

No. 735,637.

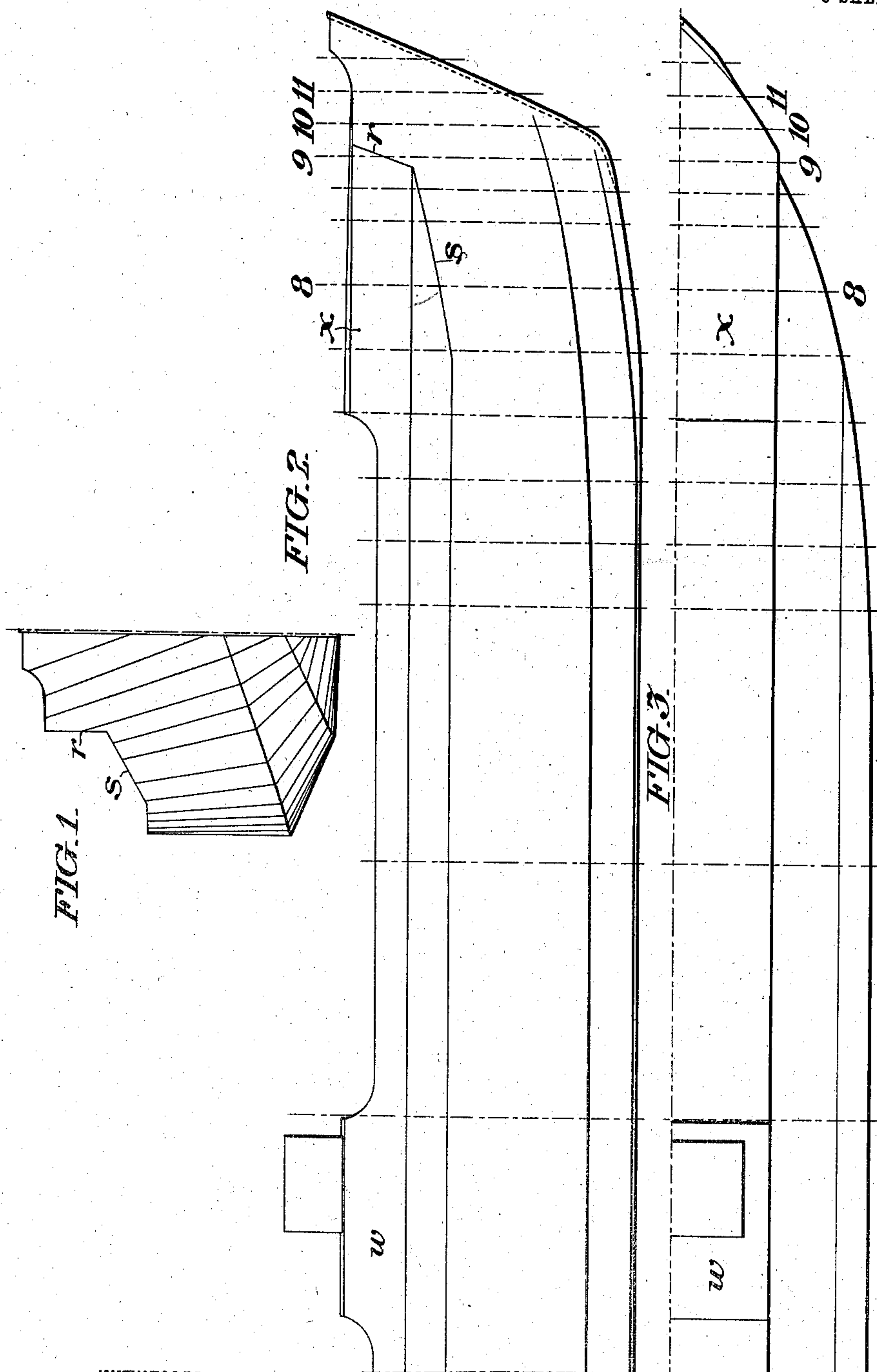
PATENTED AUG. 4, 1903.

H. N. WHITTELSEY.
VESSEL HULL.

APPLICATION FILED JUNE 6, 1902.

NO MODEL.

5 SHEETS—SHEET 1.



WITNESSES:

Victor E. Paige

J. N. Dixon

INVENTOR

H. N. WHITTELSEY,

BY

McMinnick
ATTORNEY.

No. 735,637.

PATENTED AUG. 4, 1903.

H. N. WHITTELSEY.
VESSEL HULL.

APPLICATION FILED JUNE 6, 1902.

NO MODEL.

5 SHEETS—SHEET 2.

FIG. 4.

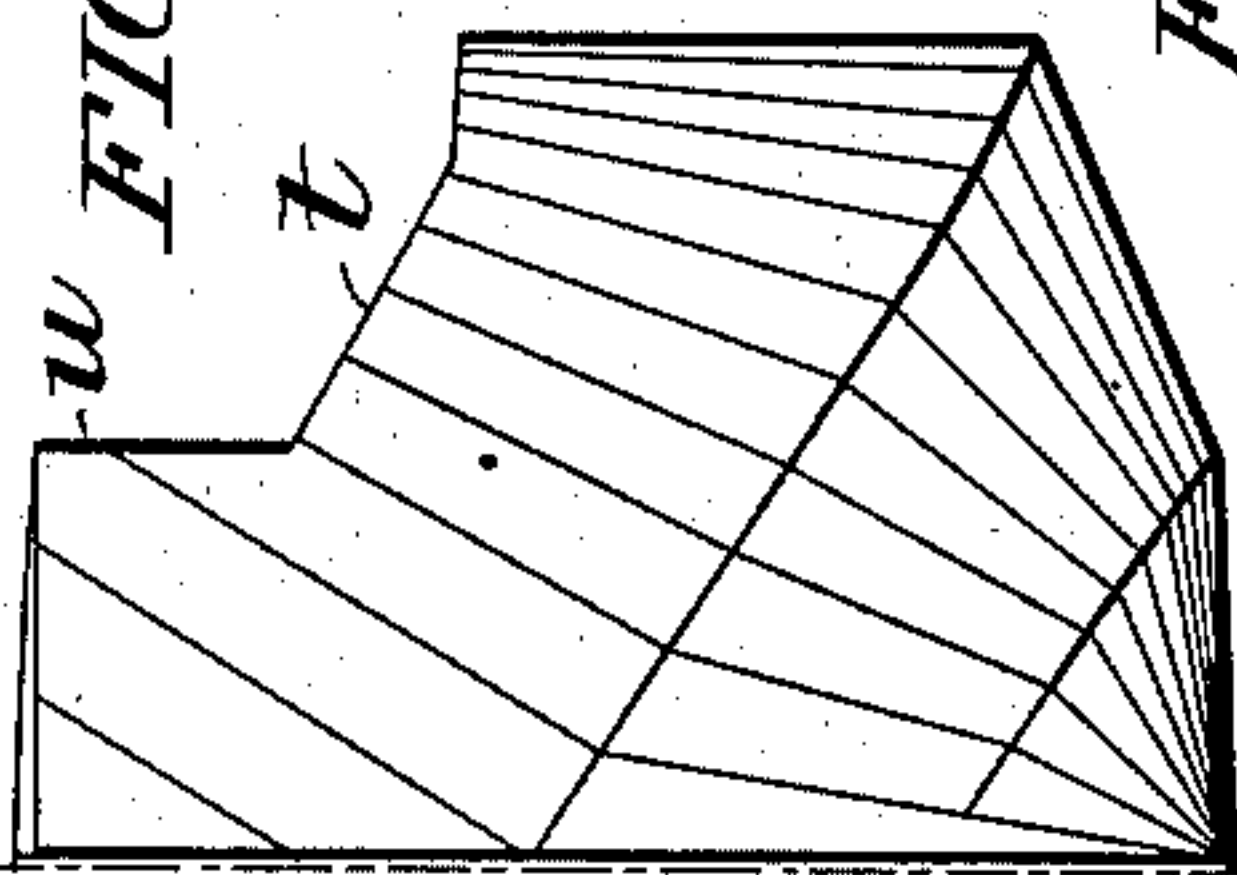


FIG. 5.

