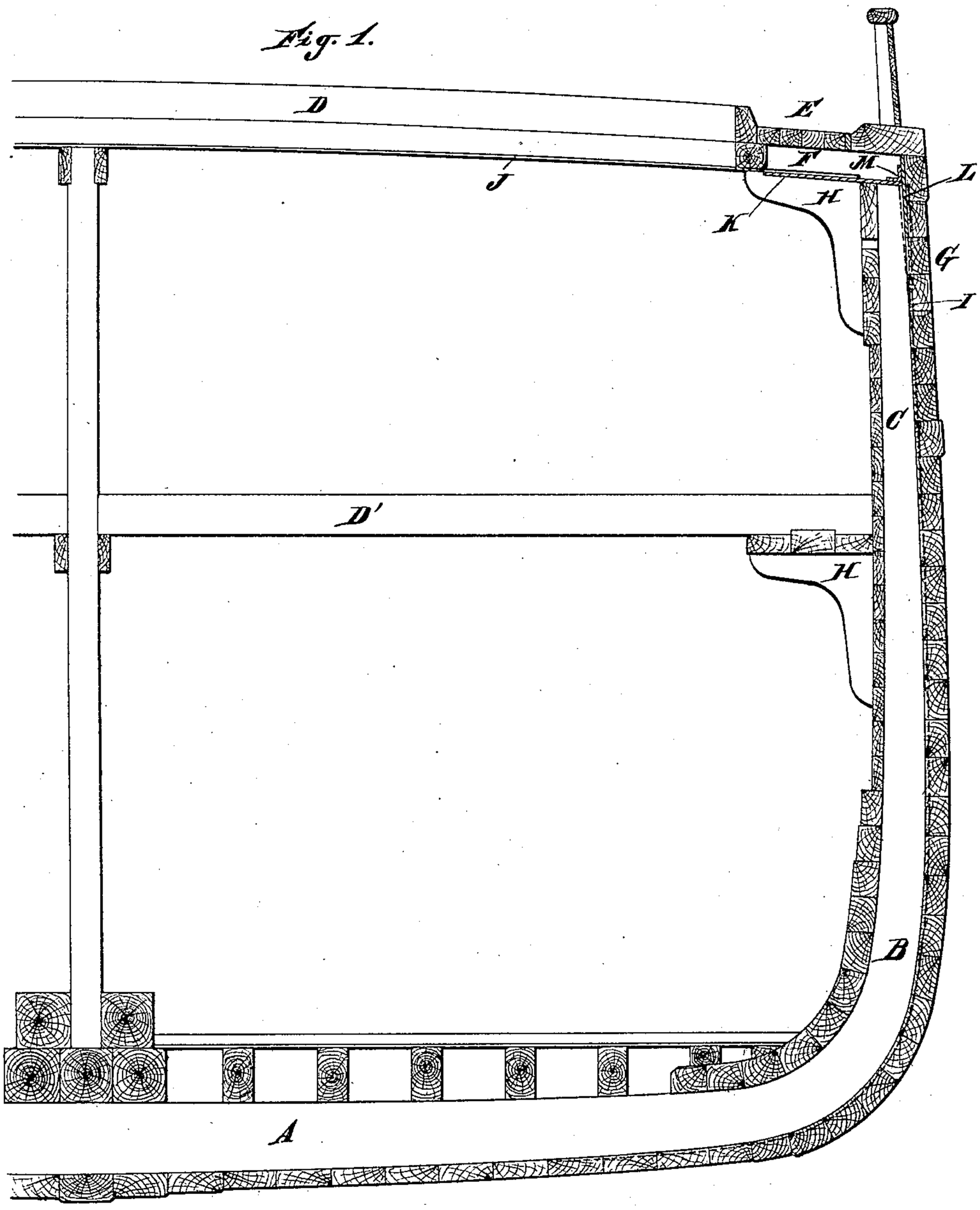
(No Model.) 2 Sheets—Sheet 1.

F. E. KIRBY.

SHIP BUILDING.

