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The rigger's guide and seaman's assistant

Charles Bushell

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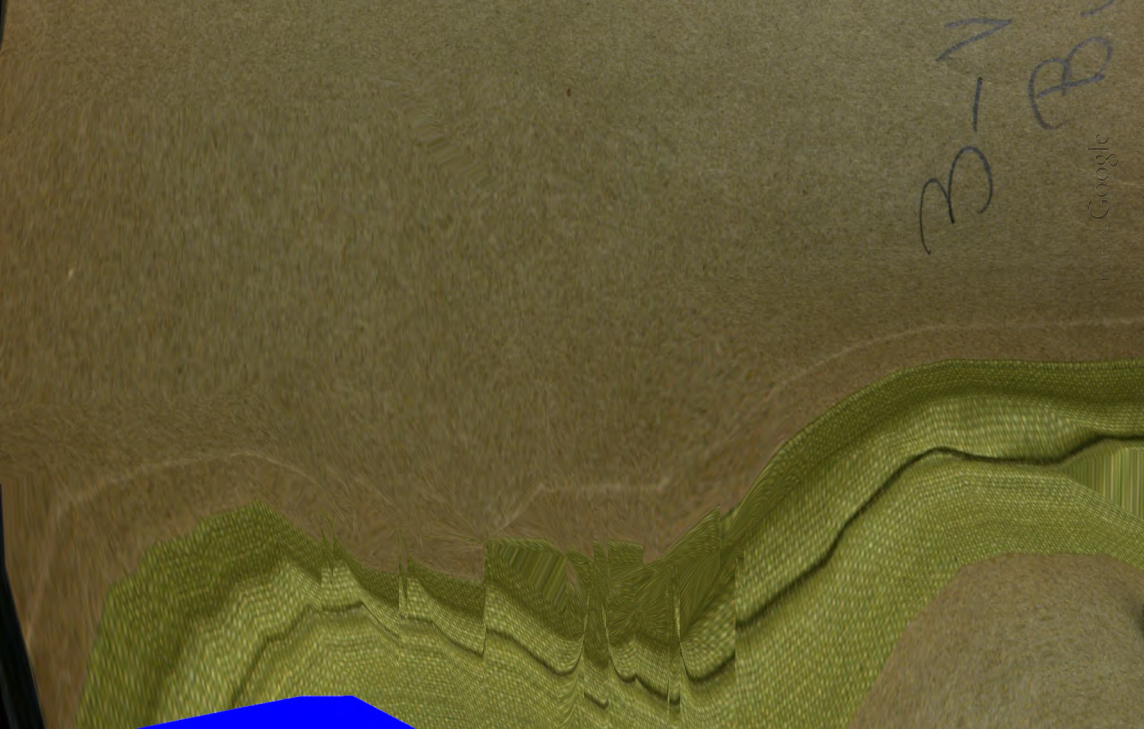
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RIGGER'S GUIDE.

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THE RIGGER'S GUIDE

AND

SEAMAN'S ASSISTANT;

CONTAINING PRACTICAL INSTRUCTIONS FOR RIGGING SHIPS, WITH CONSIDERABLE ADDITIONS RELATIVE TO WIRE RIGGING, FORMATION OF KNOTS, ETC.

By CHARLES BUSHELL.

SEVENTH EDITION.

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PREFACE

TO SEVENTH EDITION.

THIS Edition has been carefully revised and corrected.

The book is adapted to suit every class of ship whether steamer or sailing vessel.

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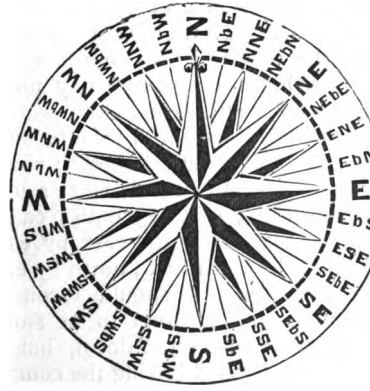
THE RIGGER'S GUIDE

AND

SEAMAN'S ASSISTANT.

The Compass, Lead Line, Log Line, &c.



THE COMPASS.

It is requisite that every young person who has any idea of being a sailor should learn the compass; also the marks and deeps on the lead line, and the knots on the log line.

We will begin with the compass. First, commence with the north point, and go round with the sun :—

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North ; north by east ; north, north east ; north east by north ; north east ; north east by east ; east, north east ; east by north ; east ; east by south ; east, south east ; south east by east ; south east ; south east by south ; south, south east ; south by east ; south ; south by west ; south, south west ; south west by south ; south west ; south west by west ; west, south west ; west by south ; west ; west by north ; west, north west ; north west by west ; north west ; north west by north ; north, north west ; north by west ; north.

It would also be as well to learn the compass the reverse way, for that will give a more perfect knowledge of it ; it is as follows :—North ; north by west ; north north west ; north west by north ; north west ; north; west by west ; north, north west ; west by north ; west ; west by south ; west, south west ; south west by west ; south west ; south west by south ; south, south west ; south by west ; south, south by east ; south, south east ; south east by south ; south east ; south east by east ; east, south east ; east by south ; east ; east by north ; east, north east ; north east by east ; north east by north ; north, north east ; north by east ; north

After this is learned, I should recommend the following questions and answers to be studied ; and not only the few that I have put down, but the whole of the compass—it is called boxing the compass.

BOXING THE COMPASS.

What is the opposite point to North? South.

What is the opposite point to East ? West.

What is the opposite point to N. E. ? S. W.

What is the opposite point to N.W. ? S.E.

What is the opposite point S. W. by S. ½ S. ? N.E by N. ½ N.

What is the opposite point to N.E by E. ? S.W. by W.

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What is the opposite point to W. by S. ½ S.? E. by N. ½ N.

What is the opposite point to W.N.W.? E.S.E.

What is the opposite point to W.S.W.? E.N.E.

What is the opposite point to N.W. by N.? S.E. by S.

What is the opposite point to W. by N.? E. by S.

What is the opposite point to S. by W.? N. by E.

What is the opposite point to S.S.E.? N.N.W.

What is the opposite point to S.E. by E.? N.W. by W.

THE LEAD LINE.

THE hand lead weighs eleven pounds, and the hand line is from twenty to thirty fathoms in length.

The way to mark the lead line is, two strips of black leather at two fathoms, three strips of black leather at three, white bunting at five, red at seven, black leather with a hole in it at ten, blue bunting at thirteen, white at fifteen, red at seventeen, and two knots at twenty. There are nine marks and eleven deeps in a hand line; the deeps are as follows:—One, four, six, eight, nine, eleven, twelve, fourteen, sixteen, eighteen, and nineteen.

To take soundings, a man stands in the weather main channels, with a breast rope secured to the rigging, or, if in a paddle-wheel steamer, the man stands on the paddle box, and throws the lead forward while the vessel has head-way; if the depth corresponds with the mark on the line, as above stated, say the blue bunting, he calls out, "By the mark thirteen;" if it is a deep, the fathoms of which have no mark upon the line, as four, six, eight, nine, &c., he calls out, "By the deep four," &c. If he judges the depth to be a quarter or a half more than a particular fathom, as, for instance, six, he calls out "And a quarter six,"

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or, "And a half six;" if it is six and three quarters, he calls out "Quarter less seven," and so on.

THE DEEP-SEA LEAD LINE.

THE length of the line is one hundred fathoms, and it is wound upon a reel; the weight of the lead is from twenty to thirty pounds.

The first twenty fathoms are marked the same as the hand line, with an additional knot at every ten fathoms, and a single knot at each intermediate five fathoms.

To sound by the deep-sea lead, take the reel aft on the quarter deck, pass the end of the line forward, on the weather side, outside of everything, to the cathead, and bend it to the lead, which must be armed with tallow; one man holds the lead, ready for heaving, the others range themselves along the side, at intervals, each with a coil of the line in his hand. All being ready, the word is given, "Stand by;" the officer calls out, "Heave." As soon as the man heaves the lead, he calls out, "Watch there, watch;" and each man, as the last fake of the coil goes out of his hand, repeats, "Watch there, watch." The line then runs out until it brings up by the lead being on the bottom, or until there is enough out to show that the bottom is not to be reached. The officer notes the depth by the line, which is hauled in and reeled up; if the lead has been on the bottom, the arming of tallow will bring up some of it, by which the character of the soundings may be ascertained.

