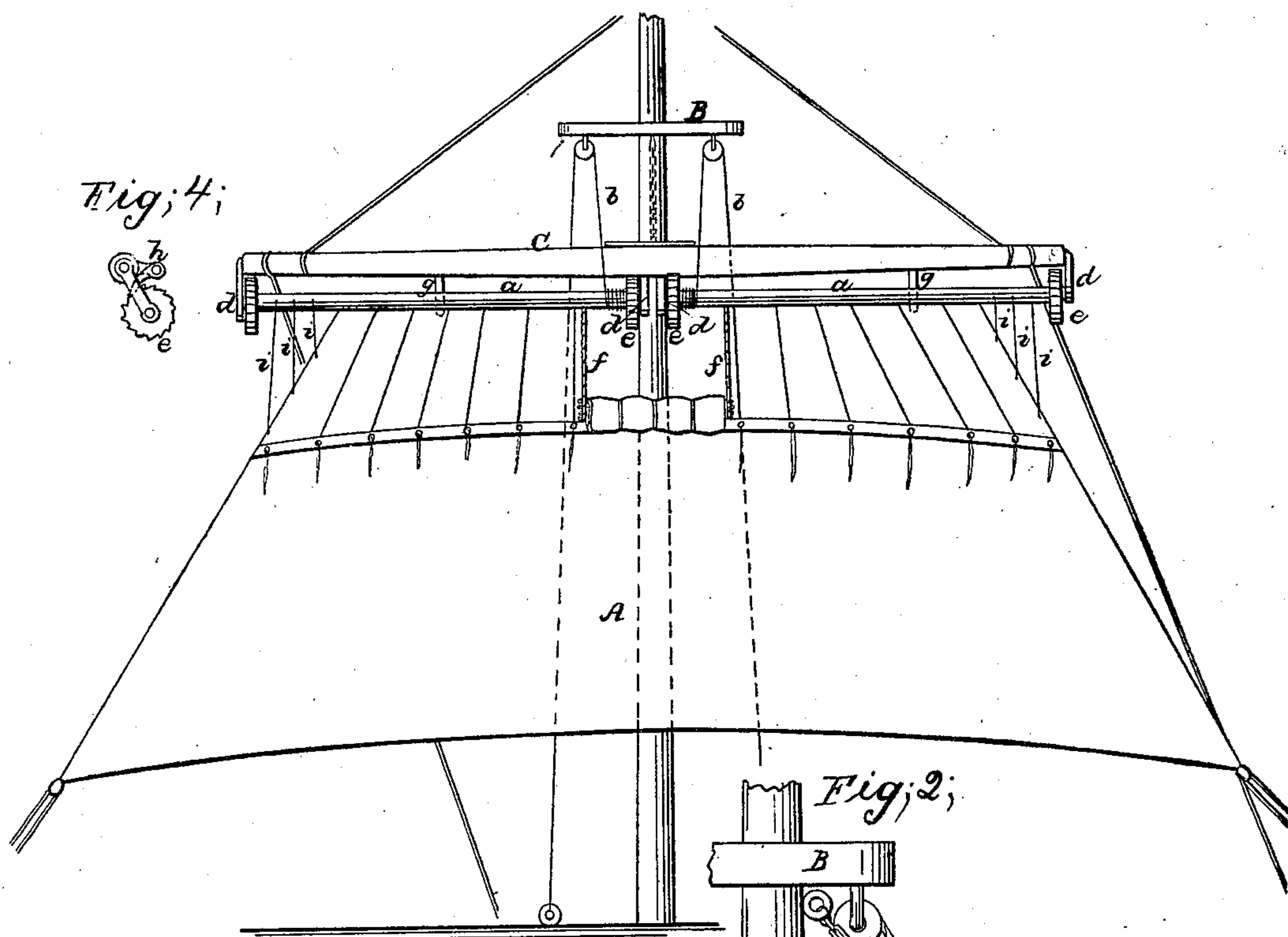


N. Ingersoll.
Sails & Rigging.