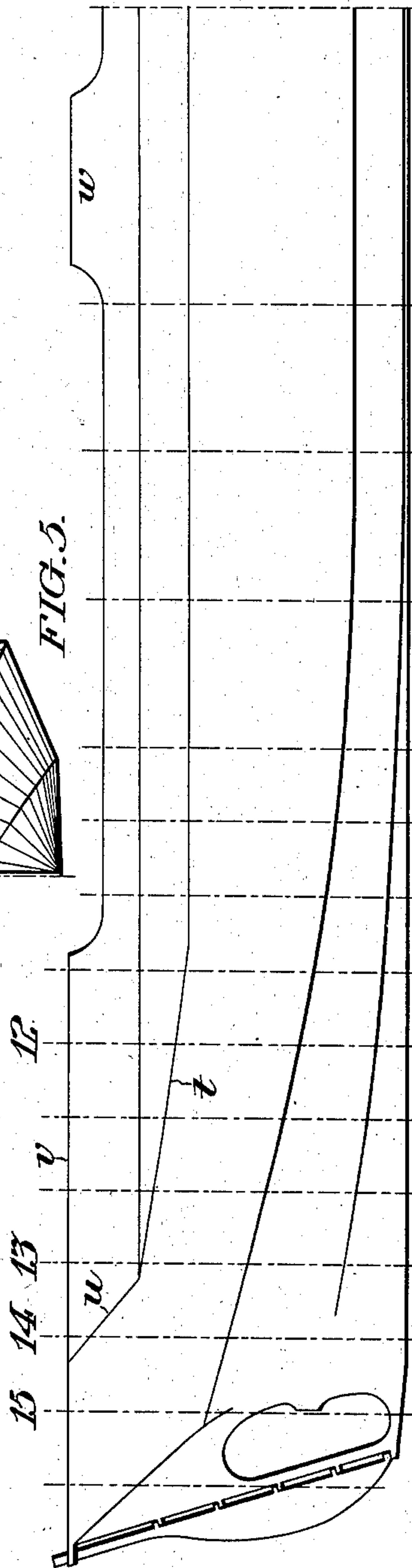
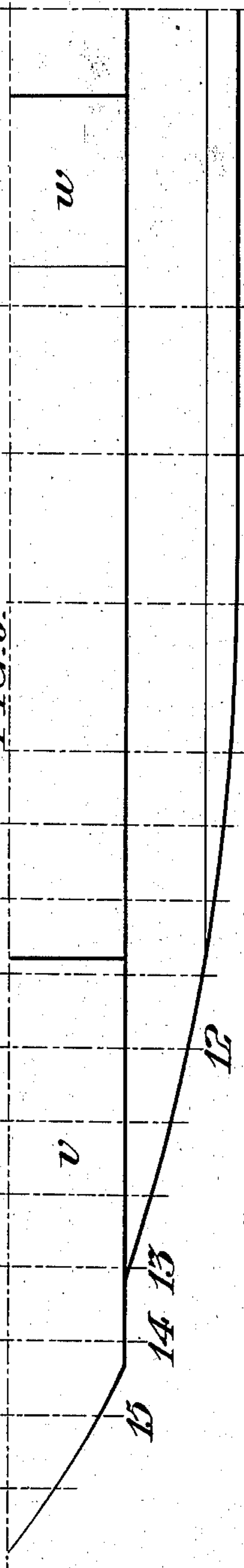


FIG. 6.



WITNESSES:

William E. Page
J. N. Dixon

INVENTOR

H. N. WHITTELSEY,

BY

W. C. Spaulding
ATTORNEY.

No. 735,637.

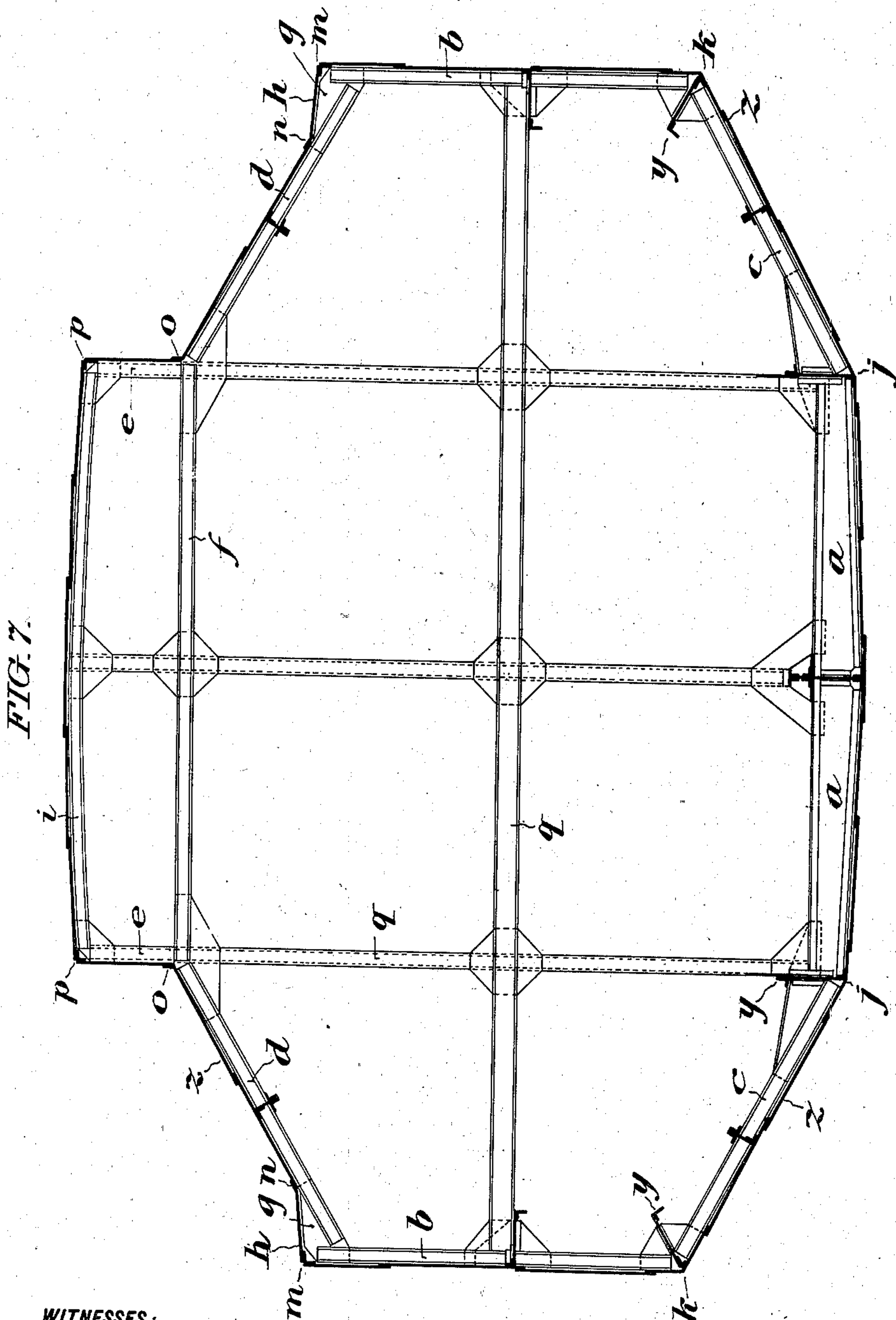
PATENTED AUG. 4, 1903.

