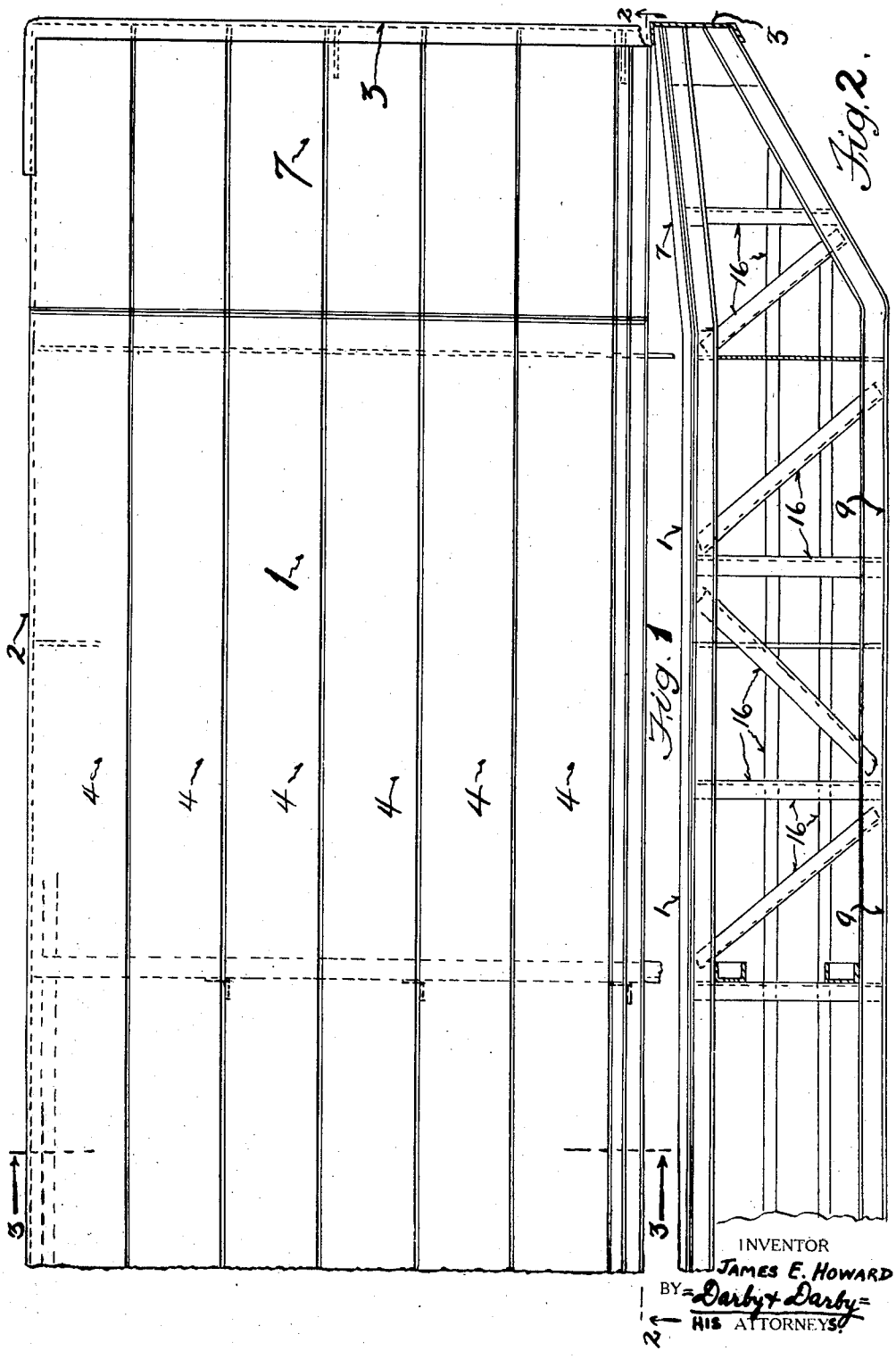
March 7, 1933. J. E. HOWARD 1,900,711

SHEET METAL VESSEL CONSTRUCTION

Filed Sept. 26, 1930 3 Sheets-Sheet 1



INVENTOR
JAMES E. HOWARD
BY Darby & Darby
HIS ATTORNEYS

March 7, 1933. J. E. HOWARD 1,900,711