THE LOG LINE.

THE rate of a ship's sailing or steaming is measured by a log line and a twenty-eight second glass.

In marking a log line, what is termed stray line

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should be given, to which is attached the log ship; this line is supposed to carry the log ship clear of the eddy water in the ship's wake; it is from twenty to forty fathoms in length, according whether it is a steam or sailing vessel, at which distance is placed a piece of white bunting, from which commences the rate the ship is going. The line is marked with a knot for each mile; the real distance between each knot is 47-ft. 6in., being the 128th part of a mile, as twenty-eight seconds are the 128th part of an hour—a knot being thus the same portion of a mile that twenty-eight seconds are of an hour. The line is marked up to seven or eight knots. At the first knot is a piece of leather, to denote the ship has gone one knot; and if it takes twenty-eight seconds for the first knot to run out, the ship is going one mile per hour; and if six knots run out in twenty-eight seconds, the ship is going six miles per hour, and so on. The second knot is marked with two knots, with a rope yarn put through the line, the third with three, &c., and in the centre, between the knots, is placed a single knot, called the half-knot mark; this is found very useful when the ship is going fast through the water, and the fourteen second glass is used instead of the twenty-eight, then the knots count double.

As the line is liable to stretch, and the glass to be affected by the weather, in order to avoid all danger of a vessel over-running her reckoning, and to be on the safe side, it is recommended to mark 46-ft. 6in. to a knot; but nearly every master of a ship has his own method of marking the log line.

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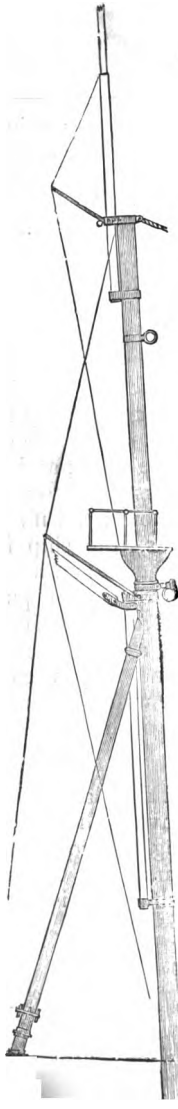

TRIPOD MASTS.

Tripod masts are of great advantage in turret ships dispensing with lower rigging, while allowing great range of training to the turret guns.

The centre leg of the tripod corresponds with an ordinary iron lower mast, standing nearly upright: the two after legs, which take the place of rigging, are fixed to its head below the trestle-trees, having about the same angle that the after swifter would have had, and the lower ends bolt to an iron plate in the deck; three or four small wire shrouds are necessary on each side for sending men aloft, which being fitted with slips, are easily cleared away.

The legs of the tripod may be placed before the mast if necessary.

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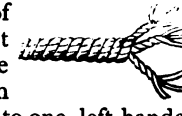
ROPES, KNOTS, SPLICES, BENDS, HITCHES, &c.

THOSE ropes in a ship which are stationary are called standing rigging, as shrouds, stays, back stays, which are four-stranded rope, laid right handed, and are called SHROUD ROPES.

Those which reeve through blocks or sheave holes, and are hauled and let go, are called running rigging, as braces, halliards, clewlines, buntlines, &c., which are three-stranded rope, called HAWSER LAID ROPE.

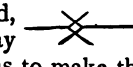
A rope is composed of threads of hemp, or other stuff, these threads are called yarns; a number of these yarns twisted together form a strand, and three or more strands twisted together form a rope.

CABLE LAID ROPE.



A CABLE laid rope is composed of nine strands, and is made by first laying them into three ropes of three strands each, with the sun, and then laying the three ropes up together into one, left handed or against the sun—thus, cable laid rope is like three small hawser laid ropes laid up into one large one.

TO KNOT ROPE YARNS.



TAKE the two ends of the yarns and split them open about two inches from the end, and if to make a smooth knot, you may scrape down a little with a knife, so as to make the ends lay smooth, you then crutch them together as you see in the engraving. Take two opposite ends, leaving the other two dormant; pass one of the ends under, and the other over the standing part of the

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yarn, connecting them together at the same side you took them from at first, then jamb your knot taut, and see if it will stand test by hauling on it; if it stands without drawing, you may trim the ends and go on.

TO MAKE A FOX.

TAKE two or three yarns and make them fast to any place convenient, stretch them out taut, and twist them together on your knee, then rub it down smooth with old yarns, or a piece of old tarred parcelling; this is called a fox, and is used for many purposes, such as making gaskets, mats, plaits, temporary seizings, &c.

TO MAKE A SPANISH FOX.

TAKE a single rope yarn, make one end fast to a belaying pin, and untwist and twist it up again the contrary way, and rub it smooth; this is used for small seizings, &c.

TO MAKE A KNITTLE.

A KNITTLE is made of two or three yarns laid up together by a jack, or by hand, by twisting them between the thumb and finger, and laying them up against the twist of the yarn; they are used for many purposes on board a ship, particularly for hammock clews.

OVERHANDED KNOT.

To make an overhanded knot, pass the end of the rope over the standing part and through the bight.

FIGURE OF EIGHT KNOT.

TAKE the end of your rope round the standing part, under its own part, and through the lower bight, and your knot is made.

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TWO HALF HITCHES.

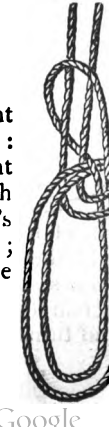
PASS the end of your rope round the standing part, and bring it up through the bight, this is one half hitch; two of these, one above the other, completes it.

REEF KNOT.

BOWLINE KNOT.

TAKE the end of your rope in your right hand and the standing part in the left, lay the end over the standing part, then with your left hand turn the bight of the standing part over the end part, so as to form a cuckold's neck on the standing part; then lead the end through the standing part above, and stick it down through the cuckold's neck, and it will appear as in the engraving.

BOWLINE ON THE BIGHT.



TAKE the bight of the rope in your right hand, and the standing part in the other: throw a cuckold's neck over the bight with the standing parts, then haul enough of the bight up through the cuckold's neck to go under and over all parts; jamb all taut and it will appear as in the engraving.

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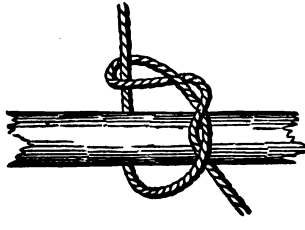
RUNNING BOWLINE.

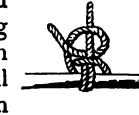
TAKE the end of the rope round the standing part, through the bight, and make a single bowline upon the running part, and the knot is made.



TIMBER HITCH.

TAKE the end of a rope round a spar, pass it under and over the standing part, then pass three turns round its own part, and it is done.

FISHERMAN'S BEND.



WITH the end of a rope take two round turns round a spar, or through the ring of a kedge anchor; take one half hitch round the standing parts and under all parts of the turns, then one half hitch round the standing parts above all, and stop the end to the standing part; or you can dispense with the last half hitch, and tuck the end under one of the round turns, and it becomes a studding sail bend.

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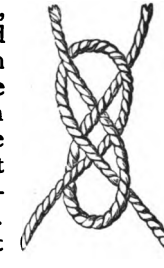
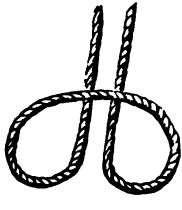
CARRICK BEND.



FORM a bight by laying the end of a rope on the top of the standing part, so as to form a cross; take the end of a second rope and reeve it down through the bight, up and over the cross, then pass the end down through the bight again, on the opposite side from the other end, for one end must be on the top, and the other underneath, as you see in the engraving. If both ends come out at the top, it will be a granny's knot.

CAT'S PAW.



LAY the bight of the rope over the end and standing part, as in left hand figure; then, with a bight in each hand, take three or four turns in them by twisting them from you; bring the bights together and hook on.

SHEET OR BECKET BEND.

