(No Model.) 4 Sheets—Sheet 1

A. McDOUGALL.

FRAME WORK FOR VESSELS.

No. 456,586. Patented July 28, 1891.

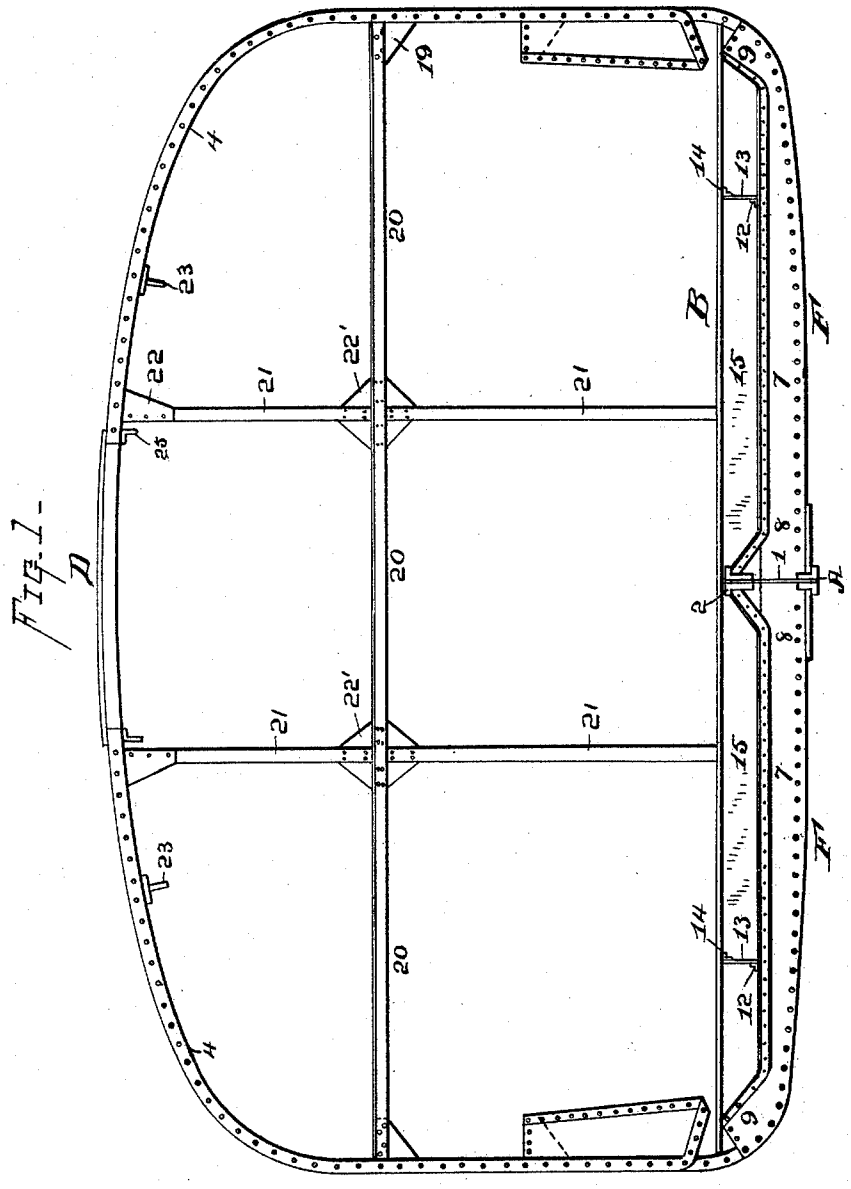

FIG. 1.

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Fig. 2.

