J. E. BOYLE AND D. A. TOAL.

SHIP CONSTRUCTION.

APPLICATION FILED MAY 14, 1919.

1,367,942. Patented Feb. 8, 1921.

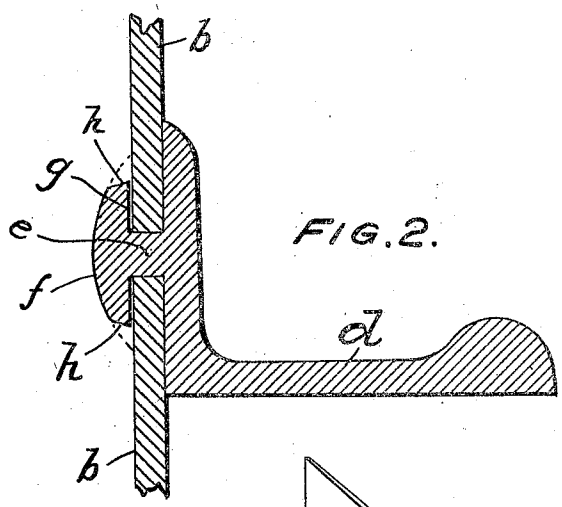

FIG. 2.

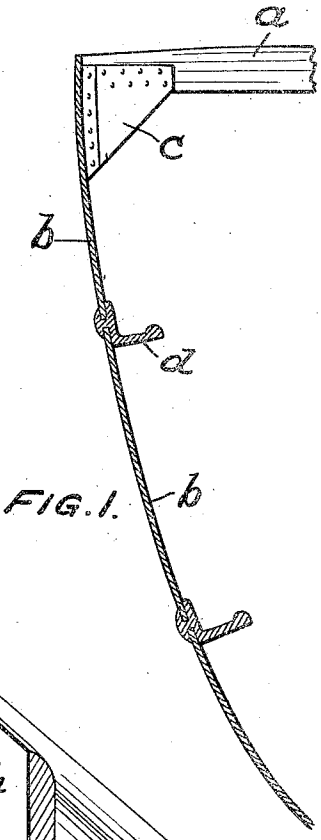

FIG. 1.

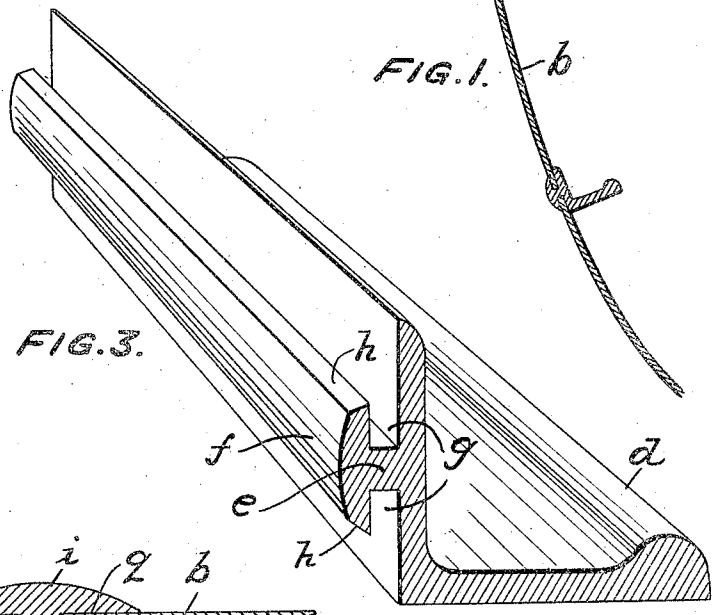

FIG. 3.

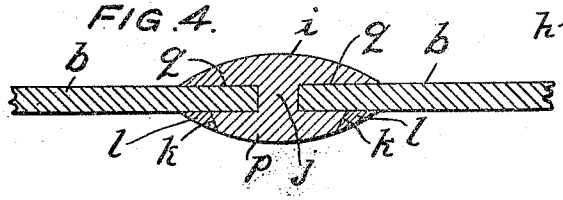

FIG. 4.

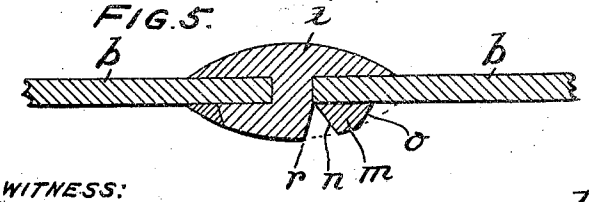

FIG. 5.

WITNESS:

Robt. R. Ritchel.

INVENTORS

John E. Boyle and

Daniel A. Toal

BY Frank S. Busser

ATTORNEY.

UNITED STATES PATENT OFFICE.

JOHN E. BOYLE AND DANIEL A. TOAL, OF CAMDEN, NEW JERSEY.

SHIP CONSTRUCTION.

1,367,942. Specification of Letters Patent. Patented Feb. 8, 1921.

Application filed May 14, 1919. Serial No. 297,093.

To all whom it may concern:

Be it known that we, JOHN E. BOYLE and DANIEL A. TOAL, citizens of the United States, residing at Camden, county of Camden, and State of New Jersey, have invented a new and useful Improvement in Ship Construction, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, which form a part of this specification.

Our invention relates to ship construction, and more especially to that type of construction based on the use of longitudinal framing.

The object of our invention is to provide means for attaching the shell plates of the ship preliminarily and finally without the use of rivets, bolts or other separate holding means.

