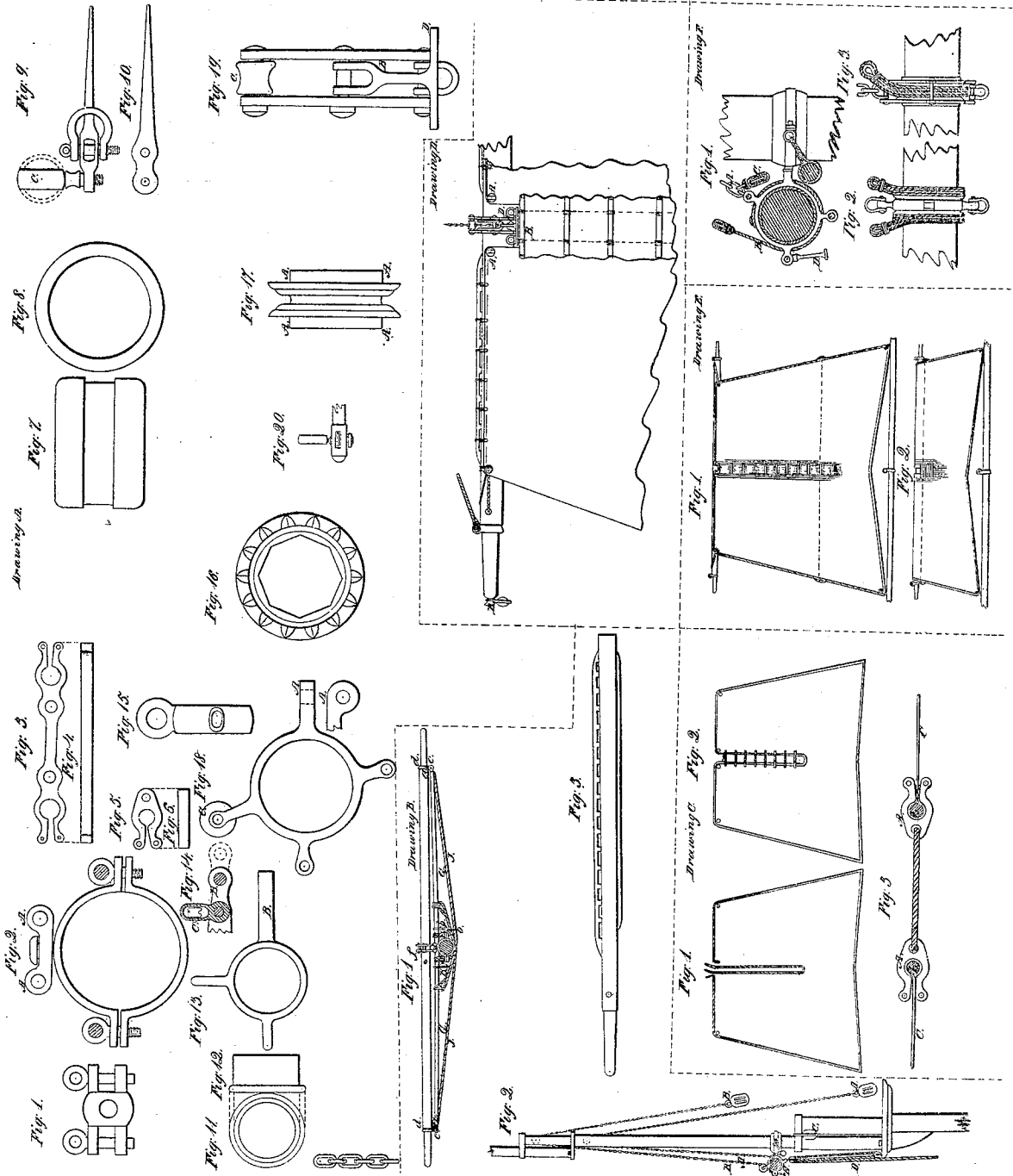


H. D. P. Cunningham.
Sails & Rigging
 No. 14,094. Patented Jan. 15, 1856



UNITED STATES PATENT OFFICE.

