

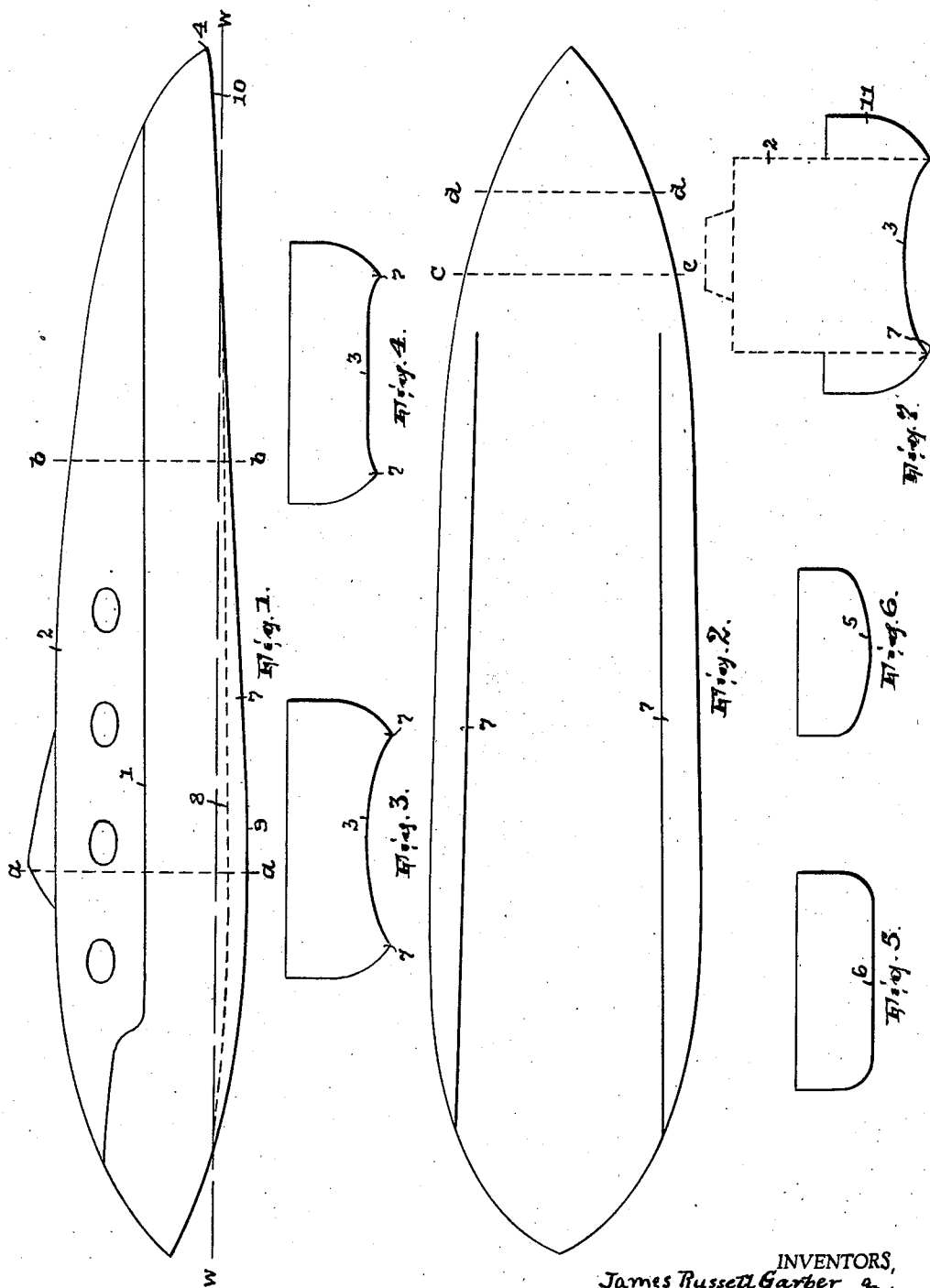
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WATERCRAFT

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## WATERCRAFT

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This invention relates to boats and other surface watercraft and it contemplates a watercraft, particularly of the power-driven class, which will have considerable superiority over known power-driven craft in respect to speed and in respect also to maneuverability at whatever speed the craft is driven. It also contemplates that the craft, in the preferred form, shall be of good stability and buoyancy and also have shallow draft so that it will be adapted not only to traverse shallow waters but to be readily run up on a beach and as readily withdrawn therefrom. So characterized the craft will be especially useful for naval and for troop and armament transport purposes, as a torpedo boat, submarine-chasing and bombing craft, or for mine-laying operations without essential structural change to adapt it to any of these uses.

That the craft herein set forth, as practice has shown, has these qualities of primary importance—to wit, superior speed and also maneuverability at whatever speed it may be driven—we attribute primarily to the following structural conditions:

The major portion of its bottom aft from approximately the bow end presents in any transverse section from near one to near the other side of the bottom a generally concave profile, whereas the portion of the bottom aft of the first-named portion and extending to the stern end thereof presents in any transverse section from side to side of the bottom a generally convex profile, such portions, viewing the bottom in substantially any section lengthwise of the craft, merging into each other without substantial diversion and throughout the width of the concave portion whereby the parts of said bottom which flank the space of the concavity of said major portion at both sides thereof form depending keels gradually reducing aftward in depth.

The superior speed attainable by the craft is due to the circumstance that the concavity provides for admission of air under the craft whereby to reduce the water-drag, whereas the defined convexity provides for the complete and easy escape of such air, not only directly but more or less laterally, so that there is a fanning-out or dispersion of the escaping air as is evident from the fact that the wake is exceedingly quiet, even at the maximum speed.