Heretofore in ship construction it has been necessary to frame the ship with some type of angle bars, then to rivet the plates onto the frame. Preparatory to the riveting process the plates and framing must be punched, planed and otherwise prepared for assembly and the plates preliminarily held in position. After the riveting is completed, the joints of the plates must be carefully calked. The riveting operation requires a great deal of time and must be done with care and accuracy.

In accordance with our invention, a minimum of preliminary framing is required. No riveting is necessary in the plating of the ship, and in consequence all punching and planing operations are omitted and the plates need only be rolled and shaped in preparation for assembly. In the assembly of the plates, no liners or scarfs are used and calking is unnecessary.

Our invention permits of great reduction in the costs of ship building, due to the fact that many operations heretofore necessary are done away with. The construction requires less special machinery and the labor requirements are greatly reduced both as to the number of men and proportion of skilled men, at the same time a ship can be constructed with greatly increased rapidity.

Referring to the accompanying drawings in which we have illustrated a preferred embodiment of our invention and in which like symbols refer to like parts in the different views,—

Figure 1 is a cross-sectional view of a portion of the hull of a ship.

Fig. 2 is an enlarged detail, in cross section, of a framing bar with plates in position.

Fig. 3 is a perspective view of a section of bow angle involving our invention.

Fig. 4 is a detail view, in cross section, of a butt joint between plates.

Fig. 5 is a detail view, in cross section, showing means for insertion of a new plate.

Referring to Figs. 1 to 3, *a* is a deck beam, *b* plates forming the skin of the ship, *c* a brace for the deck beam. Bulb angle bars *d* run fore and aft of the ship and act as a frame for the skin plates. The bars *d* are provided on the outside with webs *e* ending in the flange or beading *f*, which forms channels *g* with the sides of the bars *d*, adapted to receive the edges of the plates *b*. The upper and lower edges of the flange or beading are cut off on a bevel *h*.

Referring to Fig. 4, the bar *i* is formed with a web *j* ending in the flange of beading *p* forming the channels *q* adapted to receive the ends of plates *b*. The outer edges of the flange or beading are beveled at *k*, the curve of the outside of the flange or beading being completed by the weld *l*.

Referring to Fig. 5, when it becomes necessary to remove a plate, the beading, holding the plate, is cut away to *r* by means of a flame, allowing the plate to be removed. A new plate is put in and the bar *m*, provided with beveled edges *n* and *o*, substituted for the portion of the beading cut away. The bar *m* is then welded to the plate *b* and remaining section of the beading, holding the plate in place.

In practice, one of the frame bars *d*, extending fore and aft to the proper length by welding shorter lengths together end to end, is welded to the stem and stern members of the ship adjacent the keel. The edges of a tier of plates *b* are inserted in the channel *q* into which they fit loosely, and wedged tightly, by means of steel wedges at intervals, back against the side of the frame

bar. Spaced above the first frame bar, a similar bar is run fore and aft of the ship and receives the upper edges of the tier of plates *b* in the channel *g*, the plates being wedged as before. The butts of the plates extend into channels *j* in bar *i*, which extends vertically between the beads on bars *d* and is welded to them at its ends.

The ship is laid up tier by tier as above described. The frame bars being supported by welding to the stem and stern and by the plates, the plates are maintained in position by the engagement of their edges in the channels *g*. The butts of the plates are engaged in the channels *j* of bars *i* extending between bars *d*.

The plates are then welded along their edges to the beads, the bevel permitting the weld to get well into the corner between the bead and the plate and a tight weld is assured by the fact that the plate is wedged tightly back against the outside of bar *d*. The weld *l* fills out the ends of the beading and makes a perfectly sound and tight joint.

It will be readily seen that in laying up the ship, after stem, stern and keel sections are in place, no preliminary framing is necessary, the frame bars being put in at the same time as the plates. The plates are preliminarily held by the beading and finally welded in position without the use of rivets.

If desired, the whole hull can be laid up before the welding operation starts, or the welders can follow up.

If it becomes necessary to renew a plate or several plates, the beading may be cut off by means of a flame to allow the removal of the plate and the new plate held in position by bar *m* welded to the beading and to the plate, as heretofore described.

It will be understood that we do not intend to limit our invention to bulb angle bars as it is equally applicable to any other type, including plane angles and Z angles, nor do we wish to limit our invention to ship construction, as it is equally adaptable to the construction of tanks, etc.

Having now fully described our invention, what we claim and desire to protect by Letters Patent is:

1. A structural element for ship framing, having a relatively low web and relatively wide flanges at each end of the web, and a flange at the end of one of said flanges extending approximately in a plane parallel to the plane of the web.

2. A structural element for ship framing, having a relatively low web and relatively wide flanges at each end of the web, the grooves formed between the flanges being arranged to receive ship plates, the flanges on one end of the web being wider than the flanges on the other end of the web to form broad backings for the sides of the plates.

3. A ship having longitudinally extending frame members, each of said frame members having a web and two flanges extending from each end of the web, plates within the grooves formed between the flanges of adjacent frame members, the side edges of the plates being welded to the flanges, and a longitudinally extending stiffening flange on one of the flanges of each frame member.

4. A ship having longitudinally extending frame members, each of said frame members having a web and two flanges, extending from each end of the web, plates within the grooves formed between the flanges of adjacent frame members, the side edges of the plates being welded to the flanges, a double grooved bar welded to the ends of adjacent plates in the same plane as well as to the flanges of adjacent frame members, and a longitudinally extending stiffening flange on one of the flanges of each frame member.

In testimony of which invention, we have hereunto set our hands, at Camden, N. J., on this 12 day of May, 1919.

JOHN E. BOYLE.
DANIEL A. TOAL.