W. L. COLE.

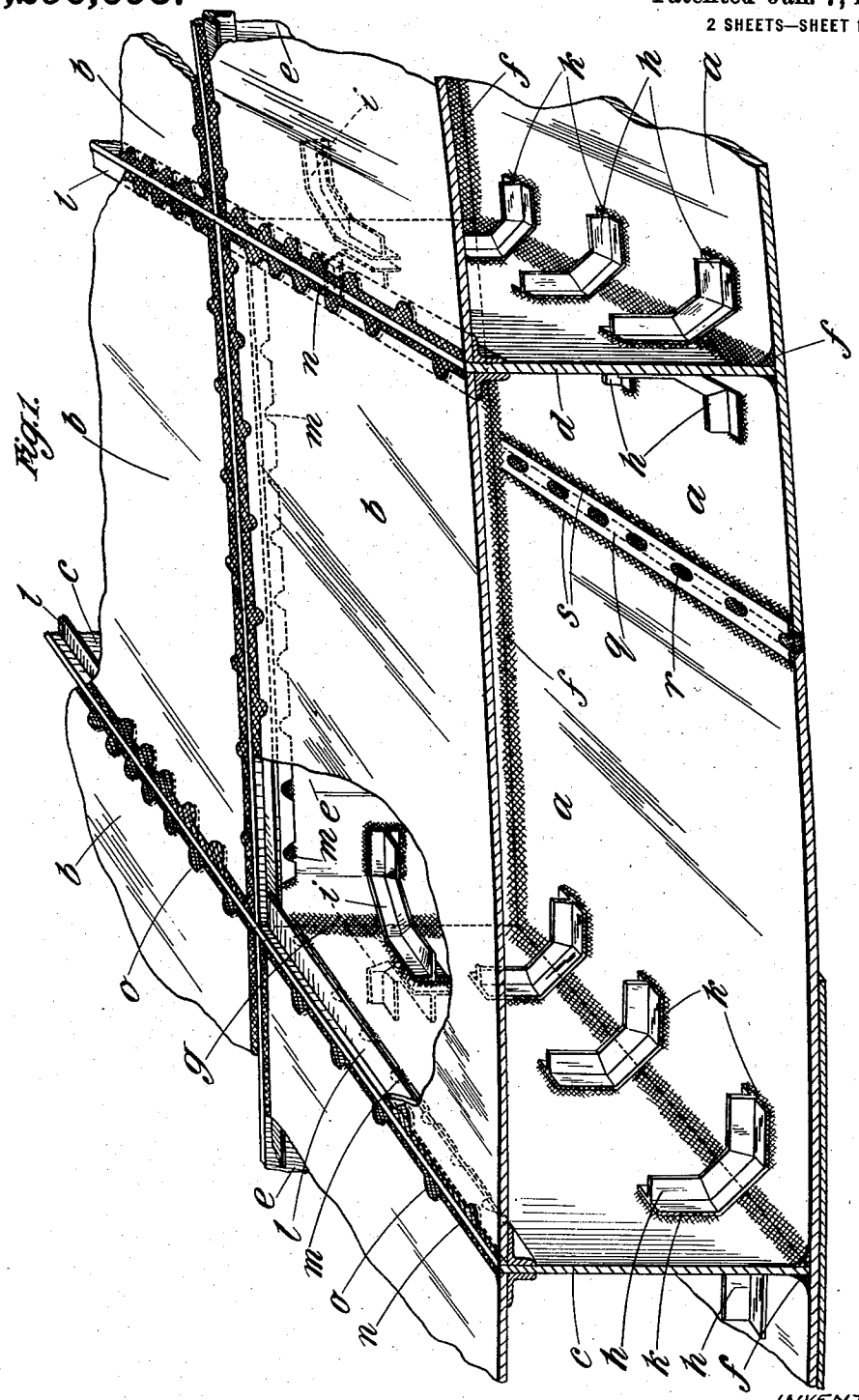
SHIP CONSTRUCTION.

APPLICATION FILED JULY 21, 1917.

1,290,093.

Patented Jan. 7, 1919.

