

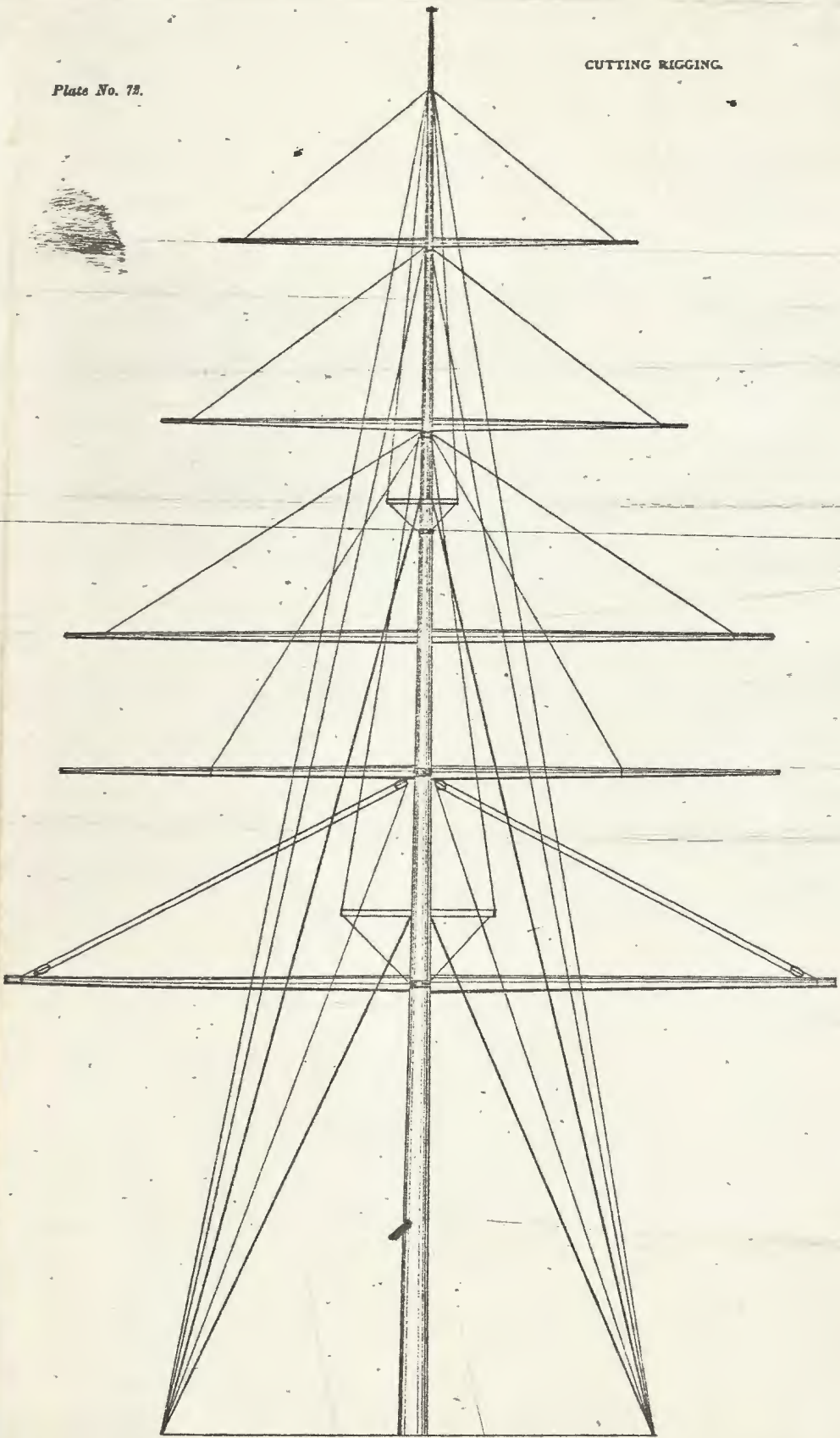
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## SECTION XXVI.

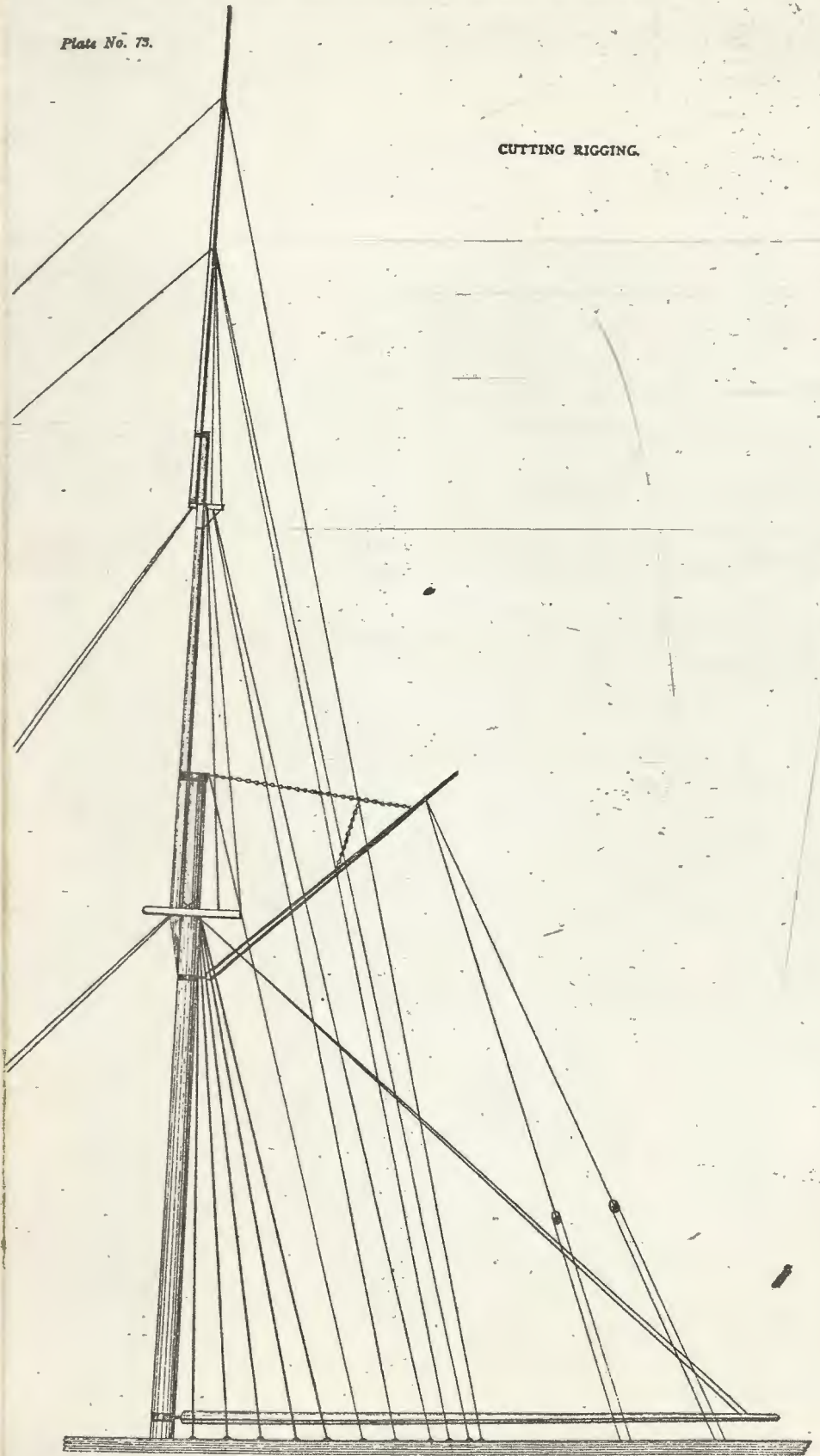
### CUTTING RIGGING.

