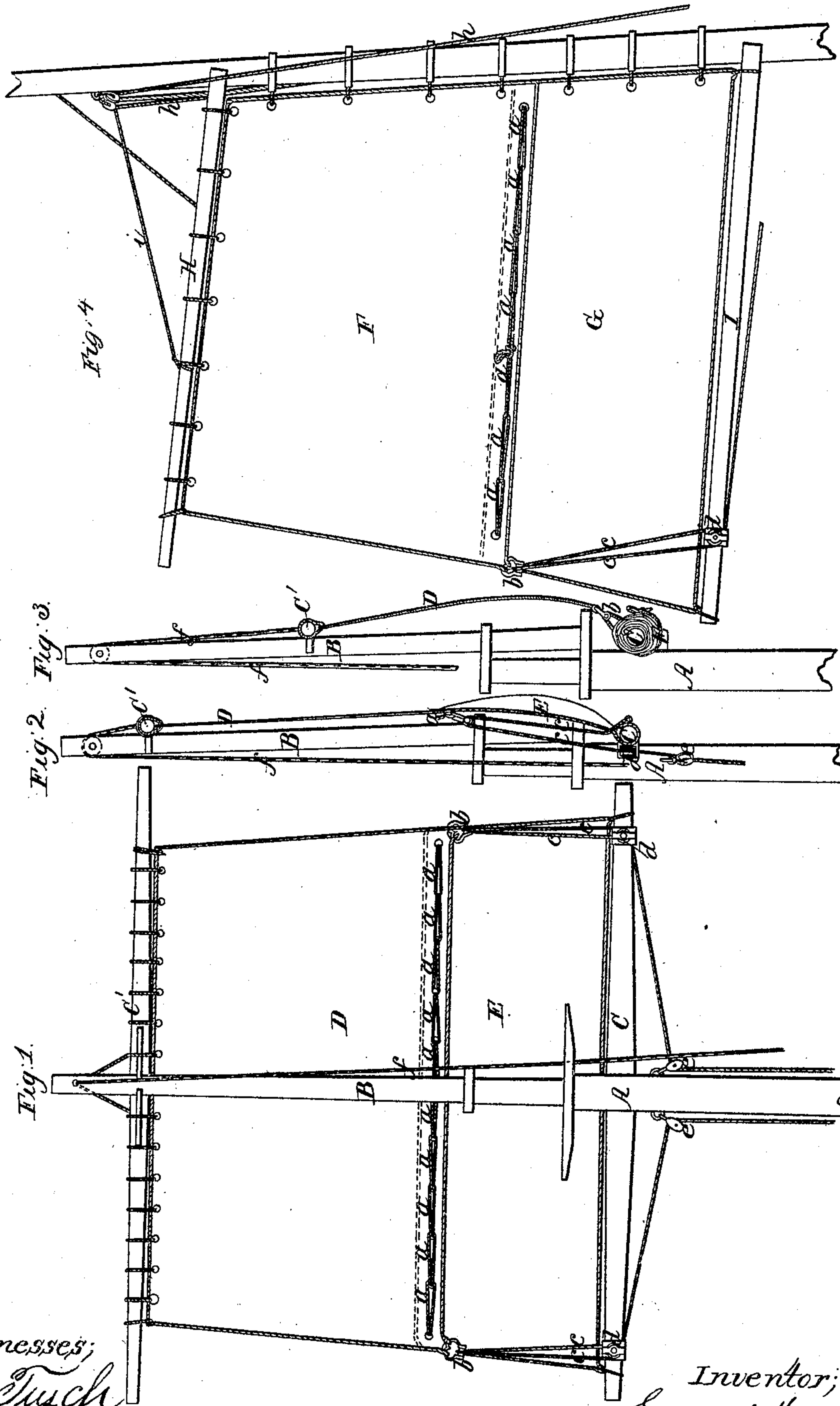


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Sails & Rigging.*

*N<sup>o</sup> 23,776.*

*Patented Apr. 26, 1859.*



*Witnesses;  
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# UNITED STATES PATENT OFFICE.

ENOCH E. MULLINER, OF NEW YORK, N. Y.

## REEFING SAILS.

Specification of Letters Patent No. 23,776, dated April 26, 1859.

*To all whom it may concern:*

Be it known that I, ENOCH E. MULLINER, of the city, county, and State of New York, have invented certain new and Improved  
5 Means of Reefing and Shortening Sails in Ships and other Vessels; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings,  
10 forming part of this specification, in which—

Figure 1, is a back view of a ship's top-sail, topmast, and head of lower mast, illustrating my invention and showing the whole sail spread. Fig. 2, is a side view, corresponding with Fig. 1. Fig. 3, is a central  
15 section showing the lower part of the sail furled. Fig. 4, is a side view which represents either a schooner's mainsail or a ship's or brig's spanker, also illustrating my invention.  
20

Similar letters of reference indicate corresponding parts in the several figures.

To enable others skilled in the art to make and use my invention, I will proceed to describe its construction and operation.  
25

A, Figs. 1, 2, and 3, is the lower mast; B, the topmast; C, the main yard; and C', the topsail yard, all of which are intended to be constructed and applied in the usual manner.