N^o 86,984. Patented Feb. 16, 1869.

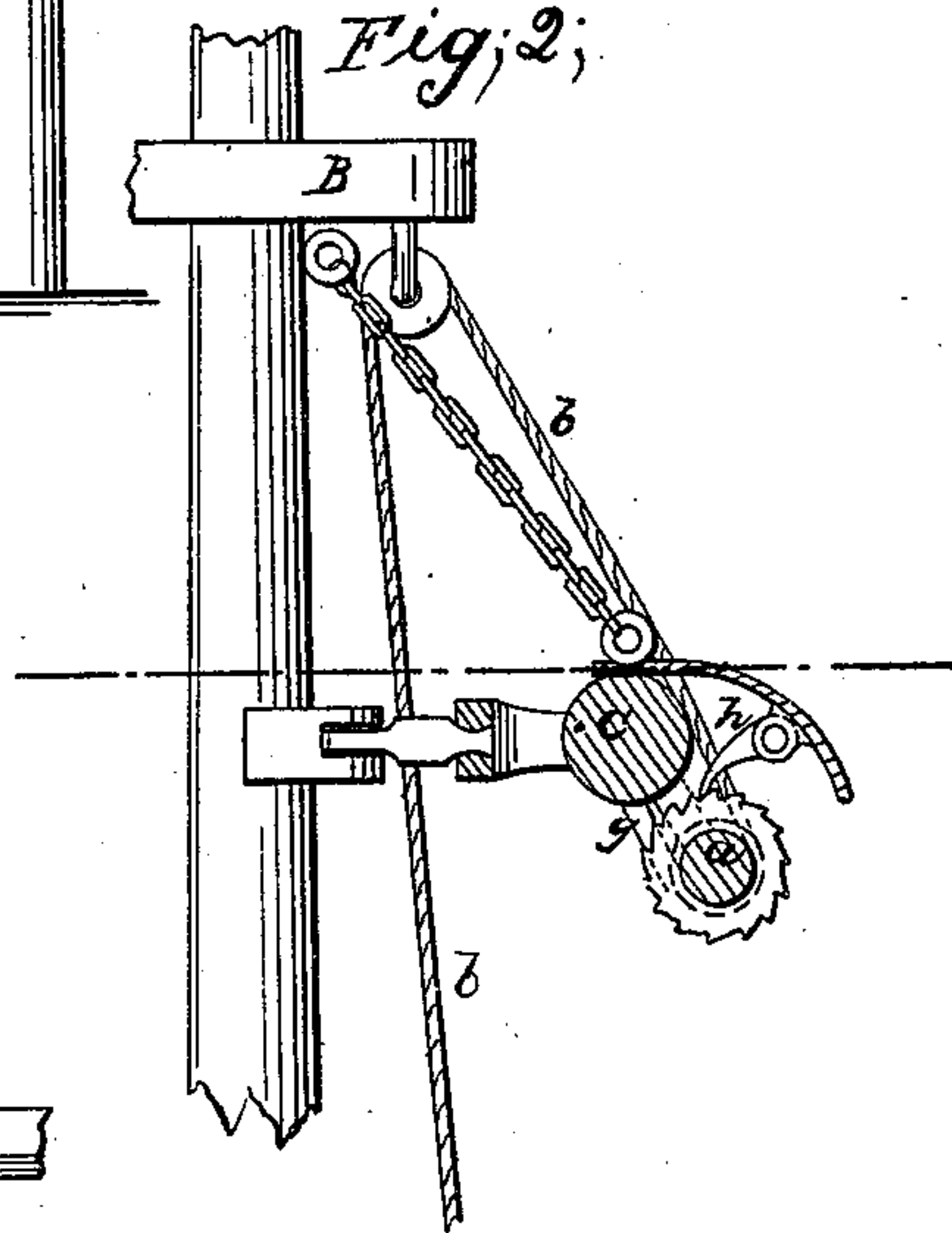
Fig; 1;



