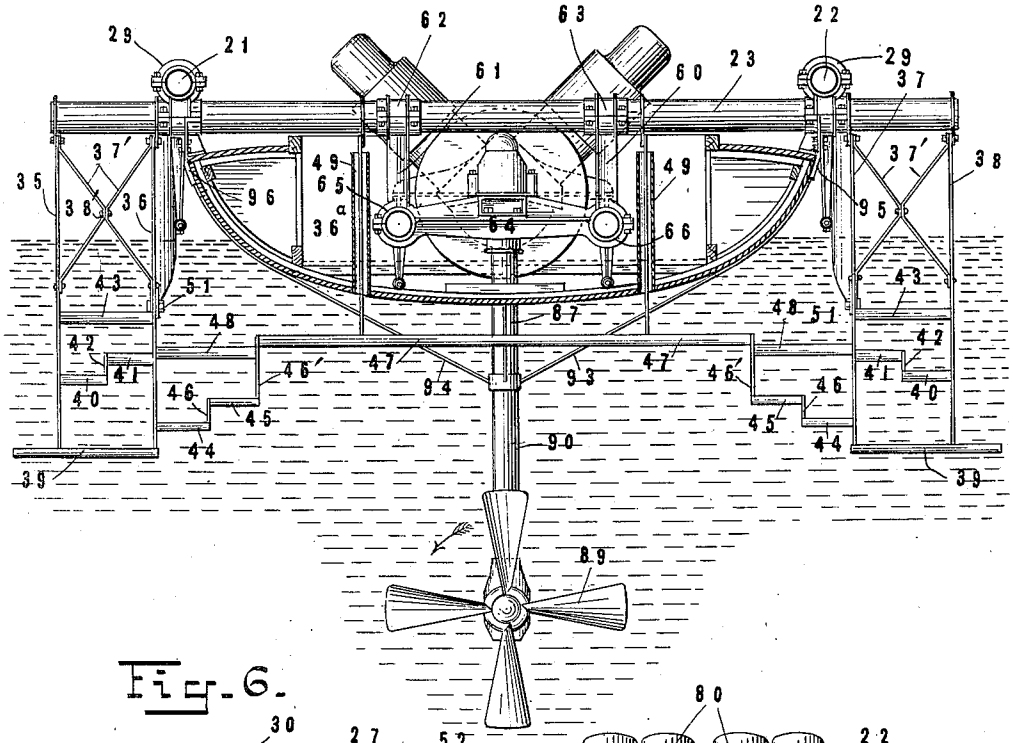
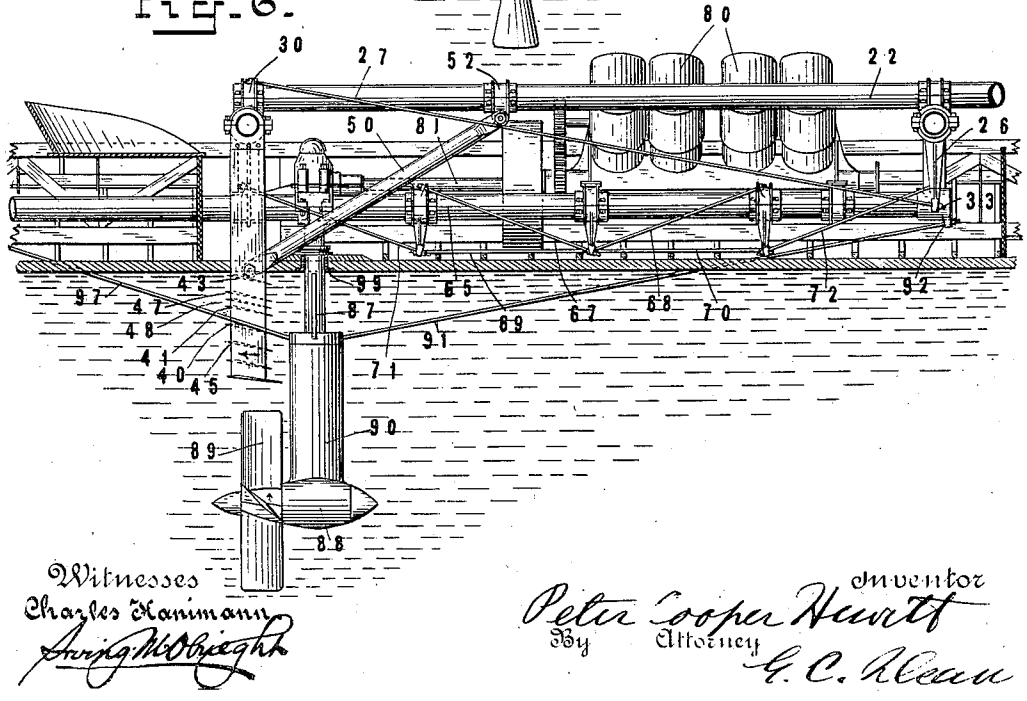