*(See Plates Nos. 72 & 73.)*

When about to cut a set of lower rigging proceed thus: make two rough drafts of the ship with the masts fidded, one draft end on, or looking from right aft; this gives the spread of the shrouds athwartships. The other draft must be a broadside draft; this gives the spread of the shrouds fore and aft, and the carry aft according to the sheer of the ship.



CUTTING RIGGING.



Say you wish to know the carry aft of each shroud. Measure on the draft the length from the middle of the masthead, in the wake of where the rigging will be placed to where you wish the foremost dead-eye, then from the same spot on the masthead measure to where you wish the after dead-eye placed; the difference that exists in this measurement between the foremost and aftermost dead-eye, divided by the number of shrouds in the rigging, gives the carry aft of each respective shroud; or in plainer terms, the longer that each shroud will be as you work aft, and the less this difference will be in the length of the shrouds, the greater rake the mast has.

For the first pair of shrouds (which go on the starboard side), measure from the middle of the port side of the masthead to the foremost dead-eye, double this, add the carry aft, allow for splicing or turning in, and cut; this is allowing the wire is on a proper stretch, all ready for serving and splicing in the dead-eyes. Then measure from the middle of the starboard side of the mast to the foremost dead-eye, for the first pair of shrouds on the port side, allowing them to be the diameter of the rope longer than the starboard pair, and cut.

The starboard No. 2 pair are next cut, then the No. 2 port pair, and so on; one pair going over the masthead on the starboard side, the next on the port side, till all the shrouds are complete. And remember as you work aft, each pair of shrouds are the diameter of the rope used longer than the pair that preceded them—bear this in mind. When measuring off the rope use a good tape line, and mark your cuttings by seizing two good rope yarns round the rope, and cut between each yarn; this will prevent the rope unlaying itself at the cutting. Tally each pair of shrouds as you cut them with a strip of marked canvas, to prevent a mistake occurring when placing the rigging over the masthead. Lower rigging should first have a coat of tallow, then parcelling, then double service of amberline right up and down. The eyes have sometimes a third service, or are parcelled over all. A coat of white lead should go on under each seizing, and the seizings should be covered with canvas.

In fitting wire rigging to a wooden vessel of any age it is wise to cut the shrouds short, and give a good length of lanyard, and thus get more *give* in the rigging.

Fore and aft stays are not served over, owing to the hanks of staysails travelling on them; the wire of stays thus goes rusty much sooner than that of the shrouds, and they require carefully looking after. Backstays, unless served right up and down, will be liable in time to carry away about the top end of the service. When unserved standing

Rigging begins to show signs of rust, it is best to paint it with white lead; this will prevent any further accumulation of rust.

(See Plates Nos. 74, 75, & 76.)

When seizing in the eyes of the rigging, leave plenty of room for the eyes to go over the masthead, so that the seizings will lie well down below the bolsters.

If you prefer it, you can measure each pair of shrouds separately from the draft; but if such is the case, your draft should be on a good workable scale, not anything less than a quarter of an inch to the foot; and bear in mind that the larger the scale is, the more exact you will be in the cutting and fitting of the rigging.

Topmast rigging is cut in the same manner, only the fore and aft topmast stays are generally fitted with two lashing eyes, that set up abaft the mast above the eyes of the rigging.

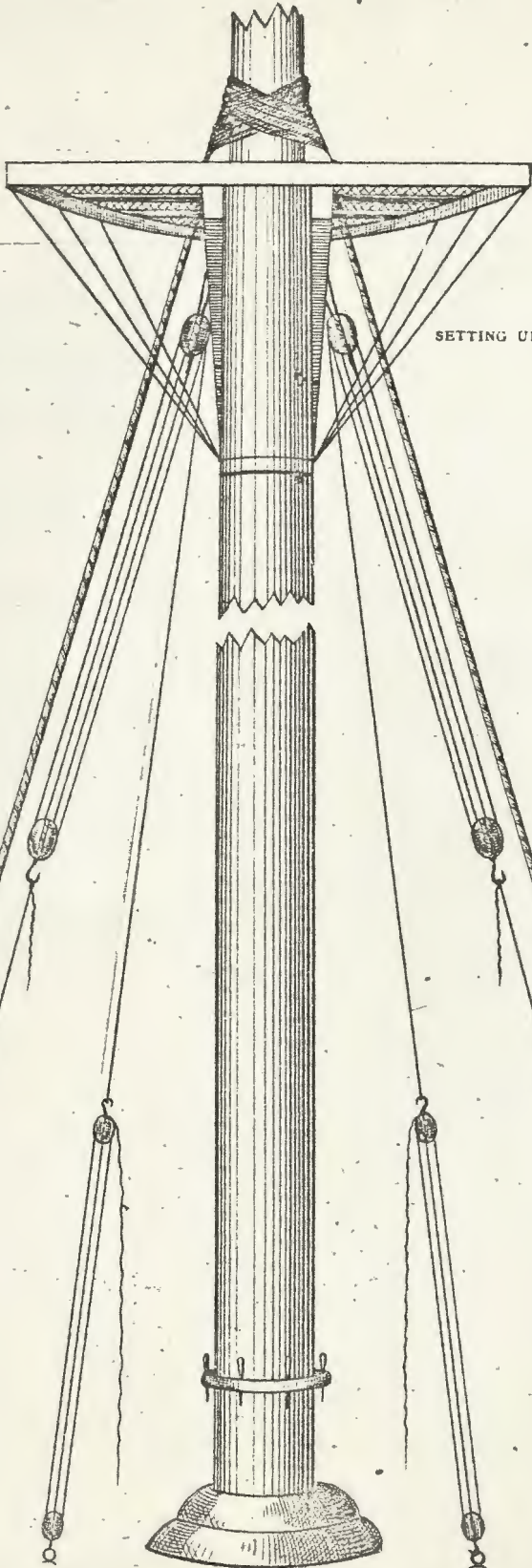
Topgallant and royal rigging is also cut in the same way, only the fore and aft stays are placed on the mast first, to prevent the eyes of the rigging slipping down over the hounds of the mast.

Riggers themselves are not very particular about the exact length of each shroud when splicing in dead-eyes on board of a ship, for by simply taking a few turns in or out of a shroud they get the dead-eye to the required position, and with wire rope this is the common practice.

