Sept. 18, 1934. T. M. THORSEN 1,973,783

STREAM LINE STERN POST BLOCK AND RUDDER ASSEMBLY

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Fig. 1

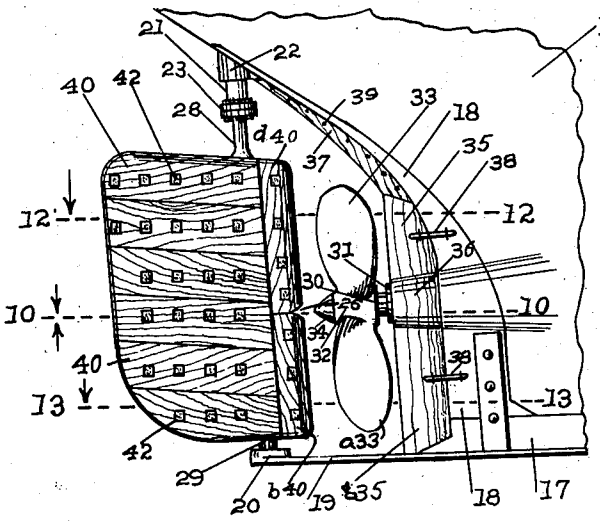



Fig. 2

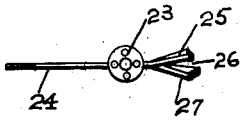



Fig. 3

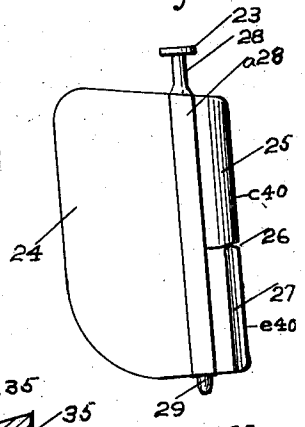



Fig. 5

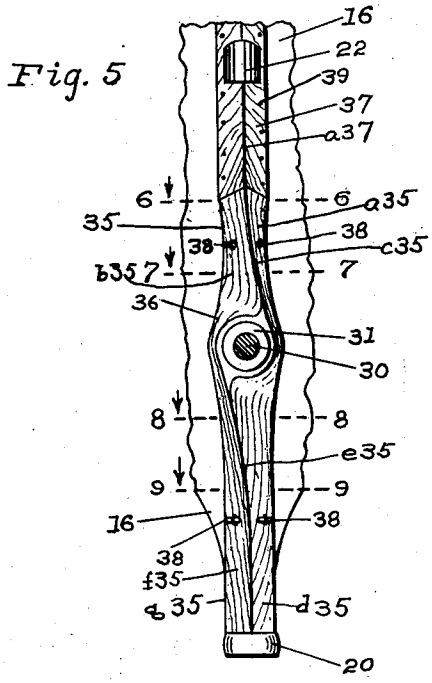



Fig. 6

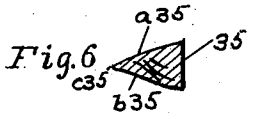



Fig. 7

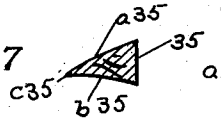



Fig. 8

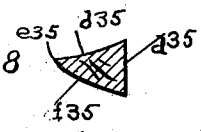



Fig. 9

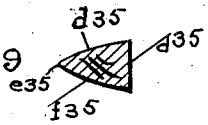
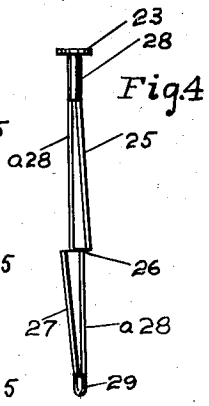



Fig4




INVENTOR,
Theodore M. Thorsen.
BY David E. Lasjn,
ATTORNEY.