Fig. 6.



Witnesses
Charles Hanimann
Irving M. Bright

Inventor
Peter Cooper Hewitt
By Attorney
G. C. Reau

UNITED STATES PATENT OFFICE.

PETER COOPER HEWITT, OF NEW YORK, N. Y.

APPARATUS AND METHOD RELATING TO HIGH-SPEED MOTOR-CRAFT.

1,084,578. Specification of Letters Patent. Patented Jan. 13, 1914.

Application filed November 12, 1906, Serial No. 343,060. Renewed March 15, 1913. Serial No. 754,645.

To all whom it may concern:

Be it known that I, PETER COOPER HEWITT, a citizen of the United States, and a resident of the city of New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Apparatus and Methods Relating to High-Speed Motor-Craft, of which the following is a specification.

My present invention relates to high-speed conveyances for traversing fluid media such as water or air, particularly those which in normal full speed operation are supported by dynamic reaction of the fluid medium upon forwardly directed inclined surfaces and particularly those in which a hull or boat is employed for static or flotation support of the device while starting, stopping or at rest.

In my prior applications Ser. No. 273,784, filed August 11th, 1905, and Ser. No. 283,730, filed October 21, 1905, I have explained the principles and have claimed certain of the broad features of construction and operation of a gliding craft wherein the dynamic support is through deflecting surfaces acting upon the water.

While the inventions set forth in my present application are especially useful in devices embodying the main principles described in said prior applications, many of them are useful in other relations.

According to my present invention the construction and operation is such that the boat may be lifted entirely clear of the water at normal full speed, and to this end the inclined surfaces utilized for the dynamic support at high speeds are entirely independent of the hull or boat, and I prefer to have the gliding surfaces for downwardly deflecting the fluid medium, and also the motor for propelling the craft mounted on a separate, rigid frame, preferably of trussed tubing. The engine is carried below the level of this frame within the body of the hull on a supplemental frame suspended from the main frame and is connected with a deeply submerged propeller by right-angle power transmitting devices including suitable transmission shafts and bevel gears.

The construction of the parts is such that all stresses due to the forward pull of the propeller, rearward drag of the planes, and torque and vibration of the motor take effect upon the frame, so that the power outfit and gliding support outfit are parts of one integral, self-contained structure. This structure is secured to the hull, which is itself a separate, self-contained structure, so that when traveling at normal high speed on the gliding planes, the hull is merely a load carried by the frame, and is not required to support any of the weight of the motive power outfit. For this reason, the hull may be of light construction, and yet be strong enough for the purpose of flotation when at rest and at low speeds.

There are other advantages in the unitary frame structure arranged as described. One is that the speed of a gliding structure is in no way dependent upon extremes of great length and narrow beam, as in the case of a hull. The gliding structure may, therefore, be only as long as is necessary to get a desirable length of base of support, and may be widened out as much as desired for the purpose of stability.

Referring to the drawings: Figure 1 is a plan view of a boat equipped with gliding planes, in accordance with my invention. Fig. 2 is a longitudinal section of the hull on the line 2, 2, showing the supporting planes, propeller, motor, and frame support therefor in side elevation. Figs. 3 and 4 are details of parts shown in Fig. 2, to be referred to hereinafter. Fig. 5 is a transverse section, on the line 5, 5 of Fig. 1. Fig. 6 is a longitudinal sectional view of parts shown in Fig. 2, but on a larger scale.

