

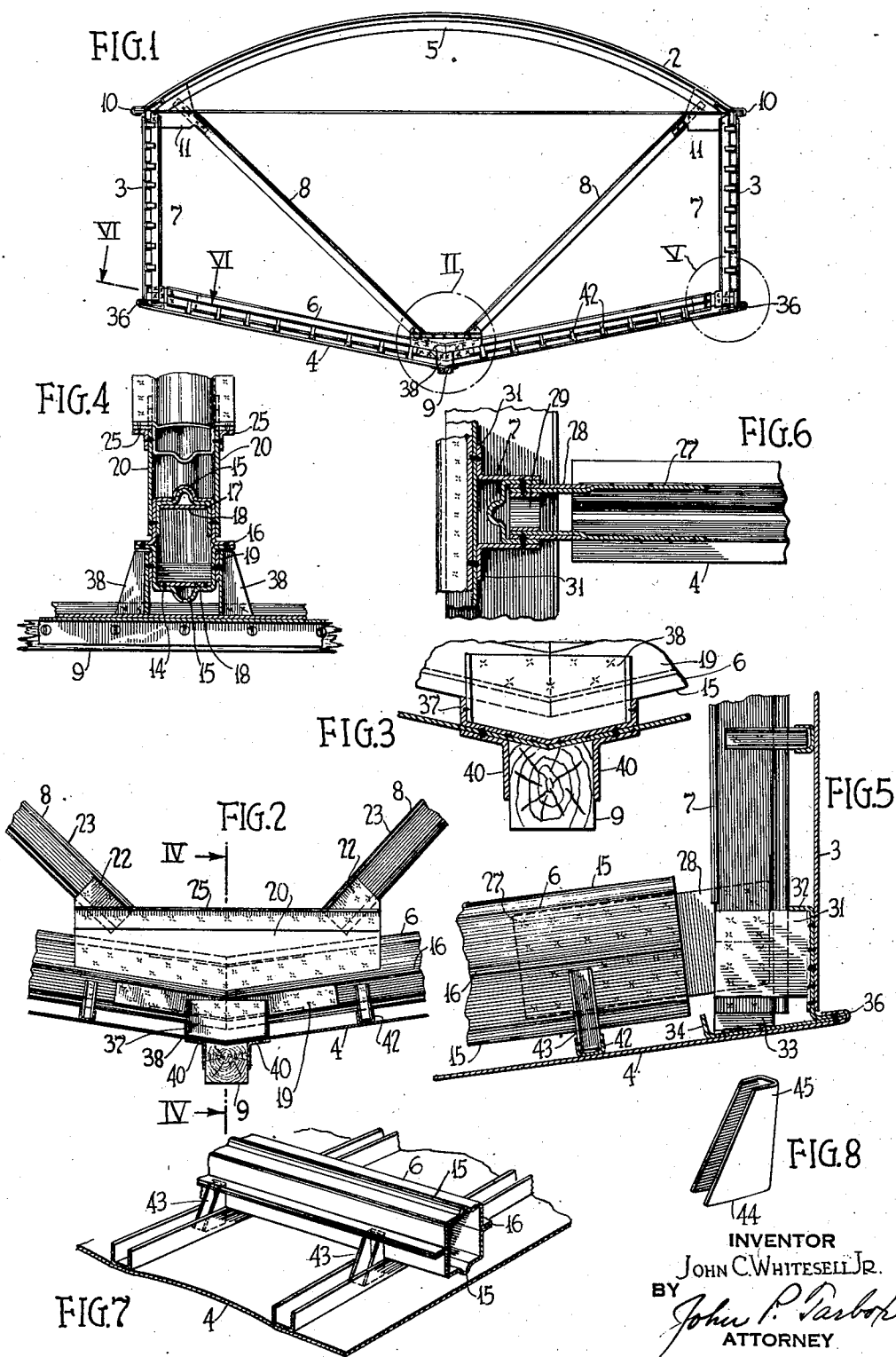
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BOAT HULL

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BOAT HULL

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My invention relates to boat hulls and particularly to hulls for stream-line flying boats.

Objects of my invention include reducing wind and water resistance of hulls, reducing the weight and increasing the strength thereof, and providing a structure that shall be simple and durable in construction, economical to manufacture and effective in its operation.

More specifically, an object of the invention is to provide a boat hull that shall be constructed substantially entirely of metal and adapted to facilitate spot welding the parts to each other.

In a speed boat of the stream-line type, it is important to reduce wind and water resistance to a minimum, and to have the hull strong, of light weight and otherwise effective for its purpose.