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STREAM LINE STERN POST BLOCK AND RUDDER ASSEMBLY

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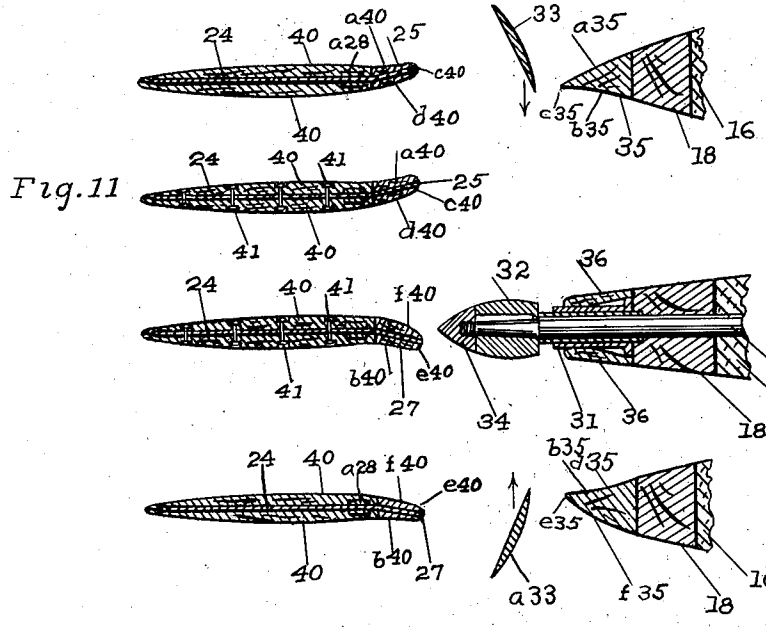


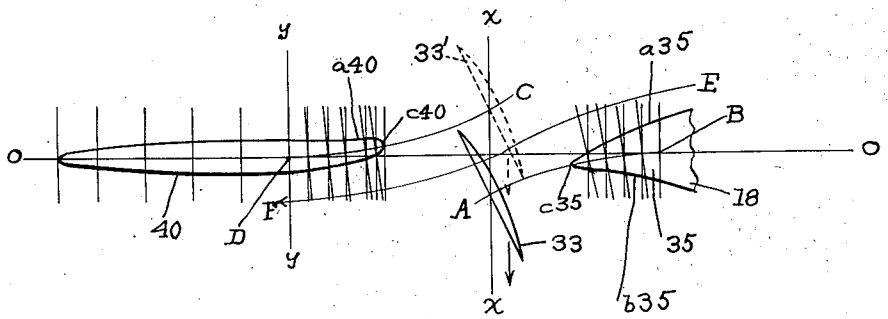

Fig. 11

Fig. 12

Fig. 10

Fig. 13

Fig. 14




INVENTOR,
Theodore M. Thorsen.
BY David E. Lowe,
ATTORNEY.

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# UNITED STATES PATENT OFFICE

1,973,783

## STREAM LINE STERN-POST BLOCK AND RUDDER ASSEMBLY

Theodore M. Thorsen, Bellingham, Wash.

Application July 30, 1932, Serial No. 626,695

1 Claim. (Cl. 114—162)

My invention relates to improvements in contra-propeller, stream-line, stern-post block and rudder assemblies for wooden hull boats and has for an object to provide stream-line parts for removable attachment to the stern-post and rudder of such boats to occupy the open space usually found between the stern-post and the propeller thereof and to build up the rudder into stream-line shape.

Another object of my improvement is to provide wooden stern-post blocks and rudder cheek pieces in order that they may be easily conformed to fair stream-line surfaces for the stern of each particular boat.

Other objects of my improvement will appear as the description proceeds.

In the hulls of wooden boats it is the practice to allow a considerable free space between the stern post and the propeller blades, and also to use a relatively thin metal plate of plane shape for the rudder. The said free space provides for the occurrence of local whirls and eddies in the water at this place which oppose the passing flow of water impelled by the propeller revolutions. Also the plane surfaces of the rudder encourages the forming of local whirls in the water next the surfaces thereof which hinder the rearward flow of water thereover, and increase the turning radius of the boat.

Because of the individual characteristics of the hulls of wooden boats the dimensions and shapes of the parts thereof about which this invention is concerned vary to a degree making it unpractical to provide metal castings for the pieces which my improvement require because nearly each boat would require special patterns for these pieces thus adding considerably to the cost of the improvement.

In practice I have found that suitable pieces made of wood can be especially shaped for each boat at a small expense and fastened in place in a manner insuring a reasonable term of service.