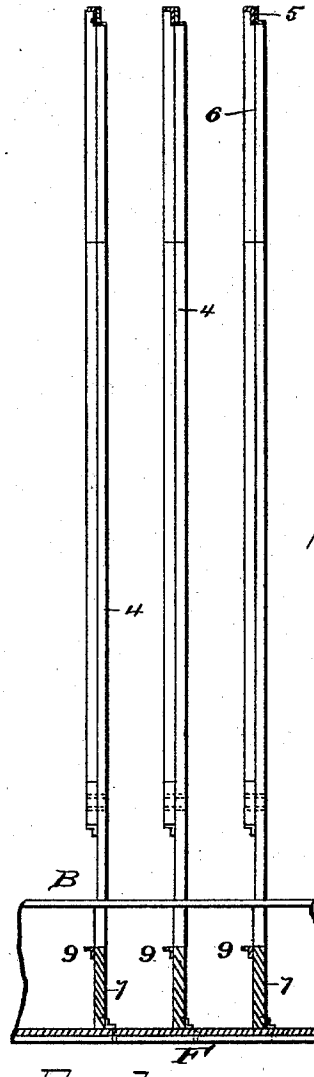


Fig. 7.

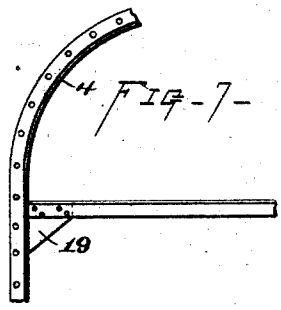


Fig. 8.

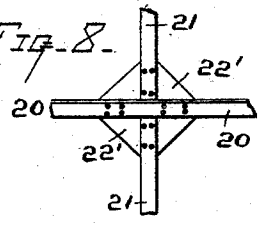


Fig. 9.

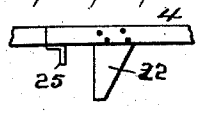


Fig. 5.

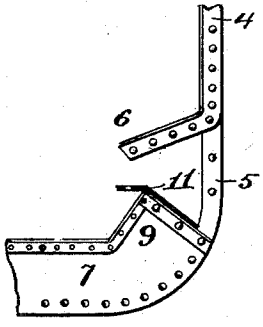
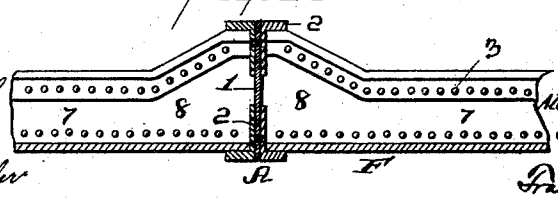


Fig. 3.



