

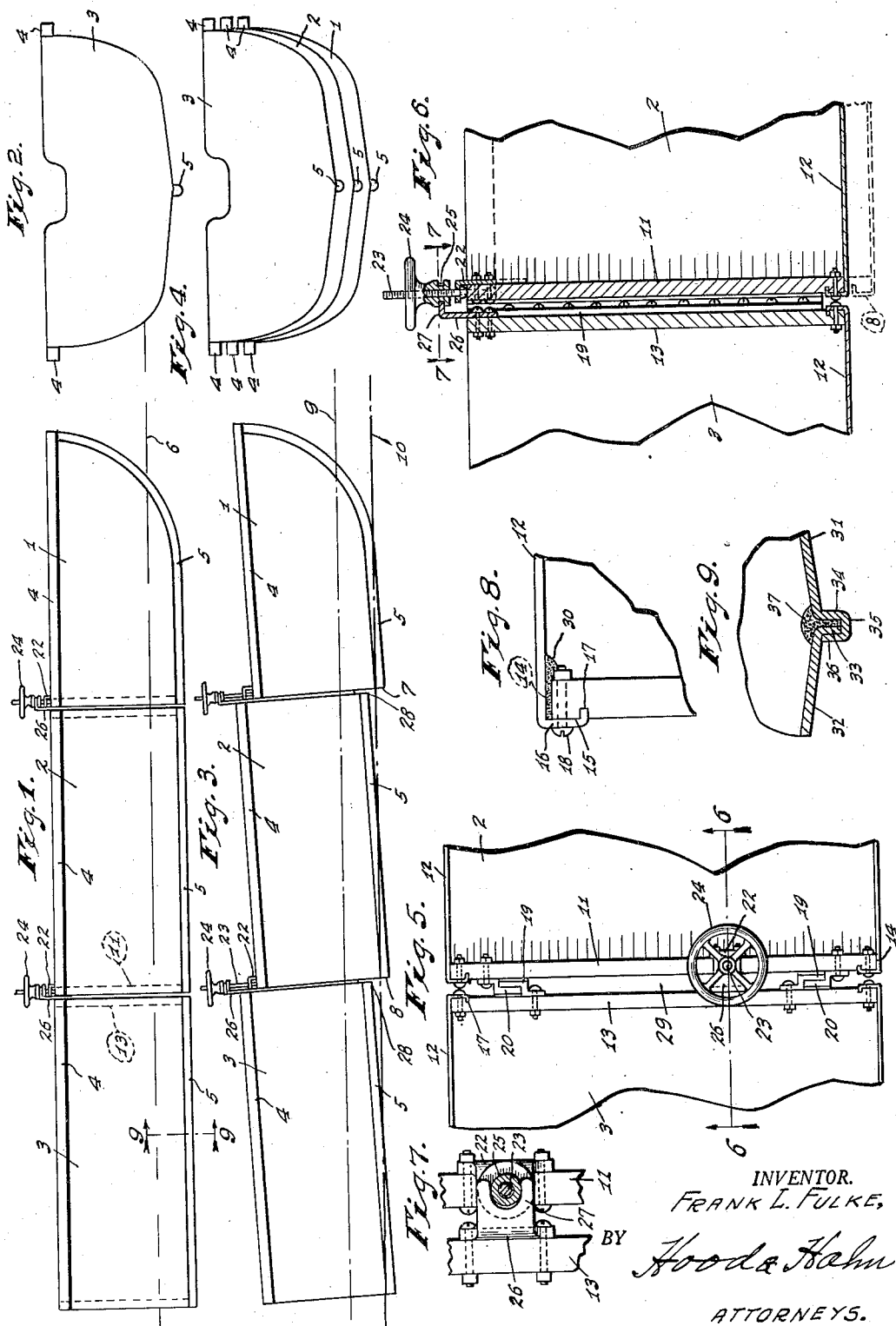
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ADJUSTABLE SECTIONAL BOAT

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ADJUSTABLE SECTIONAL BOAT

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The object of this invention is to provide a small boat composed of a plurality of separably connected sections, each being an independent water tight unit. A prime specific objective is to provide means whereby adjustment may conveniently be made at any time and under any circumstances in the relative planes of the bottoms of the several sections.

Other objects of the invention will appear as the description proceeds.