H. D. P. CUNNINGHAM, OF BURY, ENGLAND.

REEFING SAILS.

Specification of Letters Patent No. 14,094, dated January 15, 1856.

To all whom it may concern:

Be it known that I, HENRY DUNCAN PRESTON CUNNINGHAM, of Bury, Hants, England, paymaster in the British Royal Navy, have invented Improvements in Reefing Sails; and I do hereby declare that the following is a full and exact description thereof, reference being had to the accompanying drawings and to the figures and letters thereon.

My invention consists in certain improvements in reefing and unreefing topsails and other square sails of ships or other vessels from the deck and the manner in which my invention is performed is as follows:

The sail (as describes the invention singly) is reefed or unreefed or the area thereof reduced or increased by being rolled up on or unrolled off the yard, the yard being fitted to turn around in the sling hoop or hoops and yard arm hoops provided for that purpose. The sail is divided down the center to enable it to clear the center fittings on the yard. A self acting provision which I call a "bonnet" is provided to fill up or close the aperture in the sail caused by the slit or division aforesaid. The yard is turned around by the action of a chain working in a whelped or cogged grooved fixed in the yard or by bands or ropes wound around the yard and which in unrolling produce rotation in it (one end being fixed to the yard) or by the action of a cog wheel on the yard on a suitable chain. In the case of the movable yards such as the topsail, top gallant, royal yards, &c., the rotating power for reefing is produced by the weight of the yard. A provision to keep the sail from chafing against the lee rigging when rolled up on the yard consists of a spar termed a "chafing spar" which stretches from yard arm to yard arm and is secured thereto to the yard arm hoops. This spar also carries the top gallant studding sail booms.

Detail—Fitting of Yard.—Figure 1 drawing B exhibits a topsail yard fitted complete. G, G is the chafing spar connected with the yard arm hoops *d, d*, at C, C, and within which hoops and also the sling hoops at *f* the yard works freely. *a, a* are blocks attached to the yard arm irons for the top gallant sheets to lead through, the blocks *b, b*, being for the inner lead of them. J, J are the foot ropes. *o, o* is the parrel confining the yard to the top mast, a sec-

tion of which appears within it. Fig. 3 shows the jackstay to which the sail is bent or secured. This jackstay is made deeper toward the yard arms to compensate for the bevel or taper of the yard. The figures in drawing A show more detailed description of the metal fittings of yard and parrel when the yard is worked by the action of chain. Figs. 16 and 17 are sections of a whelped or cogged grooved boss firmly fixed on the yard. Fig. 18 is a side view of one of two hoops which work on each side of the boss aforesaid at A A and which two hoops are connected together by cross bolts as seen at Fig. 19 and which two hoops again connect with the parrel thus securing the yard to the topmast. The mode of this connection is by inserting the lug A, A, Fig. 18 into the double joint on the fore part of the parrel band bolts being introduced through the corresponding holes in the double joint aforesaid and which passing through the hole in the lug A A Fig. 18 completes the connection. Figs. 7 and 8 represent the wooden barrel or "tub" of the parrel. Fig. 2 represents the band which encircles the wooden parrel. Fig. 1 represents the double joint before alluded to fixed on the fore part of parrel hoop at A A. Figs. 11 and 12 represent section and elevation of a rubbing hoop which is fixed on the yard arm. Figs. 13 and 15 represent the yard arm hoop which is put over the rubbing hoop aforesaid and within which the yard works, a suitable washer and pin securing the yard arm hoop on the yard arm the eyes appearing thereon are for the lift and braces. B, B Figs. 13 and 14 are side and ground views of the lug to which the chafing spar is connected. Fig. 9 represents the start or iron which is driven into the end of the chafing spar the slot in which iron goes over the lug. B, B Figs. 13 and 14 and the shackle and pin appearing in Fig. 9 completes the connection. C Fig. 9 is the iron or hoop for the top gallant studding sail boom. C Fig. 14 is a block fixed to the connecting lug on the yard arm hoops through which the top gallant sheet leads. Instead of the start Fig. 9 a ferrule or hoop can be used which cases the end of the chafing spar having a slot in it. The lug B, B Figs. 13 and 14 in this case is elongated (see dotted line) and another eye is formed in it for the brace, the lug is inserted in the slot and the end of the boom

iron serves for the connecting pin. See Fig. 20 drawing A.