I will now describe with considerable exactness and detail concrete forms of apparatus for the practice of my invention, as illustrated in said drawings; but it will be understood that the invention is broad, and is not limited to such precise details of construction and that the claims hereinafter presented are not to be considered as limited to any particular form or feature not specifically set forth therein.

In the drawings, I have shown the invention in connection with a single hull 1, which is preferably long and shallow, being formed with a comparatively wide, rounded or V shaped bottom 2, flat deck 3, spoon bow 4, and sharply tapered flat bottomed stern 5. The extreme beam at the deck is rather large for a high speed hull, but the lines are such as to give a materially narrower beam at the water line. The skin of the hull is preferably smooth. It is covered in fore and aft

by decks 6 and 7, and laterally by washboards 8 and 9. The coamings 10 and 11 are utilized as the upper members of longitudinal trusses, which extend the entire length of the boat, and comprise the lower members 12, diagonal thrust members 13, and tension members 14. The portions decked over fore and aft at 6 and 7 are closed in by water tight bulkheads 15 and 16, and there is an intermediate transverse water tight partition at 17. The cock-pit 18 is utilized for passengers or load, and the forward compartment 19 is occupied by the motor power outfit. Such a hull combines lightness with great strength, and is well adapted to ride over the water with small displacement at low speeds, and when lifted out of the water at high speeds, it offers minimum surface for windage and air resistance.

The frame for carrying the motor and transmitting and properly distributing the stresses of propeller, gliding planes and motor, is a unitary structure consisting of rigidly secured thrust members and suitably arranged tension members, adapted to stay and stiffen the latter. The frame comprises the longitudinal members 21 and 22 and the transverse members 23 and 24 at each end, together with the transverse member 25, intermediate the ends. The members comprising this main frame, are preferably integral lengths of drawn steel tubing of ample size, and they are secured together preferably by frictional engagement without screw threading or otherwise weakening the material of the tubes.

The longitudinal members 21 and 22 are stayed and made rigid by means of thrust members 26, extending at right angles thereto a suitable distance and engaging tension members 27, 27, extending preferably from one end of the tube to the other and engaging said thrust members 26. The tension members 27, 27 are preferably fine quality steel wire of great tensile strength, as are also the other tension members hereinafter mentioned. By use of a plurality of such wires arranged parallel with each other and preferably separately secured at the ends, it is possible to secure almost any desired strength of tension member without materially increasing the total weight of the structure. The tension members 27, 27 may consist of separate lengths of the wire, each independently secured by nuts 30, 31 at opposite ends of the longitudinal frame members 21 and 22 and by other nuts 33 at the end of the thrust member 26, as indicated in Fig. 6; but I prefer the arrangement indicated at 34, in Fig. 2, where 27 is a single unbroken length of wire, extending from 30 to 31 and passing over a saddle 34 at the end of the thrust member 26.

On the ends of the transverse frame member 23 are pivotally mounted two pairs of supports 35, 36 and 37, 38 to which are secured the forward set of gliding plates. As will be seen from Fig. 5, the supports and gliding plates carried thereby are preferably symmetrically arranged with respect to the longitudinal vertical central plane of the craft. The pair of gliding plane supports 35 and 36 are stayed by diagonal braces 37′, 37′, formed from strips bolted together at 38′ and secured substantially as shown. To each pair of supports are secured the lowermost main gliding plates 39, 39. Above these are the vertically distributed gliding plates 40, 40 and 41, 41, each plate 40 being connected with plate 41 by a vertical portion 42. These gliding plates and the intermediate vertical portion are formed integrally from a single piece of steel of about ¼ inch thickness, sharpened at the forward edge and tapering rearwardly, as indicated in the drawings. Above these, at a level higher than any of the other gliding surfaces and not much below the level of the bottom surface of the hull are the supplemental gliding plates 43, 43. These are the outermost and uppermost gliding surfaces, and when the craft is traveling at normally high speed, their function is mainly that of guard planes to take effect upon the surface upon tendency to tilt, and thereby correct such tendency.