SHEET METAL VESSEL CONSTRUCTION

Filed Sept. 26, 1930 3 Sheets-Sheet 2

Fig. 3

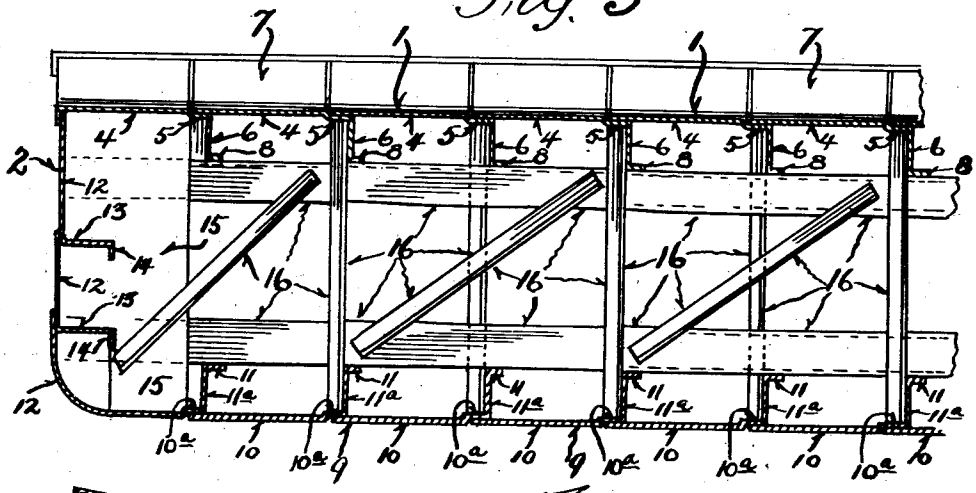


Fig. 4

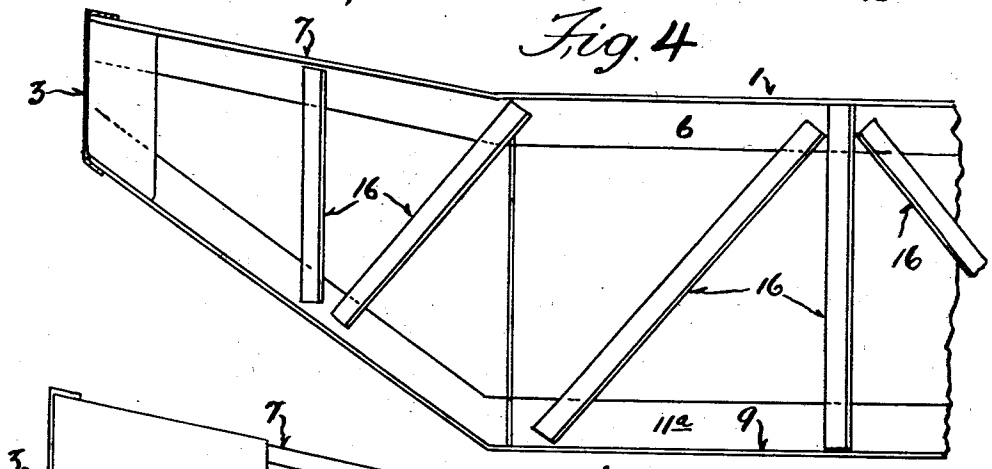
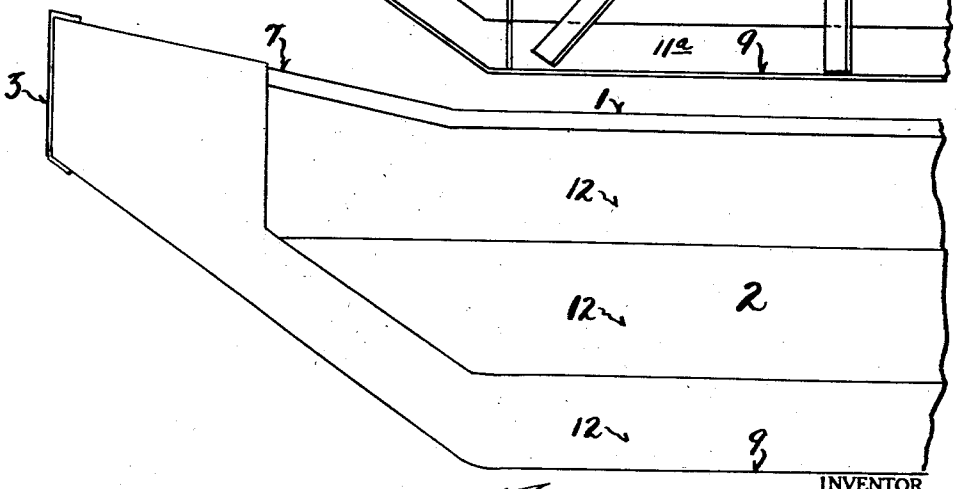


Fig. 5.