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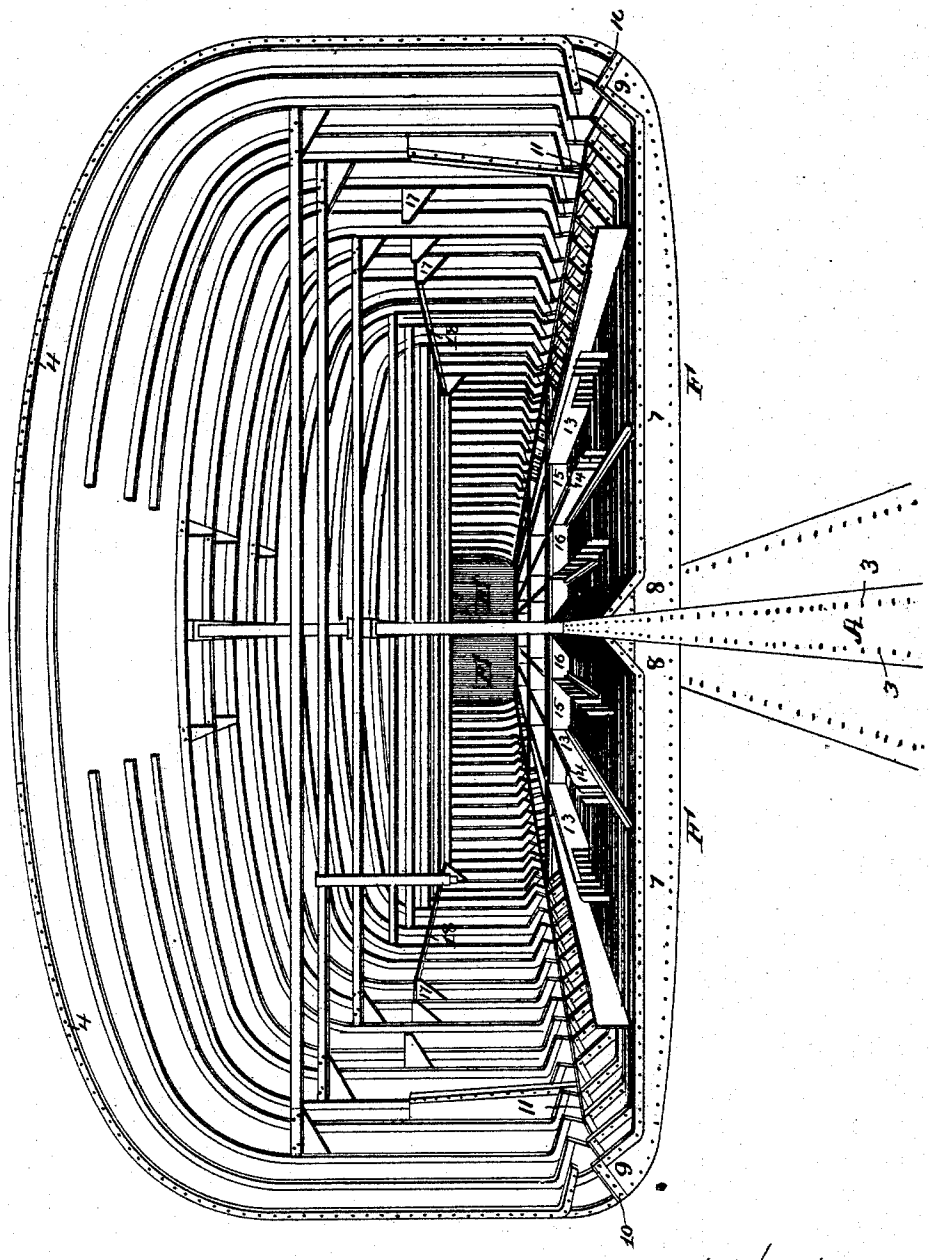

Fig. 4.

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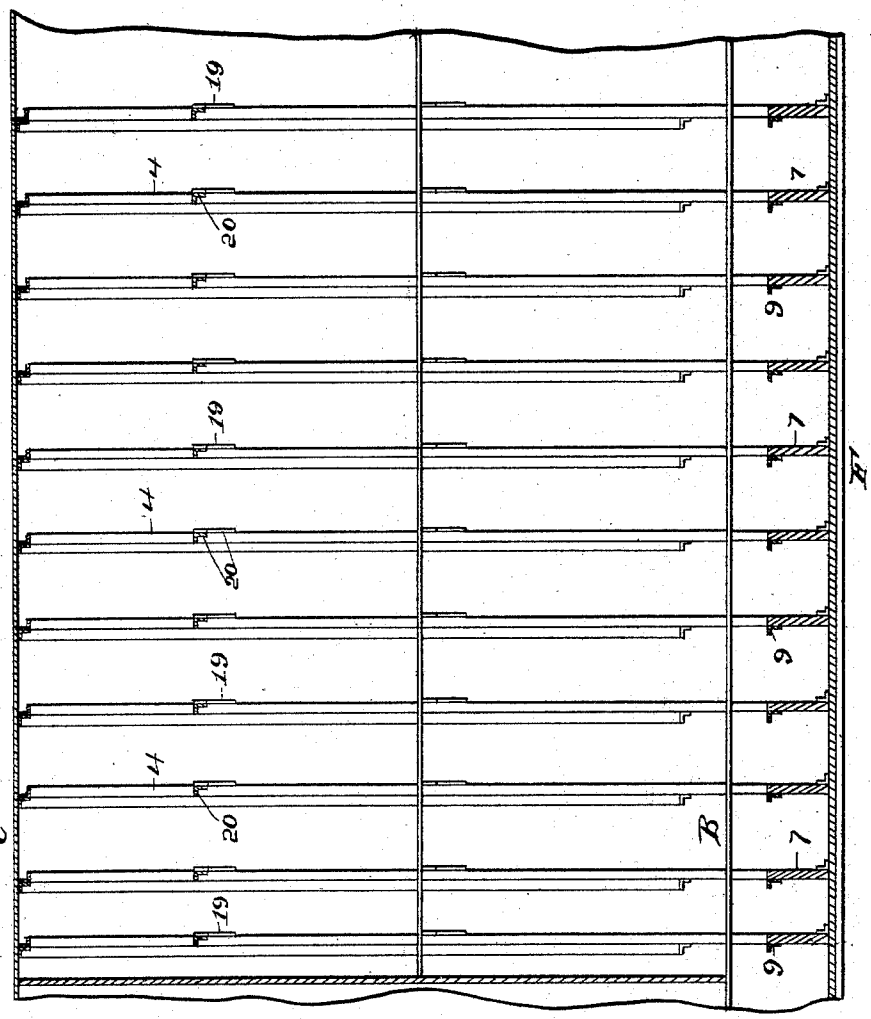