PASS the end of a rope through the bight of another rope, or through the becket of a block, then round both parts of the bight or becket, and take the end under its own part, as you see in the engraving. It is sometimes put under twice, and the end stopped back to the standing part.

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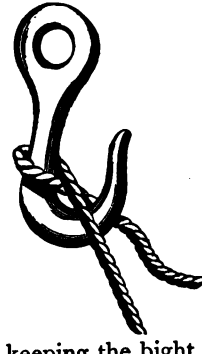
THE STUNNER HITCH.

THIS is also used with a lanyard for setting up Rigging and is more safe than the Blackwall.

Take the end part of the lanyard and form a round turn round the lower part of Block Strap and the hook, holding the bill of the hook in front, then place the bight over the hook bringing the end part underneath.

BLACKWALL HITCH.



THIS is used with a lanyard, in setting up rigging, to hook a luff tackle to, instead of a cat's paw, where the end of the lanyard is not long enough to form a paw; but a strap and toggle is preferable.

To make a Blackwall over a hook, you form a bight, or rather kink, with the end of the lanyard, having the end part underneath, and the standing part on the top; stick the hook through the bight, keeping the bight well up on the back of the hook, as you see in the engraving, until you set taut the tackle.

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ROLLING HITCH.

A ROLLING hitch is that used for stoppering a rope. It is formed by taking a hitch with the stopper round the rope, then taking another hitch above the first and between the stopper and the rope, and then dogging the tail *back* round the rope *with the lay.*

SALVAGEE STRAP.

To make a salvagee strap, get a couple of spike nails and drive them into an old piece of plank, or whatever you can find convenient to answer the purpose: or get two hooks, lash them to any convenient place, as far apart as the length you intend to make the strap.

Take the end of the ball of ropeyarns and make it fast to one of the spikes or hooks, then take it round the other one, keep passing the rope yarns round and round in this manner, hauling every turn taut as you pass it, until it is as stout as you wish it to be. If it is to be a very large strap, marl it down with spunyarn; if a small strap, two rope yarns.

SHORT SPLICE.

To splice the two ends of a rope together, you first unlay the rope to a sufficient length, that is twice the

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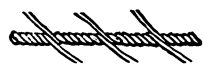
circumference of the rope for the long ends, and once and a half the circumference for the short ends, whip all the ends with a yarn, then crutch them together, put a stop round the crutch, the long ends are put in twice and the short ends once, then take the left-hand strand and pass it over the first strand next to it, put it underneath the second strand, which would be the underneath strand, and haul it taut in the lay of the

rope; the next strand to enter would be your right hand strand, and the next the middle strand, haul them taut along the lay of rope, this being the long ends, put them in again as before, take the stop off the crutch, and put the short ends once in the same manner, and it will appear as in the engraving; then stretch the splice, whip the ends and cut them off. If the splice is to be served over, put the strands in once and a half each way, take a few of the underneath yarns from each strand to fill up the lay of the rope for worming, then trim the ends and marl them down for serving.

LONG SPLICE.

To make a long splice, unlay the ends of two ropes to a sufficient length, which would be five and a half

Long Splice, 3 strand Rope.



Long Splice, 4 strand Rope.

times the circumference of the rope, crutch them together in the same manner as a short splice, unlay one strand, and fill up the space which it leaves with

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the opposite strand next to it, then turn the rope round and lay hold of the two next strands that will come opposite their respective lays, unlay one and fill up with the other as before, then cut off some of the long strand, and it will appear as in engraving. To complete the splice, take one-third out of each strand, then take the two opposite strands and knot them together, heave them well in, then put them once under one strand, with all six ends, then stretch the splice well before you cut the ends off, and it is finished.

AN EYE SPLICE.

An eye splice is made by opening the end of a rope, and laying the strands at any distance upon the standing part of the rope, according to the size of the eye you intend to make: you then divide your strand by putting one strand on the top and one underneath the standing part, then take the middle strand, having previously opened the lay with a marlinspike, and put

it under its respective strand as you see in the engraving: the next end is taken over the first strand and under the second; the third, and last end, is taken through the third strand on the other side. If it is a four strand rope, the left hand strand is put under two strands, or two lays of the rope, and is covered with the next strand.

CUT SPLICE.

Unlay the ends, place them alongside each other in opposite directions, the one overlapping the other

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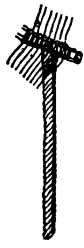
equal to the length of the eye required. Splice the

strands of each end in, as for an eye splice, and serve them over.

FLEMISH EYE.



PUT a whipping on the rope, at three times and a-half the round of the rope from the end; unlay the end to the whipping, take a piece of wood twice the size of the rope to make the eye on, lash it to any convenient place, and stop some yarns on top of it, to stop the eye after it is formed; if it is a four strand rope, unlay the heart and divide it in two, put the rope underneath the spar with two strands and half the heart each side, pass the heart over and half knot it on the top, and heave the rope close up to the spar, with a bolt each side. The width of the eye should be one-third the round of the rope; take from each strand, two yarns for every inch the rope is in circumference. Suppose it to be a ten-inch rope, take twenty yarns and twist them up, and half knot them on the top of the spar, heave them taut, and pass them down the lay of the rope for wormings, put a seizing of spun yarn over it close to the toggle, and another nine inches below it; put a yarn round the ends to keep them in the lay of the rope.

Take two-thirds as many yarns from each strand as you did for wormings, haul them taut up from the

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bosom, and half knot them on top, haul them taut, and so continue till the yarns are all expended.

Be careful to haul the yarns taut up from the bosom, or they will not bear an equal strain.

Smooth the yarns down, and put a stop round all, close underneath the toggle.

Half knot the stops that are laid on the spar, heave them taut with a mallet or a bolt each side of the eye; form the other half knot and heave it taut.

Marl the eye with two or three yarn spunyarn; the hitches to be one inch apart, commencing at the centre of the eye, and work both ways; cut the stops as you come to them, the marling of the eye being finished.

Pass a strand round all, close underneath the spar, and heave it taut with bolts; take a part of the strand off, and put on a seizing of spunyarn, then beat the strand down as you marl the yarns down.

If it is for a stay, after the collar is spliced and served, finish the eye by parcelling it, and serve it with spunyarn, fid the eye out and it is finished.

ARTIFICIAL EYE.

TAKE the end of a rope and unlay one strand to a certain distance, and form the eye by placing the two strands along the standing part of the rope; then take the odd strand and cross it over the standing part, and lay it into the vacant place you took it from at first; work round the eye, filling up the vacant strand until it comes out at the crutch again and lies under the other two strands. A few yarns taken out of each strand for worming, the remainder tapered down, marled, and served over with spunyarn.

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TO WORM AND SERVE A ROPE.

WORMING a rope is to fill up the vacant space between the strands of the rope with spunyarn, in order to render the surface smooth and round for parcelling.

Worming a Rope.

Serving a Rope.

Parcelling a rope is wrapping old canvas round it, cut in strips from two or three inches wide, according to the size of the rope.

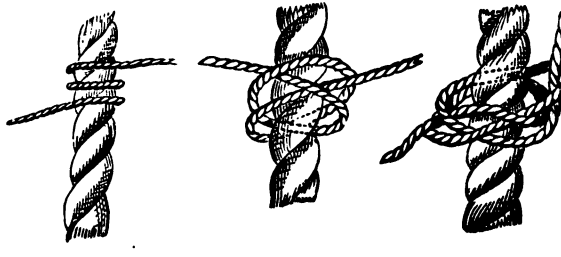
The parcelling is put on with the lay of the rope.

The service is of spunyarn, put or hove on by a wooden mallet, such as you see in engraving called a serving mallet; it has a score in the under part, according to the size of the rope, so as to lay on the rope, and a handle about fifteen inches long.

Service is always laid on against the lay of the rope.

A man passes the ball of spunyarn, taking the turns well out of it at some distance from the man that is serving the rope; when the required length of service is put on, the end is put under the last two turns, hauled taut and cut off.

TURK'S HEAD.



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TAKE two round turns round the rope, pass the upper bight down through the lower, and reeve the upper end down through it; then pass the bight up again, and reeve the end over the lower bight and up between it and the upper one. Dip the upper down through the lower bight again, reeve the end down over what

is now the upper bight, and between it and the lower; and so proceed,—working round to your right until you meet the other end, when you pass through the same bight, and follow the other end round and round until you have completed a plait of two, three, or more lays, as you wish. The right-hand cut shows a Turk's head of two lays.