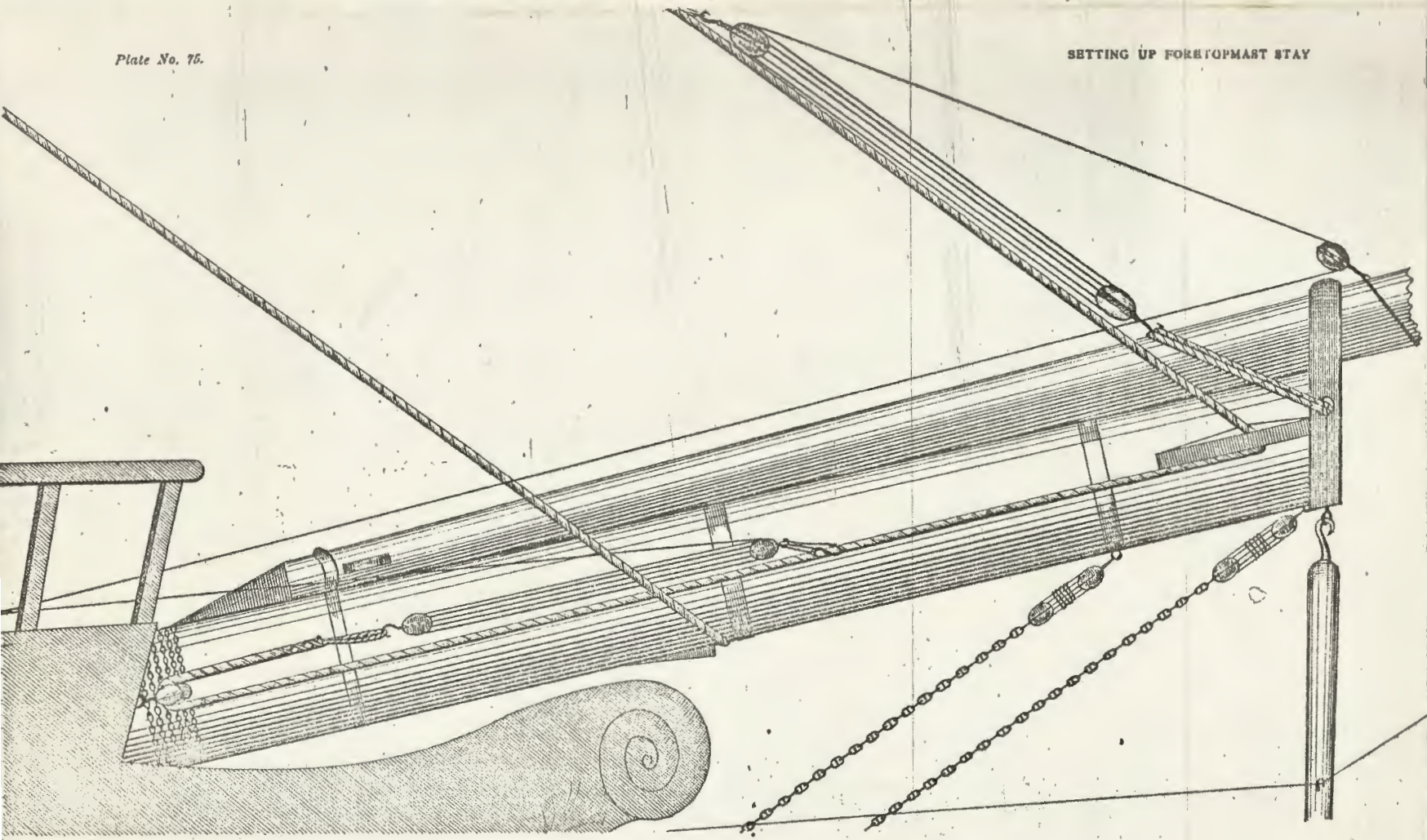
As to cutting lifts, foot-ropes, &c., and the running rigging, no special directions are necessary; they can be cut from the draft according to how they are to be fitted, there being many different modes of fitting them. Our advice is, in cutting running rigging, like buntlines, hal yards, braces, &c., reeve them *first*, and cut them afterwards: much rope will be saved thereby.

A great deal of the rigidity of wire rigging is counteracted by having the wire shrouds set up with rope lanyards, and vessels so fitted stand a less chance of getting dismasted than vessels that set up their rigging with screws, which are becoming much used in these days. In vessels so fitted there cannot be a particle of *give* in anything; and another objection to screws is, that to cut away the masts hurriedly would be impossible. And, perhaps more important still, the worms of the screws have been known to *strip* with the strain hove upon them by a heavy roll, and the vessel has been dismasted. Therefore, I think we may justly conclude that, of the two systems, the wire rigging with rope lanyards is to be preferred. (See Plate No. 77.)

Screws, no doubt, look neater than lanyards, and the rigging is more easily set up by them; yet we must not lose sight of the fact, that in



SETTING UP RIGGING.