Between the two pairs of supports 35, 36 and 37, 38 and secured to 36 and 37, are gliding surfaces 44, 44 and 45, 45, connected by integral vertical portions 46, 46. At their inner ends, or ends nearest the center of the hull, the plates 45 are provided with vertical, integral extensions 46′, 46′, which are in turn secured to or formed integrally with a single transverse plate 47, extending across the boat at a level only slightly lower than that of the supplemental gliding plates 43. The plate 47 is intended for use at low speeds as one of the main supporting surfaces, but at high speeds it is designed to be out of the water, so that its function is mainly that of a supplemental gliding plate to furnish a reserve of lifting power by coming into contact with the water when needed. Other gliding plates 48, 48 are secured to the vertically extending portion 46′ and to the adjacent supports 36, 37 respectively. These plates and supports are all preferably formed of the ¼ inch steel previously mentioned, bent to shape and secured by bolts or rivets. All adjacent opposing surfaces of the vertical extending members, are preferably flat on the sides adjacent each other and rounded off on the sides more remote from each other, so that the forward and rearward edges are sharp and adapted to split the water. All vertical surfaces are as nearly as possible parallel with each other and with the direction of movement of the boat. The gliding plates are preferably plane faced beneath, the thickening being

worked into rear or upper face. The long transverse plate 47 is preferably braced by supports rotatably mounted on the transverse frame member 23 and extending through wells 49, 49, opening through the bottom of the boat and extending above the water line.

The distribution of gliding surfaces on each side of the boat is preferably symmetrical, and the vertical distribution is such that there are always gliding plates near the level of the water, both above and below the same, adapted to be raised above or depressed below the same, to go into or out of action successively, as may be needed. By reference to Fig. 6, it will be seen that as the boat is speeded up, the plates will come out of the water in the following order: 43, 47, 48, 41, 40, and 45. Thus, at the extreme high speed, the lowermost plate 39 may be the only one normally submerged, and in such case the next higher plate 44 may perform the function of a supplemental gliding plate adapted to furnish the auxiliary support necessary to maintain the proper level of the structure and submergence of the lowermost plate 39. At a slightly lower speed 44 becomes normally submerged and 45 adapted to travel at or near the surface, above or below the same, and to act as a supplemental gliding plate. At a still lower speed, 45 is normally submerged and plate 40 is at or near the surface. When the speed is decreased to such an extent that plate 41 is at or near the surface, the relatively great lifting effect of the long gliding plate 47, with its preferably steeper angle, is available and will come into play in any emergency or upon further decrease of speed.

When the boat is traveling at the high speeds first above described, with only plates 39 and 44 normally active, all of the remaining plates then above the water are in position to come into operation with their active lifting effect at any time whenever movement of the water or shifting of the load in the boat causes submergence of such plates below the water. When these conditions occur, the plates come into action one after the other without any great shock.

The pivoted structure constituting the forward set of gliding supports is braced by diagonal thrust members 50, pivoted to the supports 36 and 37 at 51, and secured in any desired position of adjustment by clamping members 52, encircling the longitudinal frame members 21 and 22. The rear set of gliding supports is preferably like the forward set, being similarly pivotally supported on the transverse frame member 24 and secured in desired adjustment by braces 50′, 50′ and clamps 51′, 51′.

By the above described arrangement, all rearward as well as upward thrust on the gliding plates takes effect upon and is distributed through the trussed frame, instead of taking effect directly on the hull. Torque and vibration of the motor, as well as pull of the propeller, are transmitted to this same frame. To this end the motor is mounted upon a supplemental drop frame amply stayed and trussed and located within the hull cavity, but preferably not directly connected therewith. The supplemental frame comprises hangers 60, 61 depending from the transverse frame member 23 and secured thereto by clamps 62, 63, encircling same. Similar hangers are secured to the intermediate transverse member 25 by similar clamps. These hangers are castings provided with suitable strengthening ribs, as shown, and each adjacent pair of hangers has cast integrally therewith a transverse member 64, (Fig. 5). The hangers have formed therein split ring passages adapted to be clamped about the longitudinal tubes 65, 66, which form the bed of the engine. These tubes are provided with laterally extending thrust members, which are parts of a truss structure completed by the symmetrically disposed tension members 67 and 68, 69 and 70, 71 and 72. These tension members may be separate lengths of steel wire secured by nuts to each of the lateral thrust members, as shown in Fig. 6, or they may consist of two continuous lengths of such wire secured at each end by nuts, and merely fitting in saddles in the end of the thrust members as indicated in Fig. 2. In such case 71, 69, 70, 72, may be a single length of wire integral from end to end.