H. N. WHITTELSEY.
VESSEL HULL.

APPLICATION FILED JUNE 6, 1902.

NO MODEL.

5 SHEETS—SHEET 3.



WITNESSES:

Arthur E. Paige
J. N. Dixon

INVENTOR

H. N. WHITTELSEY

BY

McDonald
ATTORNEY.

No. 735,637.

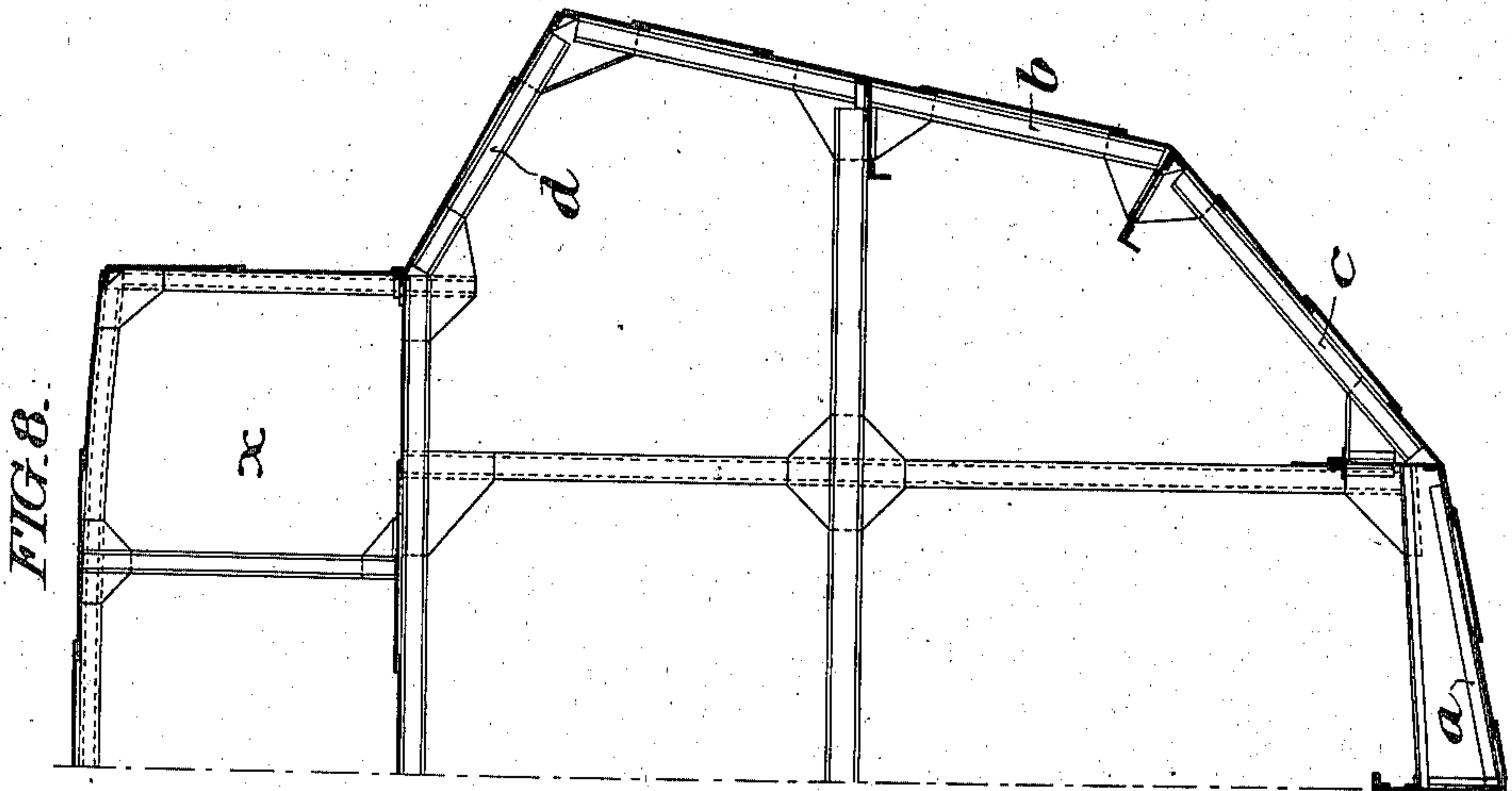
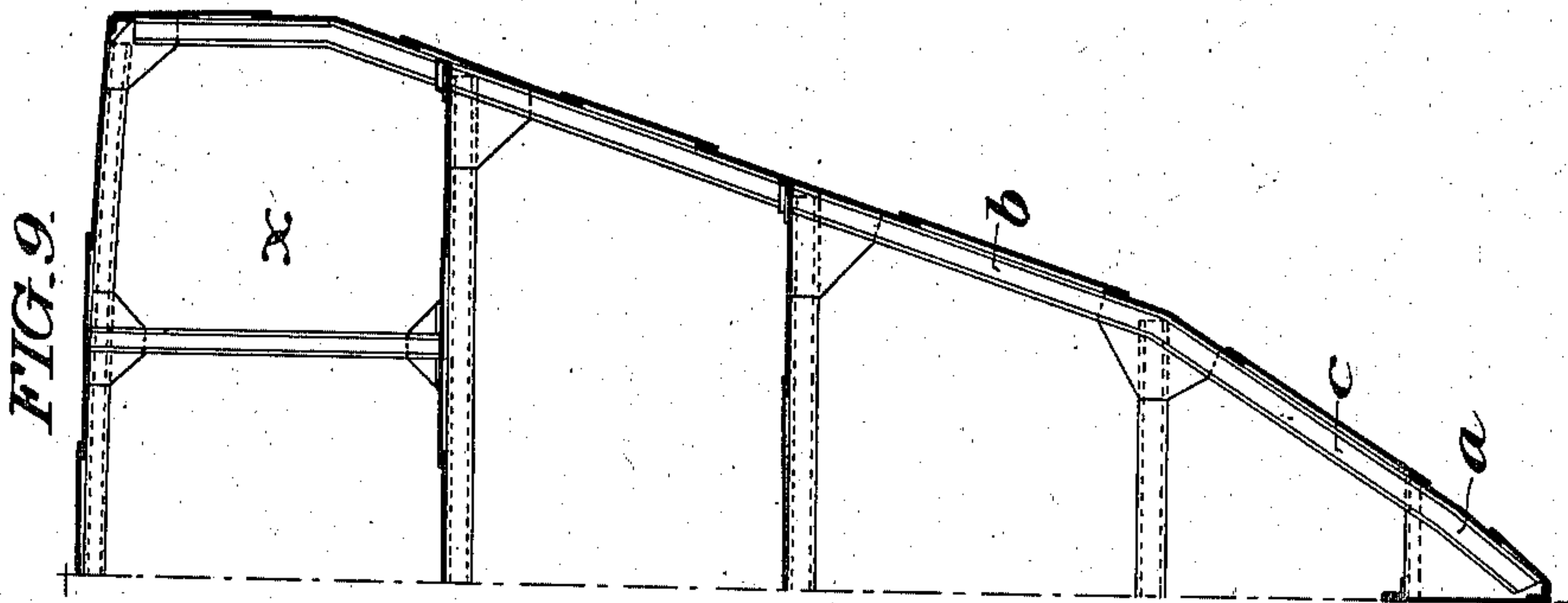
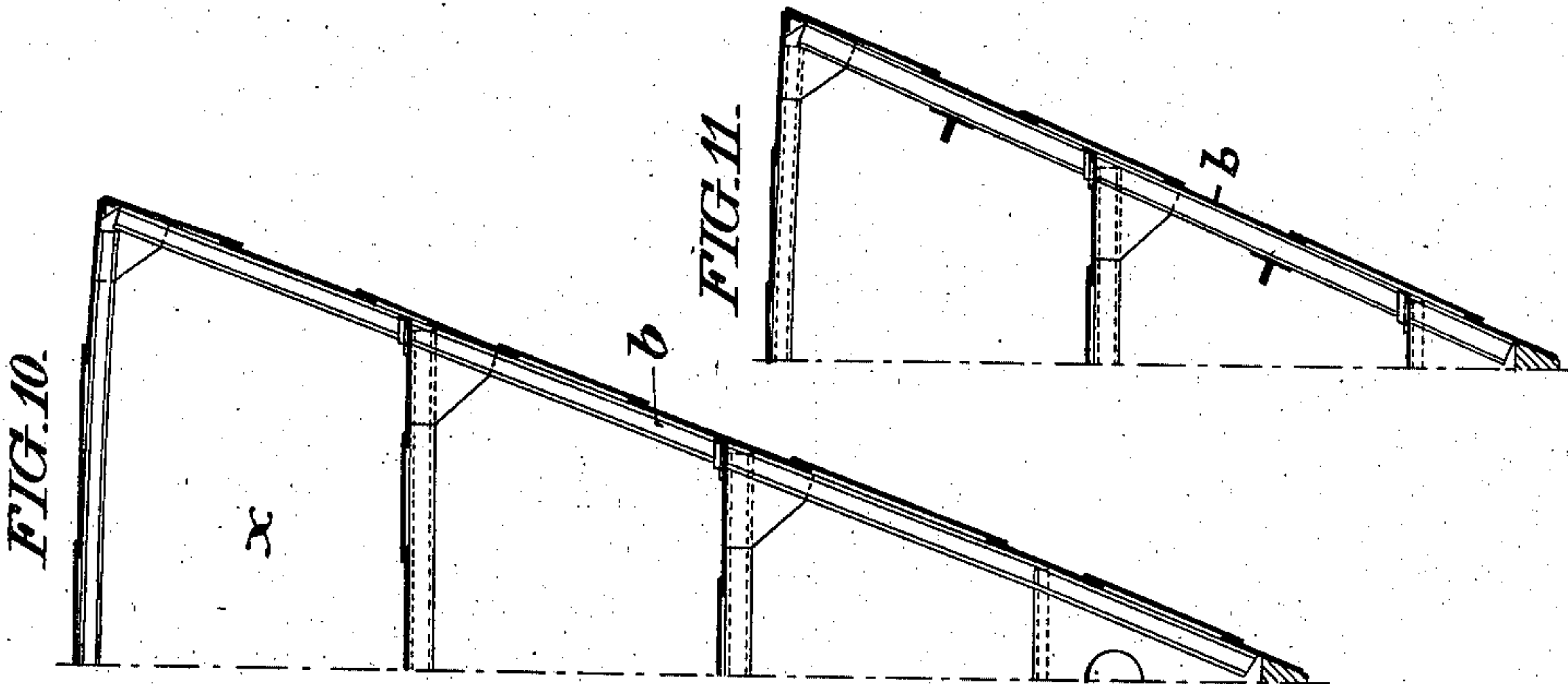
PATENTED AUG. 4, 1903.