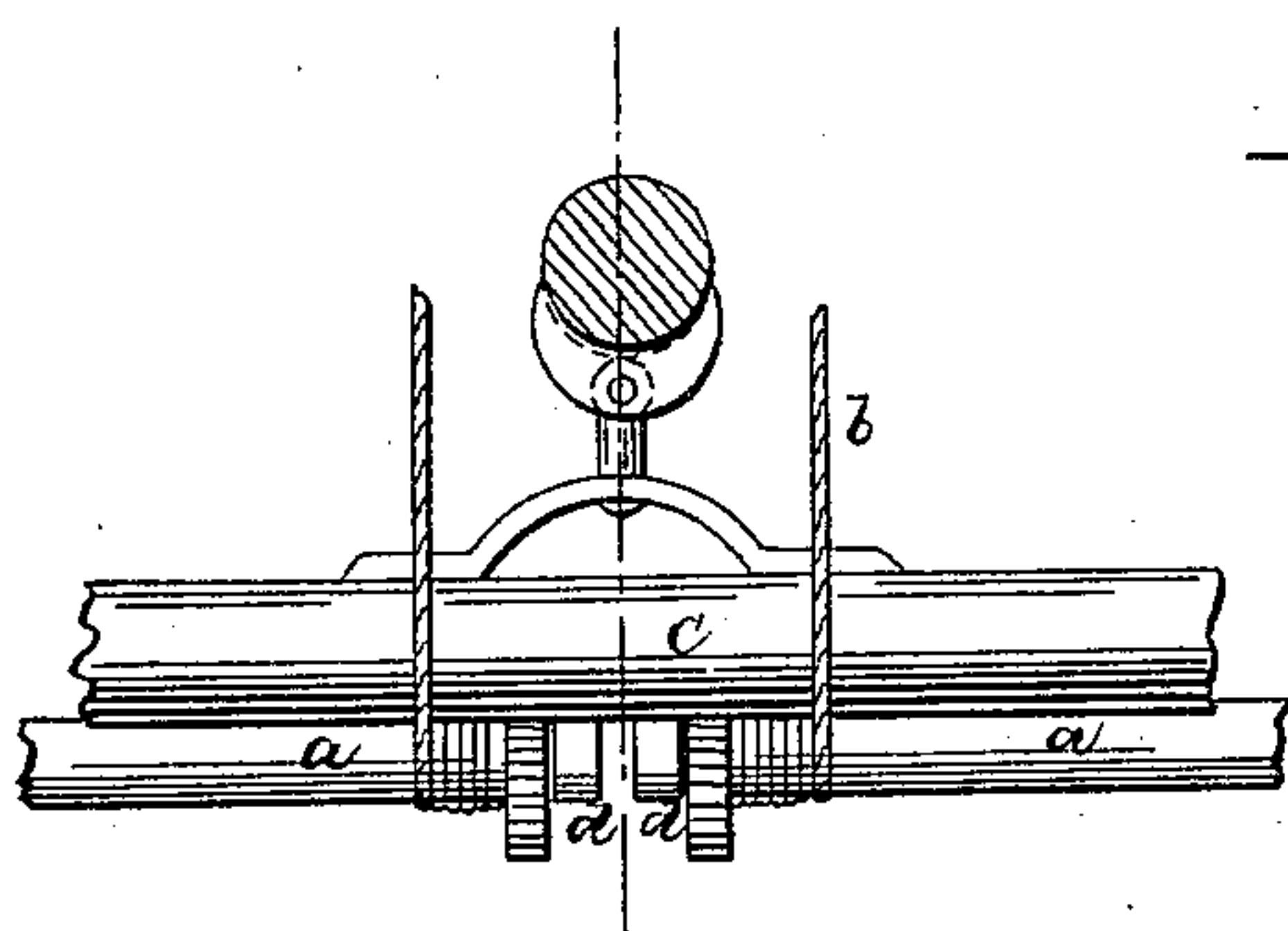
Fig; 4;



Fig; 2;



Fig; 3;



Witnesses;

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NATHANIEL INGERSOLL, OF SALEM, MASSACHUSETTS.

Letters Patent No. 86,984, dated February 16, 1869.

IMPROVEMENT IN APPARATUS FOR REEFING SAILS.

The Schedule referred to in these Letters Patent and making part of the same.

To all whom it may concern:

Be it known that I, NATHANIEL INGERSOLL, of Salem, in the county of Essex, and State of Massachusetts, have invented new and useful Improvements in Reefing the Courses or Lower Sails of Square-Rigged Vessels; and I do hereby declare that the following is a full, clear, and exact description thereof, which will enable those skilled in the art to make and use the same, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a front view of a course provided with my improved means for reefing it.

Figure 2 is a detail cross-section through the yard and one of the rolling-spars.

Figure 3 is a detail plan view, showing the means for operating the rolling-spars.

Figure 4 is a detail view of one of the ratchet-wheels and its pawl, employed on the ends of the rolling-spars, to prevent the sail from unrolling therefrom when set.

Similar letters of reference indicate corresponding parts.

The object of this invention is to provide a simple and practicable means for reducing or reefing the "courses," so called, or lower sails of a square-rigged vessel.

My invention consists in the employment of two rolling-spars, to which the head of the sail is attached, the said spars being arranged under the yard, and a little forward of the same, and connected therewith by journal-plates, which afford bearings for the gudgeons of the said rolling-spars.

The spars are actuated, to wind up the sail thereon, by means of a device known to mariners as a "parbuckle-purchase," which is a means of producing rotation in a cylindrical body, by the unwinding of a rope or chain, previously wound thereon.