INVENTOR
JAMES E. HOWARD
BY Darby & Darby
HIS ATTORNEYS

March 7, 1933. J. E. HOWARD 1,900,711

SHEET METAL VESSEL CONSTRUCTION

Filed Sept. 26, 1930 3 Sheets-Sheet 3

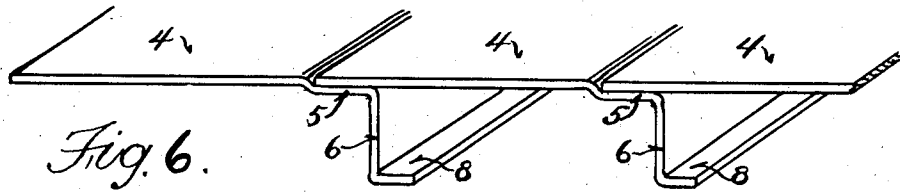


Fig. 6.

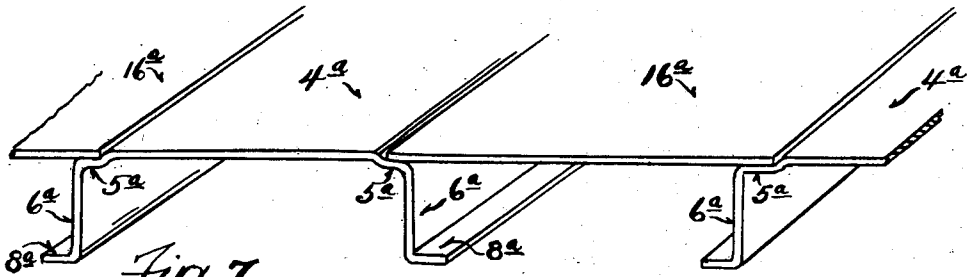


Fig. 7.

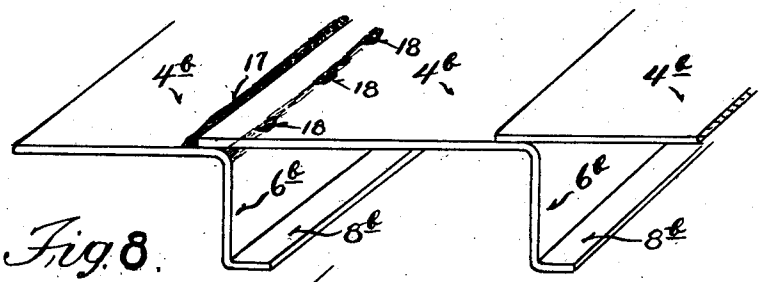


Fig. 8.

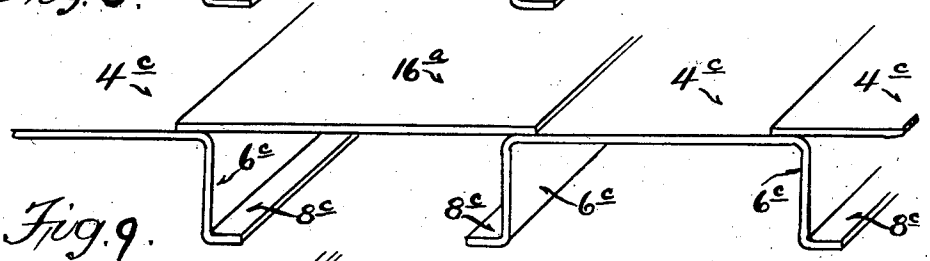


Fig. 9.