TO SHEEPSHANK A ROPE.

THIS is intended for shortening a backstay; the rope is doubled in three parts, as seen in the engraving, and a hitch taken over each bight with the standing part of the backstay, and jambed taut.

A STRAND.

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TO PUT A STRAND IN A ROPE.

THIS is done in case of one strand of a rope being chafed and the others remaining good. To perform this, cut the strand at the place where it is chafed, unlay it about two feet each way, then take a strand of a rope of the same size, and lay it in the vacancy of the rope, as you see in engraving, and half knot and tuck the ends the same as a long splice.

TO WALL AND CROWN.

UNLAY the end of a rope, and with the three strands form a wall knot, by taking the first strand and forming a bight; take the next strand and bring it round the end of the first; the third strand round the second, and up through the bight of the first; this is a wall knot, see engraving.

Single Wall.

Wall and Crown.

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To crown this, lay one end over the top of the knot, which call the first strand, then lay the second over it, the third over the second, and through the bight of the first; it will then appear as you see in the engraving.

DOUBLE WALL AND DOUBLE CROWN.

You may now double wall and double crown, by letting the strands follow their own parts round; first double walling and then double crowning, and cutting the ends off.

MATTHEW WALKER.

Put a whipping on (as with all knots), open the strands down to the whipping, and pass the first end

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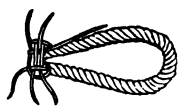
through its own bight. the next through its own and the first, and the third through all three bights; haul the ends through, work the turns round and place them; and the knot will appear as in right-hand figure.

SPRITSAIL SHEET KNOT.



UNLAY two ends of a rope and place the two parts which are unlaid together; form a bight with one strand, and wall the six together against the lay of the rope the same as you would a single wall with three ends; after you have walled with the six ends, haul them taut; you must then crown with the six ends, and it will appear as in the engraving.

To complete it, you must follow the lead of the parts, and double wall and crown it.

SHROUD KNOT.

OPEN out the ends of the rope that are to be knotted, put them together as for splicing, and single wall the strands of each end round the main part of the

opposite end; then taper the strands off, marl down, and serve over.

FRENCH SHROUD KNOT.

CROWN backwards, left-handed, the strands of each end; then dip the ends that lie *from* you to the left of those that fall down *towards* you; haul them into

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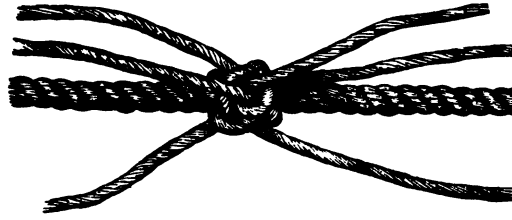
their places, and you will find that they will accommodate themselves to the knot better in this way, than if they were allowed to remain as they came out. The knot will then appear thus :—



Then tuck the ends in as in splicing (which you can do also with the common shroud knot), or tease the strands out and marl down.

SINGLE DIAMOND KNOT.

UNLAY the end of a rope a sufficient length to make the knot, and with the three strands form three bights, holding the ends fast down the side of the rope in your left hand, with the standing part of the rope, then take the first strand over the bight of the second strand and through the bight of the third ; then take the second over the third and through the bight of the first ; then the third over the first and through the second, haul these taut and lay the ends of the strands up again, and it will appear as in the engraving.

DOUBLE DIAMOND KNOT.

To make this, you make a single one, as before ; then take a marlinspike and open the strands, and follow the lead through two single bights, the ends coming out at the top of the knot ; lead the last strand through two double bights,

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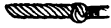
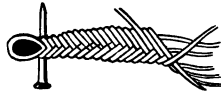
haul them taut and lay the ends up, and it will appear as in the engraving.

STOPPER KNOT.



A STOPPER knot is made by double walling. Some persons will crown them, but there is no need of it. The ends are hove together and seized, and cut off within three inches of the knot.

SEA GASKET.



A SEA gasket is made by taking three or four foxes, according to the size you intend to make the gasket, middle them over a belaying pin, and plait three or four of them together long enough to make the eye; then clasp both parts together to form the eye, and plait them by bringing the outside foxes on each side alternately over to the middle; the outside one is laid with the right hand, and the remainder held steadily with the left hand; work the whole together, adding a fox where necessary. When you have got it a sufficient length, diminish by dropping a fox at proper intervals; to finish it, lay one end up, leaving its bight down; plait the others through this bight until they are all worked through it, then haul on the end till the bight is taut, to secure all parts; cut the ends off, whip it, and it is complete.

HARBOUR GASKET OR FRENCH SENNIT.

A HARBOUR gasket is made with foxes, something similar to the common sea gasket, but instead of taking the outside fox over all the rest and bringing it into the

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middle, you interweave it between them, by taking the outside fox of both sides and taking it over one and under the other, working it towards the middle, the same as common sennit.

COMMON SENNIT.

SENNIT is made by plaiting ropeyarns or spunyarn together, the same as a sea gasket; you must have an odd number of parts.

A PAUNCH OR WROUGHT MAT.

A PIECE of small rope is stretched in a horizontal direction, and the foxes (according to the breadth you intend to make the mat) are middled and hung over it. Then take the fox nearest the left hand, and twist a turn in the two parts, one part give to the man opposite, two men being employed to work the mat. The next fox has a turn twisted in its two parts, and one part given back to your partner; the remainder is twisted round the first which is given back, and then again round its own part, and so on with the remainder of the foxes until you get it the breadth you wish; at the bottom of the mat, selvage it by taking a piece of small rope the same as you used for the top. The two parts of the foxes which are twisted together at the bottom are divided, and the piece of rope put between them; the foxes are hitched round it and the ends put through its own lay with a marlinspike. Trim the ends off and thrum it with pieces of old strands of rope, cut in pieces about six inches long; open the lays of the foxes with

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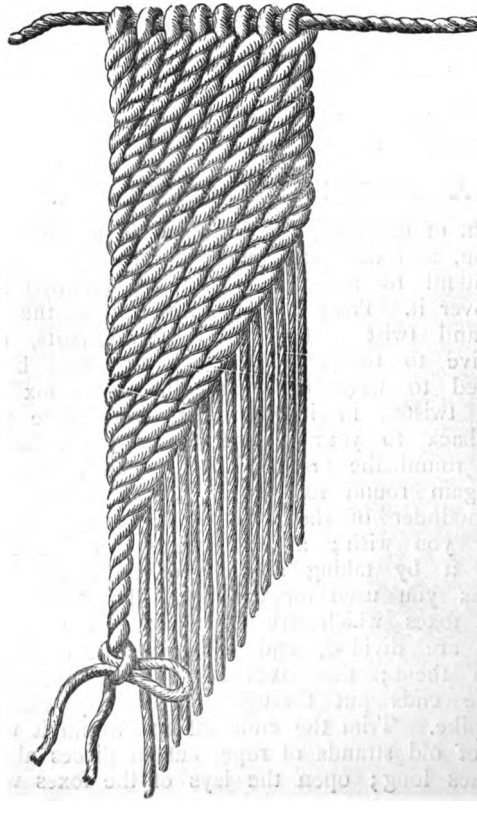
a marlinspike, put the thrums through the lays, and open the ends out.



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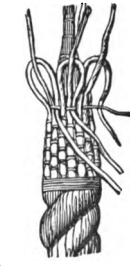
POINTING A ROPE.

PUT a whipping on, open out the strands down to it, and form the heart of the inside yarns, tapered off, and marled down hard. Having left out the outside yarns, and laid them up into two-yarn nettles if the rope is not very small, tell them off, one up and one down alternately; knot the filling with a timber-hitch over the upper ones, pass two turns, and dip the end between both to jamb it before hauling the last turn taut; then bring the upper nettles down, and lay the lower ones up, pass the filling, and so proceed, hauling the nettles taut up after each round, and passing the first turn of the filling under one or two of the upper ends in advance, each time, instead of over them; which allows the lower nettles to hide the hitch when brought up. To finish off, secure the lower nettles with the filling, as shown in the figure. Cut the upper ones off as they are, and the lower ones when you have passed two turns of the filling, hitched it, and hauled the bight of the nettles close down.