Fittings of the sail.—The sail is divided down the center to ascertain depth below which it is intended to reef. The edges of this division are roped or edged with any other suitable material. See Fig. 1 drawing C. Upon this rope or roping is disposed at intervals, see Fig. 2, metal travelers of such formation as to work freely up and down the roping or edging but still admit the sail cloth to pass through them. Fig. 3 further explains this. A A are metal instruments of shape indicated, and called travelers. b, b is section of rope. C C is section of sail cloth attached to rope. It will be seen that the slit within which the said cloth works is too small to allow the rope or edging to pass through, consequently when this system of travelers on each side of the division of the sail is connected by rope strops the middle of the sail is kept together. A solid traveler forms the upper one of this system (see Figs. 3 and 4 drawing A) and forms the connection of the bonnet when complete to the yard fittings. The connected travelers having been disposed at equal distances a cloth of canvas is applied on each side of the sail and each traveler is firmly connected to the cloth of canvas which are also secured to each other by stitching between the division in the sail. The bottom of these cloths of canvas are then stitched or otherwise secured to the sail and the whole forms the bonnet. For a better idea of this see Fig. 1 drawings D and E. In the former the connection of the upper part of the bonnet to the fittings of the yard when the sail is bent thereto is shown, the upper traveler B is furnished with screw bolts which are inserted into holes in the swinging iron D drawing D and F and Fig. 19 drawing A. This iron is so made to swing that the bonnet shall blow out or work in harmony with the other parts of the sail. It will be seen that as the yard ascends or descends the bonnet is drawn up or shoved down the roping on each side of the division of the sail and hence the aperture caused thereby is kept closed.

The working or operation of the yard and sail.—It has been said that the yard is turned around by the action of chain in a

whelped or cogged groove on the yard or by the action of unrolling bands or ropes affixed to the yard or by the action of a cogged wheel fixed on the yard on a suitable chain. The illustration of this with reference to the rotation of the yard by chain is seen in Fig. 2 drawing B. E is a section of a topsail yard A A and B B are the chain topsail tye or halyards passing under the yard and in the whelped groove before alluded to. It is to be observed that it also passes under a roller which roller is more particularly expressed at C C. Figs. 18 and 19 drawing A. The chain pressing on this roller supports the parrel and causes it to work square on the topmast, the part A A of the chain is led through the sheave hole situate under the cross trees, the other part B B goes through another sheave hole in the topmast head. It will be seen that if the part B B be kept fast and the other part A A be lowered upon, the yard necessarily turns around as it descends the topmast, rolling the sail up as in Fig. 2 drawing E and again when the part A A is pulled upon, the yard is rolled around the contrary way and the sail unrolled as in Fig. 1 drawing E, in both cases the bonnet before described being drawn up or shoved down the middle of the sail. The chain tye may be led through blocks instead of sheave holes as here shown or indeed in any other way most convenient. Figs. 1, 3 and 4 show the arrangement for turning the yard by means of ropes or bands. The manner of bending or securing the sail to the yard is seen by drawing D.

What I claim is:

1. I claim the chafing-spar applied to the after side of the sail-yard for fending off the sail from the mast or rigging when rolled around the yard as set forth.

2. I claim the radius-bar D in combination with the bonnet-head in order to permit the top of the bonnet to blow out in harmony with the belly of the sail as described.

In testimony whereof I have hereunto set my hand this twenty-fifth day of October one thousand eight hundred and fifty four.

H. D. P. CUNNINGHAM.

Witnesses:

GEO. C. WARDEN,
R. A. BROOMAN.