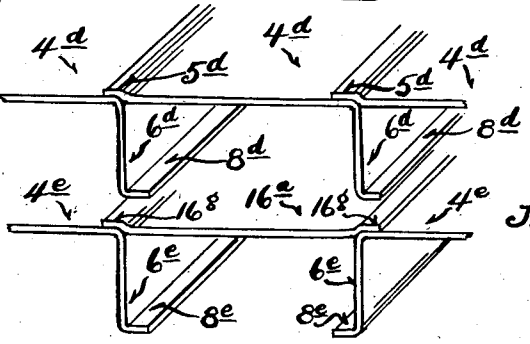


Fig. 10.

Fig. 11.

JAMES E. HOWARD
INVENTOR
BY "Darby & Darby"
HIS ATTORNEYS.

Patented Mar. 7, 1933

1,900,711

UNITED STATES PATENT OFFICE

JAMES E. HOWARD, OF JEFFERSONVILLE, INDIANA

SHEET METAL VESSEL CONSTRUCTION

Application filed September 26, 1930. Serial No. 484,483.

This invention relates to a novel structure of an all-steel vessel.

One of the objects of this invention is the provision of an all-welded sheet metal vessel hull structure to secure strength, stability, efficiency and economy.

Another object is the provision of a vessel body structure consisting of sheet metal plates and sectional framework units all lapped and joined by welding.

Another object is the utilization for vessel construction of the welding method of joining lapped plates and sectional framework to form an all-steel vessel body having greater strength, rigidity and ruggedness than that attainable with a riveted vessel construction.

A further object is the provision and utilization in vessel construction of a novel type of lap welding of steel plates and steel sectional framework.

Various other objects and advantages of the invention will appear more fully hereinafter.

The invention resides substantially in the construction, combination, arrangement and relative location of parts, all as will be more fully hereinafter set forth, as illustrated in the accompanying drawings and finally pointed out in the appended claims.

In the art of marine engineering it has been found desirable in steel vessel construction to employ sheet metal plates and structural frame units of simple, easily produced design which are capable of being readily and easily assembled and welded together, thereby securing strength, ruggedness and economy. The utilization of the welding method of lapping and joining plates and sectional framework in vessel construction does not merely constitute a change in the resulting vessel from a riveted structure to a welded structure, but it also involves important innovations in the perfection of the seam made, and in the well-known principles of stress and strain determination, as well as eliminating the necessity for nicety of measurements of the dimensions of the sheets or plates employed.

Heretofore numerous efforts have been made with different types of proposed welds to produce a readily assembled structure having inherent strength. These efforts have not resulted in a satisfactory structure. As public confidence in welded vessel body construction therefore has not been fully established, the various types of proposed welds have in the main been confined in their utilization to barges, scows and like vessels where the efficiency factor is of obviously less importance than in a self-propelled ship design.

To accomplish that high degree of perfection in welded vessel construction that is necessary to establish the requisite public confidence for the carrying over to the self-propelled ship art of welded steel plate construction, I have deemed it necessary that some method of construction be employed whereby a secure and firm seam can be effected by welding. I have discovered and hereinafter will disclose such a novel method of rugged welding of all-metal plates and sectional framework to provide the desirable rugged structure and to secure the desired economy of constructing and assembling the sheets or plates.

Referring now to the drawings, it will be seen that;

Figure 1 is a top plan view of a broken-away portion of a barge incorporating a series of top deck plates welded according to the principles of my invention;

Fig. 2 is a view in side elevation, parts in section on the line 2—8 in Fig. 1;

Fig. 3 is a transverse sectional view on the line 3—3 in Fig. 1;

Fig. 4 is a broken view in side elevation of the forward end portion of the barge shown in Fig. 1 and on a somewhat enlarged scale

with the vertical side plates or wall removed;

Fig. 5 is a view similar to Fig. 4 with the vertical side plates or wall applied;

Fig. 6 is a detail view in perspective showing one arrangement in which the sheets or plates to be welded may be interlapped in accordance with my invention;

Figs. 7, 8, 9, 10 and 11 are views similar to Fig. 6 showing various other embodiments of plate assemblies embodying my invention;

Like numerals refer to like parts throughout the several views of the drawings.

