

No. 834,234.

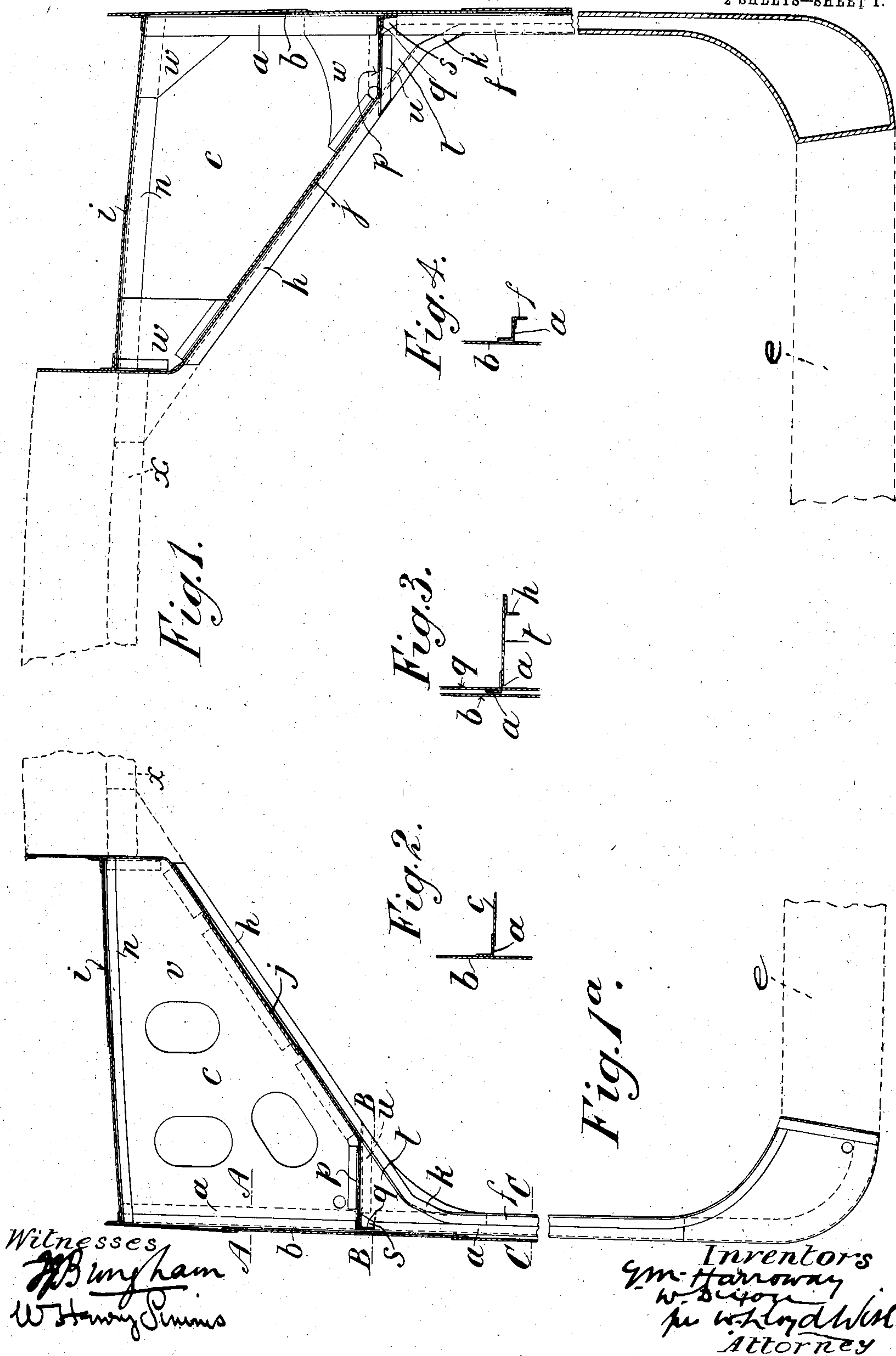
PATENTED OCT. 23, 1906.

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SHIP CONSTRUCTION.

APPLICATION FILED JAN. 13, 1905.