To the accomplishment of the above and related objects, my invention may be embodied in the forms illustrated in the accompanying drawing, attention being called to the fact, however, that the drawing is illustrative only, and that change may be made in the specific constructions illustrated and described, so long as the scope of the appended claims is not violated.

In the accompanying drawings:

Fig. 1 is a side elevation of my boat;

Fig. 2 is a rear end view thereof;

Fig. 3 is a side view of the same boat after a change has been made in the relative planes of the bottoms of the several sections of the boat;

Fig. 4 is a rear elevation of the boat so adjusted, but with the bottoms of the sections held in horizontal positions;

Fig. 5 is a fragmental top plan view of the boat at a joint between two sections thereof, showing how a sheet aluminum wrapper and transverse wooden bulkheads are employed to form an independent boat section, and showing how the sections are adjustably connected;

Fig. 6 is a fragmental vertical section taken on the line 6—6 of Fig. 5;

Fig. 7 is an enlarged fragmental section taken substantially on the line 7—7 of Fig. 6 and looking in the direction of the arrows;

Fig. 8 is an enlarged fragmental plan taken in the plane of Fig. 5; and

Fig. 9 is an enlarged section taken in a plane like that indicated by the line 9—9 in Fig. 1, and showing an alternative wrapper structure.

There is general need for a small sectional boat that lends itself to ease of transportation, as for example carrying it upon the roof of a car, or in the car, or on the bumper of the car, or shipping it in a light plywood container. Therefore my boat is made so that its independent sections may fit into each other, much like a stack of bowls, whereby a 12 foot boat may be made to occupy a volume not greatly exceeding that of one of its sections.

The weight of the boat is also a prime consideration if it is to be readily transportable and

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capable of considerable speed. Therefore I propose to make my boat as light as possible, yet as sturdy and rigid as heavier boats made in one piece.

To accomplish these objectives, each section of my boat comprises an aluminum wrapper and a pair of wooden ends, except that the front section will have only a rear wooden end and a formed front bow end.

In the drawings, 1 is a front boat section, 2 is a middle section and 3 is a rear section. Each of these sections is an independent water-tight unit, each having gunwales 4, and a keel 5.

In Figs. 1 and 2 the bottoms of the three sections are in the same plane, so the boat is a smooth bottom boat without steps, best adaptable for moderate speed with considerable load with a small outboard motor clamped to its stern, or to be rowed with oars, and broken line 6 would represent the water line under such conditions.

In Figs. 3 and 4 the rearward end of front section 1 is displaced below the forward end of middle section 2, so that step 7 is defined; and the rearward end of section 2 is similarly displaced below the forward end of the stern section 3, so that step 8 is defined. In Fig. 3 broken line 9 would represent the water line while the boat is stationary in the water and broken line 10 would represent the water line if the boat were at full speed with a light load, pushed by a high speed motor of considerable power. In this position the bottom of the boat is "planing" and very little of it actually engages the water. Only a slight area forward of the step of each section engages the water, much in the manner of running and skipping over the top of the water. The higher the boat lifts or planes the less of its bottom will engage the water and the less actual shoving of water out of its way will the boat have to do as it moves rapidly forward, and the propeller slippage will decrease as the boat speed increases.

My boat as illustrated in Figs. 1 and 2 and carrying six people may have a 20 H. P. motor and a propeller of 12" pitch and the motor may turn it 3,000 R. P. M. But it may be found under those conditions that the boat cannot be shoved through the water at greater than 1,000 feet per minute, or almost 12 miles per hour. In this case we would say the propeller slippage is 66% since the propeller could theoretically screw itself through 3,000 feet of water per minute if there were no slippage.

But my same boat illustrated in Figs. 3 and 4 carrying only its driver may, with the same motor and propeller, be found capable of running

and skipping over the water 2,700 feet per minute, or more than 30 miles an hour, in which case we would say there is only 10% propeller slippage.

A small smooth bottom boat carrying a heavy load will move faster through the water with less power and less propeller slippage than will a boat with steps, is safer and more easily steered.