No. 389,892. Patented Sept. 25, 1888.

Fig. 1.



WITNESSES

John E. Wiles.

M. B. O'Dogherty.

INVENTOR

Frank E. Kirby

By W. W. Leggett,

Attorney

(No Model.) 2 Sheets—Sheet 2.

F. E. KIRBY.

SHIP BUILDING.

No. 389,892. Patented Sept. 25, 1888.

Fig. 2.

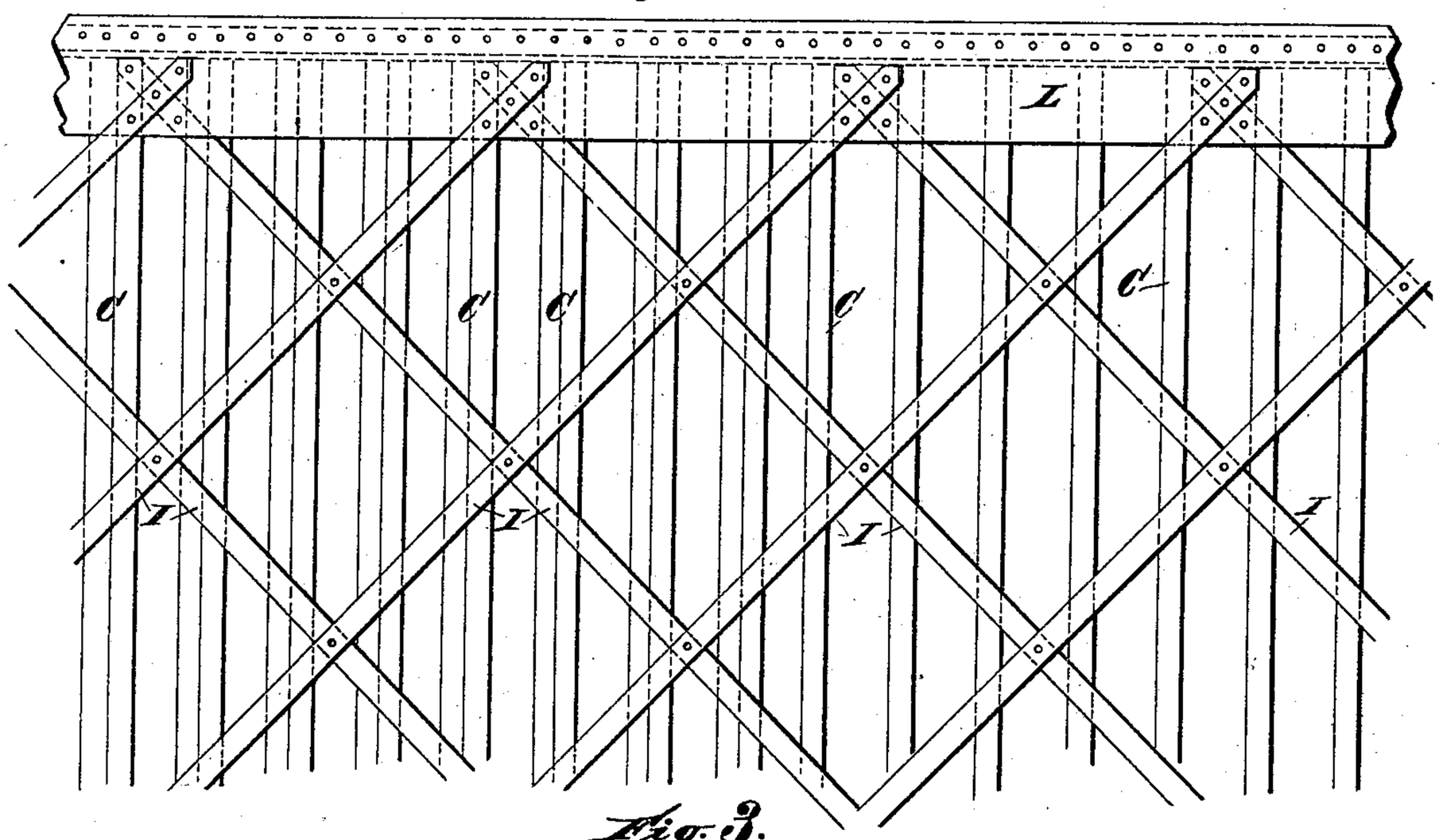
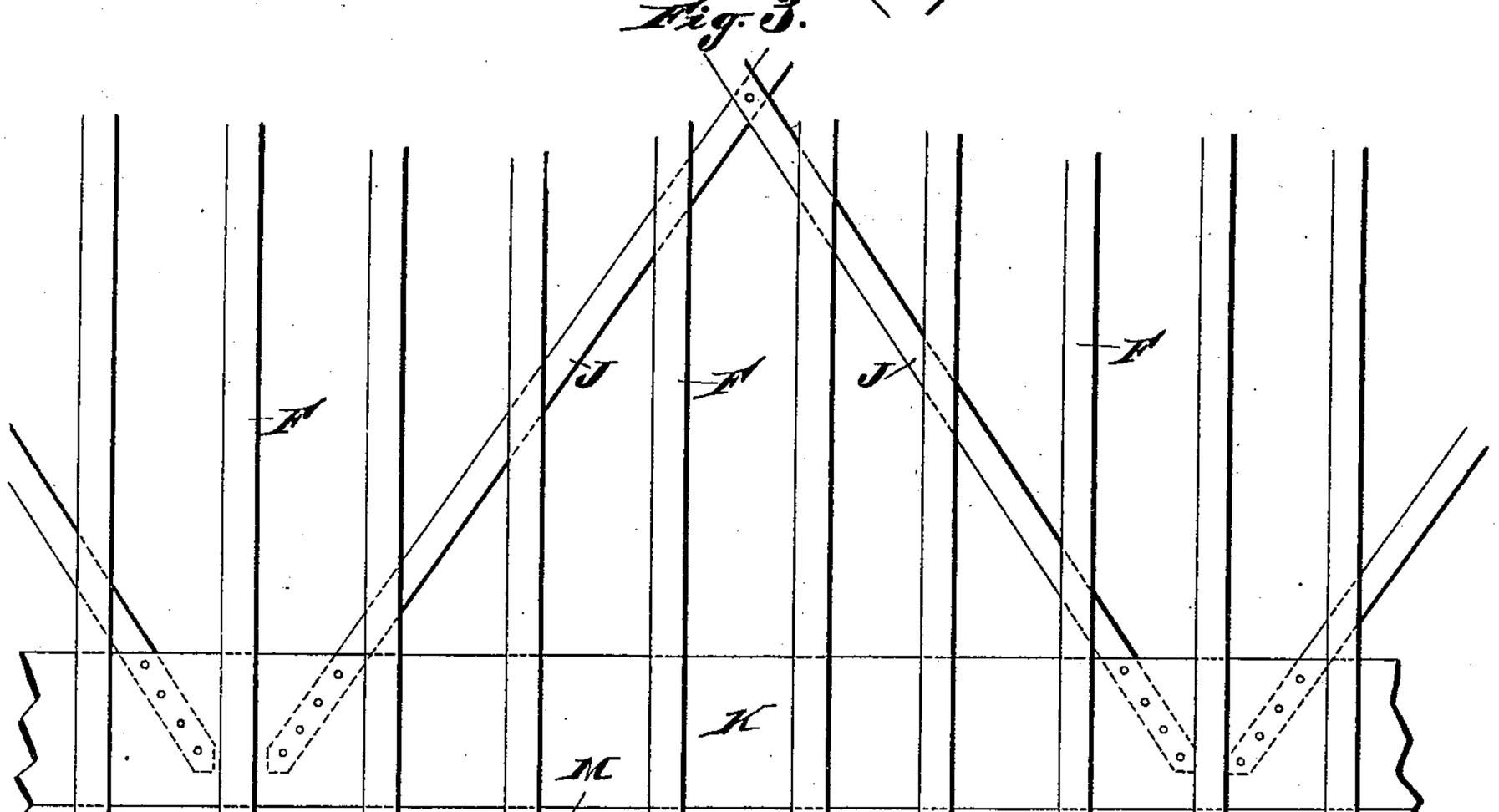


Fig. 3.