With large ropes, you secure the upper nettles as well, by taking a hitch with the lower ones round the upper ones and the filling thus :—

Grafting,—in which the rope or strop is covered the entire length, and not at the end only, as in pointing, is performed in exactly the same manner, with nettles laid along it.

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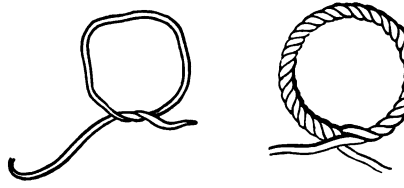
A becket is sometimes worked in the end.

A becket is a small piece of rope one-fourth the size of the rope; form a bight, unlay the ends, and twist the six strands up again by two's; take some of the inside yarns and lay them up as a rope; then short splice that and the becket together; and marl it down as before mentioned.

TO MAKE A GROMMET.

A GROMMET is made by unlaying a strand of a rope, and placing one part over the other: with the long

A Strand. A Grommet.



end, follow the lay until it forms a ring, with three parts of the strand all round; finish it by knotting, and putting the ends the same as in a long splice.

Worn rope, or four-strand rope, is the best to make a grommet.

Length of four-strand rope it will take to make a three-strand grommet for either a block or a yard :—

Take three times the round of the yard, or block, and three times the round of the thimble, then allow sufficient end to splice it, which would be six times the round of the rope.

Length to marry the strand :—

Take once the round of the yard, or block, and once the round of the thimble.

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Length of three-strand rope required to make three straps :—

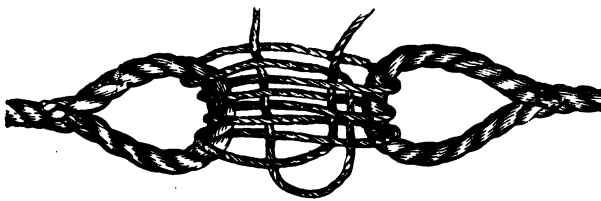
Take three times the round of the yard, or block, three times the round of the thimble, and three times the round of the rope, then allow sufficient end to splice it, which would be six times the round of the rope.

Length to marry the strand :—

Take once the round of the block, or yard, once the round of the thimble, and once the round of the rope.

ROPE LASHING.

REEVE through the eyes to be lashed, middle it, and pass racking turns, leaving off with the ends in the same bights; pass each end between the bights of the



lashing on either side of the crossing, as shown in the cut. Then take two or three round turns, passing them opposite ways, haul them well taut, and knot the ends.

TO WEAVE A SWORD MAT.

A PIECE of wood called a sword is used; this is put alternately between the parts of the spunyarn or small rope stretched over two round iron bolts, as shown in the engraving; the warp of marline is placed through the parts which the sword has opened, and jambed by it, close to the head; a piece of spunyarn is

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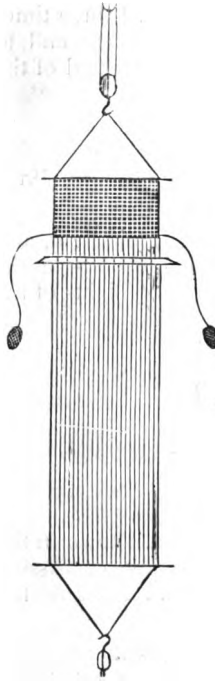
put slack through the same division at the opposite end, and left there; the sword is taken out, passed under and over the parts as before, and each end of the warp passed and jambed taut, the piece of spunyarn which was left at the opposite end is now lifted up, and brings the parts as they were first divided by the sword; the warp is passed as before, and so on untill the mat is completed.



To finish the end, knot the two ends of the warp together, cut the bights of the mat at the bolt, lay the upper ends back, lay the lanyard athwart the lower ends of the mat, take the upper ends back six inches, one at a time, and fill up the space which it leaves with the lower end, by bringing it over the lanyard; then half knot the two ends together, and tuck them under the other parts; cut the ends off, and it is finished

TO LONG SPLICE A THREE AND FOUR-STRAND ROPE TOGETHER.

UNLAY the ends of the two ropes to a sufficient length, and crutch them together; then unlay one strand of

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the three-strand rope, and fill up the space it leaves with the strand of the four-strand rope; then turn the rope round and unlay a strand of the four-strand rope, and fill up the space it leaves with a strand of the three-strand rope as far as required; then there remains two strands from the four-strand rope, and one from three; then divide the single strand, by taking one-third out of it, and knot it to one of the strands of the four-strand rope: then unlay the other strand, and fill up the space it leaves with the remaining two thirds of the strand: then knot them together, and put them in once under one strand, with all eight-strands, stretch the splice well before you cut the ends off, and it is finished.

The above splice is often required for royal back-stays, when used for a fall for the top gallant breast backstay.

There is another way to splice a three and four strand rope together, viz.—Instead of dividing the strand of the three-strand rope, knot the whole of the strand, and tuck the remaining strand of the four-strand rope under the strands of the rope; but the first way is the best.

TO SHORT SPLICE A THREE AND FOUR-STRAND ROPE TOGETHER.

UNLAY the ends of the two ropes to a sufficient length, make four strands out of the three by dividing one strand in two, and lay the four strands up a sufficient length for the ends of the other rope to be put in once; then crutch them together, and splice them as two four-strand ropes,

A GRECIAN SPLICE.

To make a Grecian splice, take the end of two ropes, put a whipping on at twice the round of the

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rope from the end, then unlay the rope to the whipping, take the outside yarns and twist them up into foxes the number of yarns in each fox depends upon the sixe of the rope, for instance, take about two yarns, to every inch the rope is in circumference, leaving about one-fourth of each strand, of the inside yarns, to be laid up as rope far enough to put the strands in once each way; then take some of the yarns out of each strand, and lay them in the lay of the rope for worming, and cut the remainder off; after that, form a cross point with foxes, by bringing the upper fox down, and the lower fox up, and crossing each other all round the rope, the last lower fox is put under the bight of the first upper fox that was brought down, which secures it; commence again by putting the end over one fox and under the bight of the other, and so continue until you have worked close up to the whipping; then scrape and marl the foxes down, serve over it with small spunyarn, and it is finished.

The splice will be but very little larger than any other part of the rope, if properly made, and is strong enough to break the rope.

This splice is often made in standing rigging, in preference to a shroud knot, as it is much neater.

Another way to make a Grecian splice is to make all the yarns into foxes, leaving no heart; but the former way is decidedly the best.

A MARINER'S SPLICE.

It is a long splice in a cable laid rope. To make this splice, take the turns out of the rope, stretch it, and beat it well with a mallet; then unlay the ends of the two ropes to a sufficient length, which would be six times the round of the rope, crutch them together the same as for a short splice, only marry them tauter;

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put a good stop round them, leaving out the strand to be unlaid; unlay one strand, and fill up the space it leaves with the opposite strand next to it, the distance of three times the round of the rope; each of these strands is composed of three small strands, called readies; unlay them, and crutch them together, put a good stop round them, leaving out the ready to be unlaid; then unlay one ready, and fill up the space it leaves with the opposite ready the distance of twice the round of the rope, half knot them together, and tuck them under one strand; or, instead of half knotting them, lay them across each other, and tuck them under the next strand to it, then put the end underneath two strands or readies, and the end will come out under the strand, and be out of sight when cut off. Then take hold of the next two readies that will come opposite their respective lays, unlay the ready and fill up the space it leaves with the other, the same distance as before, and splice them the same; then the two readies in the place where they were first married, half knot them and tuck them the same as before. Then turn round, and take the stop off from the place the strands were first married or crutched together, leave out the two next strands that will come opposite their respective lays, and put the stop on again to secure the two strands that remain, then unlay one strand, and fill up the space it leaves with the other, the same distance as before from the place they were married; then unlay the strands, marry the readies together, and long splice them as before; then turn round to the two strands at the place where they were first crutched together, and long splice the six readies the same as before directed.

Well stretch the splice, cut the ends off, and it is finished.

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SPLICING AN EYE IN THE END OF A ROPE.