The foregoing is, of course, understood by those skilled in the art. However, no two experts in the art would agree upon exactly how high step 7 and step 8 should be and they might disagree on whether one of the steps should be there. Given certain boat weight and dimensions, motor, propeller, a 175 pound driver and a 200 pound passenger, both experts might agree that if the passenger is sitting on the rear seat with the driver step 7 would give no benefit in boat speed and step 8 would best be quite high, for example, 4 inches. But let the 200 pound passenger move up to a forward seat and it is quite probable the experts would agree that step 7 would confer a benefit in speed. However, they could hardly be expected to agree that step 7 should be $1\frac{3}{8}$ " high and step 8 should be $2\frac{3}{4}$ " high under those conditions, to obtain the very fastest boat speed.

Now as to boat performance under any particular set of specific conditions there is just one correct answer but it could never be reliably calculated by any number of experts. The only way to find the correct answer is to equip the boat with a water-speed indicator and find some way to selectively vary the bottom of the boat, its steps and their height, and get out on the water, set the motor at full speed, and proceed to adjust the boat until the speed indicator shows highest boat speed. That, and only that, will give the correct answer.

A small boat is operated by its owner, under extremely varying sets of conditions. He may want to take 6 friends out for a ride and he will do a better job of this with a smooth bottom boat like my Fig. 1. But if he wants to drive alone 6 miles to town to get cigars, he can travel 30 miles an hour and have a lot more fun if his boat is like my Fig. 3. So far as I am aware, he would have to own at least two boats to be able to serve ordinary purposes for which such small boats are employed with any reasonable degree of efficiency. Even with one slow boat and one fast boat there would be no high degree of efficiency except in an extremely rare case in which all the conditions added up to exactly those for which the boat happened to be ideal. The conditions of load, available engine, available propeller, etc., are of such extreme variation that I consider it worth while to so contrive my boat that its owner may conveniently adjust it to meet every condition he will encounter in the use of his boat.

In Fig. 5 wooden bulkhead 11 is the rear end of my section 2, and similar bulkhead 13 is the front end of my section 3. These bulkheads are shaped to define the athwartships outline of the boat and give this shape to sheet metal wrapper 12 which forms the skin of the boat. This wrapper 12 is securely attached at its edges around the edge of bulkhead 11. My objectives being to make my boat as light as possible for convenient transportation in sections and to give fast speed, I will use plywood for bulkhead 11 and about 20 gauge sheet aluminum for wrapper 12. The use of such light materials to attain the objectives sought entails careful consideration of the way in which the bulkhead and wrapper are secured together. The sawed edge of a plywood panel must be protected against water seeping in be-

tween the sheet metal wrapper and its juncture with the plywood. This juncture might be conventionally secured by a line of closely spaced wood screws. But even if the screws were only an inch apart there is no assurance that a screw might not break off, work loose, or otherwise fail to securely hold the aluminum wrapper so tightly against the wood at every point, as to assure against water seeping into the plywood, which would in time cause it to badly deteriorate and permit separation of its laminated layers. Then I have to consider the unusual stresses to which such junction portions of my boat are subjected, not at all common to conventional small boats. I must guard against any possibility of rupture or breaking apart of its several sections, under smashing impacts as when the boat is tossed upward by one wave and then crashes down upon a succeeding wave, these stresses being extremely high if the boat is heavily loaded. Such shocks could tear out the aluminum sheet at conventional perforated screw holes, or it could shear the screws, preferably made of brass, to resist rusting away. It must be remembered that an ordinary full length boat having such a wrapper attached to a stern bulkhead only, cannot receive any stresses likely to tear the wrapper from the bulkhead, while stresses upon the juncture of my wrapper with its bulkhead can come from ahead and from behind at the same instant, and these can be severe twisting stresses, as when the boat crashes its left front portion down against an oncoming wave while its right rear portion is supported on another wave.