Referring now particularly to Figs. 1 to 5, inclusive, it will be seen that the portion of the barge there shown comprises a top or deck plate, indicated generally by 1, side plates, indicated generally by 2, a bottom plate 9, and end plates, indicated generally by 3. Top or deck plate 1 is composed of a number of sheet steel plates 4, 4, 4, 4, etc., formed with depressed seats or joggles 5, 5, 5, 5, etc., and bent edge portions 6, 6, 6, 6, etc., the latter terminating in laterally extending feet or flanges 8. These deck plates may also be bent transversely at or near one or both of the ends to form the inclined bow portion of the boat indicated generally by 7 in Figs. 1, 2 and 3, respectively. The bottom plate indicated generally by 9, in Figs. 2 to 5, inclusive, is also composed of a series of similarly shaped sheets 10 having depressions or joggles, bent edge portions and flanges, similar to the deck plates 4, but assembled in reverse relation with respect to the deck plates 4. The side plates 2 are also formed from a series of sheet steel plates 12, 12, 12, etc., having bent edge portions 13, 13, 13, etc., terminating in flanges or feet 14, 14, 14, etc. In the arrangement shown in Figs. 3 and 6, one longitudinal edge of each sheet or plate 4 fits into the depression or joggle 5 of the next adjacent sheet 4. The depression or joggle is of a depth approximately equal to the thickness of the sheet. The result is to form a substantial smooth even deck surface, without raised ridges. The bent portion 6 of each sheet, with its terminal flange 8, form braces and seating surfaces, respectively, for securement to the framework bracing of the structure. Similar assembly, union and interlocking of the plates 10, 10, 10, etc., at their depressed seats or joggles 10^a forms the continuous bottom plate 9, having arising therefrom the series of bracing and framework securing bent and flange portions 11^a and 11. The side plates are likewise assembled with thin bent portions 13 and flanges 14 extending inwardly. Supported between the general top or deck plate 1 and the bottom plate 9 and secured to the series of feet or flanges 8 and 11 is provided an interior truss work indicated generally at 16, composed of cross-truss and strut members to give both vertical, transverse and diagonal bracing, to extend fore and aft of the vessel. Secured to the bent edge portions and flanges or feet 13 and 14 by gusset plates 15 is the internal above mentioned truss work, 16, made up of cross-trusses and struts to give vertical, longitudinal, transverse, and diagonal bracing. It may be said at this point that the union of the cross-trusses and struts to give the requisite bracing action may be readily effected by the welding of the struts and trusses together and to the deck, bottom and side plates. As will be apparent in Fig. 3, the bent portions 6 and 11^a are in vertical alignment and the flanges 8 and 11 parallelly disposed one over the other, lending to the structure ready means for securing and supporting the internal truss work. The flanges 8 and 11, it is obvious, also may support a flooring or a double bottom, as well as add strength to the construction. It will be further noted that the alignment of the bent portions 6 and 11^a yields means for accurately and rigidly supporting the vertical truss members. The requisite trusses and struts may be formed of standard parts of **U**, **L** or like formation and readily welded together after the cross-trusses have been secured, as shown, to the feet 8 and the feet 11. The vertical struts secured to the cross-trusses may be permitted to rest against the top and bottom plates after union thereof.

Although I have briefly described the internal construction shown in Fig. 3, I do not desire to be limited to the construction shown, inasmuch as I believe that the invention may readily lend itself to other adaptations, upon which I will dwell more fully hereinafter. It is clear, however, at this point that the vessel construction above described may be formed entirely of welded plates and parts of standard type and of predetermined dimensions.

Referring now particularly to the various other forms of embodiments shown in Figs. 7 to 11, inclusive, it will be seen that all of the embodiments there shown involve sheet metal plates adapted to lap welding joinder. I have found that in the art of vessel construction by welded plates that the use of the butt weld of joint and seam is undesirable, whereas the lap welds of mv invention have proven most satisfactory.

Referring particularly to Fig. 6, it will be seen that I there disclose a series of plates 4 of the type shown in Fig. 3, with depressed seats or joggles 5 and bent edges 6 having flanges or feet 8. It will be noted that plate 4 is flat over the major portion of its width and has at one side thereof the joggle 5, the side edge 6 bent substantially at right angles to the plate, and the flange or foot 8 bent at right angles to the bent edge.

Referring next to Fig. 7, a form of em-

bodiment is shown wherein the plate 4^a is formed at both sides with seats or joggles 5^a and has the usual bent portion and flanges 6^a and 8^a. This type of plate 4^a is adapted to be used in connection with an auxiliary, uniformly, rectangular flat plate 16^a. This plate, as will be noted, is adapted to join successive plates 4^a at their depressed seats or joggles 5^a.