2 SHEETS—SHEET 1.



INVENTOR.
William Lawes Cole
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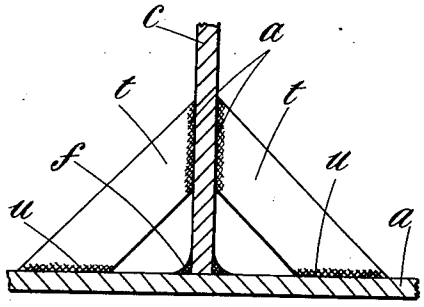


Fig. 3.

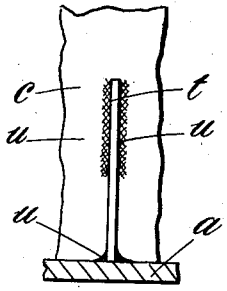


Fig. 4.

Fig. 5.

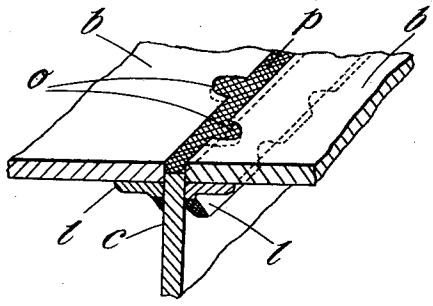
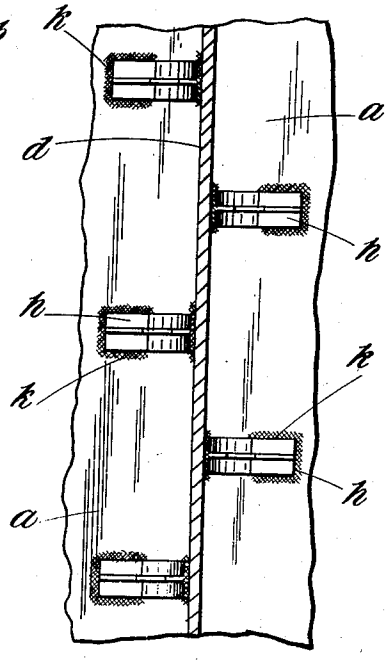


Fig. 2.



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UNITED STATES PATENT OFFICE.

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SHIP CONSTRUCTION.

1,290,093. Specification of Letters Patent. Patented Jan. 7, 1919.

Application filed July 21, 1917. Serial No. 181,977.

To all whom it may concern:

Be it known that I, WILLIAM LAWES COLE, a subject of the King of England, and residing at Clinton Road, Mile End, East London, England, have invented certain new and useful Improvements in Ship Construction, of which the following is a specification.

This invention relates to the construction of ships, and in particular to the method of inserting the vertical keel plate, the longitudinal partition plates, the intermediate cross-partitions or plates, and the inner shell which is carried on or secured to the framework formed by such plates. Hitherto it has been usual to secure the vertical keel plates and partitions in place by means of angle-iron brackets riveted to the keel and the ship's bottom plating, and to secure the inner shell plating of the ship to such vertical plates by brackets riveted to said plates and to the inner shell. In order to make the structure water- and oil-tight it is necessary to calk every joint and all the rivets, but even when the ship is new the joints are rarely fluid-tight throughout, and after a time they are sure to loosen more owing to vibration and to racking stresses.

These difficulties are avoided, and an improved structure is provided according to the present invention, by a method of welding, whereby the whole labor of riveting and all necessity for calking is avoided. It might have been thought that it would be sufficient to employ angle irons as before, and merely to weld them instead of riveting them in place, and this has been previously proposed, but though this might present some advantages over riveting it does not provide nearly so strong or effective a structure as is provided by the construction hereinafter set forth.

In the accompanying drawing:—

Figure 1 illustrates in perspective, and partly broken away, a portion of a ship's bottom and inner shell plating or false bottom, with the intervening keel and partition plating.

Fig. 2 shows in perspective a slight modification.

Figs. 3 and 4 are two views at right angles showing another modification; and

Fig. 5 is a plan view showing another slight modification.