In recognition of these requirements I have so devised the juncture of my wrapper and its transverse wooden bulkhead, that it can safely meet all the requirements. In Fig. 8 it will be seen that my aluminum wrapper 12 lies across the sawed edge 14 (obscured by the sealing material 30) of the plywood bulkhead 11 and at the corner of the outer face 15 of bulkhead 11 the wrapper 12 deflects at a right angle so as to present a portion 16 of the wrapper lying against outer face 15 of bulkhead 11. A further right angle deflection of wrapper 12 presents an edge 17 of the wrapper parallel with edge 14 of the wooden bulkhead. It should be apparent that when wrapper 12 and bulkhead 11 are put together a simple application of pressure will cause edge 17 of the wrapper to bite itself into the wood, after which a few bolts 18 are affixed. Now it should also be apparent that bolts 18 and the holes in the aluminum wrapper 12 through which they pass cannot be subjected to the smashing impact stresses that will be encountered. Edge 17 of wrapper 12 bites into bulkhead 11 all around, so that to shear bolt 18 or tear the aluminum wrapper at the bolt hole, the entire continuous edge 17 of the wrapper must be torn, full length, and this is quite a different proposition from shearing a screw or tearing out at a screw hole. Also, since the edge 17 of wrapper 12 is at all points tightly imbedded into the face 15 of bulkhead 11 a perfect and permanent watertight seal is effected, so that no water can seep into sawed edge 14 of the plywood. This seal never requires caulking, nor can it ever open up. It may also be noted that this arrangement adds materially to the stiffness and rigidity of the juncture of metallic wrapper and wooden bulkhead, and will protect the bulkhead against any splitting or peeling of its layers. Before the wrapper 12 and the bulkhead 11 are assembled, a suitable cement, as liquid rubber cement, may

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first be brushed upon the sawed edge 14 and the outer edge of the bulkhead against which portion 16 of the wrapper is to lie, as an added safeguard against any moisture entering the wood; and after assembly, a seal of rubber cement or the like may be applied as at 30 to guard against seepage of spray or rain between the wrapper and the sawed edge of the bulkhead.

In Fig. 5, at each side of adjacent transverse bulkheads 11 and 13 which are the ends of adjacent boat sections, is shown a pair of vertical steel interlocked guide elements disposed in vertically slidable manner. On bulkhead 13 guides 19, 19 are suitably secured as by bolts, having flanges facing outward. On bulkhead 11 guides 20, 20 are fastened, having flanges facing inward. In this manner the adjacent boat sections are interlocked together in slidable manner, so that the plane of the bottom of one of the sections can be offset from the plane of the bottom of the other section. The steel guides extend vertically substantially from the lower edge to the upper edge of their respective transverse bulkheads, thereby securing all the strength and rigidity possible.

In Fig. 6 I have shown the wrappers 12 secured at the bottom edges of the rear transverse bulkhead 11 of boat section 2, and the front transverse bulkhead 13 of boat section 3. In the position shown in solid lines there is no offset in the planes occupied by the bottoms of these two boat sections, so the boat will function as a smooth bottom boat. One of the steel guides 19 just previously described is shown slidably interlocking boat sections 2 and 3 in a manner that will permit the bottom of section 2 to be downwardly displaced, so that its bottom will be lower than that of section 3, as shown in dotted lines, whereby a step 8 will be defined, and the height of this step may be any exact height desired from zero to four inches. All that is now needed to carry out my objective is mechanical means whereby the operator can, while the boat is moving, selectively vary the height of step 8 until he finds that the boat is going the fastest.

In Figs. 6 and 7, I have shown a bracket 22 fastened to bulkhead 11 and having welded thereto a vertical threaded rod 23. A handwheel 24 formed to provide a groove 25 is threaded upon rod 23. Bulkhead 13 has fastened to it a bracket 26 which has a lip 27 projecting into groove 25. When hand wheel 24 is turned counter-clockwise rod 23 must therefore move downwardly, having conventional right hand thread, therefore boat section 2 must move downwardly. By spinning handwheel 24 the boat operator may therefore readily move boat section 2 downwardly or upwardly, at will, and while the boat is in motion, and selectively position it at the point where the boat goes fastest. In this way he may readily transform the characteristics of his boat to make it meet, with highest efficiency, all the conditions of load, engine power, propeller, etc., involved at that particular moment. And every time there is some change in those conditions, as by a change in the load, he may quickly and conveniently alter the boat to make it again perform with highest efficiency under the changed conditions.

It should be noted that similar control devices as shown in Figs. 6 and 7 may be disposed to independently control further sections of the boat.

In the construction of step boats with which I am familiar the step defines sharp corners at

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the sides of the boat. In other words, looking at the boat from the side, the step resembles a gash clear across its bottom. There is no attempt to provide any step clearance at the side of the boat. Why not? For a considerable depth of water the side of the boat is in full frictional engagement with the water to just the same extent the bottom of a smooth bottom boat is. If a step on the bottom is desirable, why not a step or relief on the sides? The very distinct wakes left by the corners of the usual steps of a boat that is planing should be eliminated because they cost power and mean drag, and they are eliminated by my construction.