2 SHEETS—SHEET 1.



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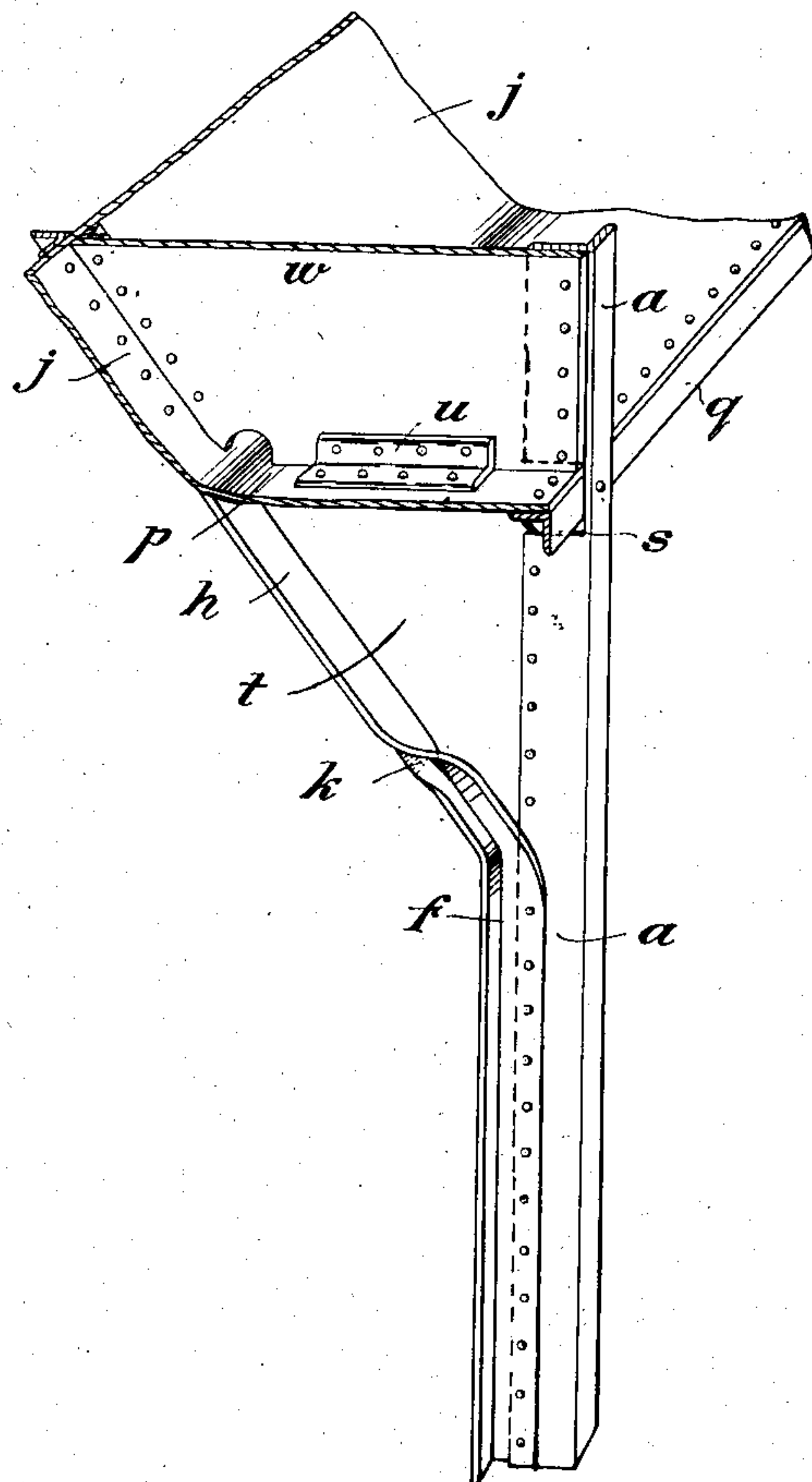
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2 SHEETS—SHEET 2.

Fig. 5.



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UNITED STATES PATENT OFFICE.

GEORGE MITCHELL HARROWAY AND WAYNMAN DIXON, OF MIDDLESBROUGH, ENGLAND.

SHIP CONSTRUCTION.

No. 834,234.

Specification of Letters Patent.

Patented Oct. 23, 1906.

Application filed January 13, 1905. Serial No. 240,904.