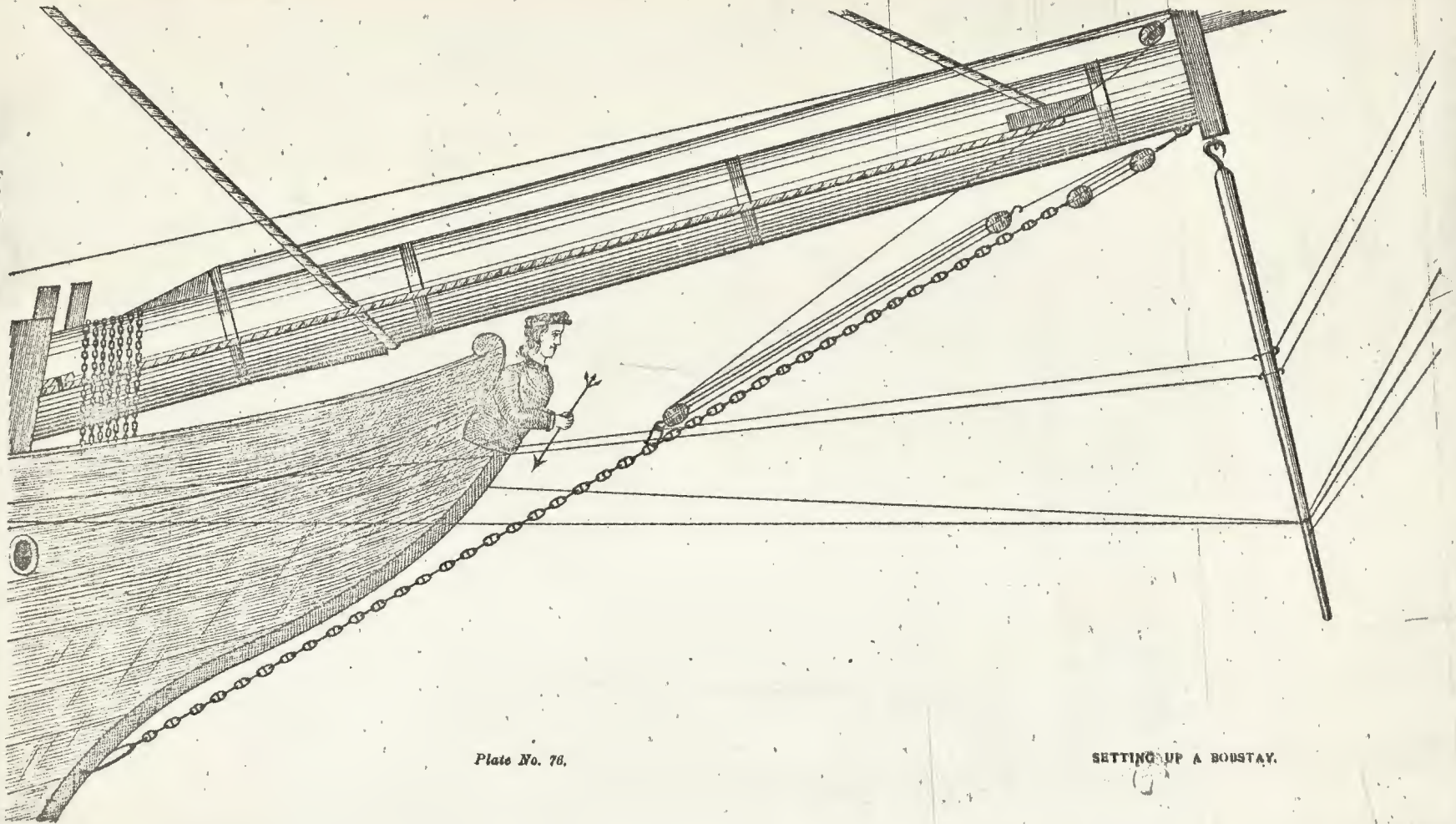


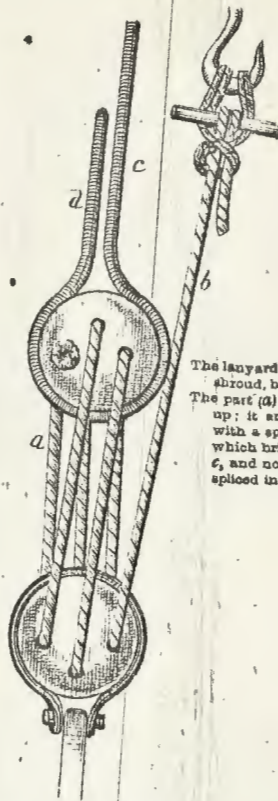
Plate No. 78.

SETTING UP A BOBSTAY.



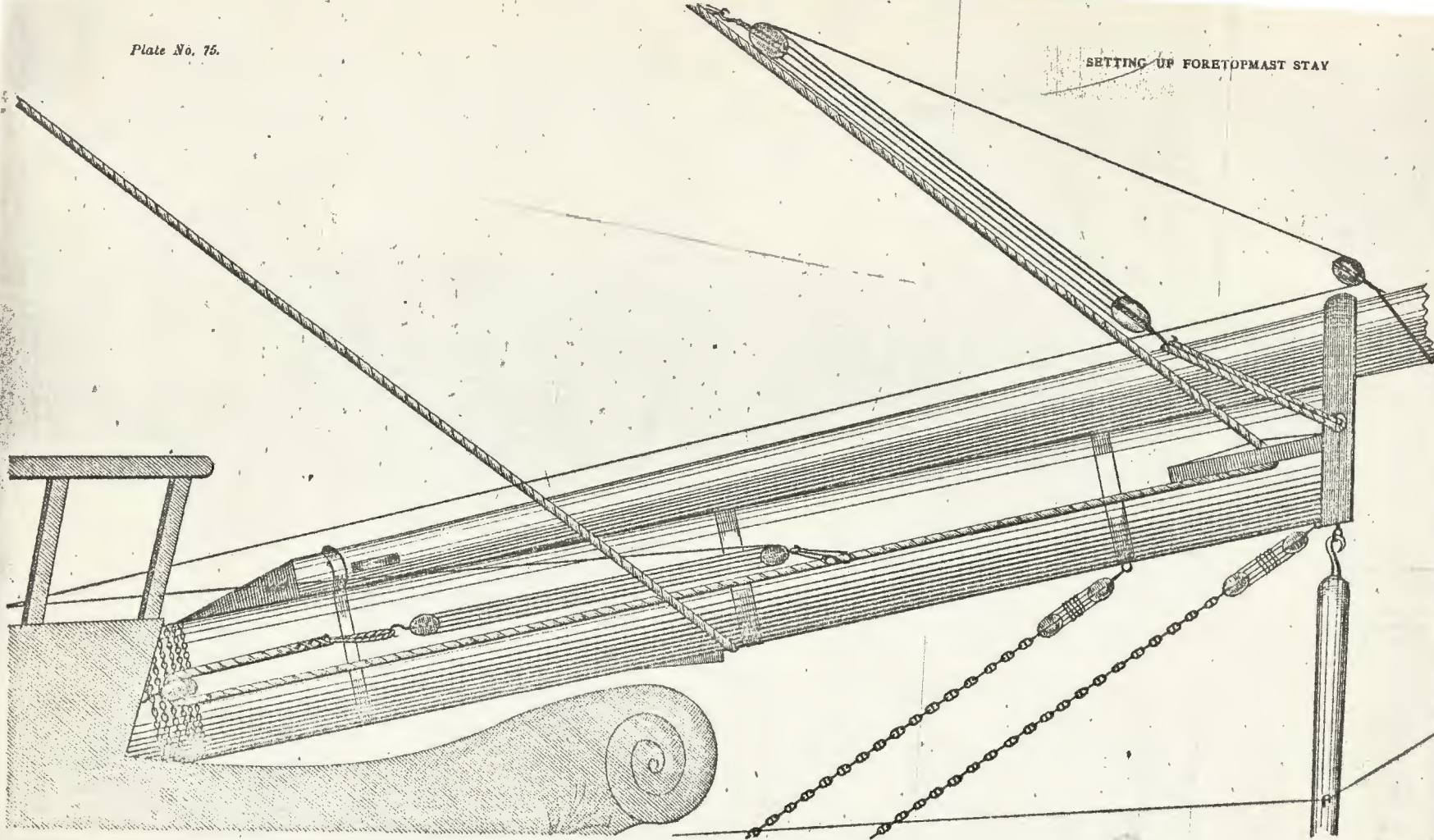


Wire rigging fitted with Snaffles to masthead.



The lanyard is rove with the knot under the end part of the shroud, because  
 The part (a) of the lanyard bears little or no strain in setting up; it and the next part having to be rendered through with a spike. Thus the principal strain is on the part (b), which brings the strain on the standing part of the shroud c, and not on the end part d, which would probably be spliced in, and thus be the weaker part.

REEVING A LANYARD



heavy weather, with a laboursome cargo, their safety is not to be depended on, and these screws have been the means of splendid ships of the present day losing their masts through stripping, as aforesaid.

In setting up the lower rigging the masts are first stayed; the stays being secured, the rigging is then set up, foremost shrouds first. Whilst setting these up keep an eye on the mast-coat, to see that one side of the canvas does not get all the strain. (*See Plate No. 74.*)

In reeving a lanyard in a dead-eye, the knot must be rove in the hole under the end part of the shroud; the hauling part will then be under the main part of the shroud, which will thus get the principal strain when setting up. The accompanying table gives the proper sizes of shrouds and lanyards. In all cases with wire rigging the lanyard should be at least the size of the rigging.