H. N. WHITTELSEY.
VESSEL HULL.

APPLICATION FILED JUNE 6, 1902.

NO MODEL.

5 SHEETS—SHEET 4.



WITNESSES:

Victor E. Paige
H. N. Dixon

INVENTOR

H. N. WHITTELSEY,

BY

W. C. Moulton

ATTORNEY.

No. 735,637.

PATENTED AUG. 4, 1903.

H. N. WHITTELSEY.
VESSEL HULL.

APPLICATION FILED JUNE 6, 1902.

NO MODEL.

5 SHEETS—SHEET 5.

FIG. 12.

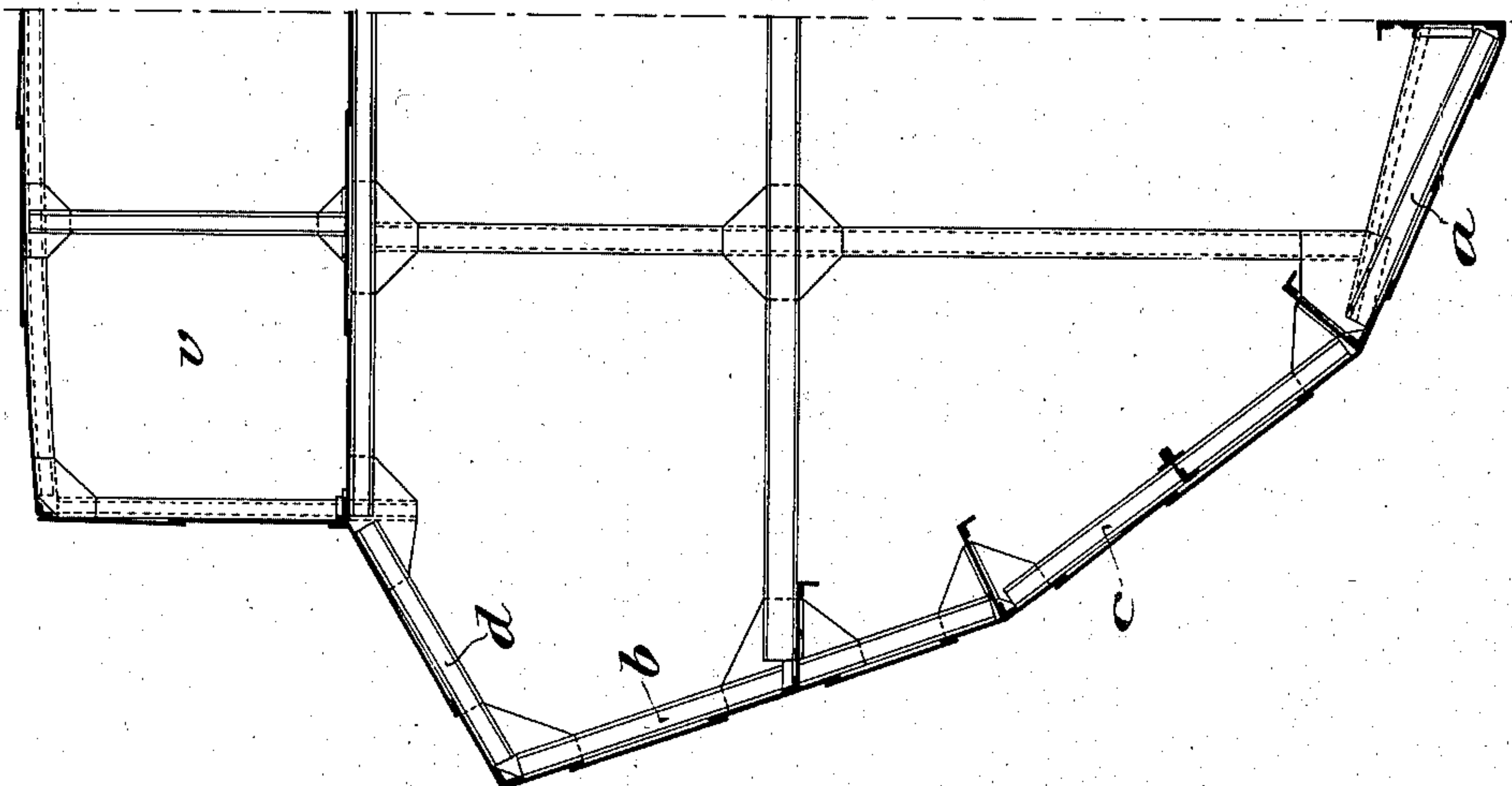


FIG. 13.