My invention provides features useful in the improvement of such boats but it primarily relates to the provision of a flying boat which, when in the water, obtains the advantages of my invention therefor, and in addition, is particularly adapted for effective cooperation with the other parts of an amphibian airplane.

In other words, although adapted for use as a purely water-surface vessel, it must, in turn, support and be supported by the other parts, such as the airfoils, engine etc., of a flying structure.

It should be of the least possible weight, consistent with proper strength, and internally braced, not only, against the forces incident to its use as an ordinary boat but also those in effect when it is suspended in the air and when it is supporting the other parts from beneath.

To the above ends, the device is constructed almost exclusively of thin-gauge stainless sheet steel, the parts of which are so contoured and inter-related as to provide a structure of substantially maximum strength and minimum weight. The parts are also formed with a particular view to the employment of spot welding, to eliminate weight in the form of nuts, bolts, screws, etc. and for economy and facility of assembly.

The device is therefore proof against rust and a homogeneously integral unit of great endurance and reliability.

A particular feature resides in a structure wherein the outer sheathing is flexible and supported only by laterally-spaced fore-and-aft members. The sheathing, being of standard flat stock, yields transversely of the supporting members to form longitudinal or fore-and-aft channels, whereby the resistance of wind and water is substantially reduced.

Other features of novelty reside in particular detail structural parts in their relation to the weight, strength, force and spot-welding features above pointed out.

The primary features of advantage and others

incident to a utilization of the improvement will be apparent from the accompanying drawing in which,

Figure 1 is a view, in transverse section, of a boat hull or body constructed in accordance with my invention,

Figure 2 is an enlarged detail view of the structure shown in the broken-line circle II of Fig. 1,

Figure 3 is a further enlarged view of a portion of the device, as shown in Fig. 2,

Figure 4 is a view, taken along the line IV—IV of Fig. 2,

Figure 5 is an enlarged detail view of the structure shown in the broken-line circle V of Fig. 1,

Figure 6 is an enlarged detail view taken along the line VI—VI of Fig. 1,

Figure 7 is a detail perspective view of a portion of the hull bottom, and

Figure 8 is an enlarged detail perspective view of a gusset employed in, and constituting part of, the invention.

Referring to the drawing, the structure comprises, in general, a top sheathing 2, side-wall sheathings 3, bottom sheathing 4, a top-supporting arch-beam 5, a transverse frame including bottom and side upright portions 6 and 7, respectively, diagonal beams 8 and a keel 9. All of these parts, except the keel 9 which is constructed of wood, are preferably of thin-gauge stainless sheet steel.

The top sheathing 2 is secured in water-tight relation to the side sheathing 3 by having its longitudinal edges 10 crimped about, and welded to, longitudinal edge stringers which, with other features at the upper part of the structure of Fig. 1, are the subject of another application and need not be described in detail herein. This is also true of the particular attachment of the diagonal beams 8 to the top part of the body, as by gussets 11 and other elements.

The bottom transverse frame 6 comprises longitudinal half portions of hollow or box-section converging from positions adjacent to the bottoms of the side walls to a position adjacent to the keel to provide V-bottoms and having complementary top and bottom main channel-sections 12 and 14, respectively. These sections are each provided with integral longitudinal auxiliary reinforcing channel sub-sections 15 pressed therefrom and adjacent spot-welded transverse flanges 16. Relatively short members 17 of main and reinforcing channel section, conforming to the sections 12, 14 and 15, and short plates 18 and 19 are spot welded in side surface engagement with the transverse frame between points at substantial distances oppositely from the apex of the angle formed by the elongated half portions of the frame 6 adjacent to the keel.

The diagonal beams 8 are also, of hollow or box section and converge from the side-wall gus-

sets 11 toward a point below the center of the top edge of the bottom transverse frame portions 6 but, since the lower ends of the diagonal beams are above, and adjacent to, the transverse frame portions 6, they are spaced transversely a substantial distance along these portions at opposite sides of the center thereof.

A pair of one-piece flat-plate gussets 20 bridge the lower ends of the diagonals 8 and are spot welded to the transverse beam portion 6 in side surface engagement therewith; the gussets 20 having lower edges conforming to the flanges 16 and small upper web extensions 22 spot welded to, and fitting, the flat sides, and conforming to flanges 23, of the diagonals 8. Elements 25 of L-section are spot welded to the gussets 20 and have transverse top flanges disposed under, and substantially constituting extensions of, the flanges 23. This structure provides reinforcement against stresses in all directions and is a feature of particular strength and light weight, besides rendering all of its spot welded parts readily accessible.