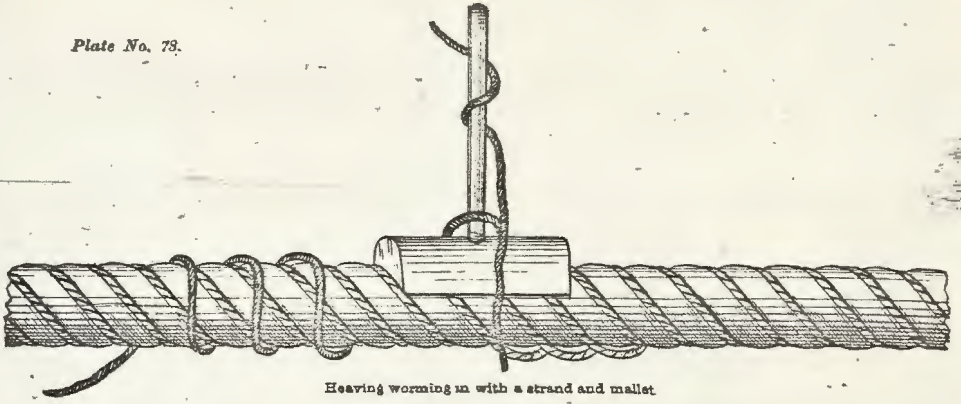
REGISTER TONNAGE UNDER DECK.	Tons. 1,800 to 2,000	Tons. 1,600 to 1,800	Tons. 1,400 to 1,600	Tons. 1,200 to 1,400	Tons. 1,000 to 1,200	Tons. 800 to 1,000	Tons. 700 to 800	Tons. 600 to 700	Tons. 500 to 600	Tons. 400 to 500	Tons. 300 to 400
	No. Size. Inches.	No. Size. Inches.	No. Size. Inches.	No. Size. Inches.	No. Size. Inches.	No. Size. Inches.	No. Size. Inches.	No. Size. Inches.	No. Size. Inches.	No. Size. Inches.	No. Size. Inches.
FORE & MAIN Shrouds ...	6 5½ and cap	6 5½ and cap	6 5 and cap	6 4¾ and cap	6 4½ and cap	5 4½ and cap	5 4 and cap	5 3¾ and cap	5 3½ and cap	4 3½ and cap	4 3 and cap
"  "  Chain plates ...	2½	2½	2	1½	1½	1½	1½	1½	1½	1½	1½
"  "  Dead-eyes ...	12 × 7	11½ × 6½	11 × 6	10½ × 6	10 × 6	9½ × 5½	9 × 5½	8½ × 5	8 × 5	7½ × 4½	7 × 4½
"  "  Lanyards (hemp) ...	6	5½	5½	5	5	4½	4½	4½	4	3¾	3¾
"  "  Topmast. bckstys. ...	3 5½	3 5½	3 5	3 4¾	3 4½	2 4½	2 4½	2 3¾	2 3½	2 3½	2 3
"  "  Top-gilt. bckstys. ...	2 4	2 3¾	2 3½	2 3¼	2 3	2 3	2 2¾	2 2½	2 2½	2 2½	2 2
"  "  Lower stays ...	2 5½	2 5½	2 5	2 4¾	2 4½	2 4½	2 4	2 3¾	2 3½	2 3½	2 3
"  "  Topmast stays ...	2 5½	2 5½	2 5	2 4¾	2 4½	2 4½	2 4	2 3¾	2 3½	2 3½	2 3
"  "  Topgallant stays ...	4	3¾	3½	3¼	3	3	2¾	2½	2½	2½	2
MIZZEN Shrouds ...	5 4½ and cap	5 4½ and cap	5 4 and cap	5 3¾ and cap	5 3½ and cap	5 3½ and cap	5 3½ and cap	4 3½ and cap	4 3 and cap	3 2½ and cap	3 2½ and cap
"  Topmast backstays ...	3 4½	3 4½	3 4	3 3¾	3 3½	2 3½	2 3½	2 3½	2 3	2 2½	2 2½
"  Topgallant backstays ...	2 3½	2 3	2 2¾	2 2½	2 2½	2 2½	2 2½	2 2	2 1¾	2 1½	2 1½
"  Lower stays ...	2 4½	2 4½	2 4	2 3¾	2 3½	2 3½	2 3½	2 3½	2 3	2 2½	2 2½
"  Topmast stays ...	2 4½	2 4½	2 4	2 3¾	2 3½	2 3½	2 3½	2 3½	2 3	2 2½	2 2½
"  Topgallant stays ...	3½	3	2¾	2½	2½	2½	2	2	1¾	1½	1½
BOBSTAY Bar ...	3½	3½	3½	3½	3	2½	2½	2	2	2	2
"  Pin ...	2½	2½	2½	2½	2½	1½	1½	1½	1½	1½	1½
"  Chain ...	1½	1½	1½	1½	1½	1½	1½	1½	1½	1½	1½
BOWSPRIT Shrouds ...	2 1	2 1	2 7/8	2 7/8	2 7/8	2 7/8	2 7/8	2 7/8	2 7/8	2 7/8	2 7/8

Equivalent strengths of Good Steel Wire.

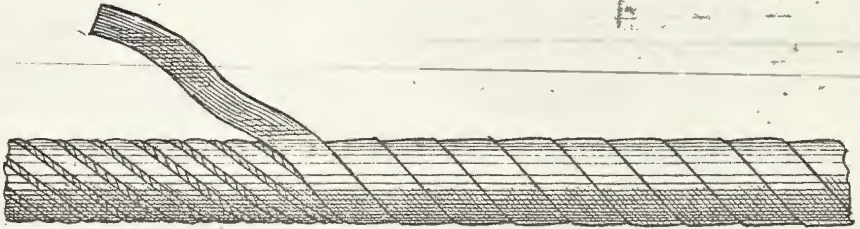
	In.	In.	In.	In.	In.	In.	In.	In.	In.	In.
Iron ...	5½	5½	5	4½	4½	4½	4	3¾	3½	3
Steel ...	4½	4½	4½	4½	4	3½	3½	3½	3	2½

1.—The above sizes are intended to apply to vessels in which the dimensions of the masts and yards are such as would not be deemed unusual for vessels of the respective tonnages.

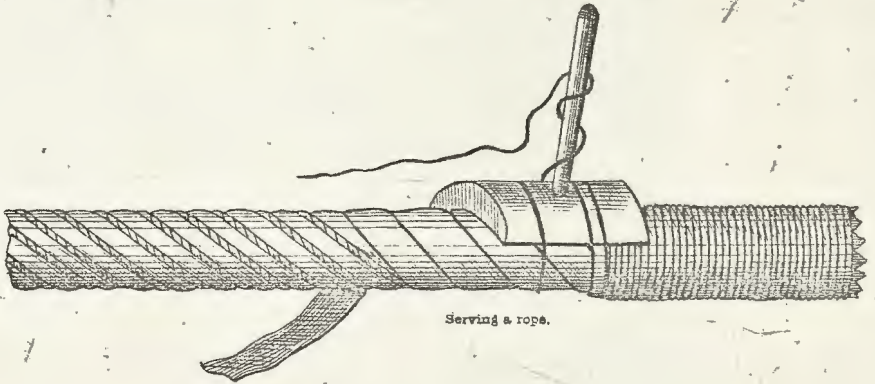
2.—Where double topgallant yards are to be adopted, a topmast cap backstay should be fitted.



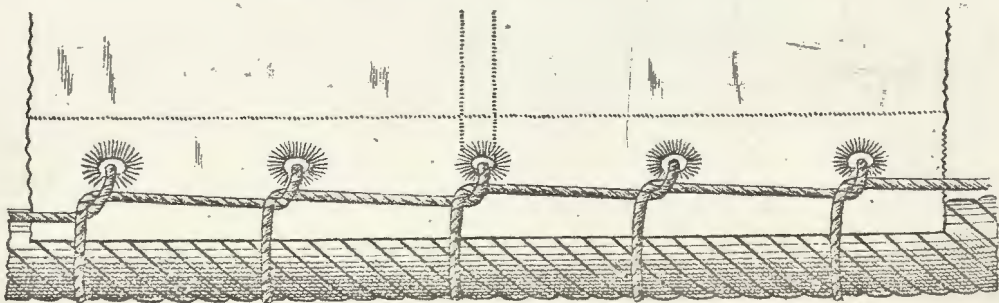
Heaving worming in with a strand and mallet



Parcelling a rope,



Serving a rope.



Marling on the footropes of a sail.

Topmast backstays and lower shrouds are the same size.

Topmasts are first stayed, the backstays are then set up, and the rigging last.