To all whom it may concern:

Be it known that we, GEORGE MITCHELL HARROWAY and WAYNMAN DIXON, subjects of the King of Great Britain and Ireland, residing at Middlesbrough, in the county of York, England, have invented Improvements in Ship Construction, of which the following is a specification.

This invention has for its object to improve the construction of ships of the type wherein there are longitudinal water-tight side chambers in the upper part of the ship.

With a view of producing a ship of the type mentioned that will possess, *inter alia*, great longitudinal and transverse strength we in the construction thereof provide at each side of the ship what we call "cantaliver-frames," in each of which a frame-bar, to which the corresponding portion of the skin or shell plating of the vessel is attached and which extends up to form part of the framing of the corresponding top side chamber, is suitably secured at its lower end to the bottom, and there is riveted to the frame-bar the lower portion of a reverse angle-bar whose upper portion inclines inwardly from the frame-bar up toward the deck and has riveted to it the inner side plating of the top side chamber.

In order to enable the reverse bar to be riveted as required to the top chamber side plating the reverse bar has a twist of a quarter of a revolution (ninety degrees) between where it is attached to the frame-bar and the part in question. The height to which the attachment of the reverse bar to the frame-bar will be carried will depend upon the design and the purpose of the vessel.

The top side chamber or chambers at each side of the vessel is or are formed partly by the skin or shell plating and partly by fore-and-aft plating. This plating comprises, first, a deck portion which extends between the upwardly-diverging portions of the frame-bars and reverse bars and is supported by appropriate deck-beams each extending between and rigidly secured to the upper ends of a frame-bar and a reverse bar; second, a side portion which is riveted to the inwardly-inclined upper portions of the reverse-bars, and, third, a bottom portion which extends outwardly from the side portion to the frame-bars and is suitably secured to the shell, as by means of fore-and-aft angle-bars, which are inserted in gaps made in the inwardly-pro-

jecting flanges of the frame-bars and are riveted to the shell. The bottom portion of the plating which is riveted as aforesaid to the inwardly-diverging portions of the reverse bars is supported by bracket-knees riveted to the inwardly-projecting flanges of the frame-bars and to angle-bars riveted to the bottom portion of the plating.

In order that others skilled in the art may be enabled to make and use our invention, we now proceed to more fully describe the same with reference to the accompanying illustrative drawings, whereof—

Figure 1 is a cross-sectional view of one side of a ship, showing one form of our invention. Fig. 1^a is a similar view showing a modification of certain features of the invention. Fig. 2 is a horizontal section on the line A A of Fig. 1^a. Fig. 3 is a horizontal section on line B B of Fig. 1^a. Fig. 4 is a horizontal section on the line C C of Fig. 1^a. Fig. 5 is a perspective view drawn to a larger scale than Figs. 1 to 4, inclusive, showing portions of a frame-bar and a reverse-bar at and near their point of divergence and parts of the stringer-bar and of the fore-and-aft plating attached thereto.

In each cantaliver-frame *a* is a frame-bar secured at its lower end to the bottom and having riveted to it the corresponding portion of the skin or shell plating *b* of the vessel, the bar and plating extending upward and forming the outer wall of the corresponding top side chamber *c*. To the left in Fig. 1 one mode of attaching the frame-bars *a* to the bottom is illustrated; but any other known or convenient form of such attachment may be adopted in building a ship according to this invention.

f h represent a reverse angle-bar. Its lower portion *f* is riveted to the frame-bar *a* and its upper portion *h* inclines inwardly from the frame-bar *a* up toward the deck *i* and has riveted to it the plating *j*, so that the bars and plating form the inner side wall of said chamber *c*.

k is a twist of, say, ninety degrees in the reverse bar *f h* to enable the top side plating *j* to be riveted to said bar.

