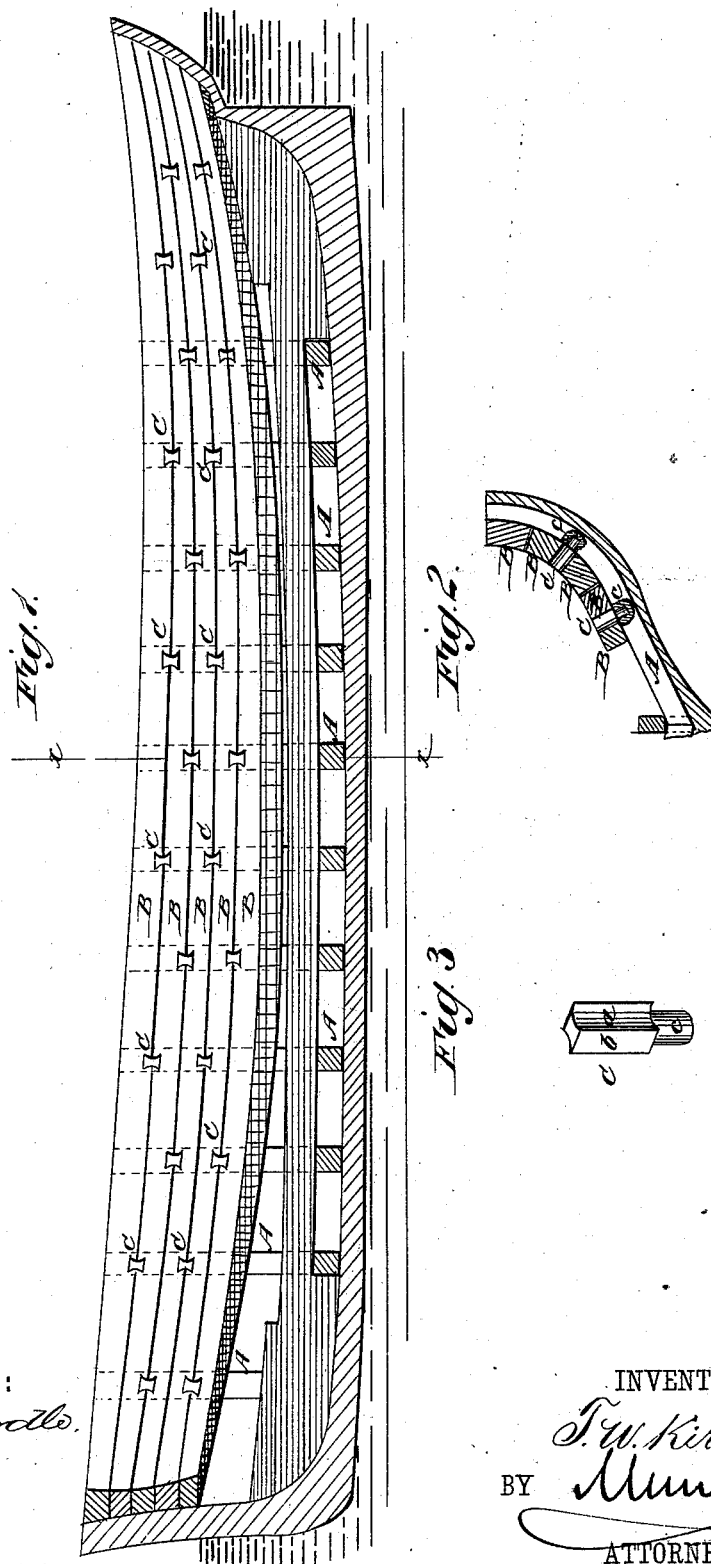


T. W. KIRBY.
Treenail for Ships, &c.

No. 216,682.

Patented June 17, 1879.



WITNESSES:
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THOMAS W. KIRBY, OF GRAND HAVEN, MICHIGAN.

IMPROVEMENT IN TREENAILS FOR SHIPS, &c.

Specification forming part of Letters Patent No. **216,682**, dated June 17, 1879; application filed April 21, 1879.

To all whom it may concern:

Be it known that I, THOMAS W. KIRBY, of Grand Haven, in the county of Ottawa and State of Michigan, have invented a new and Improved Concave Key-Nail Fastening for Ships, of which the following is a specification.

This invention relates to an improvement in fastening together the strakes of the ship's ceiling, and the fastening of the ceiling to the ship's timbers, the object whereof is to bind the strakes together in a solid ceiling, and thus strengthen the sides of the vessel.

It consists in fastening the strakes together at the edges and to the timbers by nails having concave sides and treenails on the end, which are driven through mortises with convex sides made through the strakes at the seam, and into holes in the timbers, whereby a dovetailed connection is made between the strakes, and they are thus securely fastened together.

In the accompanying drawings, Figure 1 is a vertical longitudinal section of a vessel with the ceiling fastened by my improvement. Fig. 2 is a cross-section of the same on line *x x*, and Fig. 3 represents the fastening.

Similar letters of reference indicate corresponding parts.

Referring to the drawings, A designates the ship's timbers, and B the strakes of the ceiling.

The nails are designated by the letter C. They are composed of blocks of wood with concave sides, *a a*, and square top and bottom, *b b*, and on one end is turned a treenail, *c*. These nails are used to fasten the strakes B together at the seams, and also fasten them to the timbers, and they are employed in the following manner: Holes are bored through the ship's ceiling at the seams, where they cross the timbers, and into the timbers. A mold is then taken, cast expressly for the purpose, and of the exact size of the concave key to be used, and with a suitable tool the holes in the ceiling are cut out so as to have convex sides and square tops and bottoms, so as to adapt

them to receive the concave key. One half of each of the holes is in one strake, and the other half in the adjoining one, the seam forming the dividing-line. The holes in the timbers remain round. The key, of the same dimensions precisely as the hole, is then entered with its treenail end forward and the concave sides next the convex sides of the hole, and it is driven home. In this way the strakes are firmly dovetailed together and fastened to the timbers, thus forming substantially a solid ceiling from stem to stern, and from the bilges to the deck-beams, whereby the sides of the vessel are greatly strengthened.

In case of the shrinkage of the ceiling and the opening of the seams, the concave-nail fastener will cause the strakes to draw more closely to them, and thus form a stiffer and more compact ceiling, and thus it will be impossible for a ship to strain her sides when this fastening is used.

The nails are not put through the ceiling at the crossing of every timber, but alternately, as shown in the drawings.

The treenails *c* may be round or square, as may be preferred, and the holes in the ship's timbers made to receive them of a corresponding shape.

This manner of fastening may be applied with equally good results to iron ships with wooden ceilings.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

As an improved concave key-nail fastener for ships, the nail C, with concave sides and square top and bottom, and having a treenail, *c*, on the end, whereby a fastener is provided for dovetailing the strakes of the ceiling together at the seams, and also fastening the ceiling to the timbers, substantially as described.

THOMAS WATERS KIRBY.

Witnesses:

JOHN FURLONG,
THOS. WALSH.