WITNESSES

John E. Wiles.

M. B. O'Dogherty.

INVENTOR

Frank E. Kirby

By Wm. Edgerton

Attorney

UNITED STATES PATENT OFFICE.

FRANK E. KIRBY, OF DETROIT, MICHIGAN.

SHIP-BUILDING.

SPECIFICATION forming part of Letters Patent No. 389,892, dated September 25, 1888.

Application filed October 7, 1887. Serial No. 251,725. (No model.)

To all whom it may concern:

Be it known that I, FRANK E. KIRBY, a citizen of the United States, residing at Detroit, county of Wayne, State of Michigan, have invented a certain new and useful Improvement in Ship-Building; and I declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, which form a part of this specification.

My invention consists of the devices and combinations hereinafter particularly described, and pointed out in the claims.

In the drawings, Figure 1 is a cross-sectional view of a ship illustrating my invention. Fig. 2 is a side elevation with the sheathing removed. Fig. 3 is a top view with the deck removed.

A represents the floor, B the bilge, and C the top timbers of the frame.

D D′ are the hatches.

E is the deck.

F, in Fig. 3, represents the deck-beams.

G represents the sheer-strakes.

H represents knees.

I represents the truss-bars on the side of the vessel; J, similar deck truss-bars.

It is well known in the art of ship-building that when the bow and stern, or either of them, are out of water and the vessel supported intermediate of its ends, the tendency for the ends to drop down, or, in other words, for the vessel to become hogged, is very great. The strain in such a case is converted into a longitudinal strain upon the deck-stringers and adjacent sheer-stringers. If the vessel has a very large unbroken deck—that is to say, if there is at this place a large amount of deck-stringers and sheer-stringers to sustain the strain—no considerable trouble is experienced; but the difficulty is greatly aggravated where the vessel is of that kind provided with large hatchways, like those used for transporting grain, ore, coal, &c. In this latter case the contiguity of the deck-stringers is so broken up that but little strength is afforded to resist the strong longitudinal strain, as above described. This difficulty has been in a measure corrected by thoroughly trussing the sides of the vessel by truss-bars I; but they have usually been connected at their tops simply with the sheer-stringers, or with individual top timbers, C, of the frame.

It is the purpose of this invention to provide improved means for further correcting the difficulty mentioned. To this end I provide a broad flat plate of metal, K, of adequate thickness, which extends lengthwise of the vessel adjacent to its edge and rests with a firm bearing upon the upper ends of the top timbers, C, of the frame, so that the upward thrust of the ribs is received directly by the plate without being first received by intermediate deck-timbers or other timbers which might, by crushing to a greater or less extent, yield more or less to the said thrust. In connection with the plate K, I provide another upright plate, L, which comes down at the sides of the top timbers. These two are firmly united by a stiff angle-plate, M, which plate I prefer shall rise and extend longitudinally across the ends of the deck-beams F. The upper ends of the diagonal truss-bars I (shown in Fig. 2) are then firmly secured to the plate L, while the extremities of the diagonal deck truss-bars J (shown in Fig. 3) are firmly connected with the plate K. By this construction the plates K and L constitute the upper chord of a truss, and they are of sufficient strength to hold their own, and, in connection with top timbers, which bear directly against the horizontal plate K and serve as rigid struts in the truss, prevent any yielding or opening of the deck or sheer-strakes under those conditions which would have a tendency to hog the vessel. It is apparent that any strain of this character thrown upon the vessel will at once be communicated from the said chord directly to all top timbers, C, of the frame, and by them conveyed as a thrust directly against the plate K at their ends, thus converting said timbers at once into struts of the truss, in which the top chord, K and L, and diagonal truss-bars are the straining members. In this way the side frame-work of the ship is made exceedingly stiff and strong, and becomes in itself an unyielding truss without communicating any considerable longitudinal strain upon the deck-stringers, the sheer-stringers, or upon the sheer-strakes. Moreover, since the deck-beams are above the plate K, they are pre-