FIG. 5.

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UNITED STATES PATENT OFFICE.

ALEXANDER McDOUGALL, OF DULUTH, MINNESOTA.

FRAME-WORK FOR VESSELS.

SPECIFICATION forming part of Letters Patent No. 456,586, dated July 28, 1891.

Application filed April 19, 1890. Serial No. 348,687. (No model.)

To all whom it may concern:

Be it known that I, ALEXANDER McDOUGALL, a citizen of the United States, residing at Duluth, in the county of St. Louis and State of Minnesota, have invented certain new and useful Improvements in Frame-Work for Vessels; and I do hereby declare the following to be a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to an improved frame-work for metallic vessels, and more particularly those vessels which I have invented, and which are described and shown in several Letters Patent of the United States numbered 241,813, 259,889, and 393,997, and in applications for Letters Patent serially numbered 311,991, 324,496, and 324,497, respectively.

The objects of the invention are to provide a frame-work which will be very strong and rigid and at the same time simple and capable of being set up easily.

The principal novelties in the invention consist in a number of continuous frames or ribs extending at right angles to the keelson and ranging from one extreme end of the vessel to the other extreme end, a number of longitudinal frames extending from bow to stern and which strengthen the frame-work longitudinally, and a number of lateral frames or braces which strengthen the frame-work against lateral pressure.

For a clearer comprehension of my invention attention is invited to the accompanying drawings, forming a part of this specification, and in which—

Figure 1 is an elevation of one of the continuous frames or ribs, showing the lateral braces in position; Fig. 2, a side elevation of the keelson with the continuous frames or ribs in section; Fig. 3, an enlarged sectional view of the keelson, illustrating the manner of attaching the continuous frames thereto; Fig. 4, an interior view of the frame-work completed; Figs. 5, 6, 7, 8, and 9, detached views illustrating different details of the frame-work.

In all of the above views corresponding parts are represented by identical letters and figures of reference.

The preferable dimensions of the vessel having the frame-work shown in the drawings, and which will be described immediately, are two hundred and sixty feet in length, thirty-six feet in width, and twenty-two feet in depth.

In building the frame-work the first thing to be done is to lay the keelson A on the usual stocks or ways. It has been found that the preferable manner of launching the vessel is from the side, instead of from either end as is now practiced, for the reason that the vessel has no keel and is practically flat on the bottom. The keelson is therefore laid so as to be broadside to the water, and is wedged up, in short, on short inclined ways. This keelson (see Fig. 3) is composed of a plate 1, having angle-irons 2 2 2 2 bolted to its top and bottom at each side and extending the entire length of the keelson so as to strengthen the same. These angle-irons are each provided along its outer edge with a line of bolt-holes 3 3.