DIRECTIONS for splicing an eye in the end of a rope, to go over a boom, gaff, yard, &c., such as spritsail guys, yard tackle pendants, foot ropes, jack stays, &c.

Put a good whipping on the rope at twice and a-half the round of the rope from the end.

The length of a rope for the eye should be once the round of the spar, and once the round of the rope; from the whipping to the strand the marlinspike is to be first entered. After the marlinspike or fid is driven in as far as required to receive the strand.

Then the length from the fid to the whipping should be once the round of the spar, and two-thirds the round of the rope. The strands are put in once and a-half, and served over with spunyarn.

LASHING EYE.

DIRECTIONS for the length required for a lashing eye, such as bobstay collars, bowsprit shroud collars, straps for clewgarnet blocks, topsail clewline and top-gallant sheet blocks, the inner ends of foot-ropes, &c.

Put a good whipping on the rope at twice and a-half the round of the rope from the end. Enter the marlinspike at the eleventh lay from the whipping, then bend the rope up and form the eye, and there will be nine clear lays from the strand, the fid is under the first strand to be entered. The strands are put in once and a-half, and served over with spunyarn.

SPLICING A ROPE ROUND A THIMBLE.

DIRECTIONS for splicing the end of a rope round a thimble, or a hook and thimble.

Put a good whipping on the rope at twice and a-half the round of the rope from the end.

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The length of rope to go round the thimble should be once the round of the thimble, and once the round of the rope: from the whipping to the strand the marlinspike is to be first entered, and after the marlinspike or fid is driven in as far as required.

Then the length from the fid to the whipping or the first strand to be entered, should be once the round of the thimble, and two-thirds the round of the rope.

If the splice is not to be served, whip the ends of the strands, to prevent them from opening out into yarns, then put them in twice whole strand.

TO MAKE A ROPE-MAKER'S EYE IN A JIB STAY.

THERE is a thimble in the eye to receive a slip at the jib-boom end; this eye forms a rope-maker's eye, with two strands round the thimble.

To make the eye with a four-strand rope, unlay the rope to a sufficient length, which would be eight times the round of the rope, and marl two strands together the length to go round the thimble; then form the eye with these two strands, large enough to put the thimble in; parcel the eye with canvas, tar it, and put the thimble in; then unlay the other strands, one at a time, and fill up the space it leaves with the opposite strand that formed the eye, about two feet from the thimble; unlay the other strand one foot from the thimble, and lay in the other strand that formed the eye; then cross and tuck them, the same as a long splice. Stretch the splice, serve over it with spunyarn, and it is finished.

JIB STAY, THREE STRAND ROPE.

To make the eye in a three-strand rope, the length to unlay the rope would be seven times the round of the rope. Marl two strands together, the same as for a four-strand rope, parcel it with canvas, tar it, form the

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eye, and put the thimble in; then unlay the third strand, and fill up the space it leaves with one of the strands that formed the eye, about 18 inches from the thimble, cross the strands, or half knot it and tuck it in the same as a long splice; the other strand that formed the eye is divided into three equal parts, a portion of each is put in the lays of the rope for worming, the remainder is tapered and marled down, and served over with spunyarn, which finishes it.

Frequently a Flemish eye is put in the stay, but a ropemaker's eye is considered to be stronger. Either of these eyes will break the rope, if properly made.

FLEMISH EYE IN A JIB STAY.

To make a Flemish eye in a jib stay, take a piece of wood a little larger than the thimble and of the same shape, put a whipping round the rope at four times the round of the rope from the end; then unlay the rope to the whipping, and open the strands out into yarns; twist up as many yarns from each strand as will fill up the lays of the rope for wormings, and form the eye with them round the piece of wood, half knot them on top, and take them down the lays of the rope for wormings; then reef knot all the remainder of the yarns and cut them off; knot the yarns, one at a time, round the piece of wood, at different places, that the knots may not come abreast of each other; stop them all together with the yarns that were round the toggle previous to forming the eye, marl the eye down with two yarn spunyarn, parcel it with canvas, tar it, put the thimble in, and serve over the wormings.

TO LENGTHEN THE ROPE OF A SAIL.

To lengthen the bight of a rope by cutting it, and splicing in a strand of a rope. For instance, suppose it wanted to give a sail one cloth more spread, the

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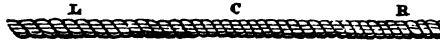
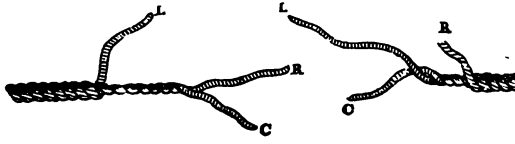
head and foot ropes must be lengthened 1-ft. 8-in. To do so, strip the rope off four cloths. The width of a cloth being 24-in., the two seams would take up 3-in., leaving the cloth 1-ft. 9-in.; therefore the head and foot ropes would require to be lengthened 1-ft. 8-in. If it is a 3-in. rope, it will take 2-ft. for splicing, that will allow 6-in. to each strand. Cut the strands 2-ft. 6-in. from each other, as in Fig. 1.

Fig. 1.



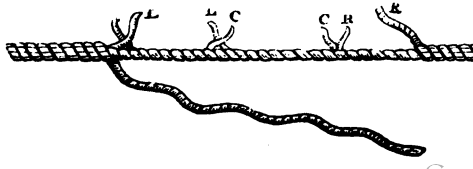
Cut one strand at L and unlay it to C, then cut another strand at R and unlay it to C; the lays should be counted, or the wrong strand may be cut, that is to say, the same strand may be cut twice; then cut the strand at C, that would be the centre strand, and draw the rope apart, as in Fig. 2.

Fig. 2.



Marry the end L to the end C, then lay up the strand R in the lays of the strand L, and marry it to strand C, and it will appear as in Fig. 3.

Fig. 3.



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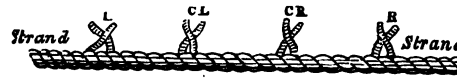
Take a strand 9-ft. 6-in. long of the same size rope, and marry one end to the strand L, and fill up the space L and R left, and marry the other end to the strand R, and it will appear as in Fig. 4.

Fig. 4.



Then splice all the strands, the same as for a long splice. Stretch the splice, whip the ends, and cut off within one inch of the rope.

N.B.—A strand was cut at 2-ft. 5-in. each side of the centre. 1-ft. was for splicing; then 1-ft. 5-in., and 3-in. the rope will stretch, will lengthen the rope 1-ft. 8-in., and the cloth will take up 1-in. in tabling, which would be equal to 1-ft. 9-in.

Suppose it is required to lengthen a 3-in. rope 5-ft. 6-in. Allow 1-ft each side of the centre for splicing, that would be 6-ft. 6-in.; then cut a strand at the centre, and one at 6-ft. each side of the centre; the rope will stretch 6-in. The length of strand required to fill up the vacant space should be 15-ft. of the same size rope.

N.B.—For all size ropes take eight times the round of the rope for splicing, that would be four times each side of the centre strand that is cut; this must be allowed in addition to what is wanted to lengthen the rope. If a 6-in. rope, allow 2-ft. each side of the centre.

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STRAPS FOR BLOCKS, &c.

THE rope is set up and stretched: it is wormed, parcelled, tarred, and served with spunyarn.

Strapping under 3½ inches is not wormed or parcelled, only served with two and three-yarn spunyarn.

The size of the strapping should be one third the length of the block, for a lashing eye, such as leach-lines, slab-lines, leading blocks, top-gallant and royal braces, &c., giving the advantage of half-an-inch to all tackle and leading blocks, for runners, stays, yard tackles, &c.

Put a chalk mark at the length required to be married, leaving sufficient end to splice it, which would be twice the round of the rope for the long end, which is put in twice, and once and a-half for the short end, which is put in once.

You unlay both ends of the rope to the chalk mark, then crutch them together, and bring the two chalk marks abreast of each other.

Marry the splice slack, or it will not make a good splice; put the strands in twice one way, and once the other; stretch the splice, and bring the service close up to the strands; cut the strands off in wake of the block, the other strands are whipped and cut off after the block is seized in.

If the strap is not to be served, allow twice the round of the rope at each end, and put the strands in twice each way.