As for the superior maneuverability, that is attributed to the fact that whereas the keels are present at the forward and absent at the aft part of the craft, or where its bottom is convex, thus opposing side-slip at the forward and

permitting it at the aft part, the convexity as to the latter part invites side-slip thereon changing the course to starboard or port, the craft pivoting readily around a relatively forward axis.

Preferably, viewing the craft in any section thereof extending lengthwise of and between the keels, the profile of its bottom is generally convex and has the peak of such convexity between the vertical mid-ship plane of the craft and the water-line at the bow. This description is also true of the craft as viewed in side elevation, or having regard to the profile of the keels.

Further, the above-indicated second-named portion of the bottom of the craft preferably reaches and has the indicated convexity of its profile reaching aftward and above the water-line.

In the drawing the views of the examples shown are all mainly profile views,

Fig. 1 being a side elevation;

Fig. 2 an underneath plan;

Figs. 3 and 4 sections on lines *a-a* and *b-b*, respectively, in Fig. 1, and Figs. 5 and 6 sections on lines *c-c* and *d-d*, respectively, in Fig. 2;

Fig. 7 a section in the same plane as Fig. 3 but showing a modification.

All that appears above the line *l* in Fig. 1 is a cabin super-structure 2, which may or may not be present. We are herein concerned with the form of that part of the body of the craft which constitutes the hull, or so much as is below the line *l*.

From approximately the bow end of the craft aftward throughout the major portion of the bottom of the craft, or here nearly to the line *c-c*, said bottom presents in any transverse section from near one to near the other side thereof a generally concave profile, as at 3 in Figs. 3 and 4; but the portion of the bottom aft of the first-named portion and extending to the stern end 4 thereof presents in any transverse section from side to side of the bottom a generally convex profile, as at 5 in Fig. 6. The two such portions merge into each other without substantial diversion and throughout the width of the major or concave portion, as at line *c-c* in Fig. 2 (or it may be a narrow zone cut by line *c-c*), where the profile 6 exists straight, wherefore parts 7 left flanking the concavity of said major portion of the bottom form depending chines or keels which gradually reduce aftward in depth, i. e., to substantially nil, as at line *c-c*.

Preferably and as herein shown, viewing the craft in any section lengthwise thereof and between the keels, the profile of the bottom of the

craft is generally convex (see dotted line 8, Fig. 1, which defines the bottom profile of the central or axial section of the craft) and has the peak of such convexity between the vertical mid-ship transverse plane of the craft and the water-line at the bow. This is also true of the bottom of the craft as the latter is viewed in side elevation, or having regard to the profile 9 of the keels, whose peaks are also between said vertical mid-ship transverse plane and the water-line at the bow. But the convexity of the profile of the keels is more abrupt or pronounced than that of the profile of the bottom between the keels, the keels being gradually reduced in depth to substantially nil as well at their bow as at their stern ends.

In the preferred form the bottom extends past the water-line at the stern, as at 10, Fig. 1, and will be understood to present a convex profile in substantially any transverse section from side to side of the bottom and existing aft of the water-line.

Having regard to the structural features so far described the craft will have superior speed and maneuverability for the reasons hereinbefore pointed out.

The qualities of stability and buoyancy and adaptability for traversing shallow waters and for beach-landing operations may be attained by constructing the craft in the proportions as to depth and length and beam dimensions substantially as shown, in which regard we note that its maximum beam dimension is preferably approximately coincident with line *a-a*, its sides then gradually converging to near the line *c-c*; in such case the concave portion of the bottom tapers and the keels converge aftward correspondingly.

The reason for extending the bottom past the water-line at the stern, being formed convex in substantially any transverse section thereof, is to provide for the complete and easy escape, in the way hereinbefore set forth, of the air which is interposed between the craft and the surface of the water when the craft undergoes more or less planing according to its speed.

It has been indicated that the keels gradually reduce afterward as an incident of the transversely concave and convex portions of the craft, viewing the bottom in substantially any lengthwise section, merging into each other without substantial diversion and throughout the width of the concave portion. This must obviously follow if any profile of the convex portion extends from side to side of the bottom whereas

any profile of the concave portion extends from near one to near the other side of the bottom.

We do not wish to be necessarily limited to the concavity extending forward above the water-line or the convexity extending aft above the water-line when the craft is at rest, though preferably at least the latter condition will be present.

The craft may have its cabin super-structure 2, if present, narrower than the hull (Fig. 7) thus to provide pontoons 11 affording storage spaces and at their upper surfaces platforms or catwalks.

Having thus fully described our invention, what we claim is:

1. A surface water-craft having the major portion of its bottom aft from approximately the bow end presenting in any transverse section from near one to near the other side of the bottom a generally concave profile and the portion of said bottom aft of the first-named portion and extending to the stern end thereof presenting in any transverse section from side to side of the bottom a generally convex profile, such portions, viewing the bottom in substantially any section lengthwise of the craft, merging into each other without substantial diversion and throughout the width of the concave portion, whereby the parts of said bottom which flank the space of the concavity of said major portion at both sides thereof form depending keels gradually reducing aftward in depth.

2. The water-craft set forth in claim 1 characterized by the profile of said bottom, viewing any section thereof extending lengthwise of and between the keels, being generally convex and having the peak of such convexity between the vertical mid-ship plane of the craft and the water-line at the bow.

3. The water-craft set forth in claim 1 characterized by the profile of said bottom, viewing the same in side elevation, being generally convex and having the peak of such convexity between the vertical mid-ship plane of the craft and the water-line at the bow.

4. The water-craft set forth in claim 1 characterized by said bottom extending past the water-line at the stern and presenting a convex profile in substantially any transverse section from side to side of the bottom and existing aft of such water-line.

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