served against the crushing action which would ensue were they placed between the top timbers and the said plate, while at the same time there is wholly avoided the play or lost motion that would soon arise by reason of the crushing of the deck-beams if they were thus located, and which would result in destroying the rigidity of the truss, and so contribute in a measure to the hogging of the vessel, which my improved construction is designed to overcome. Again, the same action takes place at the deck of the vessel. The diagonal truss-bars J, being secured at their ends to a plate, K, brace the ship against lateral strains. Any sudden pressure against one side of the vessel is by the truss-bars communicated to the opposite side, and is converted into a strain of extension upon the corresponding chord K L, and the deck-beams F become struts in the truss, to which longitudinal pressure is imparted directly by the plate L and angle-plate M.

I find in practice that the metallic chord, as shown, composed of the plates K and L and angle-plate M, is very effectual for the purpose; but of course this construction may be varied should it be found expedient, the essential features being the embodiment in a wooden ship having wooden ribs at this point, in connection with the truss bars I, of a metallic chord which shall receive the longitudinal strain thrown upon this part of a ship's structure and transmit it directly as a longitudinal pressure against the upper ends of the top timbers of the frame, and also, in conjunction with the latter, the utilization of such a chord, in connection with the deck truss-bars J, to sustain the longitudinal strain due to lateral pressure against the ship, and to transmit the same longitudinally upon the deck-beams F.

What I claim is—

1. In a wooden ship having the usual wooden ribs and frame-work, the combination, with the top timbers of the said ribs, of a metallic chord consisting of horizontal plate K and vertical plate L, arranged at right angles to each other and united by an angle-plate, M, said horizontal element brought to a firm bearing against the upper ends of the top timbers, and said vertical element projecting downward along the sides of said top timbers, and in connection therewith the said truss-bars I, the whole constituting a trussed structure in which the bars I and chord K L are the extension members and the ribs are struts or compression members, substantially as and for the purpose described.

2. In a wooden ship having the usual wooden ribs and frame-work, the combination, with the top timbers of the said ribs, of a metallic chord consisting of plates K L, arranged at right angles to each other and united by an angle-plate, M, the plate K projecting over and brought to a firm bearing against the upper ends of the top timbers and underneath the deck-beams, and a plate, L, projecting downward along the sides of said top timbers and upward across the ends of the deck-beams, and in connection therewith the side truss-bars, I, the whole constituting a trussed structure in which the bars I and chord K L are the extension members and the ribs are struts or compression members, substantially as and for the purposes described.

3. The combination, with a wooden ship, of a metallic chord consisting of the plates K L, arranged at right angles to one another and secured together by the angle-plate M, the plate K projecting over the upper ends of the top timbers of the frame immediately contiguous thereto and underneath the deck-beams, and the plate L projecting downward along the sides of said top timbers and upward across the ends of the deck-beams, and the side truss-bars, I, and the deck truss-bars J, arranged substantially in the manner described.

4. The combination, with a wooden ship, of a metallic chord consisting of the plates K L, arranged at right angles to one another and secured together by the angle-plate M, the plate K projecting over the upper ends of the top timbers of the frame immediately contiguous thereto and underneath the deck-beams, the plate L projecting downward along the sides of said top timbers and upward across the ends of the deck-beams, and the angle-plate M extending across and underneath the ends of the deck-beams, the side truss-bars, I, secured to the plate L, and the deck truss-bars J, secured to the plate K, substantially as shown and described.

In testimony whereof I sign this specification in the presence of two witnesses.

FRANK E. KIRBY.

Witnesses:
M. B. O'DOGHERTY,
JOHN E. WILES.