I attain these and other objects of my improvement with devices illustrated in the two sheets of accompanying drawings in which Figure 1 is a side elevation of a portion of the stern of a wooden boat hull, the remainder thereof being broken away, showing my stream-line blocks in place thereon and also the cheek pieces for the rudder thereof in place thereon, Fig. 2 is a top plan view of the rudder before my cheek pieces are attached thereto, Fig. 3 is a side elevation of Fig. 2, Fig. 4 is an elevation view of the forward end of the rudder, Fig. 5 is a rear elevation of Fig. 1 with the propeller and rudder omitted drawn on a larger scale, Fig. 6 is a horizontal section of Fig. 5 on the line 6—6, Fig. 7 is a horizontal section of Fig. 5 on the line 7—7, Fig. 8 is a horizontal section of Fig. 5 on the line 8—8, Fig. 9 is a horizontal section of Fig. 5 on the line 9—9, Fig. 10 is a transverse section of Fig. 1 on the line 10—10, drawn on a larger scale, as viewed from above the said line 10—10, Fig. 11 is a transverse section of the rudder, segregated, on the line 10—10 of Fig. 1 as seen from below the said line drawn on a larger scale, Fig. 12 is a transverse section of Fig. 1 on the line 12—12, (drawn on a larger scale) Fig. 13 is a transverse section of Fig. 1 on the line 13—13 drawn on a larger scale, and Fig. 14 is a diagrammatic representation of the fair reverse curve along which the water is impelled between my stern-post stream-line block and my stream-line rudder above the propeller axis by the revolving propeller, and the curved surfaces of the said block and rudder between which the said current of water passes.

Similar characters refer to similar parts throughout.

With more particular reference to the designated parts: A wooden boat hull 16 has the keel 17, the stern-post 18, the skeg 19 with rudder bearing 20 thereon, the rudder shaft 21, the rudder shaft bearing 22, the rudder shaft coupling 23, the rudder 24, the rudder stem 28, the rudder stem shank *a*28, the rudder gudgeon 29, the propeller shaft 30, the propeller shaft outbearing 31, the propeller hub 32, the propeller blades 33 and *a*33 and the stream-line propeller shaft nut 34.

The rudder 24, which in boats of this character usually is a relatively thin plate of iron or steel, preferably for my purpose is cleft at 26 in its counterbalance edge in line with the axis of the propeller shaft, and the said edge above the cleft is bent outward as at 25 in one direction while the edge 27 below the cleft at 26 is bent outward in the other direction, and the ends of the bent over parts at the cleft are bent at a larger angle than the ends thereof at the top and bottom of the rudder as shown in Figs. 2 and 4.

It is the custom to make the aft surface of the stern-post, of those boats with which this invention is concerned, straight transversely; thus failing to complete the stream-line shape of the hull at the stern thereof, and providing a place into which the water may not quickly enter as the boat moves forward, thus com-

pelling a quantity of water to follow along with the boat aft of the stern-post while it is being revolved by the main body of the water past which it is being carried and more especially by those parts of the main body of the water which are deflected to pass between the stern-post and the rudder as impelled by the revolving propeller blades.

The stern-post stream-line block 35, *g*35 and the stream-line rudder 40, *a*40, *d*40 and *b*40, *f*40 provide stream-line surfaces between which the said deflected currents of water may flow in fair curves unhindered by the eddying waters being carried along with the aft parts of the said boats when built as usual.

The diagrammatic drawing shown in Fig. 14 will aid in explaining the way in which the desired stream-line surfaces are determined. In Fig. 14 *o*—*o* is the center line of the boat being improved by the addition of my devices. The line *x*—*x* is drawn through the center of the propeller blades at right angles with *o*—*o*. The line *y*—*y* is drawn through the rudder axis at right angles with the line *o*—*o*. Two positions of a propeller blade above the axis thereof are given the one in solid lines at 33 is, in rotation, in front of the propeller axis and the one in dotted lines at 33′ is, in rotation, behind the said axis.

The fair curved line B—A is drawn from the intersection of the line *o*—*o* with the aft surface of the stern-post 18 to intersect the intersection of *x*—*x* with the propeller blade 33 and to be at right angles with the propeller blade. The fair curve D—C is drawn from the intersection of the line *o*—*o* and the line *y*—*y* to intersect the intersection of the line *x*—*x* with the propeller blade position at 33′ and be at right angles with the said propeller blade position.

If the boat being considered were a sailing vessel the peak *c*35 of the block 35 would be on the line *o*—*o*. But because of the diagonal direction of the current forced by the revolving propeller blades the peak *c*35 intersects or is on the curve B—A and the sides of the block 35 are in the curves *a*35 and *b*35. The shape of the curved sides *a*35 and *b*35 depend on the fair curve B—A.

The peak *c*40 of the forward rudder edge would, in a sailing vessel, be on the line *o*—*o*; but because of the said propeller-impelled current it is on the fair curve D—C, and the shape of the surfaces of the said rudder edge are obtained from the curve D—C.

The center of the flow of current between the block 35 and the rudder end *d*40 which is impelled by the revolution of the propeller is the fair reversed curved line E—F which is obtained from the curves B—A and D—C.