Upon a consideration of Fig. 4 it will be noted that when I displace one of my sections to define a step bottom, the step that is defined does not terminate squarely at corners of the boat bottom. There are no corners. The entire side of the boat below water level is provided with a step. The step height gradually merges from the full bottom step dimension to zero at about the gunwale of the boat.

In planing, a boat rises until only small areas of its bottom just ahead of the step and just ahead of its rear end frictionally engage the water, and a partial vacuum may form in the region 28 immediately behind the step. Air must adequately be pulled in from the sides, else the effect of this vacuum would be to pull the boat down into the water, in other words, resist its free planing upon the surface of the water. If air could be admitted directly from above and entirely across the width of the step, it would aid materially and in my construction this is provided for by the air space 29 existing between the adjacent sections of my boat, which will admit air directly above and to the rear of, and full length of the step.

In the structure thus far described, the keel will preferably be formed by wrapping the wrapper 12 about a wooden bar, or the like, suitably secured to the bulkheads. As an alternative construction, I have illustrated in Fig. 9 a keel produced by bending the adjacent edges of a two-part wrapper. Thus, instead of the wrapper 12, extending from gunwale to gunwale, I disclose in Fig. 9 a wrapper consisting of a section 31 extending from the starboard gunwale to the region of the keel, and a section 32 extending from the port gunwale to the region of the keel. The inner edge of the wrapper section 32 is bent straight downwardly as at 33, while the somewhat elongated inner edge of the section 31 is bent straight downwardly as at 34, substantially in contact with the portion 33 of the section 32, thence toward the port, as at 35, and thence upwardly as at 36 to embrace the portion 33 of the section 32. The thus-bent portions of the wrapper sections may be crimped together tightly enough to produce a rigid, water-tight seam; or they may be crimped and then spot welded or seam welded; or, as illustrated, a seal of rubber cement or similar material may be applied to the inner surface of the joint, as indicated at 37.

I claim as my invention:

1. In a small boat a plurality of independent water-tight sections slidably coupled together in tandem with means including a vertically positioned threaded element operable to effect relative movement of the adjacent ends of adjacent sections upon a vertical line.

2. In a small boat a plurality of independent water-tight sections slidably coupled together in tandem with selectively adjustable means com-

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prising coacting elements carried by adjacent sections and operable to effect relative movement of the adjacent ends of such sections upon a vertical line.

3. In a small boat a plurality of independent sections coupled together in tandem with mechanical means including interacting elements carried by said respective sections to offset the forward end of the bottom of one section vertically from the rearward end of the bottom of an adjacent section and to selectively vary the amount of said offset.

4. In a sectional small boat a section having a keel, a wrapper, a bulkhead, a pair of gunwales, means slidably interlocking said section with a further section whereby said first mentioned section may be displaced vertically relative to said further section, and means cooperating with the adjacent bulkheads of connected sections for selectively varying the amount of said displacement.

5. In a boat comprising independent water tight sections arranged in tandem, a forward section having a rear end bulkhead and a rearward section having a front end bulkhead, means including vertically extending cooperating guide means on said respective bulkheads, and threaded means operatively associated with said respective bulkheads and operative to vary the relative positions of said bulkheads vertically.

6. In a small boat, a plurality of independent water-tight sections, each having a bottom, a pair of gunwales, a forward closed end and a rearward closed end, cooperating adjusting elements carried by the forward closed end of one section

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and the rearward closed end of an adjacent section, said adjusting elements coacting to connect said sections together in tandem with the bottoms of both sections resting upon the water, and said adjusting elements being operable to vary the angular relation between the bottoms of said sections and the surface of the water.

7. In a small boat, a plurality of independent water-tight sections, each having a bottom, a pair of gunwales, a forward closed end and a rearward closed end, cooperating adjusting elements carried by the forward closed end of one section and the rearward closed end of an adjacent section, said adjusting elements coacting to connect said sections together in tandem with the connected ends of said sections spaced from each other and with the bottoms of both sections resting upon the water, and said adjusting elements being operable to vary the angular relation between the bottoms of said sections and the surface of the water.

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