The motor 80 is preferably an eight cylinder motor having four cylinders on a side, disposed at an angle of ninety degrees from each other, and preferably of light construction. I have constructed such a motor of such a design that at a weight of five hundred pounds it will develop more than one hundred horse-power. The bed plate of the motor is formed with clamps fitting the tubes 65, 66 of the supplemental drop frame previously described, the latter constituting the bed plate of the engine. It will be understood that the efficiency of the gliding planes is such that a boat of the proportions shown will be operative if equipped with any light engine of similar horse-power, even though it weigh considerably more than five hundred pounds.

The crank shaft 81 is extended forwardly to a point near the plane of the forward set of gliding plates, where it connects with the transmission gear extending vertically downward to the propeller. The transmission gear is supported in a saddle 83, consisting of a casting provided at the ends with clamps 84 and 85, encircling the longitudinal frame members 65 and 66. The upper gearing is located in a central chamber 86 from which extends the tube 87, inclosing

the vertical power transmitting shafts. The tube 87 terminates in a lower gear chamber 88, which also serves the function of journal for the propeller 89. For a portion of its length the tube 87 is provided with a case 90, which is about the same diameter as the tube laterally, but is extended and sharpened fore and aft so as to cleave the water with as little resistance as possible. The case referred to begins at a point below the bottom of the hull, which is designed to be near the water level when the craft is at normal high speed and supported upon the gliding surfaces. This propeller support and power transmitting projection is stayed against the pull of the propeller by a rearwardly extending tension member 91, which passes through the bottom of the boat, preferably through a yielding water tight packing, so as not to positively engage the hull, and is secured by a screw nut to the rear end of the supplemental engine frame, as at 92. The propeller support is stayed laterally by tension members 93, 94, extending outside the hull and adjustably secured at 95, 96. If desired the propeller may be stayed in a forward direction by tension member 97 extending through the hull and engaging the tubular projection 98 of the motor frame. The vertical tube may be surrounded by suitable water tight packing 99 at the point where it passes through the skin of the hull. The packing at this point may also be elastic so as to permit slight yielding action and vibration without too great stress upon the hull.

The proportion and relative arrangement of the parts is preferably such that the propeller acts substantially in the vertically transverse plane of the forward set of gliding plates. In accordance with this part of my invention, the propeller is preferably arranged in front of its support to pull the load through the water, rather than to push it.

The rudder 42^a, carried by a rudder post 42^b is journaled in brackets, preferably carried by the rear transverse frame member 24 and the rear transverse deflecting plate 47. It is arranged at a depth sufficient for operativeness at all speeds and levels of the craft and conditions of the water.

I have described and claimed in my application Serial No. 807,054, filed December 16, 1913, copending herewith, certain desirable features including the design of the propeller and means for transmitting the power of the engine thereto and these I do not claim herein.

I claim:

1. In a high speed craft and in combination, a hull or body, a motor, means for applying the power of the motor to drive the craft, and a separate longitudinally extending frame work carrying said means adapted to sustain and internally distribute the motive stresses, together with means for connecting said frame and hull.

2. In a high speed craft and in combination, a hull or body, a motor, means for applying the power of the motor to drive the craft, and a separate longitudinally extending frame work carrying said means and also gliding plates suitably spaced apart longitudinally and laterally, said frame work being adapted to sustain and internally distribute the motive and driving stresses, together with means for connecting said frame and hull.

3. In a high speed craft and in combination, a hull or body, formed with longitudinal trusses, one member forming the coaming of the cock-pit, a motor, means for applying the power of the motor to drive the craft, and a frame work adapted to sustain and internally distribute the driving stresses, together with means for connecting said frame and hull.