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For all straps where the splice is to be served all over, such as the fore stay collar, yard-arm straps for brace blocks, the span for spanker brail blocks, &c., allow twice the round of the rope at each end from the marrying mark for splicing; the strands are put in once and a-half each way, they are tapered and marled down, and served all over with spun-yarn.

Directions for Cutting the Length of the Straps for Blocks, by Measuring the Extreme Round of the Blocks, &c.; also the Length to Marry the Straps.

SINGLE BLOCKS WITH LASHING EYES.

LENGTH to cut the strap: Take twice the round of the block, and once the round of the rope.

Length to marry the strap: Take once and a-half the round of the block, and half the round of the rope.

SINGLE BLOCKS WITH THIMBLES, OR HOOK AND THIMBLE.

SUCH as pendant block, tack and sheet blocks, luff tackle, reef tackle, jigger tackle or leading blocks.

Length to cut the strap: Take twice the round of the block, and once the round of the rope.

Length to marry the strap: Take once the round of the block, once the round of the thimble, and once the round of the rope.

SINGLE BLOCKS WITH A LONG STRAP AND AN EYE SPLICED IN EACH END.

SUCH as clewgarnet blocks, mizen topsail sheet, or royal clewline blocks.

Length to cut the strap: Take twice the round of

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the block, twice the round of the rope, and once the round of the yard.

The length of the strap, after the two eyes are spliced, would be once the round of the block, and once the round of the yard; and after the block is seized in, the length of the strap from the block would be half the round of the yard, and what the seizing and the strap take up in going round the yard, will give sufficient drift between the eyes for lashing.

SINGLE BLOCKS WITH LONG STRAPS AND HOOKS

SUCH as fore and main runner tackles, yard and stay tackles, Burton tackles, and the lower block for topsail halliards.

The length the strap should be from the block depends on the class of the ship.

Topsail halliard blocks vary from 20in. to 26in.; runner, and yard and stay tackle, from 18in. to 24in; and Burton tackle blocks, from 12in. to 18in.

Length to cut the strap: Take once and a-half the round of the block, twice the length of the strap should be from the block, and half the round of the rope.

Length to marry the strap: Take once the rouud of the block, twice the length the strap should be from the block, and half the round of the rope.

SINGLE BLOCKS WITH STRAPS TO FID OUT

SUCH as fore and main lifts, and topsail lift blocks to go over the yard arms.

Length to cut the strap: Take once the round of the yard, once and a-half the round of the block, and once and a half the round of the rope.

Length to marry the strap: Take once the round

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of the yard, once the round of the block, and once the round of the rope.

SHOE BLOCKS FOR FORE AND MAIN BUNTLINES.

THESE are two single blocks, put into one strap, with a seizing round the strap between the two blocks.

Length to cut the strap: Take twice and a-half the round of one block, and once and a-half the round of the rope.

Length to marry the strap: Take once the round of each block and once the round of the rope.

LOWER STUDDING-SAIL HALLIARD BLOCK.

THIS block is fitted with a long strap, to go over the topmast studding-sail boom end; the length of strap between the block and the boom should be 9-in

Length to marry the strap: Take once the round of the boom, once the round of the block, and twice the length the strap should be between the boom and the block; then allow sufficient end to splice it.

LOWER STUDDING-SAIL HALLIARD PENDANT.

THERE is a single block spliced in one end of the pendant, and a long eye in the other end to reeve the block through, after it is passed round the topmast head; some prefer a long tackle block, (commonly called a fiddle block,) or a double block, in the pendant for the topmast studdingsail-topping lift and lower studding-sail halliards.

LOWER AND TOPMAST STUDDING-SAIL TACK BLOCKS.

THESE are single blocks strapped with a double strap, so that the sheave will stand fore and aft.

Length to marry the strap: Take twice the round

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of the boom, twice the round of the block, three times the round of the rope, and sufficient end to splice it.

TOPMAST STUDDING-SAIL HALLIARD SPAN BLOCKS.

THERE are two single blocks seized in one strap, to lash athwart the topmast cap. The length of strap between the blocks should be the width and the depth of the cap.

Length to cut the strap: Take twice and a-half the round of one block, once and a-half the round of the rope, and twice the width and depth of the cap.

Length to marry the strap: Take once the round of each block, once the round of the rope, and twice the width and depth of the cap.

TOP-GALLANT STUDDING-SAIL HALLIARD SPAN BLOCKS.

THERE are two single blocks seized in one strap, to lash round the top-gallant funnel.

Length to cut the strap: Take three times the round of one block, once the round of the funnel, and twice the round of the rope.

Length after the two eyes are spliced and served: Take once the round of each block and the funnel; then double the strap up, and seize a block in each bight; the length of span between the blocks would be half the round of the top gallant funnel.

TOP-GALLANT STUDDING-SAIL HALLIARD BLOCK.

THIS block is fitted with an eye, to go over the eye-bolt at the top gallant yard-arm.

Length to cut the strap: Take twice the round of the block, and twice the round of the rope.

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Length to marry the strap: Take once and a-half the round of the block, and once and a-half the round of the rope.

TOP-GALLANT STUDDING-SAIL TACK BLOCK.

THIS block is fitted with an eye, to go over the eye-bolt at the top gallant studding-sail boom-end.

Length to cut the strap: Take twice the round of the block, and once and a-half the round of the rope.

Length to marry the strap: Take once and a-half the round of the block, and once the round of the rope.

The eye-bolt is not so large as the one in the top-gallant yard.

TOP-GALLANT AND ROYAL-YARD ROPE BLOCKS.

THESE are fitted with a long eye; the yard rope is half-hitched over the strap, the bight put through the eye, and a toggle put through it.

Length to cut the strap: Take twice the round of the block, and twice and a-half the round of the rope.

Length to marry the strap: Take once and a-half the round of the block, and twice the round of the rope.

TOP-GALLANT HALLIARD BLOCKS, FOR LARGE SHIPS.

THESE are a double and a single block; the double block is fitted with an eye and a lizard.

Length to cut the strap: Take twice the round of the block.

Length to marry the strap: Take once and a-half the round of the block.

The single block is fitted with a hook.

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REEF TACKLE BLOCKS, FOR TOPSAILS.

A SINGLE block strapped with a thimble, and a small strap with two thimbles placed under the splice of the strap, for the reef tackle to lead through.

Length to cut the strap: Take twice the rouud of the block, and once the round of the rope.

Length to marry the strap: Take once the round of the block, once the round of the thimble, and once the round of the rope.

These blocks are used in preference to strap bored blocks.

STRAP BORED BLOCKS.

THEY are fitted to lash round the clews of topsails and courses, for topsail clewlines and clewgarnets. These blocks have a shoulder on each side, with a hole bored through it, to reeve the strap.

Length to cut the strap: Take three and a-half times the round of the block.

The length from eye to eye should be once the round of the block and three times the length of the block. Splice an eye in one end, and measure the length for the other eye, then reeve it round the block and splice the other eye.

The length of the strap from the block when fitted should be once and a-half the length of the block.

SPAN BLOCKS FOR SPANKER BRAILS.

THESE are two blocks, either double or single, fitted with a lashing eye; the span is rove through them, and spliced aud served over with spunyarn. Put three seizings on the span, and close to the strap of each block, and one at the centre of the span, which would be the centre of the splice, which is a flat seizing.

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The length of span between the blocks should be two-thirds the round of the gaff where it is lashed on.

Length to cut the span: Take once and a-half the round of the gaff and four times the round of the rope.

Marry the span at once and a-half the round of the gaff.

SINGLE THICK DOUBLE SCORED BLOCKS.

THESE are fitted for topsail sheets, called quarter blocks. They are fitted with a long strap placed round the block; the two bights go round the yard, and lash on top.

Length to cut the strap: Take twice and a-half the round of the block, twice the round of the yard, and once and a-half the round of the rope.

Length to marry the strap: Take twice the round of of the block, twice the round of the yard, and once the round of the rope.

The length of the strap from the block when fitted would be half the round of the yard; and what the strap takes up in going round the yard, will give sufficient drift between the eyes for lashing.

JEER BLOCKS.

THESE are single, thick, double-scored blocks, fitted with two straps, one long and one short.