Referring next to Fig. 8, it will be noted that the plate 4^b formed with the bent edge 6^b and flange or foot 8^b is similar to the plate 4 shown in Fig. 6, but with the joggle omitted.

In Fig. 9 the plate 4^c, having the bent edge 6^c and the flange or foot 8^c, is similar to the plate 4^a shown in Fig. 7 with the joggles omitted. With the structure shown in Fig. 9 a plate 16^a must also be used.

In Fig. 10 the plate 4^d is formed with the usual bent edge 6^d and flange or foot 8^d, but the unbent side thereof is joggled at 5^d to securely seat against the curve formed by the bending over of the next succeeding plate 4^d to form its bent edge.

In Fig. 11 the plate 4^e formed with the bent edge 6^e and the foot 8^e is exactly the same as the plate 4^c with its bent edge 6^c and foot 8^c. In this instance also a plate 16^a is used. This plate, however, is joggled at both sides thereof, as shown at 16^g, so that the ends thereof may securely set against the curves formed by the bending over of the plates 4^e to form the bent edges.

It will be noted, therefore, that all of the various embodiments shown in Figs. 6 to 11, inclusive, have successive plates lap welded to one another or joined to one another by a joining plate, such as plate 16^a, which is lap welded to the successive plates.

Referring to Fig. 8, it will be seen that the plates when overlapped, as shown, are ready for lap-welding.

I have found that in welding the plates together it is preferable to form a continuous weld 17 on the outside or working side of the plates and to only weld intermittently at separated spots 18, 18, 18, etc., on the inside or non-working side of the plates. Although I have shown the general idea of the manner of weld with respect to the embodiment shown in Fig. 8, it is apparent that this method of weld may and is intended to be used with each of the various embodiments shown in Figs. 6 to 11 inclusive.

It is also apparent from the foregoing that the utilization of the lap weld in ship construction obviates the necessity of absolute uniformity in plate width, that is, successive plates may be satisfactorily joined by lap-welding even though, due to slight differences in width, they do not lap over and completely cover the preceding depressed seat or joggle. The intervening space between successive plates may then be left as it is, or filled in with solder or the like.

From the foregoing it will be readily apparent that it is possible from the method of weld and joinder of parts disclosed to form a vessel construction entirely of all-steel sheet metal parts secured together solely by lap-welding.

Inasmuch as many changes may be made in the above construction and many apparently widely and different embodiments of the scope of the invention may be made without departing from the spirit and scope thereof, it is intended that all matter hereinabove contained or shown in the accompanying drawings shall be interpreted as illustrative and not in any way limiting. The following claims are intended to cover all generic and specific features of the invention described.

What I claim to secure by United States Letters Patent is:

1. A plurality of plates adapted to interengaging, overlapping interconnection comprising a plurality of flat plates joggled at both sides thereof to form inset joggled portions bent at the ends of said joggled portions and formed with flanges at the ends of the bent portions, and a series of uniformly flat plates adapted to cooperate with said joggled plates at the joggled portions thereon.

2. In a vessel construction having top, bottom and sides of overlapping interengaged sheet metal members, each having along one edge thereof aligned portions bent substantially at right angles to said members, and having flanges formed at the ends of said bent portions, of a plurality of internal truss and strut members adapted to rigidly support the top, bottom and sides by securement thereof to the aligned bent portions of the overlapping metal members mentioned.

3. In a vessel construction of the type described, an internal truss work including horizontal and vertical truss members, a top, a bottom and sides formed of overlapping interengaged sheet metal members having bent portions and flanged portions at the ends of said bent portions, the bent portions of the members comprising the top being in vertical alignment with the bent portions of the members comprising the bottom to form supports for the vertical truss members and the flanged portions of both top and bottom members being in horizontal alignment to provide supports for the horizontal truss members.

4. In a vessel construction of the type described, an internal truss work including horizontal and vertical truss members, a top, a bottom and sides formed of over-lapping interengaged sheet metal members having bent portions adapted to support vertical truss members and flanged portions at the

ends of said bent portions for supporting horizontal truss members.

5. The structure recited in claim 2 characterized in that the bent portions of the members comprising the top are in alignment with the bent portions of the members comprising the bottom, so that the flanges formed at the ends of said bent portions are parallelly opposed and adapted to support the top and bottom cords of the truss members.

In testimony whereof I nave hereunto set my hand on this 16th day of September A. D., 1930.

JAMES E. HOWARD.