The rolling-spars are provided with ratchet-wheels and pawls, to perfect their operation, which, with other devices, forming part of the invention, and conducing to the operation of the same, render it fully effective, as is hereinafter more fully set forth.

In the drawings, a single course, as a ship's mainsail, is represented, to illustrate the principle and operation of the invention.

a a are the rolling-spars, to which the sail *A* is attached.

b b are ropes or chains, attached to the inner ends of the said spars, and moved around the same a sufficient number of turns to roll up the sail on the said spars to the desired extent.

These ropes or chains *b b* lead through blocks attached to the under side of the top, *B*, preferably to the rim of the same, and thence to the deck, where they may be connected with any tackle, purchase, or power, deemed most desirable, forming a parbuckle-purchase on the spars *a a*, as before mentioned.

d d d are the journal-plates, affixed to the yard *C*,

at the ends and slings of the same, to afford bearings for the gudgeons of the rolling-spars.

e e e are ratchet-wheels at the ends of the rolling-spars, and which, in connection with their respective pawls *h*, hold the spars from unwinding the sail previously wound thereon.

The middle cloth of the sail is split down to the point to which the sail is to be rolled up on the spars, in order to permit the operation of winding the sail on two separate spars, which would otherwise be impossible, as will be obvious.

This loose cloth is provided with a stretcher, a short wooden rod, which is attached to the head thereof, and provided with any suitable line leading to the deck, to haul it up in place, to form a whole sail when the same is not reefed.

The edges of the said loose cloth may be provided with rings, if desired, which run on short stays, *f f*, attached to the spars *a a*, and to the sail, as shown, to perfect the operation of the said loose cloth in settling away, as the sail is rolled on the spars, or being again hoisted in place, as aforesaid.

In order to stiffen the rolling-spars in heavy weather, and prevent their sagging or springing on such occasions, from the unusual strain on them, I employ curved horns or cleats, *g g*, one or more, for each yard-arm, which are affixed to the yard-arms about at the middle points of the spars *a a*, and are curved, so as to reach around under the said spars, and sustain them when slightly sprung downward, as aforesaid.

It has been found, in practice, that sails rolled upon spars were liable to sag off to the leeward, as the sail was rolled up, particularly when the yard was braced up sharp, whereby the even rolling of the sail on the spar or yard was prevented.

This defect I remedy by means of a system of short guy-lines, *i i i*, connecting the leaches of the sail with the rolling-spars, and winding on the latter with the sail.

This simple device has been found to obviate the difficulty completely, and is applicable to all square sails generally, when rolled up on spars, in the manner set forth.

I am aware that sails of vessels have been rolled up in a manner generally similar to that herein set forth, but in such cases a single rolling-spar was employed, which has been found objectionable, from its extreme length, whereby the sails, like the lower sails of square rigged vessels, which sails have more "spread" than "hoist," are unevenly wound, and become wrinkled and distorted, or "foul," as it is called, in the operation of rolling them up.

I will further note that the rolling up of square sails has heretofore been accompanied by the lowering of the yard to which the rolling-spars were attached, as in topsails, and the like, but in no case heretofore have rolling-spars been combined with fixed yards, or yards

working on a fixed truss, and which is one distinguishing feature of my invention.

It will be observed that the loose cloth before mentioned may be weighted by a heavy stretcher, or by other means, to insure its settling away as the sail is rolled up.

Finally, to insure the better operation of the guy-lines *i i i*, the outer ends of the rolling-spars may be formed with helical shoulders or threads, which being followed (as the spars are rolled) by the guy-lines, the latter are thus more securely made to hold the ascending leaches properly drawn outward.

I claim as new, and desire to secure by Letters Patent—

1. The method of reefing the courses, or lower sails of square-rigged vessels, by means of two rolling-spars *a a*, arranged under each yard-arm of the yard *O*, and working in bearings afforded by journal-plates *e*, affixed

to the said yard *O*, and operated by two parbuckle-purchases, *b b*, and provided with ratchet-wheels *c* and pawls *h*, all substantially as shown and described, and for the purpose set forth.

2. The method of steadying the leaches of rolling sails, by means of guy-lines *i i i*, substantially as described.

3. The method of sustaining the rolling-spars *a a*, by means of curved cleats *g g*, substantially as shown and described.

4. Providing the loose middle cloth with rings and stays *f f*, substantially as described, in combination with the two rolling-spars *a a*, and parbuckle-purchases *b b*, all as set forth.

NATH'L INGERSOLL.

Witnesses:

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