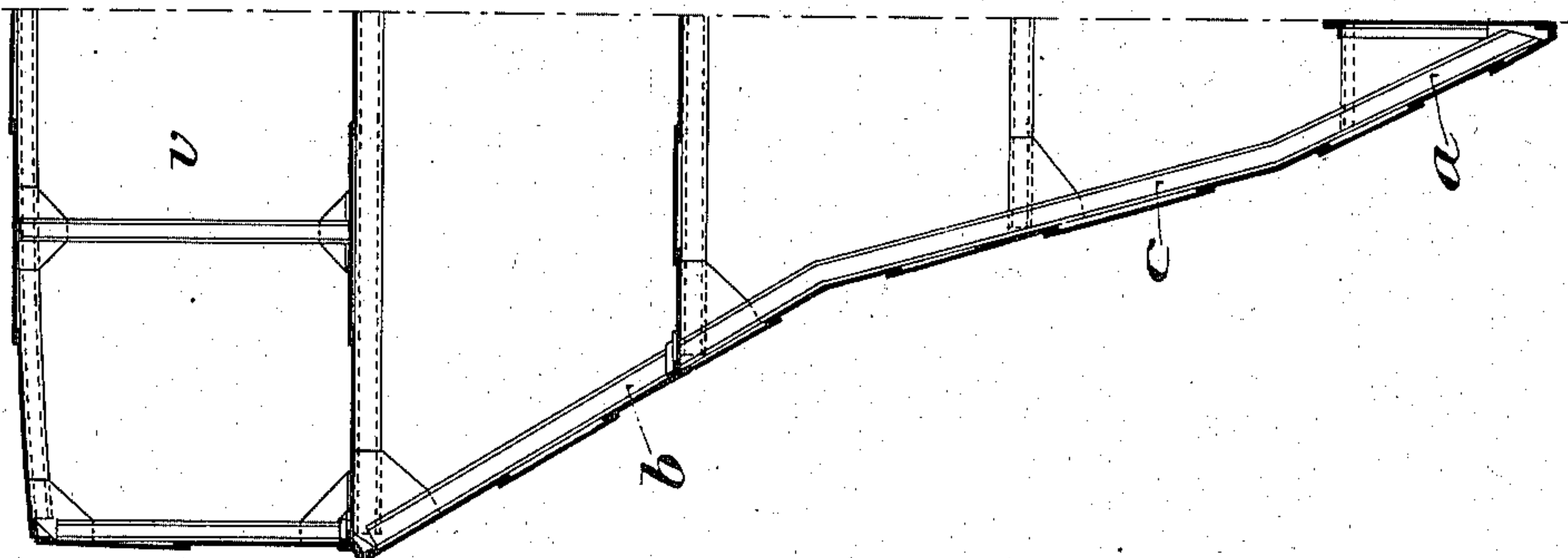


FIG. 14.

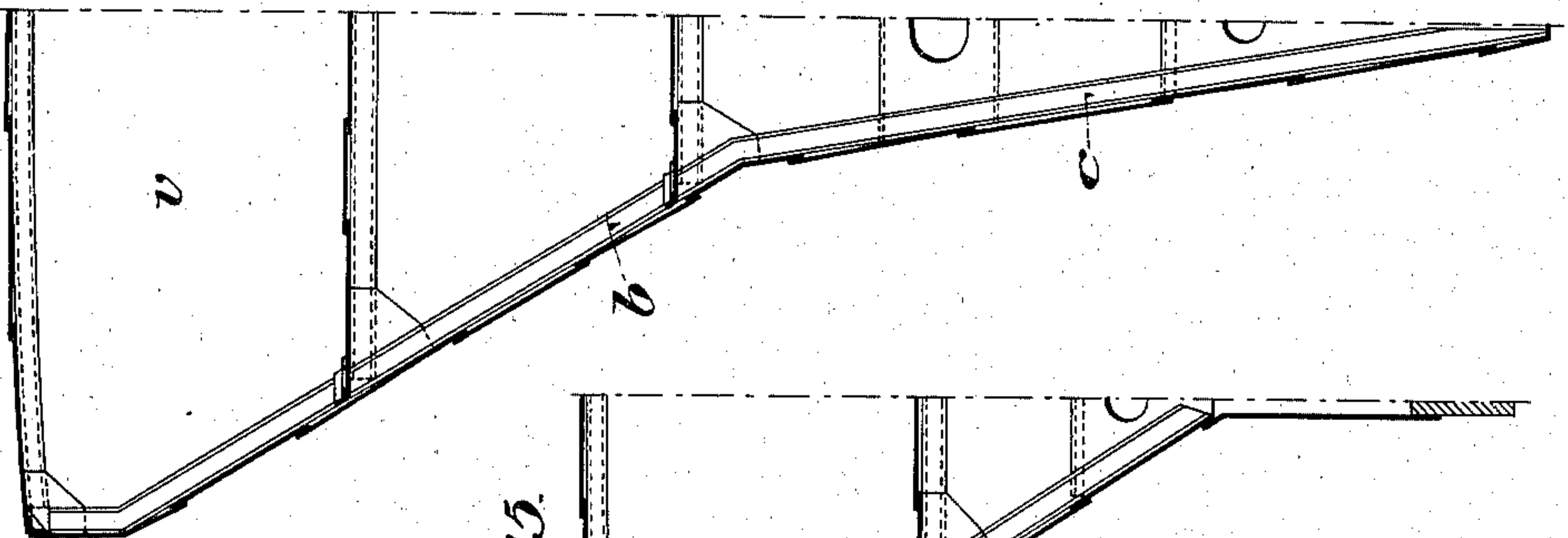
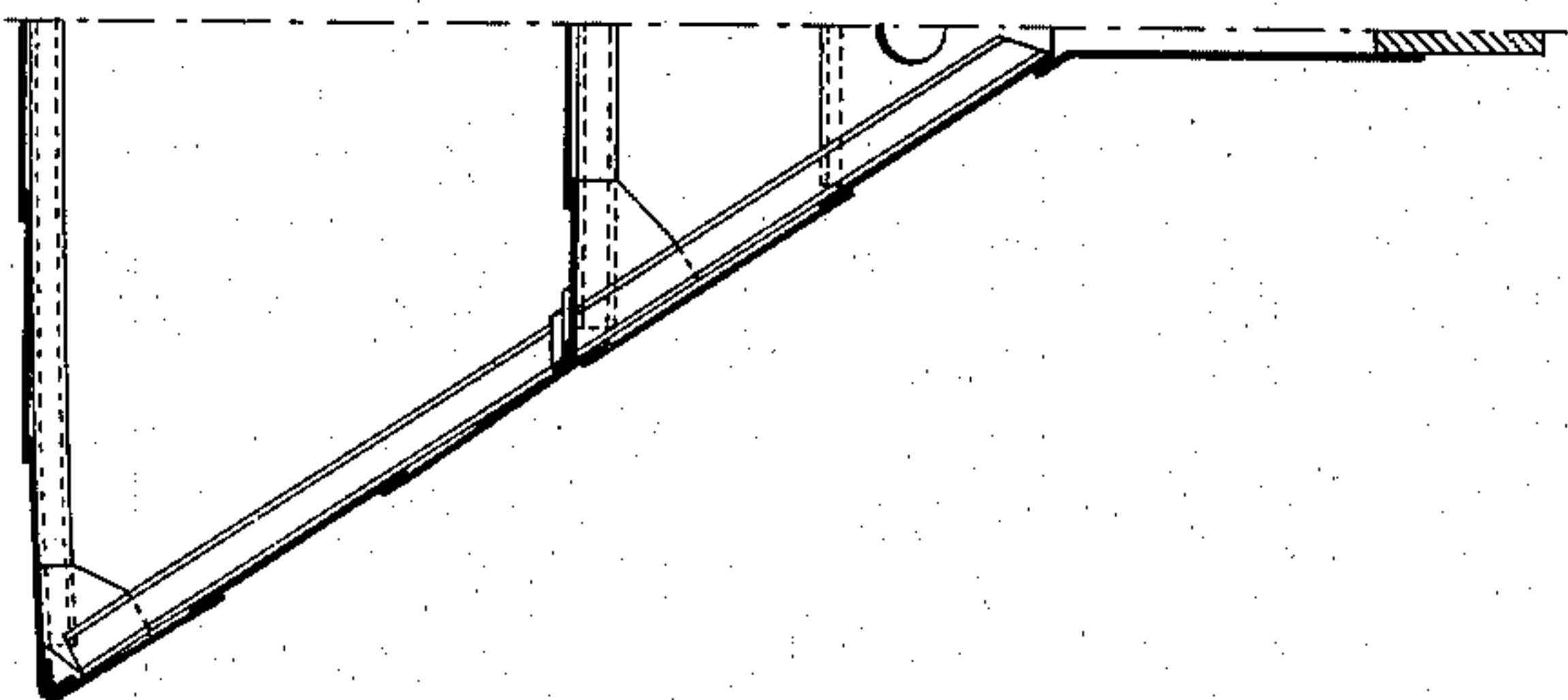


FIG. 15.