The transverse frames or ribs 4 4 4 of the vessel are each composed for the greater part of two angle-irons 5 and 6, bolted together, as shown in Fig. 5, so as to be very light and strong. At the point where the frames or ribs begin to curve inwardly to form the bottom the two angle-irons 5 and 6 are separated and the upper angle 6 is bent inwardly to form an angle, as shown. The lower angle-iron 5 continues along the bottom, and is bolted to one of the lower angle-irons 2 2 of the keelson. At the bottom part of the frame-work the lower angle-iron 5 is re-enforced by means of a metallic plate 7, which is bolted to the said angle-piece. The plate 7 is widened at its inner end, as at 8, so as to fit between the angle-irons 2 2 of the keelson. An angle-iron 9 is bolted to the upper edge of the metallic plate 7, so as to strengthen the same, and the inner end of this angle-iron 9 is bolted to the upper angle-iron 2 of the keelson. In this way it will be evident that the continuous frames are secured in place to the keelson both at the top and bottom of the same, and by being provided with the strengthening-plates 7 7 the frame-work at the bottom will be very strong and rigid. The plates 7 are also widened at their outer ends, as shown at 9, to correspond with the portion 8. Along the outer edges of the plates 7, on each side, is bolted a short angle-iron 10, to which in turn

is bolted along metallic strip 11, extending from the beginning of the bow portion. The construction of the bow and stern transverse frames differs from that of the amidships portion, as will be described presently. The strip 11 is bent over at its upper edge, as shown, and this portion is provided with a line of bolt-holes all along. The bent-in portions of the angle-iron 6 may be bolted to the strip 11 or to the angle-iron 9. At suitable points on top of the angle-irons 9 a number of angle-irons 12 are bolted in position extending longitudinally and parallel with the keelson. To each of these angle-irons 12 is bolted a plate 13, which is provided at its upper end with an angle-iron 14. It is preferable to make use of about four of these lines of plates 13 on each side of the keelson, so as to further strengthen the frame-work at the bottom, where the greatest strength is necessary. At suitable intervals a number of plates 15 are bolted to the top of the angle-irons 9, and extend parallel therewith at right angles to the plate 13. The plates 15 are each provided with an angle-iron 16 along its upper edge corresponding with the iron 14. On top of the angle-irons 14 and 16 and to the flanged section of the strip 11 is bolted a metallic floor B, composed of a number of thin plates.

The floor B forms the bottom of the hold of the vessel, and it materially serves to strengthen the frame-work. When the bottom plates are in position, the space between the same and the floor F constitutes a "water-bottom," the functions and advantages of which are fully set out in said application serially numbered 311,991.

To prevent the transverse frames from spreading while being erected, before the plating is in position, and also to strengthen the hull longitudinally, I make use of a metallic strip 18 on each side. Each of these strips is bolted or riveted to a number of brackets 17 17, secured in place by riveting or otherwise to the transverse frames, preferably to alternate frames. These strengthening-strips 18 18 are located about one-third of the depth of the vessel from the bottom. It is a good arrangement to extend some of the plates 7 entirely around the curve of the bottom and up the sides as far as the top of the brackets 17, and also to extend the angle-irons 9 9 to the same point. With this arrangement the top of the plates 7 will serve the place of the brackets 17 17, and the transverse frames will be materially strengthened. The brackets are preferably held in place by the same bolts or rivets which hold the two angle-irons 5 and 6 together. Still further up, at the point where the transverse frames begin to curve to form the deck or top, are secured corresponding brackets 19, held in place identically like the brackets 17 17. These two sets of brackets are connected by means of angle-irons or T-irons 20, which extend directly across the interior of the vessel. These connecting-braces extend across the hold only at alternate frames, and they form the base of the arch of the deck, so that the deck cannot spread or flatten under the weight of the waves or merchandise.

To further strengthen and support the deck, upright braces 21 21 are used. These braces 21 are riveted or bolted to brackets 22, secured to the transverse frames near the top and corresponding with the brackets 18 and 19. The lower end of the braces 21 are secured in some suitable way to the floor B, or else they are bolted or riveted to the plates 13 13 and pass down through suitable openings in the floor B. These braces 21 are rendered more rigid by being bolted or riveted to brackets 22′ 22′, which are secured to the cross-braces 20. On the outside of each line of upright braces 21 is a line of double angle-irons or T-irons 23, which are bolted or riveted to the under side of the transverse frames, and which also contribute to the lateral strength of the frame-work.