4. In a high speed craft and in combination, a hull or body, a motor, means for applying the power of the motor to drive the craft, and a unitary structure or frame work, supporting said motor within said hull and adapted to sustain and internally distribute the driving stresses, together with means for connecting said frame and hull.

5. In a high speed craft and in combination, a hull or body, formed with longitudinal truss members, a motor, means for applying the power of the motor to drive the craft, and a unitary structure or frame work, supporting said motor within said hull and adapted to sustain and internally distribute the driving stresses, together with means for connecting said frame and hull.

6. In a high speed craft and in combination, a hull or body, a motor, and a propeller, and a unitary structure or frame work separate from the hull and carrying said propeller and also suitably spaced gliding plates, said frame work being adapted to sustain and internally distribute the motive stresses, together with means for connecting said frame and hull.

7. In a high speed craft and in combination, a hull or body, a motor, and a propeller, and a unitary structure or frame work, supporting said motor within said hull and adapted to sustain and internally distribute the motive stresses, together with means for connecting said frame and hull.

8. In a high speed craft, adapted for support by deflecting surfaces, and in combination, a body, suitably distributed deflecting surfaces, a motor, means for applying the power of the motor to drive the craft, and a unitary structure or frame work, supporting said deflecting surfaces in operative relation to the fluid medium and carrying said motor, and adapted to sustain and internally

distribute the stresses thereof, together with means for connecting said frame and body.

9. In a high speed craft, adapted for support by deflecting surfaces, and in combination, a hull or body, formed with longitudinal truss members, suitably distributed deflecting surfaces, a motor, means for applying the power of the motor to drive the craft, and a unitary structure or frame work, supporting said deflecting surfaces in operative relation to the water and carrying said motor, and adapted to sustain and internally distribute the gliding and driving stresses thereof, together with means for connecting said frame and hull.

10. In a high speed craft, adapted for support by deflecting surfaces, and in combination, a hull or body, formed with longitudinal truss members, suitably distributed deflecting surfaces, a motor means for applying the power of the motor to drive the craft, and a unitary structure or frame work, supporting said deflecting surfaces in operative relation to the water and carrying said motor within said hull, adapted to sustain and internally distribute the motive stresses thereof, together with means for connecting said frame and hull.

11. A light high speed hull, comprising ribs, skin, and trusses, the upper members of said trusses forming the coaming of the cock-pit, in combination with gliding plates.

12. A light high speed hull comprising ribs, skin, and trusses securing the bottom of the hull to the deck or wash boards, the upper members of said trusses forming the coaming of the cock-pit, in combination with gliding plates arranged fore and aft.

13. A light high speed hull comprising ribs, skin, and longitudinal trusses extending substantially the entire length of the hull, the upper members of said trusses forming the coaming of the cock-pit, in combination with gliding plates.

14. In a high speed craft, adapted for support by deflecting surfaces, and in combination, a hull or body, a motor, a propeller, suitably distributed deflecting surfaces, and a unitary structure or frame work, supporting said motor within said hull and adapted to sustain and internally distribute the deflecting, propelling, and motor stresses, together with means for connecting said frame and hull.

15. In a high speed craft adapted for support by deflecting surfaces, and in combination, a hull or body, suitably distributed deflecting surfaces, means for driving the craft, and a unitary structure or frame work, supporting the latter and supporting said deflecting surfaces in operative relation to a fluid supporting medium and adapted to sustain and internally distribute the stresses thereof, together with means for connecting said frame and hull.

16. In a high speed craft adapted for support by deflecting surfaces, and in combination, a hull or body, suitably distributed deflecting surfaces, a motor, a propeller, and a unitary structure or frame work, supporting said motor and supporting said deflecting surfaces and said propeller in operative relation to the water, and adapted to sustain and internally distribute the stresses thereof, together with means for connecting said frame and hull.

17. In a high speed craft, adapted for support by deflecting surfaces, and in combination, suitably distributed deflecting surfaces, a motor, means for applying the power of the motor to drive the craft, and a unitary structure or frame work supporting said deflecting surfaces in operative relation to the fluid medium and carrying said motor, and adapted to sustain and internally distribute the gliding and driving stresses.