WITNESSES:

Arthur E. Paige
J. N. Dixon

INVENTOR

H. N. WHITTELSEY,

BY

W. C. Minnick
ATTORNEY.

UNITED STATES PATENT OFFICE.

HENRY NEWTON WHITTELSEY, OF CAMDEN, NEW JERSEY.

VESSEL-HULL.

SPECIFICATION forming part of Letters Patent No. 735,637, dated August 4, 1903.

Application filed June 6, 1902. Serial No. 110,530. (No model.)

To all whom it may concern:

Be it known that I, HENRY NEWTON WHITTELSEY, a citizen of the United States, residing in the city of Camden, in the county of Camden, State of New Jersey, have invented certain new and useful Improvements in Vessel-Hulls, of which the following is a specification.

In the construction of vessel hulls of steel or iron, as the same have been hitherto built, the extensive area of curved surface existing in such structures has made it necessary to employ a large number of variously shaped frame members and plates, the cost of working which, it being necessary to have them heated and specially bent in applying them to the structure, has been very considerable, and occasioned corresponding increase in the cost of construction.

It is the prime object of my invention to produce a metal hull equal in all essential particulars to vessel hulls as heretofore in use, but of reduced cost, and I carry my invention into effect by providing a vessel the frame of which is in part or altogether composed of straight or approximately straight steel or iron structural shapes not specially bent, but assembled in the framing as they may be obtained direct from the mills without reheating, and is, to enable the use of such structural shapes of special conformation, as hereinafter fully set forth.

I further carry my invention into effect by the employment of steel or iron shell plate lying flat or approximately flat in transverse section, on the framing as above described, and thus use the shell plate material as it is received direct from the mills without re-rolling to a special form, all as hereinafter fully set forth.

Vessel hulls made in accordance with my invention, and which, obviously, may be built at very much less cost than steel or iron hulls of the character heretofore in use, may be employed as either sailing or engine-driven vessels, or barges, and as freight or passenger boats.

In a vessel constructed in accordance with my invention, the quantity of material used on its top sides and outer halves of the deck will be greatly reduced, thus further saving the cost of construction and lessening the

weight which, of course, involves a proportionate increase in load or carrying capacity, or an increase in speed with given power. 55

A vessel hull embodying my invention will be especially advantageous in carrying cargoes of grain, coal, oil, or such other commodities as are carried in bulk, and more or less liable to shift in the movements of the vessel. 60

In the accompanying drawings I show, and herein I describe, a vessel frame or hull embodying my invention. Such drawing and description, however, set forth only the general features of construction and arrangement. It is to be understood that any preferred arrangement of internal construction may be resorted to in connection with my invention, and that the invention relates broadly to general features of construction and arrangement of the framing and skin rather than to details which may, of course, be varied infinitely. 65

Briefly stated, my invention, in its preferred form, comprehends the provision of a hull, the construction of which is such that the profile line, in transverse section, instead of being of the usual continuously curved form, is made up, so to speak, of a plurality of straight or approximately straight courses meeting at knuckles. 70

In the accompanying drawings, Figure I is a view in front elevation of a half hull embodying my invention. 85

Figure II is a view in side elevation of the forward portion of a hull embodying my invention.

Figure III is a plan view of the forward portion of a half hull embodying my invention. 90

Figure IV is a view, from the rear, of a half hull embodying my invention.

Figure V is a view in side elevation of the after portion of a hull embodying my invention. 95

Figure VI is a plan view of the after portion of a half hull embodying my invention.

Figure VII is a transverse sectional elevation, amidship, of a hull embodying my invention. 100

Figures VIII, IX, X, and XI, are respectively transverse sectional elevational views of the half hull shown in Figures I, II, and

III, section being supposed on the dotted lines 8, 9, 10, and 11, of Figures II and III.

Figures XII, XIII, XIV, and XV, are respectively transverse sectional elevational views of the half hull embodying my invention shown in Figures IV, V, and VI, section being supposed on the dotted lines 12, 13, 14 and 15, of said Figures V and VI.

Similar letters of reference indicate corresponding parts.

In the accompanying drawings,

As shown in the construction represented, *a*, see especially Figure VII, are a series of transversely extending structural shapes, hereinafter termed the bottom frame bars, which, in connection with suitable floor plates and reverse bars at the top edges of said plates, as clearly shown in said Figure VII, constitutes the framing for the bottom of the vessel. The frame bars, *a*, in the midship portion of the vessel, are in approximately horizontal position, and, in the vicinity of the respective ends of the structure, incline upwardly from the center line. The reverse bars throughout the length of the vessel, are preferably in horizontal position. Instead of the frame bars *a*, and the associated floor plates and reverse bars, it is manifest that heavy channel bars, I-beams, or bulb bars, could be employed. The frame bars are shown as made in two sections, extending from the center line to the respective bilge frame bars.

b represents a series of structural shapes or frame members, hereinafter termed side frame bars, which constitute the frame of the side walls of the vessel, said side frame bars being in the midship region of the vessel, arranged preferably in perpendicular position.

Such of the series of side frame bars as exist in the vicinity of the respective ends of the vessel are somewhat inclined as shown.

c represents a series of structural shapes, hereinafter termed bilge frame bars, which extend from the outer ends of the bottom frame bars *a* to the lower ends of the side frame bars *b*, the connections between the ends of the bilge frame bars and the adjacent ends of the bottom frame bars and side frame bars, respectively, being made in any preferred manner. The making of such connections is a matter within the skill of any workman versed in the art of building iron structures.

In the midship region of the vessel the bilge frame bars *c* happen to be arranged at an angle to the horizon which is more acute than the angle to the plane of the horizon at which the bilge frame bars in the vicinity of the respective ends of the vessel are placed.

d represents a series of structural shapes hereinafter termed back frame bars, which extend from points in the vicinity of the upper ends of the side frame bars *b* inwardly and upwardly to a point where they are con-

nected with the trunk side frame bars *e* and also the tie bars *f* at the base of the trunk.

g are bracket plates, conveniently of approximately triangular form, disposed above the outer ends of the back frame bars, and serving not only to firmly tie said back frame bars to the side frame bars, but also to afford a support for the plates of the side decks *h*.

The top edges of the bracket plates *g* are slightly pitched outward. The side decks *h* afford a convenient place for standing in the handling of lines while the vessel is in harbor, hold the necessary bitts, chocks, &c., and in them may be formed or provided small hatches, if considered advisable, for fuel or cargo.