As shown more clearly in Figs. 4 and 5, the box-section transverse frame uprights 7 each have a side opening opposite an end opening of the bottom frame portions 6. Plates 27 are spot welded to the inner sides of the side frame portions 6 and 7 and are reinforced by plates 28 where they bridge a space between the portions 6 and 7. They are further reinforced, in the portion 7, by transverse members 29.

In the above described structure, certain of the spot welding is done before placing the covers on the box section 7, whereby to facilitate placing the electrodes.

Angle braces 31, edge stringers 32 of Z-section, end pieces 33 and edge stringers 34 of L-section complete the outer corner or edge structure; the bottom sheathing 4 having a crimp 36 about portions of the stringers 33 and 34, and an inner flange of the stringer 34 constituting a brace for the side frame portion 7.

In the structure, as better shown in Fig. 5, the members 31 and 33 substantially constitute extensions of the beams 6 and 7, respectively, at their intersection, to secure them to the bottom and side walls in conformity thereto.

Also, in this structure the edge stringers 32 and 34 render the walls 3 and 4, respectively, of double or multi-layer thickness for substantial distances transversely on the walls from the edge.

Adjacent to the keel, the transverse frame portions 6 are supported by keelson 37 of channel section and gussets 38 in the channel which extend transversely on the bottom sheathing 4 to positions above keel members 40 of L-section; this arrangement providing a solid backing for the keel and for the L-section arms extending therefrom along the bottom sheathing. The vertical arm or flanges of the L-section members 40 provide a channel for the reception of the keel 9. Transversely between the gussets 38 and the edge stringers 34, the bottom sheathing is supported only on longitudinal stringers 42 of channel section and disposed substantial distances apart.

Being spaced from the transverse frame portions 6, mounted only on longitudinal members and of sufficient flexibility, the sheathing 4 flexes laterally, or bows upwardly, between the longitudinal supports, under the reacting pressure of the water, to form longitudinal relatively shallow channels in the outer surface of the hull bottom.

This feature substantially reduces resistance to

the forward motion of the hull and cushions the hull against shocks.

The transverse frame is supported on the stringer channels 42 by simple one-piece sheet metal gussets 43 consisting of flat sheet-metal stampings bent to channel shape and each having sloping side edges; the construction providing the gusset with a deep-channel end and a shallow channel end 45.

This arrangement provides substantial side surface area adjacent to the deep end 44 for spot welding to the sides of the channel stringers 42 and facilitates spot welding the bottom wall of the gusset, adjacent to the shallow end, to the transverse frame 6. The uprights 7 are similarly mounted on longitudinal side stringers 42 of channel section and braced by gussets 43.

The side and bottom sheathing 3 and 4, as described above, whereby the reacting pressure of water on the sheathing 4 causes the latter to form longitudinal channels, may also be adapted to flex to a slight degree under air resistance during the forward drive of the hull.

While I have shown and described a particular form of my invention, changes may be effected therein without departing from the spirit and scope thereof, as set forth in the appended claims.

What I claim is:

1. A boat hull comprising side and bottom walls including longitudinal sheet metal edge stringers secured together in their outer margins, a transverse sheet metal frame including intersection supporting beams for said walls, respectively, in spaced relation to said stringers, connecting means between the edge stringers and the frame and substantially constituting extensions of the beams outwardly from the intersection thereof, and inwardly-extending flanges on said stringers embracing said extensions.

2. A boat hull comprising side and bottom sheet metal sheathing sections and side and bottom sheet metal edge stringers interiorly of the sheathing and connected thereto and to each other to render said walls of multi-layer thickness along the edge for substantial distances upwardly therefrom on the side wall and inwardly therefrom on the bottom wall, at least one of said side and bottom sheathing sections being crimped over the joined edges of the stringers to form a reinforced chine structure.

3. In combination, an elongated element of channel section, a member of hollow section extending transversely over the open side thereof, and a gusset of tapering side wall channel section disposed with its deeper-end side walls between, and spot welded to, the side walls of said element and its shallow-end bottom wall against, and spot welded to, said member.

4. In combination, sheet metal members overlying and crossing each other, one of which is of channel section, and a sheet metal gusset of channel section varying in depth from end to end having the sides of its deeper end inside and spot welded to the sides of said channel member and its bottom at an angle to the bottom of said first-named channel member and at its shallow end spot welded to the other of said members.

5. In combination, a member of channel section, a second member of channel section crossing said first member over the open side thereof and having flanges normal to its sides, and oppositely facing gussets of channel section in said first member, each having sides welded to the

sides thereof and projecting therefrom with its outer end against one of said flanges and its bottom welded to said second member.