As already stated, the height to which the attachment of the reverse bar *f h* to the frame-bar *a* will be carried will depend upon the design and purpose of the vessel.

i is a deck-plating; *n*, deck-beams supporting said plating and each extending between

and rigidly secured to the upper ends of a frame-bar *a* and a reverse-bar *f h*.

p is a bottom portion of plating. It extends outwardly from the side portion *j* to the frame-bars *a* and is suitably secured to the shell, as by means of fore-and-aft angle-bars *q*, which are inserted in gaps *s*, made in the inwardly-projecting flanges of the frame-bars *a*, and are riveted to the shell *b*, the bottom portion *p* of the plating *j* which is riveted, as aforesaid, to the inwardly-diverging portions *h* of the reverse-bars is supported by bracket-knees *t*, riveted to the inwardly-projecting flanges of the frame-bars *a* and to angle-bars *u*, riveted to the bottom portion *p* of the plating. For strengthening purposes gusset or web plates *v* or corner-bracket plates *w* are secured in the chambers *c* between the upwardly-diverging portions of the frame-bars *a* and of the reverse-bars *f h*.

The upper portions of inwardly-projecting cantaliver-frames at opposite sides of the ship are connected together where required by light thwartship-girders *x*, Fig. 1, abutting against their inner ends, and in this way a double cantaliver structure of great transverse strength is produced. The fore-and-aft plating *i j p* of the top side chambers and the cantaliver-frames form on each side of the ship a box-girder which overhangs the hold and even where cantaliver-frames are opposite to a hatchway, and consequently without a connecting-beam *x*, is of such strength as in many cases to obviate the necessity for any pillaring, and so provides an absolutely clear hold. It will be seen that each cantaliver-frame is continuous from the double bottom *e* or floor-plate to the top of the corresponding top side chamber, both at the outer side of the latter and at the inner side thereof.

The water-tight chambers *c*, constructed as described, besides adding greatly to the strength of the ship and being available, if required, for water-ballast, are of great advantage when empty (except of course as regards air) and the ship is loaded, and in such case will give additional buoyancy to the ship.

What we claim is—

1. In a ship construction, a plurality of transverse cantaliver-frames which form the main framing of the ship and are arranged at the sides thereof and to which the skin may be secured and each of which comprises an outside stiffening flanged member, an inwardly-diverging flanged member secured to said outside member at the bottom thereof and twisted intermediate of its length to receive the plating of a top side water-tight chamber, and a third member connecting the tops of the aforesaid members.

2. In a ship construction the combination with a plurality of transverse cantaliver-frames forming the main framing of the ship

and arranged at the sides thereof and each comprising an outside frame-bar, a twisted angle-bar secured below its twists to said frame-bars and divergent therefrom above its twist, and a connecting-bar for the aforesaid divergent bars, of longitudinal plating secured to the divergent portions of said frames and forming with the deck-plating a continuous chamber suitable for containing water-ballast.

3. In a ship construction the combination with a plurality of transverse cantaliver-frames forming the main framing of the ship and arranged at the sides thereof and each comprising an outside flanged member having a gap made in its inwardly-projecting flange to receive a fore-and-aft stringer-bar, an inwardly-divergent twisted flanged member secured to said outside member, and a third connecting member for aforesaid members, of longitudinal plating secured to the outer sides of the inwardly-divergent members and to the outsides of the outside members, deck-plating secured to the connecting members of the cantaliver-frames, stiffening-plates connecting the divergent parts of the frames, angle-bars connecting said stiffening-plates to the longitudinal plating, and longitudinal stringer-bars located in the gaps of the outside members of the cantaliver-frames.

4. A ship having top side water-tight chambers and comprising side frames each of which has an upwardly-extending lower part and a part extending inwardly and upwardly from said lower part, skin-plating riveted to said lower part and extending upwardly therefrom to form the outer wall of the corresponding water-tight chamber, fore-and-aft plating riveted to said inwardly and upwardly extending part and secured in a water-tight manner to said skin-plating above where said inwardly and upwardly extending part diverges from said upwardly-extending part, an upwardly-extending bar located opposite to said inwardly-diverging part and having said skin-plating riveted to it above where said fore-and-aft plating is secured to said skin-plating, deck-plating secured in a water-tight manner to said fore-and-aft plating and to said skin-plating, transverse stiffening means secured to said fore-and-aft plating, said deck-plating, and said skin-plating, and thwartship-girders connecting together the upper parts of the cantaliver structures thus formed on opposite sides of the vessel and forming struts so as to enable pillars and cross-ties in the hold to be dispensed with.

Signed at Middlesbrough this 29th day of December, 1904.

GEORGE MITCHELL HARROWAY.
WAYNMAN DIXON.

Witnesses:

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HENRY LISTER.