The drawing in Fig. 14 pertains to conditions above the propeller shaft. If it were drawn to respresent the direction of flow below the propeller shaft it would have to do with the peak *e*35 of the lower part *g*35 of the stream-line stern-post block the curved sides of which are shown at *f*35 and *d*35, and the peak *e*40 of the forward end of the rudder the curved sides of which are shown at *b*40, *b*40; and the center line of the diverted current in the water would pass by the curved side *f*35 of the stream-line block and the curved side *f*40 of the rudder.

In the stern of the particular boat herewith illustrated the hull curves rearward above the propeller blades and the stern-post is nearly vertical opposite the propeller but follows the shape of the hull and curves rearward above the same, and my stern-post block follows the direction of the aft surface of the stern post 18 and consists of the part *g*35 below the shaft out bearing 31, the hub part 36 around the said out bearing, the central part 35 above the hub part and the top part 37 above the propeller. For convenience of construction the top part 37 is made separately from the other parts to which it is joined opposite the top of the propeller.

The peak *a*37 of the top part of the block is nearly medial thereof and this part of my block is relatively thin making the fastening thereof to the stern post easily attained by the nails 39 driven through the block and into the stern-post against which it is placed. The lower parts of the block which are opposite the propeller are thicker and are fastened to the stern-post by the staples 38 alone.

The peak *c*35 of the part 35 at the top thereof is near the center but it curves toward the right hand, as one faces forward, and joins the hub part 36 near the right-hand side of the block. The peak *e*35 of the part *d*35 at the lower end of the block is near the middle of the block at its bottom and curves toward the left to join with the hub part 36 near the left side of the block. Thus at the hub the ends of the curved peak lines are spaced apart. The contours of the slanting sides of the block are indicated in the selected cross-sections thereof shown in Figs. 6–9 taken on lines of like number in Fig. 5.

As stated above the rudder 24 has the cleft 26 made in the forward edge thereof in line with the axis of the propeller and the parts 25 and 27 respectively above and below the cleft are bent outwardly oppositely, the bending being at a greater angle at the cleft than at the top and bottom of the rudder. The forward edges of the parts 25 and 27 are the peaks *c*40 and *e*40, respectively, of the stream-line rudder which I make from the metal plate rudder 24 by fastening wooden cheek pieces thereon. It may be noted that at the cleft 26 the peak line *c*40 is at the left of the propeller axis while the block peak line *c*35 is at the right thereof at its bottom end, and that at the cleft 26 the peak line *e*40 is at the right of the propeller axis while the upper end of the block peak line *e*35 is at the left thereof, this being the location of these lines for a forwardly revolving propeller.

In covering the rudder plate 24 with wooden cheek pieces in practice the plan has been followed of fastening vertical wooden strips *a*40 and *d*40 over the sides of the rudder counterbalance above the cleft 26, vertical wooden strips *b*40 and *f*40 over the sides of the said counterbalance below the cleft 26 and the horizontal wooden strips 40, 40 on both sides of the rudder plate rearward of the axis thereof. Preferably these wooden cheek pieces are fastened in place with bolts and nuts 41 as shown, the nuts and bolt heads being in countersunk recesses which afterward are filled with Portland cement as indicated at 42.

The stream-line contour of the rudder is shown in the sectional views thereof in Figs. 10, 11, 12 and 13 taken on the lines 10, 12 and 13 in Fig. 1. Two views on the line 10—10 being shown, the one in Fig. 10 being viewed from above the said line and the one shown in Fig. 11 being viewed from below the said line.

While the best results and the most improve-

ment in freedom of movement through the water and in maneuvering are obtained by closely following the stream-line construction described above, the class of boats above referred to are considerably improved by fixing a block of triangular cross-section on the aft surface of the stern-post and by adding to the thickness of the rudder and rounding the forward and stern edges thereof. These less developed improvements also are within the scope of my invention.

Having thus disclosed my invention, what I claim as new therein and desire to secure by Letters Patent is,—

A boat structure including, a separately-removable, contra-propeller stream-line block fastened on the stern surface of the stern post of the said boat forward of and adjacent the propeller of the boat, and the rudder of the said boat including a central metal plate having a rearwardly-extending cleft in the front edge thereof alined with the axis of the said propeller, portions of the said front edge being curved outwardly above and below the said cleft in opposite directions, and stream-line-shape cheek pieces fastened on both sides of the said rudder plate covering the same.

THEODORE M. THORSEN.