### WORM, PARCEL, SERVE, AND MARL

Worming is passed into the lay of a rope to give it a snug, round appearance. Small ropes are wormed with rope yarns, or marline; larger ropes are wormed with either spun yarn or amberline. The ends of worming are either seized on the rope, or tucked through the strands, then passed round the rope in each respective lay, and hauled hand tight. A soft strand is then passed round the rope and round a serving mallet (*see Plate No. 78*), which is worked along the rope, and which heaves the worming taut into the lay of the rope; when the worming is well home in, the ends are again tucked through the lay of the rope and cut off. If the worming is not to be served over, the ends must be tucked twice through the rope before cutting them off. Very large ropes are sister wormed, which is done by placing on each side of the worming a smaller thread put on by hand.

Parcelling is made by tarring half worn canvas and cutting it in narrow strips; this is wound round the rope above the worming, to prevent water getting into the heart of the rope (*see Plate No. 78*.) When parcelling standing rigging, pass it so that one lay of it overlaps the edge of the other, and be careful to commence at the bottom and parcel upwards. An old sea rhyme says:—

“Worm and parcel with the lay,  
Then serve and marl the other way.”

Service is employed to keep the rope from getting chafed. When beginning the service, place your left side against the rope, and work from you, taking the turns from right to left round the rope, the opposite way to the hands of a watch, in right-handed rope. Of course if the rope is left-handed this order of things must be exactly reversed, but in any case always remember service must be put on against the lay.

Having taken four turns round the rope, take the end and shove it under these four parts, then heave each of these turns well taut over the end. Ship your serving mallet in its place, and take over it, and round the rope three turns (*see Plate No. 78*) and heave on your service with the mallet as tight as necessary. Standing rigging should be served very tight, but any rope that has to work through a block should only be served moderately tight, or rather slack served. When

about to finish off the ends of service, slack up the last four turns and pass the end through the four bights, then render each turn taut separately, and heave them in with a marlingspike, then pull the end through tight and cut it close off.

Marline hitches are employed in fastening a sail to the footrope (*see Plate No. 78*); also parcelling that has not to be served over is kept in its place by marling it tight upon the rope with hitches.

When about to marl parcelling on a rope, first secure the end of the marline round both parcelling and rope with a timber hitch; then place your left side against the rope, and work towards you. With the left hand throw the bight of the marline over the top and underneath the rope, and as the bight comes up, with the right hand pass the ball or end of your marline through this bight on your near side of the rope: this when rendered taut forms a marling-hitch. To render this hitch tight proceed thus:—With the left hand haul the bight of the marline on the near side of the rope upwards *against the lay* of the parcelling, being careful in doing so that you do not pucker it, and with the right hand render tight the hitch, and proceed in the same way with each successive hitch. In fact the manipulation is much easier done in actual practice than to describe it in writing, as it is accomplished very quickly. Mooring hawsers, coming in the wake of iron rings, posts on shore, or iron bollards on board, should all be roughly marled and parcelled, to prevent them getting chafed or injured.

#### WIRE SPLICING.

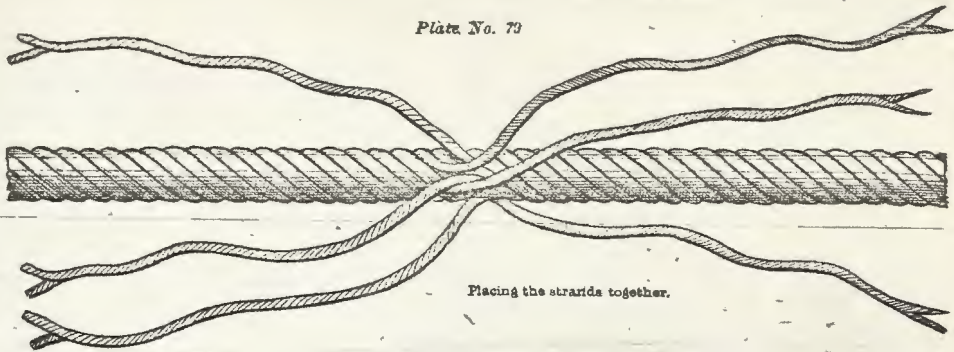
Wire splicing at the present day is a distinct branch of the rigging trade itself, so much so that in all large roperies two or three men are kept constantly employed doing nothing else. So as wire is the order of the day both for steamers and ships' standing rigging, besides being used for all kinds of transporting ropes and mooring hawsers, it is very essential that seamen should know how to handle and splice wire in a proper manner, so we will try and describe the usual methods employed by practical wire splicers.

Mostly all wire ropes are six-stranded, and are layed up as right-handed or left-handed ropes, right-handed being the most in favour with the riggers at the present time.

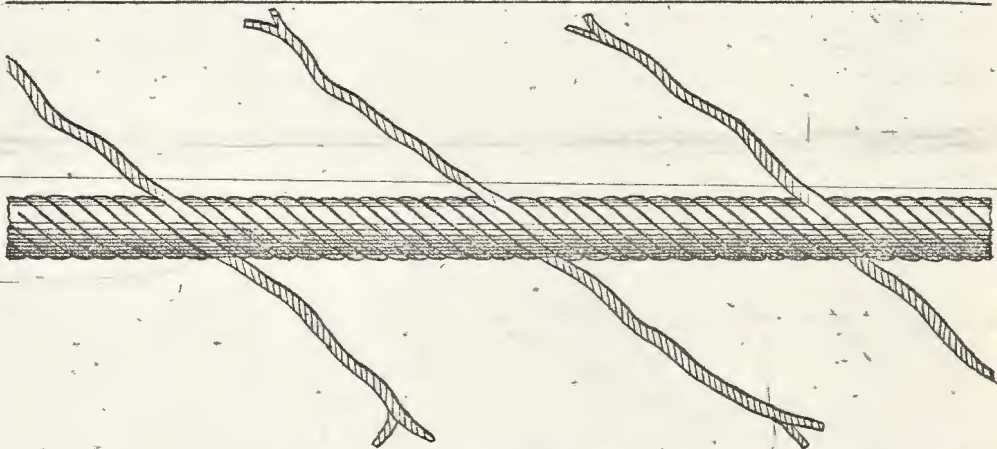
Through the centre of the rope runs a europe heart, and this heart is the same size as a strand of the rope. (Bear this in mind.)

Each strand has also a europe heart in it, the heart being the same size as the wires composing the strand.

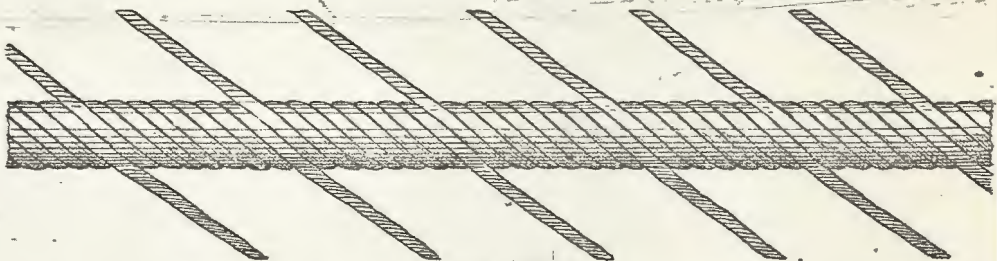
The long splice being the most important, we will describe it first.