Refering to Fig. 1, the ship's bottom plating is marked *a*, and the inner shell plating *b*. A portion of the vertical keel plating is seen at *c*, while *d* is another longitudinal line of partition plating, and *e* is the intermediate cross partition plating. The vertical keel plate *c* and the longitudinal partitions *d* are laid along the bottom plating *a* of the ship, and are fillet-welded thereto along their bottom edges at both sides, as indicated at *f*. The transverse intermediate partition plates *e* are similarly placed and welded, both to the ship's bottom plating as at *f*, and also to the longitudinal partitions *c* and *d*, as seen at *g*. The joints so made would not effectively resist racking stresses, but the necessary strength and rigidity is obtained separately, by making struts *h* of angle- or T-iron, and welding them at intervals to the vertical keel plates *c* and partition plates *d* at the one end, and to the ship's bottom plating *a* at the other end. The struts may be shaped from suitable section irons, with ends at the proper angle to the middle portions in order to lie flat against the plates to which they are to be welded; and the welding is done either around the said ends of the struts as indicated at *k*, or through slots or notches cut therein, or in both of these ways. Instead of struts *h*, plain gusset plates *t* may be used, these being cut from metal plates and welded around their ends as shown at *u* in Figs. 3 and 4. The term "struts" where used hereinafter is to be read as including such gusset plates. In the welding of these struts, owing to the fact that the struts are of much less mass than the plates, they become more highly heated, and therefore expand more than the plates. On cooling after the welding therefore the struts *h* or *t*, which extend at an angle from the vertical keel and partition plates *c* and *d* to the bottom plating *a* of the ship as shown, tend to contract more than the plates, with the result that all the struts are left in tension while the vertical keel and partition plates *c* and *d* are in compression between the ends of the struts and the ship's bottom plating *a*. Hence a rigid trussed structure is formed which is admirably adapted to resist all racking, bending or vibrational stresses. The struts may be placed in pairs at opposite sides of the vertical plates as shown, or in staggered position (as shown in plan in Fig. 5) as may be preferred, and

will be fixed at intervals depending upon their strength and section. Similar struts *i* may be arranged and welded in horizontal positions at the corners where the longitudinal and transverse partition walls meet.

It will be seen that the structure depends to a large extent for its rigidity on the struts, and that these play no part in rendering it fluid-tight. The fillet welds *f* along the lower edges of the plates and at *g* between the longitudinal and intermediate partition plates, serve this latter purpose in an entirely effective and permanent manner, while at the same time they prevent any possibility of movement or shearing between the vertical plates *c*, *d* and *e* and the ship's plating *a*.

The vertical keel plates *c*, the longitudinal partitions *d* and transverse intermediate partitions *e* form a structure or framework which provides a number of oblong cells or spaces, and instead of forming the inner plating or bottom *b* of the ship so as to lie over this, the inner plating is fitted as follows: Angle brackets *l* are welded to the vertical keel and partitions *c*, *d*, and *e* at intervals preferably by notching or slotting the vertical webs of the brackets at suitable points as at *m* and welding the edges thereof to the vertical plates, and then filling in the notches or slots with deposits of welding metal so as to provide solid supporting pieces. The tops of the brackets *l* are disposed the plating-thickness below the tops of the partitions *c*, *d* and *e*, and templets are cut to fit in the cells, the inner plating *b* being made up in complete sections therefrom one section for each cell of the partition structure. The inner plating sections *b* may have chamfered edges as shown in Fig. 1, and when they are inserted, deposits of welding metal are made at *n* to fill in the V-shaped spaces and to weld the plating *b* to the vertical keel and partition plating *c*, *d* and *e*. The plates *b* are also preferably slotted or notched at intervals at or near their edges as at *o* and are welded to the tops of the brackets *l* by deposits at these points before the edges of the plates are welded all around as at *n* to the vertical plating *c*, *d* and *e*.

In the alternative construction shown in Fig. 2, the brackets *l* are at such a height that the inner plating *b* when inserted, stands up half-proud of the vertical plating *c*, *d* and *e*. After the welds in the notches *o* holding the plating *b* to the brackets are made, filled welds are then made around the entire edges of each section of the inner plating *b*, upon the tops of the partitions *c*, *d* and *e*, and these joint lines are finally filled in also with welding metal as at *p*. The result is to form an inner plating for the ship, in sections *b* which are completely welded to the partition walls *c*, *d* and *e*, all around the same, and are also welded one to another along their edges, so that a very strong and rigid structure is provided which is completely fluid-tight, without the necessity of calking.

The structure is substantially the same for the partition plates and inner plating of the ships as far as these are carried up the ship's sides past the bilge keels, except that in the sides there is not the same necessity for making the longitudinal partitions all fluid-tight, and one line or fillet of welding on the upper edge of each partition plate may suffice, while the flanges of the struts on which the plates rest may be welded from above to the partition plates through slots therein.