The trunk side frame bars *e* would in an average vessel have a rise of from three to five feet above the back frame bars, and said trunk side frame bars connect at the top with the trunk deck bars *i*. The trunk, however, may be entirely omitted and decking thrown across the ties *f*.

j are the knuckles at the junctions of the bottom frame bars with the bilge frame bars; *k* are the knuckles at the junctions of the bilge frame bars with the side frame bars; *m* are the knuckles at the junctions of the side frame bars with the side deck and back frame bars; *n* are the knuckles at the junctions of the side decks with the intermediate portions of the back frame bars; *o* are the knuckles at the junction of the inner ends of the back frame bars with the trunk side frame bars and the tie bars *f*; and *p* are the knuckles at the junctions of the trunk side frame bars with the trunk deck frame bars *i*.

The foregoing description sets forth the main arrangements of the framing amidships and for a region extending fore and aft for a large length of the vessel.

The lay of framing in transverse sectional elevation is in straight or approximately straight lines from knuckle to knuckle. I employ the term "approximately straight," as covering a structural shape of iron or steel, to which has been imparted such slight curvature as may be given to such shapes of steel or iron while in a cold condition,—an object of my invention being the employment of structural shapes without heating them to make them conform to a given pattern.

The structural shapes, as they are termed, may be of any selected sections and dimensions. Individual frame bars may be made of a single integral bar, or of a plurality of bars, suitably united.

I show in the drawings a system of internal bracing or framing, made up of vertically and horizontally extending bars *q*. I make no claim to this system, and any preferred arrangement of internal bracing may be resorted to. The arrangement shown in Figure VII wherein the trunk side frame bars *e* are shown as extensions of certain of the members *q* is not of the essence of my construc-

tion, and said trunk side frame bars when employed may be placed in any desired arrangement and supported on any desired internal structure.

5 From a consideration of the drawings, it will be understood that, in a vessel embodying my invention in its preferred form, the customary convex, concave, and reverse curve constructions of the framing at the bow and stern
10 are dispensed with.

It will be noted in Figures I, II, and III, which show the outline of construction from the midship section or body to the stem, that all knuckles disappear before striking the
15 stem bar, and it will be again noted in Figures IV, V, and VI, which show the outline of construction from the midship section or body to the stern, that all knuckles disappear before striking the stern frame, except the one
20 at the tuck. By the "tuck" is meant the point in the stern of a vessel, where the framing and plating flare from the stern post to form the upper part of the stern.

By reference to the Figures I, II, III, IV, V,
25 and VI, which show the outline of construction of the entire vessel, it will be seen that the lower portion of the midship section construction up to the knuckles *g* extends fore and aft without material change, and merges
30 into the construction at the bow and stern in fair longitudinal lines. By reference to the same figures it will be seen that the upper portion of the construction of the midship section, from the knuckles *g* to the trunk, and
35 which includes the side deck and the inclined back, extends without material change fore and aft, until it intersects so to speak, the bow and stern construction, forming the knuckles *r*, *s*, Figure II, and *t*, *u*, Figure V.
40 The poop *v*, bridge-houses *w*, and forecastle *x*, may be and are shown as constructed of the same width as the trunk and constituting continuations of it. The construction of the forecastle is shown in Figures VIII, IX, X,
45 and XI, and the construction of the poop is shown in Figures XII, XIII, XIV, and XV.

The construction of the stern above water is shown by Figures XII, XIII, XIV, and XV, and the outline of construction Figures IV,
50 V, and VI, would have generally the characteristic of being pointed on the deck line aft, instead of round and the further characteristic of not having the overhang behind the sternpost, which is usual in vessels built for
55 the hereinbefore named purposes, but it is understood that I may build the stern above water in any preferred manner.

In the construction of a vessel according to this invention, the knuckles may, of course,
60 be either angular or rounded in section.

In the construction of a vessel according to this invention, intended for oil or liquid cargo, the customary method of substituting a center-line fore and aft bulkhead for the center-
65 line fore and aft line of stanchions would be resorted to. It is also noted that the vessel may be constructed with the ordinary inner

or double bottom or not, according to requirements, without affecting the spirit of this invention. The drawing happens to illustrate
70 a single and not a double bottom construction.

The engine and boiler rooms and fuel bunkers in these vessels when intended to have steam power may be in the stern behind the cargo space or amidships. The officers' and
75 crew's quarters, passengers' cabins may be forward, amidships or aft according to circumstances.

In a frame made up of approximately straight structural shapes arranged without
80 heating in transversely extending courses,—in connection, of course, with suitable longitudinally extending frame members *y* arranged in any desired relation to the said transversely extending straight structural
85 shapes,—inheres very great and important economic advantages in the construction of the frame itself. Incident to such construction is the further very great and important
90 advantage that the shell plate *z* applied to said frame, may be applied in the form in which it is received from the mills, except for such straightening out of buckles as may be necessary at the yard.

The skin of the vessel is in fact made up of
95 longitudinally extending steel or iron plates termed shell plate *z*, which may be applied in the overlapped arrangement indicated in the drawings, and riveted to the frame in any desired manner. It will be found advantageous
100 to so apply the metal plates that their longitudinally extending laps do not coincide with the knuckles or joints at the meeting ends of the transversely extending frame bars, so that each knuckle may be covered or
105 protected by the body of a metal plate.

As will be understood from a comparison of Figures VII with Figures I, II, III, VIII, IX, X, and XI, the bottom frame bars become successively shorter in the region of the bow
110 of the vessel, and the respective ends or halves thereof assume an upwardly extending angular position so that when the region in the vicinity of the section line 9 (Figure II) is reached, said bottom frame bars may be
115 made as integral continuations of the bilge frame bars, and said bilge frame bars as integral continuations of the side frame bars, said bottom frame bars, bilge frame bars and side frame bars at a point close to the bow
120 being arranged in an approximately straight continuous line at an angle of about twenty degrees from the vertical.

From a comparison of Figure VII with Figures IV, V, VI, XII, XIII, XIV, and XV, it
125 will be seen that in the stern portion of the vessel, the inclination of the side frame bars, bilge frame bars, and the respective ends of the bottom frame bars is such that an end of a bottom frame bar and a bilge frame bar, at
130 the section line 13, are so nearly in line with each other and with a side frame bar that all three of said members may be formed as a single integral bar, the side frame bar and

the bilge bar forming, however, a concavity owing to the overhanging of the side frame bar, said concavity becoming more marked at the section line 14, while at the section line 15, the bottom frame bars have reached the vanishing point.

The exterior faces of the series of side frame bars, of the series of bilge frame bars, and of the series of back frame bars, and of the bottom frame bars, are throughout the main body of the vessel arranged so that each series is at an angle with respect to the adjacent series, the result being that the exterior of the hull of the vessel presents the aspect (the plates, of course, attached to the bars following their conformation, except, of course, where said plates form the side decks, being attached to the side deck brackets) of a series of facets or panels, approximately flat in transverse section, and the back frame panels, side panels, bilge panels, and bottom panel or panels, extend forward and aft, with but little change in the relation of one panel to another, except at points at the bow and stern where the special bow and stern construction illustrated in the drawings may be resorted to.

It will be seen that while the vessel constructed in accordance with this invention has the advantage of a seaworthy bow and stern it has also the advantage of having none of the usual decks upon which water would lodge.

Its unusual structural plating allows an increase in strength and a large reduction in the quantity of material used.

The vessel as above described is intended to be constructed of steel, or iron, and built for a steam or sail vessel or barge for the particular purpose of carrying cargo or passengers.

When in the claims I refer to vessels of iron or steel, I refer to vessels the frame bars and shell plate of which are formed of iron or steel or their alloys, and when I refer to the frame bars, I intend such term to cover beam-like or bar-like structures of iron or steel, or their alloys, straight or approximately straight, of the character termed in the art structural shapes.