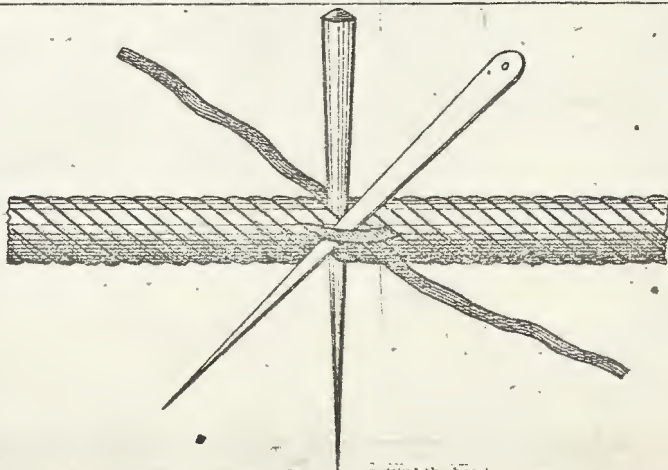
Placing the strands together.



Laying up the rope before singling the strands.



Ready for splicing.



Picking out and

cutting the heart.



Unlay the strands to be spliced several feet; if a good-sized rope, you will require nine feet of each end of it to make a good splice. Mind place a good seizing round the rope before you start to unlay it. When unlaying it, unlay two strands together, this keeps the rope in its original lay (mind if you unlay the strands singly it is impossible to form a neat splice). Then put the ends of the rope together in the same manner as a three-stranded hemp rope, and lay it up so that the strands are equal distances apart, the same as in an ordinary long splice—(see *Plate No. 79*)—then take two of the ends, which are double strands, and unlay them singly; then lay them up a short distance clear of each other ready for splicing, and serve all the rest of the strands in the same way, so that the splice will appear as represented in the plate.

Now fix upon two ends to begin the splice, and where the two strands come together, shove a marlingspike right through the centre of the rope above and below three strands; this spike must be kept through the rope till the strand you are working with is finished; then, with another marlingspike, pick out the europe heart of the rope in the wake of the marlingspike and cut the bight—(see *Plate No. 79*)—then work the heart out of the rope a few inches, and at the same time force the strand you are working with into the place the europe heart formerly occupied; this is easily done by turning the marlingspike round that you first placed through the centre of the rope. As you turn it round (it will require considerable force to do so), it will work its own way along the rope, and by a little manipulation the strand you are working with will go right into the heart of the rope; work it along in the heart of the rope a few inches till it joins the europe heart, then cut the ends close off so that the europe heart and the wire strand lie in the centre of the rope, with their ends touching each other. Being a six-stranded rope the splice cannot draw. Serve all the other strands in the same way, and when the splice is finished, and the ends of the wires neatly cut off, you will not be able to see where the rope is spliced.

If it is a transporting hawser, when finishing off the end of the strand you may, if you like, tuck it once round a strand; but if it happens to be a piece of rigging you are splicing, this is quite unnecessary. The novice at wire splicing may think because the ends of the strands are not tucked, the splice will draw. We can assure him such is not the case. Remember the rope is *six stranded*—a splice made as described will never draw; the rope will break first. And as you have merely taken out of the rope a europe heart, and in its place put in a

wire heart, the rope, when spliced, will be the same size throughout, and a very neat job it is when finished.

Ropers and riggers use a long tapered steel marlingspike for splicing wire, with a small *flat* point. This flat point is of great service in picking up the strands in a large close layed rope.

We will now try and describe the eye-splice. There are several methods in vogue in tucking the strands, and each roper and rigger you meet considers his way is the proper way to do it. It is, however, quite unnecessary to go into the different methods, as we will give the necessary directions how to make a good, neat, and strong eye-splice, suitable for either splicing in a lower rigging dead-eye, a long eye for a towline, or in fact any other eye-splice that is called for on board of a ship.

As there are six strands to tuck, we have thought it best to number the strands in the illustrations, so that the novice will at once see how to unlay the strands preparatory to making the splice, and place them in their proper position by referring to *Plate No. 1*.

When splicing wire never withdraw your marlingspike till after you have tucked the strand, and hauled the slack of it through. When pointing the strand pass it close alongside of the marlingspike, either above it or below it will do; and mind before you point a strand take a couple of turns out of it, so that it will lie flat and snug on the rope.

Before unlaying the strands to make an eye-splice, place a tight seizing round the rope, about eighteen inches or two feet from its end, according to the size of the rope. Do not pinch yourself in the length of strand if you can avoid it; when the seizing is taut on, unlay the strands singly up to the seizing.

Then take a piece of amberline, and hang the bight of the wire rope to something, so that the splice itself will be as high as your chin; and see in making the bight fast with the amberline that the rope will not turn in the seizing, and that there is about two feet drift between the part of the rope you intend to tuck the strands and the amberline seizing: by this means you can heave a turn or two out of the rope at pleasure, which enables you to work in the strands as required. Always work your marlingspike with its point from you, then if it slips on the wire no damage is done; and remember the manipulation of the whole splice greatly depends on hanging it up and seizing it carefully as directed.

If you try to splice it lying on the deck, or on your knees, failure is sure to be the result as regards a neat splice, therefore it is very important to pay great attention to the hanging up of the rope, as it materially adds to the success of the undertaking.

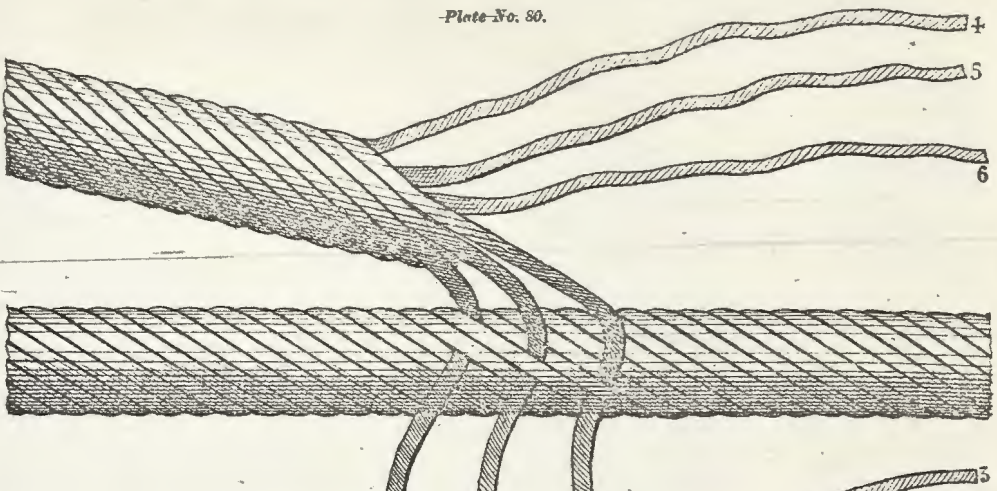


Fig. 1.