The inserted sections *b* of the inner plating or shell of the ship may be built up from plates welded together in the manner set forth in my concurrent patent application Serial No. 181,975, or in any other convenient manner. They may have angle pieces or girders welded or otherwise secured to their under surfaces if required in order to give them the necessary strength. In Fig. 1, a welded joint in the bottom plating *a* is shown, with a butt-strip *q* on the inside, welded through slots *r* along the center, and with fillet welds *s* along its edges.

The struts *h* may be continued upwardly to constitute the brackets for supporting the inner plating *b* if desired, but in most cases it will be preferable to fit separate brackets *l* for this purpose.

The construction hereinbefore set forth has an advantage in saving dead weight, and consequently in reducing the displacement of the ship.

Any convenient welding process may be employed, but we prefer to use the fillet process, with electrodes of the type set forth in the specification of Patent No. 1,144,390.

Such electrodes are suitable for making welds and welding deposits of all of the kinds hereinbefore referred to. In the fillet process the electrodes are held with their ends close down to the work, and it is a spluttering or quasi-arc which passes.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:—

1. In ship construction, the combination of bottom plating, keel and partition plates, and inner plating fillet welded together and also fillet welded to the bottom plating to form water-tight compartments, said inner plating having its edges notched to increase the line of weld.

2. In ship construction, the combination of bottom plating, keel and partition plates, and inner plating fillet welded together and also fillet welded to the bottom plating to form water-tight compartments, said inner plating having notches in its edges for in-

creasing and strengthening the welded joint, and means for bracing said partitions with respect to each other and also with respect to the bottom and inner plating.

3. In ship construction, the combination of bottom plating, vertical partitions fillet welded to said plating and inner plating welded to said vertical partitions to form hollow compartments of great strength, the line of weld between said inner plating and vertical partitions being irregular so as to more firmly and securely hold said members together.

4. In ship construction, the combination of bottom plating, vertical partitions fillet welded to said plating, inner plating welded to said vertical partitions to form hollow compartments of great strength, and angle irons reinforcing the joint between the partition and inner plating, said angle irons being notched to more securely hold them along the vertical partitions and said inner plating being notched along its edges to more securely hold the same against edgewise stresses.

5. In ship construction, the combination of bottom plating, vertical partitions fillet welded to said plating, inner plating welded to said vertical partitions to form hollow compartments of great strength, and means reinforcing each welded joint, said reinforcing means and inner plating being scalloped to materially increase the line of weld, thereby strengthening the same.

6. In ship construction, the combination of bottom plating comprising sheets of metal welded together to form a smooth outer surface, partitions welded to said plating, braces welded to said partitions and to said plating so as to place said braces under tension when cold, an inner plating fillet welded to said partitions, the said inner plating having notches in the edges thereof so that when filled the said plating is effectively secured against transverse movement.

7. In ship construction, the combination of bottom plating, partitions fillet welded thereto, inner plating having scallops in the edges thereof fillet welded to said partitions, angle members with scalloped edges fillet welded to said partitions and said inner plating, and braces reinforcing certain of said joints.

8. In ship construction, the combination of partitions, inner plating attaching the sides of said partitions and extending above said partitions a distance equal to one-half the thickness of said inner plating and having notches in said edges at intervals and welding deposit filling the space between the sections of inner plating and coming flush with the upper surface thereof.

9. In ship construction, the combination of welded partitions and plating, said partitions being fillet welded to the ship's bottom plating and to one another to form water-tight compartments and struts welded at one end to the partitions and at the other end to the bottom plating, said struts being heated to a higher temperature during welding than the parts to which they are welded, whereby upon cooling, said struts are under tension and the other parts are under compression.

10. In ship construction, the combination of partitions and plating welded together, inner plating in sections, brackets welded to the longitudinal and partition plating and supporting the inner plating, said inner plating having notches or slots and welding material connecting said inner plating to said brackets through said slots, said inner plating being also welded around its edges to the tops of the vertical partitions substantially described.

11. In ship construction, the combination of partitions and plating, brackets attached to said partitions at the deck level, a deck or inner plating supported on said brackets so that the inner plating extends above the partitions a distance equal to approximately one-half the thickness of the inner plating, the edges of the inner plating being fillet welded to the tops of the partition plating and the space between the inner plating being filled with welding deposits to form water-tight inner shell plating.

WILLIAM LAWES COLE.