6. A boat hull comprising an inner longitudinal bottom center beam of top opening channel section, a transverse beam crossing said beam thereabove, sheet metal gussets in the channel beam at opposite sides of the transverse beam each having sides welded to the sides of the channel and a bottom projecting therefrom and welded to the side of the transverse beam, a sheathing beneath the channel beam, elements of angle section having diverging arms welded to the channel beam through the sheathing and depending arms forming a keel channel, and a keel secured to said depending arms in the channel thereof.

7. A boat hull comprising an upright side beam of inwardly-opening channel section, a transversely extending bottom beam of hollow section in the same transverse plane as the upright beam having an end spaced therefrom, gussets inside of the beams joining adjacent ends thereof, side and bottom sheathings spaced from said beams, and gussets outside of the beams securing the sheathings thereto, said outside gussets extending longitudinally of the hull for edge reinforcement thereof.

8. A boat hull comprising side and bottom sheet metal frame members, a sheet metal skin supported thereby, a longitudinal beam interiorly of the skin and connected to the skin, said bottom frame members overlying said longitudinal beam, and a joint between the beam and the central portion of said bottom frame members including sheet metal elements in lap welded relation to adjacent end portions of said frame members and longitudinal beam, respectively.

9. A boat hull comprising side and bottom sheathing walls, longitudinal side and bottom edge stringers interiorly of said walls secured together in their outer margins, a transverse sheet metal frame including intersecting supporting beams for said walls and stringers, which beams are in spaced relation to both said walls and said stringers at the intersection, connecting means between said walls and said beams removed from the intersection, and connecting means directly between said edge stringers and the frame at said intersection, which connecting means bridge the space between the beams and the stringers at the intersection and constitute extensions of the beams beyond the intersection.

10. In a hollow body construction, a sheet metal sheathing, a longitudinal stringer element of channel section spot welded thereto, a frame element extending transversely to the channel, and a gusset element disposed in, and having its side walls spot welded to, said channel element and having its bottom wall projecting from the channel element and spot welded to said transverse frame element.

11. A boat hull comprising, longitudinal and transverse frame members of channel section and extending at an angle to each other, the said frame members overlying each other without inter-section sheathing supported by said frame members, and channel-shaped interconnecting members having branches of their channel section spot welded to branches of the channel section

tion of one of the frame members on opposite sides of the overlap of the frame members.

12. A boat hull comprising, longitudinal and transverse frame members of channel cross section and extending at an angle to each other, said frame members overlying each other without inter-section, bottom sheathing carried by said frame members and channel shaped interconnecting members having the bottoms of their channel cross sections and the sides thereof spot welded respectively to the sides of the channel cross sections of the frame members, said interconnecting members extending across the longitudinal center line of the bottom sheathing.

13. A boat hull comprising, a keel, longitudinal and transverse frame members of channel section and extending at an angle to each other, the said frame members overlying each other without inter-section, said transverse frame members being discontinuous and interconnecting members of channel section having the respective branches of their channel spot welded to branches of the channel of the frame members, said channel section interconnecting member abutting adjacent ends of the transverse frame members to join the respective ends and overlying the other frame member a distance approximately equal to the width of the keel and its supports.

14. A boat hull comprising, longitudinal and transverse frame members and frame interconnecting members, each member being of channel cross section and extending at an angle to the other two, the said frame members overlying each other without inter-section, said interconnecting member having the respective branches of its channel cross section spot welded to branches of the channel cross section of the frame members, together with a keel member of angle cross section paralleling one of said frame members and having one branch of its angle cross section spot welded to one branch of the parallel frame member.

15. A boat hull comprising a keel, longitudinal and transverse frame members supporting an outside sheathing and interconnecting members between said frame members, said frame and interconnecting members being of channel cross section and each extending at an angle to the other two, the said frame members overlying each other without inter-section, the said interconnecting members having the bottoms of their channel cross sections and the sides thereof spot welded respectively to the sides of the channel cross sections of the frame members, one of said frame members having a joint bridged and secured by said interconnecting member, said interconnecting members being spaced longitudinally of and immediately above the keel to reinforce the frame members adjacent said keel.

16. A boat hull comprising sheet metal bottom sheathing extending continuously from side to side, a transverse frame spaced from said sheathing, a wood keel associated with the outside of the bottom of the metal sheathing, an inner longitudinal sheet metal member of channel section having the channel opening upwardly in said space and an angle section sheet metal keel carrying structure spot welded to the sheathing and to the inner longitudinal member.

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