30 D, E, Figs. 1, 2, and 3, is the topsail, divided horizontally into two parts, the lower part E, of which is fitted to the upper part like what is known to seamen as a "bonnet," and sometimes applied to jibs and lug sails;  
35 loops *a, a*, being attached near the upper margin of the lower part E, to pass through eyes in the upper part D, and interlace with each other in such a manner as to be secured by one knot or key, like the usual method  
40 of attaching bonnets to sails. The upper part D, of the sail constitutes a complete sail without the lower part E, the said upper part being secured to the yard C', in the usual manner and having roller clues *b, b*, applied at its lower corners to receive the  
45 reef pennants *c, c*, which are attached by one end to the yard C, and pass thence through said roller clues, thence downward under pulleys *d, d*, attached to the yard C, and thence through blocks *e, e*, attached to the mast, and below these blocks they should have reef tackles attached. The lower part  
50 E, of the sail is intended to be attached to the yard C, by sheets, after the manner of an ordinary topsail, but these sheets are not represented in the drawing.  
55

When the two parts D, and E, of the sail are secured together and spread as shown in Figs. 1, and 2, they are equivalent to a single sail. When it is required to  
60 shorten sail, the yard C', is lowered by the halyard *f*, and the reef pennants hauled taut by the "hands" on deck, to bring the clues of the upper part D, close to the yard; the reef pennants then constituting sheets  
65 to the upper part D, of the sail, which then constitutes of itself a complete sail. This leaves the lower part E, slack in front of the yard and free to be disconnected from the upper part when it is convenient to send  
70 men aloft to unloose the knot or key which fastens all the loops *a, a*, which permits the lower part E, to be furled snugly to the yard C, so that it will not chafe like the reef of an ordinary sail. The lower part E, should  
75 be connected again to the upper part before hauling up the yard C', in order to spread it again.

The fore-and-aft sail F, G, represented in Fig. 4 is made in two parts F, and G, of  
80 which the top of the upper part F is attached to the gaff H, in the same manner as the top of an ordinary fore-and-aft sail, and the bottom of the lower part G, is attached to the boom I, in the same manner  
85 as the bottom of an ordinary fore-and-aft sail. The two parts F, G, are connected by loops *a, a*, like the two parts of the square sail above described, to make them constitute the equivalent of a single sail when spread.  
90 The outer lower corner of the sail has attached to it a roller clue *b*, through which passes a reef pennant *c*, which is attached to the boom near its extremity, and which passes upward therefrom to and through  
95 the roller clue *b*, and thence down to and under a pulley *d*, attached to the boom. This pennant should have a reef tackle applied to it. To reef or take in the lower  
100 part of the sail, the gaff is lowered by the throat and peak halyards *h, i*, in the same manner as the gaff of an ordinary fore-and-aft sail and the roller clue is hauled down to the boom by means of the reef tackle *c*.  
105 The lower part G, is then disconnected by unloosing the knot or key which secures all the loops *a, a*, and is furled and made fast to the boom leaving the upper part F, entirely independent so as to constitute, to all intents  
110 and purposes, a complete sail. It may be observed that, in Fig. 4, the reef pennant *c*, is applied so as to come entirely on one



side of the part G, of the sail, and leave the latter entirely free of it, as the upper part F is being hauled down to the boom; thus permitting the part G to be furled without interfering with or being interfered with by the upper part F.

One advantage of my invention, in its application to fore-and-aft sails, is that it prevents any chafing of the sail on the boom, which is unavoidable with ordinary fore-and-aft sails when reefed. The same advantage also results from its application to square sails. Many other advantages of my improvement might also be stated, among which are the following:

By the division of the sail as described, the surface of canvas presented to the wind is stronger than if it were a single sheet like the common sail; this is owing to the necessary employment of foot and top ropes of the respective parts D, F, where they unite.

My improvement permits the "shortening-in" of sail in a very brief space of time, without altering the vessel's course and without sending men aloft. It also requires a less number of men to "shorten-in" or "make sail" than the common rig. These advantages are evident, because, instead of letting down the yard on to the mast-head, or lowering the boom upon deck as the old plan of reefing requires, it is only necessary to lower the yard or boom far enough to bring the clues of the upper part of the sail down to the under yard or boom. Thus there is little or no hoisting-up of the boom or yard to be done after the sail is shortened. Under the old plan of reefing, whether schooner or square rig, it is often a matter of great difficulty, if not impossibility, to raise the boom or yard to its place after reefing. This difficulty is increased in proportion to the violence of the wind and waves. If the sails are loaded with ice, the trouble is greatly augmented. Ice sometimes entirely prevents reefing under the old plan, owing to the impossibility of lifting or bending or tying the reef-points around the sail to the yard. The result is that the vessel must run before the gale, and

drive out to sea again, even when nigh a safe harbor; or perhaps her masts are carried away and the ship is driven upon the rocks, a pitiable wreck. My improvement obviates all these difficulties; because no matter how violent the gale, or how much loaded with ice the sail may be, all that is necessary to "shorten-in" is to lower the yard or boom just far enough to bring the clues of the upper part of the sail down to the under yard or boom. When this is done, and the emergency is such that the lower part of the sail cannot readily be secured, it is only necessary to sever the key (a) with a knife and let the lower part of the sail blow away.

The old plan requires that a large number of men shall be sent aloft upon the yard in order to "shorten sail." The great danger to life and the long space of time that is sometimes involved in this operation are so well known as to require no demonstration here. My improvement entirely removes this great difficulty in the way of mariners; since my plan requires no men to be sent aloft, and renders the operation of shortening sail easy and expeditious, even under the most trying circumstances of sea and wind.

My improvement does not add to the parts of a vessel's rig and thus render it more complicated than before; but my plan dispenses with a number of parts and so simplifies the whole.

I do not claim, broadly, the invention of the bonnet, as that has been applied to jibs and lug sails. But

What I claim as my invention, and desire to secure by Letters Patent, is:

The combination of the divided sail D, E, or F, G, with reef pennants (c), roller clues (b), pulleys (d), and yard or boom C, I, as and for the purpose herein shown and described.

ENOCH E. MULLINER.

Witnesses:

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W. HAUFF.