18. In a high speed craft, adapted for support by deflecting surfaces, and in combination, suitably distributed deflecting surfaces, a motor, a propeller, and a unitary structure or frame work, carrying said motor and supporting said deflecting surfaces and said propeller in operative relation to the water, and adapted to sustain and internally distribute the gliding and driving stresses thereof.

19. In a high speed craft, adapted for support by deflecting surfaces, and in combination, suitably distributed deflecting surfaces, a motor, a propeller, and a unitary structure or frame work, supporting said motor above the water and supporting said propeller and said deflecting surfaces in operative relation to the water, and adapted to sustain and internally distribute the motive stresses thereof, said structure or frame work being formed of tubes.

20. In a high speed craft, adapted for support by deflecting surfaces, and in combination, suitably distributed deflecting surfaces, a motor, a propeller, and a unitary structure or frame work, supporting said motor above the water and supporting said propeller and said deflecting surfaces in operative relation to the water, and adapted to sustain and internally distribute the motive stresses thereof, said structure or frame work being formed of tubes stiffened by suitably arranged transverse struts and longitudinal tension members.

21. In a high speed craft adapted for support by deflecting surfaces, and in combination, a hull or body, suitably distributed deflecting surfaces, a motor, a propeller, and a unitary structure or frame work, supporting said deflecting surfaces and said propeller in operative relation to the water, and carrying said motor upon a drop frame extending into the hull cavity, but not engaging the hull, said frame being adapted to

sustain and internally distribute the stresses thereof, together with means for connecting said frame and hull.

22. In a high speed craft, adapted for support by deflecting surfaces, and in combination, a hull or body, a motor, a propeller, suitably distributed deflecting surfaces, and a unitary structure or frame work, carrying said motor upon a drop frame extending into the hull cavity, but not engaging the hull, said frame being adapted to sustain and internally distribute the deflecting, propelling, and motor stresses, together with means for connecting said frame and hull.

23. In a high speed craft, adapted for support by deflecting surfaces, and in combination, a hull or body, a motor, a propeller, suitably distributed deflecting surfaces, and a unitary structure or frame work, supporting said motor upon a drop frame within said hull, said frame being adapted to sustain and internally distribute the deflecting, propelling, and motor stresses, together with means for connecting said frame and hull.

24. A high speed craft provided with supporting surfaces adapted to deflect the water downwardly, said surfaces being suitably distributed and symmetrically arranged with the lowermost surfaces farthest from the longitudinal vertical plane of the craft.

25. A high speed craft provided with supporting surfaces adapted to deflect the water downwardly, said surfaces being suitably distributed and symmetrically arranged with the lowermost surfaces farthest from the longitudinal vertical plane of the craft, and other deflecting surfaces nearer said plane and at progressively higher levels.

26. A high speed craft provided with supporting surfaces adapted to deflect the water downwardly, said surfaces being suitably distributed and symmetrically arranged with the lowermost surfaces farthest from the longitudinal vertical plane of the craft, and other deflecting surfaces of progressively greater lifting effect, distributed at progressively higher levels and extending progressively nearer said plane.

27. In a high speed craft adapted to be supported by deflecting surfaces when at high speed and by a float at lower speed, having in combination a hull or body to float upon the water at low speeds, suitably distributed deflecting surfaces, a motor, a propeller, and a unitary structure or frame-work supporting said motor, said deflecting surfaces, and said propeller in operative relation to a fluid supporting medium and adapted to sustain and internally distribute the stresses thereof.

28. In a high speed craft adapted to be supported by deflecting surfaces when at high speed and by a float at lower speed, having in combination a hull or body to float upon the water at low speeds, suitably distributed deflecting surfaces, a motor, a propeller, and a unitary structure or frame-work supporting said motor, said deflecting surfaces, and said propeller in operative relation to a fluid supporting medium and adapted to sustain and internally distribute the stresses thereof, together with means for connecting said frame and hull.

Signed at New York city in the county of New York and State of New York this 8th day of October A. D. 1906.

PETER COOPER HEWITT.

Witnesses:

ANITA BURKE,

IRVING M. OBRIEGHT.