Having thus described my invention, I claim—

1. An iron or steel vessel hull, embodying a series of transversely extending bottom frame bars, a series of side frame bars, the lower ends of which latter exist a considerable distance above the bottom frame bars, a series of bilge frame bars formed separately from and extending from the bottom frame bars to the side frame bars, the bottom frame bars at the midship region of the vessel being approximately horizontal, the side frame bars at such region being approximately vertical and the bilge frame bars being at such region at a suitable angle to extend from the bottom frame bars to the side frame bars, knuckles being formed at the junctions of the bilge

frame bars with the bottom frame bars and side frame bars, said frame bars having shell plate applied thereto. 70

2. A steel or iron vessel hull embodying, in its construction, a series of straight or approximately straight approximately vertical side frame bars, a series of transversely extending bottom frame bars, and a series of straight or approximately straight bilge bars formed separately from and arranged between said side frame bars and said bottom frame bars, and arranged at an angle to both, and shell plate applied to the exteriors of said bars. 75 80

3. A steel or iron vessel hull embodying in the construction of its body portion a series of approximately vertical side frame bars, a series of inclined back frame bars, and side deck brackets, said side bars and back frame bars consisting of straight or approximately straight structural shapes formed separately but connected together by suitable means, substantially as set forth. 85 90

4. In a steel or iron vessel hull, in combination, two series of vertically disposed side bars, two series of back frame bars, said back frame bars terminating at the outer ends below the upper ends of the side bars, suitable supports for the inner ends of said back frame bars, said back frame bars and said side frame bars consisting of structural shapes, and metal covering plates applied to said bars. 95 100

5. In a steel or iron vessel hull, in combination, two series of vertically disposed side frame bars, two series of back frame bars, said back frame bars terminating at the outer ends in the vicinity of the upper ends of the side bars, suitable supports for the inner ends of said back frame bars, the inner ends of the back frame bars being considerably above their outer ends, metal plates applied to said side frame bars and to said back frame bars, a portion of the covering formed by said metal plates, extending over the outer ends of the back frame bars being arranged in approximately horizontal position to form a side deck. 105 110

6. A steel or iron vessel hull the body portion of which is made up or composed of the bottom, bilge, and side panels, each panel being composed of a series of transversely extending approximately straight structural shapes, the shapes of each series being formed separately from the bars of the adjacent series and united thereto by suitable means, and metal shell plates applied to all said shapes. 115 120

7. A steel or iron vessel hull the middle body of which is made up of the bottom, bilge, and side panels, united with any suitable longitudinally extending frame members, each of such panels being composed of a series of straight or approximately straight structural shapes, and metal shell plates applied to the exterior of said shapes, the structural shapes of each series being formed separately from and connected to those of the adjacent series by any suitable means. 125 130

8. A steel or iron vessel hull the middle portion of which comprises the bottom, bilge, side, and back frame, panels, each panel being composed of a series of transversely extending structural shapes, the members of each series being formed separately from and suitably united to but arranged at an angle with reference to the shapes of the adjoining series, suitable longitudinally extending frame members connected with said transversely extending members and metal shell plates applied to the exterior of said transversely extending shapes.

9. A steel or iron vessel, the respective sides of which at the bow are straight or approximately straight in transverse section and are inclined to each other in approximately V-shaped relation and which, to the rear of the stem bar and forward of the midship region, are each composed of a series of panels flat in transverse section and having knuckles at their junctions, which panels merge into the midship section of the vessel.

10. A steel or iron vessel, the respective sides of which at the stern are straight or approximately straight in transverse section and are inclined to each other in approximately V-shaped relation and which, forward but in the region of the stern frame, are each composed of a series of panels flat in transverse section and having knuckles at their junctions, which panels merge into the midship section of the vessel.

11. A steel or iron vessel hull, embodying in its construction a series of side frame bars, consisting of straight or approximately straight structural shapes, a series of back frame bars, consisting of straight or approximately straight structural shapes and arranged at an obtuse angle to the side frame bars first mentioned and with their outer ends below the upper ends of said side frame bars, connecting devices for the adjacent ends of said side frame bars and back frame bars, and extending above the level of the outer ends of said back frame bars, and shell plate applied to the exteriors of said side frame bars and back frame bars, following the contour of the said side frame bars and the contour of the upper and inner portions of the back frame bars, but in the region of the outer ends of the back frame bars extending in an approximately horizontal plane to form a side deck.

12. A steel or iron vessel hull, embodying in its construction a series of side frame bars, consisting of straight or approximately straight structural shapes, a series of back frame bars, consisting of straight or approximately straight structural shapes and arranged at an obtuse angle to the side frame bars first mentioned and with their outer ends below the upper ends of said side frame bars, bracket plates connected to the adjacent ends of said side frame bars and back frame bars, and extending above the level of

the outer ends of said back frame bars, and shell plate applied to the exteriors of said side frame bars and back frame bars following the contour of the said side frame bars and the contour of the upper and inner portions of the back frame bars, but in the region of the outer ends of the back frame bars extending in an approximately horizontal plane to form a side deck, said bracket plates forming a support for the shell plate which constitutes the side decks.

13. In a steel or iron vessel hull, in combination, two series of bottom frame bars, two series of bilge frame bars, two series of side frame bars, two series of back frame bars, two series of side deck brackets, two series of side trunk frame bars, a series of trunk deck frame bars, said bars each consisting of a transversely extending straight or approximately straight structural shape, the bars of each series being at an angle with respect to the bars of the two adjacent series, knuckles being formed at the junction of the bars of each series with the bars of the adjacent series, metal shell plate applied to the exterior of all of said series of frame bars, and longitudinally extending frame bars combined and arranged in any desired manner with said transversely extending frame bars, substantially as set forth.

14. A steel or iron vessel, the respective sides of which in transverse section at the bow, are straight or approximately straight and inclined to each other in approximately V-shaped relation, and which to the rear of the stem bar and forward of the midship region in transverse section are made up of series of flat panels having knuckles at their junctions, which panels merge into the midship section of the vessel, said panels each consisting of a series of structural shapes at right angles to the longitudinal axis of the vessel and covered by shell plate.

15. A steel or iron vessel, the respective sides of which in transverse section at the bow, are straight or approximately straight and inclined to each other in an approximately V-shaped relation, and which, to the rear of the stem bar and forward of the midship region in transverse section, are made up of series of flat panels having knuckles at their junctions, which panels merge into the midship section of the vessel, said panels each consisting of a series of structural shapes covered by shell plate.

16. A steel or iron vessel the respective sides of which in transverse section at the stern, are straight or approximately straight and inclined to each other in approximately V-shaped relation and each of which forward of but in the region of the stern frame in transverse section is composed of a series of flat panels having knuckles at their junctions, which panels merge into the midship portion of the vessel, said panels being each composed of a series of straight or approxi-

mately straight structural shapes extending transversely of the longitudinal axis of the vessel and covered by shell plate.

5 17. A steel or iron vessel hull the middle portion of which comprises the bottom, bilge, side, and back frame, panels, each panel being composed of a series of transversely extending structural shapes, the members of each series being formed separately from and suitably united to but arranged at an angle with reference to the shapes of the adjoining series, suitable longitudinally extending frame members connected with said transversely extending members and metal shell plates applied to the exterior of said transversely extending shapes, said shell plates forming side decks in the region of the outer ends of the back frame bars, and suitable supports for said side decks.

18. A steel or iron vessel the lower portion of the midship region of which is composed

of transversely extending frame bars or members formed of straight or approximately straight structural shapes, metal shell plate applied thereto, said frame bars being arranged in independent series, the members of each series being formed separately from and arranged at an angle with respect to the members of an adjacent series, certain of said members being arranged to form the bottom of the vessel certain of them to form the sides of the vessel, and certain of them to form the bilge of the vessel intermediate of the bottom and sides.

In testimony that I claim the foregoing as my invention I have hereunto signed my name this 3d day of June, A. D. 1902.

HENRY NEWTON WHITTELSEY.

In presence of—

S. SALOME BROOKE,
THOS. K. LANCASTER.