Entrance to the hull is afforded by means of suitable hatchways cut in the upper deck, as mentioned in said Letters Patent and applications. It is therefore possible to extend some of the transverse frames only as far as the edges of these hatchways, as will be evident from Fig. 1. The ends of the transverse frames at these points are strengthened and supported by means of an angle-iron 22, bolted or riveted near the upright braces 21 21. When the outer plates C are in position, the edges of the same at the hatchways are strengthened by means of an angle-iron 25, extending entirely around the same. The plating is further strengthened by means of the hatch D itself when in position.

At the points where the frames begin to curve inwardly to form the bow and stern portions is placed a diaphragm or partition E, which is composed, preferably, of a thin metallic plate bolted or riveted to the interior flange of one of the transverse frames. These partitions divide the hold of the vessel from the bow and stern portions. The plates 7 7 and 13 13 and 15 15, strips 11 11, and floor B are made use of only in the space between the two partitions. At the bow and stern portions the transverse frames are composed entirely of two angle-irons 5 and 6, and the attachments to the keelson consists in bolting or riveting the angle-iron 6 to the lower angle-iron 2 of the keelson.

The horizontal connecting-braces 20 20 are used within the bow and stern portions, and form convenient beams to which a metallic floor B is riveted. The space beneath this floor is used as a water-tank, as explained in said application serially numbered 311,991, and the space above the same at the stern is used as a cabin for the officers and cook, and at the bow this space is used as a forecastle for the crew. These floors B also strengthen the bow and stern portions materially. The upright braces 21 21 extend only in the hold portion of the vessel, but the

longitudinal braces 18 18 and 23 23 are made use of also in the bow and stern sections.

When all the frames above described are in position, the outside metallic plates are secured in place to the transverse frames, preferably by riveting or bolting. These plates are secured in position longitudinally, so that when in place, by reason of the frame-work above described, the completed boat will be very strong and light.

Details, such as the working decks, turrets, windlass, steam-pump, &c., referred to in said application serially numbered 311,991 are not mentioned here, since this application is limited solely to the main frame-work of the vessel. Riveting has been mentioned as being the preferable manner of fastening iron work; but it should be understood that bolting, welding, or other suitable means may be used instead.

Having now described my invention, what I claim as new therein, and desire to secure by Letters Patent, is as follows:

1. In an improved frame-work for metallic vessels, the combination of the keelson A, continuous transverse frames 4, secured at their ends to said keelson and consisting of angle-irons, re-enforcing plates 7 7, secured to said transverse frames, angle-irons secured to the upper ends of said re-enforcing plates, upright metal plates 13 15, secured to said angle-irons, and a floor B, secured to said plates.

2. In an improved frame-work for metallic vessels, the combination of the keelson A, continuous transverse frames 4, secured at their ends to said keelson and consisting of angle-irons, re-enforcing plates 7 7, secured to said transverse frames at the bottom portion of the vessel and perforated for the purposes mentioned, angle-irons secured to the upper ends of said re-enforcing plates, upright metal plates 13 15, secured to said angle-irons, and the floor B, secured to said upright metal plates, substantially as set forth.

3. In a metal frame-work for vessels, the combination of the keelson A, the continuous frames 4, secured at their ends to said keelson, re-enforcing plates 7 7, secured to said transverse frames and perforated for the purposes mentioned, angle-irons secured to the upper ends of said re-enforcing plates 7 7, upright metal plates 13 15, secured to said angle-irons, angle-irons at the upper ends of said upright plates 13 15, and a metallic floor B, bolted to the last-mentioned angle-irons, substantially as set forth.

4. In an improved frame-work for metallic vessels, the combination of the keelson A, continuous transverse frames 4, secured at their ends to said keelson and arched at their upper ends to form the curve of the deck, and cross-frames connecting said transverse frames at the base of the arch, substantially as set forth.

ALEXANDER McDOUGALL.

In presence of—
C. E. WACHTEL,
W. M. ROSS.