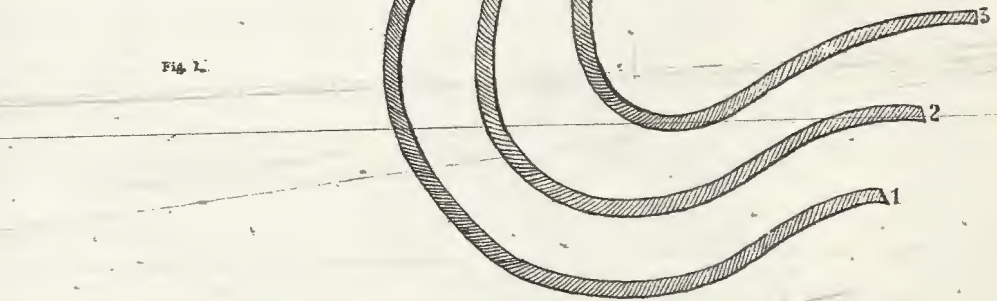
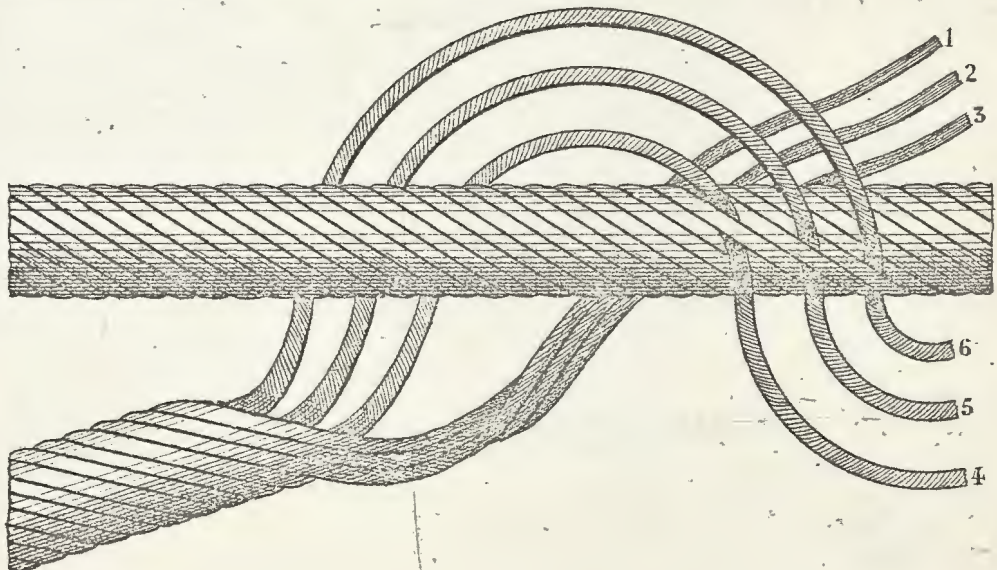


Fig. 2.



When bending the rope round to form the splice, place the unlayed end on the left side of the standing rope. (See Plate No. 80.)

Unlay the strands so that three lie towards your right, and three towards your left hand. The three that lie to the right must be the upper set. Firstly, take No. 1 strand and tuck it down through two strands, then No. 2 strand enters the same lay of the rope as No. 1, but only passes under one strand, and the last of the set, No. 3, is tucked through the next strand above No. 2.

Now turn the splice half round, and it will appear as represented in Plate No. 80; then take No. 4 and tuck it round the strand next to No. 3, next follow Nos. 5 and 6, each following one another round their respective strands.

The splice has now resolved itself into this:—The first strand was tucked under two strands, and all the rest following it tucked under one strand respectively. By tucking the strands in this manner each strand comes out in its proper lay; and remember the tucked strands are all worked round the strand of the standing rope from beginning to end, in the same manner as a sailmaker's splice, which means tucking all strands from left to right.

When all strands are tucked once through the rope, haul them all moderately tight, and beat each strand into its proper place; the tools required for accomplishing this object successfully being a long tapered marlingspike, flat pointed, a hammer, and a strong hand-vice, fitted with two pieces of hollowed steel to fit the rope.

Do not haul the parts of the rope that have not been unlayed, close together at the neck of the splice; if you do, depend upon it a lumpy splice will be the result.

Always leave an inch space in the neck of the splice: more if it is a very large rope. This gives the strands a chance to lay to their work, and bear an equal strain when a great weight is hove upon the rope.

Having tucked the strands once, and got them into their proper places, then tuck them again *whole* twice. (Mind it is only in the first tucking that strand No. 1 is passed under two strands; in each succeeding tucking it only passes under one strand, and is spliced along the rope in the same manner as the other five strands.) Now you have tucked the strands, in all, whole three times through the rope; so, to finish off the splice, halve the strands and tuck them once. When tucking the strands do not nip them short round, but endeavour to get the wires of the tucked strands to lie in the same way as the wires in the standing part of the rope.

To make a neat eye-splice in a heavy rope requires a good deal of hammer and marlingspike manipulation after the splice is formed; and can only be come at to perfection by constant practice. All eye-splices should be neatly parcelled with oily canvas, and served over with good amberline, spun yarn being quite inadequate for the purpose.

This description, and its accompanying plates, are for a six-stranded, right-handed layed rope, this being the kind at the present time that finds most favour with riggers. But if it so happens you have a left-handed rope to splice, the above directions must be exactly reversed.

This completes the art of wire splicing, and although it only consists of making two splices, viz.:—the eye and long splice—it cannot be learned in a day, and no amount of writing can convey to the novice the art so well as a trip to a wire rigging loft for half an hour; and then, after having taken good stock of all he saw there, coming on board and practising on a piece of wire himself. And if he does not succeed in his first attempt to make a neat splice, let him not feel crest-fallen, but persevere again and again; and later on, at some other time, and at some other place, he will undoubtedly gain the summit of his ambition. Remember Rome was not built in a day. Depend upon it the seamen of the coming day will have to be efficient wire splicers, and will have to handle wire as well as they can rope; and he who is the most adept wire splicer in a vessel is sure to enjoy the respect of his officers, and be the envy and admiration of all his brother shipmates.

Never forget when about to purchase new wire rope to repair old, if the two have to be neatly spliced together, that the new has *exactly* the same amount of lay in it as the old. Mind, although the circumference of the old and new may coincide, the lay may either be longer or shorter; if such is the case it is quite impossible to tail the two together properly. Therefore, when you take the circumference of the old rope, measure carefully the length of its lay. Proceed thus:—Make a mark on one strand of the rope, count seven lays from this mark, and mark it again; the distance between the marks measured on a foot rule gives the length of lay. And as I said above, if the new is not exactly the same lay as the old, discard it at once—it is of no use for the purpose required. And once a roper has cut wire rope to the ordered length and size you cannot return it; so it is very important, when ordering new rope, that the lay should be quoted as well as the circumference, or else you will have a lot of useless rope thrown on your hands that may be unsuitable for any other purpose, and entail extra expense upon the ship.

## STRENGTH OF ROPES.

Hemp.	Iron.	Steel.	Working Load Cwts.	Breaking Strain Tons.	Ordinary Chain.
2½	1		6	2	⅞
	1½	1	9	3	
3½	1¾		12	4	
	1½	1½	15	5	
4½	1¾		18	6	
	2	1¾	21	7	
5½	2¼	1½	24	8	⅞
	2¼		27	9	
6	2¾	1¾	30	10	
6½	2¾	2	36	12	
	2¾	2¼	39	13	
7	2¾	2¼	42	14	1½
7½	3¼	2¾	48	16	
8	3¾	2½ X	54	18	
	3¾		60	20	
8½	3¾	2½	66	22	
9½	3¾	3¼	78	26	1½
10	4		84	28	1"
	4¼	3¾	90	30	
11	4¾		96	32	
	4¾	3½	108	36	
12	4¾	3½	120	40	

Strength of short, round-linked chain such as is used for cranes or rigging.

Inches.	Mean breaking Strain Tons.	Test.
1½	44	18'8
1	29	12'0
¾	23.	9'1
½	17	6'8
⅝	12	4'6
¼	7½	3'0