The length of the long strap from the block, when fitted, should be three-fourths the round of the yard.

The length of the short strap from the block, should be one-fourth the round of the yard.

Length to cut the long strap: Take once and a-half the round of the yard, once and a-half the round of the block, and once the round of the rope.

Length to marry the long strap: Take once and

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a-half the round of the yard, once the round of the block, and half the round of the rope.

Length to cut the short strap: Take half the round of the yard, once and a-half the round of the block, and once the round of the rope.

Length to marry the short strap: Take half the round of the yard, once the round of the block, and half the round of the rope.

Why should a topsail sheet block be strapped with a double strap, placed twice round the block?

Because the sheave should stand athwartships, fair for the sheet to lead through from the yard-arm.

Why should the jeer block be strapped with two single straps?

Because the sheave should stand fore and aft, to correspond with the mast-head block.

BRACE BLOCKS FOR LOWER YARDS.

THESE are single, thin, double-scored blocks. They are fitted with a double strap with a thimble, and a thimble rove through it; they are called union thimbles for the yardarm strap.

Length to marry the strap: Take twice the round of the block, twice the round of the thimble, and three times the round of the rope, then allow sufficient end to splice it. This would be the length to cut the strap.

FORE AND MAIN TOPSAIL BRACE BLOCKS.

THESE are single, thin, double-scored blocks, and are fitted with two straps with the union thimbles.

Length to marry each strap: Take once the round of the block, once the round of the thimble, and once the round of the rope, then allow sufficient end to splice it. This would be the length to cut the strap.

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YARD-ARM STRAP FOR BRACE BLOCKS.

THIS strap is fitted round the thimble that is rove through the thimble of the brace block, before the block is strapped.

Length to marry the strap: Take once the round of the yard-arm, once the round of the thimble, and once and a-half the round of the rope.

Why should a topsail brace block have two separate straps, and a fore and main brace block be strapped with one strap placed twice round the block and thimble?

The fore and main brace blocks, being strapped with one strap placed twice round the block and thimble, the sheave will lay horizontal; whereas the topsail brace block, being strapped with two straps, the sheave will stand perpendicular.

In placing the fore and main brace block on the yard, how should the head of the pin be?

The head of the pin should be on the upper side of the block, or otherwise it is liable to fall out.

DOUBLE BLOCKS WITH LASHING EYE.

LENGTH to cut the strap: Take twice the round of the block.

Length to marry the strap: Take once and a-half the round of the block.

DOUBLE BLOCKS WITH THIMBLES, OR HOOK AND THIMBLE.

SUCH as fore and main tackle blocks, luff tackles or jigger tackles, &c.

Length to cut the strap: Take twice the round of the block.

Length to marry the strap: Take once the round of the block, once the round of the thimble, and two-thirds the round of the rope.

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DOUBLE BLOCKS FOR TOPSAIL AND TOPGALLANT CLEWLINES.

THESE are double blocks, fitted with a long strap with an eye spliced in each end, for topsail clewlines and top-gallant sheet blocks; also for top-gallant clewline and royal sheet blocks.

Length to cut the strap: Take twice the round of the block, once the round of the yard, and twice the round of the rope.

After the two eyes are spliced in, the length from eye to eye should be once the round of the block and once the round of the yard.

After the block is seized in, the length of the strap from the block would be half the round of the yard.

What the strap takes up in going round the yard will give sufficient drift between the eyes for lashing.

JEER BLOCK FOR MAST-HEAD.

THIS is a double block with two scores, and the strap is placed twice round the block, with two long bights, to go up through the after hole in the fore part of the top, and is lashed at the after part of the mast.

Length to cut the strap: Take four times the round of the mast-head, twice and a-half the round of the block, and once the round of the rope.

Length to marry the strap: Take four times the round of the mast-head, twice the round of the block, and once the round of the rope.

The length the bights of the strap should be from the block when fitted, is once the round of the mast-head. The block is seized in the two bights, and the seizing is crossed both ways.

FISH TACKLE BLOCKS.

THERE are four double blocks, doubled scored; two are fitted for the davits and two with fish-hooks; and

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two single-blocks, double scored, for the davit, for the leading part of the fish fall.

A line-of-battle ship's fish-hook block is fitted with a long strap, two feet from the block, with two seizings on it, one close to the block, the other close to the thimble. In smaller ships the hook is strapped close to the block.

Length to marry the long strap: Take twice the round of the block, once the round of the rope, and four times the length of the strap from the block, then allow sufficient end to splice it.

Length to marry the short strap: Take twice the round of the block, twice the round of the thimble, and three times the round of the rope, and sufficient end to splice it.

DOUBLE BLOCKS FOR THE DAVIT.

LENGTH to marry the strap: Take twice the round of the block, twice the round of the davit, and four times the round of the rope that will fit taut on the davit, allowing six inches extra that it may be put on and off easily, and sufficient end to splice it.

SINGLE BLOCKS FOR THE DAVIT.

LENGTH to marry the strap: Take twice the round of the block, twice the round of the davit, and three times the round of the rope that will fit taut on the davit, allowing six inches extra, that it may be put on and off easily, and sufficient end to splice it.

PINNACE PURCHASE FOR PADDLE-WHEEL STEAMERS.

THERE is a pendant, one end of it is spliced round a double block, and a clump block rove on the pendant, with a lizard to carry out on the fore-yard; the pendant is cut long enough to go over the cap,

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and is secured to the lower yard ; the lower block is a single one, fitted with a long strap and a hook.

Occasionally the purchase may be seen reversed, viz :—The double block is fitted with a long strap and a hook, the pendant spliced round the single block, and a single block fitted with a thimble to reeve on the pendant for the leading part of the fall, and a hook block to the cap to lead the fall on deck ; the clump block is rove on the pendant after the leading block is on.

PROPELLER PURCHASE.

There are two metal sheaves in the propeller framing, and two iron blocks on the spanker boom, and the boom is supported with crutches.

The purchase blocks, for large ships, are two 18-in. treble, double scored, and two 18-in double, double scored. The blocks are fitted with a double strap, placed twice round the block ; the length the strap should be from the block is 2 ft. 6-in.

Length to marry the strap : Take twice the round of the block, and four times the length the strap should be from the block, then allow sufficient end to splice it.

There are two pendants with a becket in each end ; the pendant is rove through the block on the boom from forward, down through the block in the framing, and up round the boom with a round turn and two half hitches.

Then toggle the pendant, or hitch and seize it through the strap of the treble block. Take the double block forward to the main-tack cavil, and reeve the purchase fall.

Small ships have only one pendant, and two 12 in. double blocks ; and the length the strap should be from the block is 2-ft.

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GUN TACKLE BLOCKS.

THE straps for these blocks are grommet straps, made from one-eighth or quarter worn rope, and one length of rope will make three straps.

Directions for the length are as follows, viz :—

For a double 10in. block, $3\frac{1}{2}$ in. rope :

	Ftm.	Ft.	In.
Length to cut the rope for three blocks would be	1	5	7
To prove it			
10in. block, take three times the round of it	1	1	0
Thimbles 8 in. take three times the round of it	0	2	0
$3\frac{1}{2}$-in. rope, take three times the round of it	0	0	10
And three times the round of the rope at each end for splicing	0	1	9
	1	5	7

Length to marry the strand :			
Take once the round of the block ...	0	2	4
Once the round of the thimble ...	0	0	8
And once the round of the rope ...	0	0	$3\frac{1}{2}$
	0	3	$3\frac{1}{2}$

Mark the rope for marrying at that length before you unlay it.

For a double 8in. block :

Length to cut the rope for three straps would be	1	4	0
To prove it.			
Take three times the round of the block	1	0	0
Three times the round of the thimble, 7in. in circumference	0	1	9

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	Ftms.	Ft.	In.
3in. rope, three times the round of it ...	0	0	9
And three times the round of the rope at each end for splicing	0	1	6
	1	4	0
Length to marry the strand:			
Take once the round of the block ...	0	2	0
Once the round of the thimble ...	0	0	7
And once the round of the rope ...	0	0	2
The length to marry the strand ...	0	2	10
For a double 6in. block:			
Length to cut the rope for three straps ...	1	1	10½
To prove it.			
Take three times the round of the block	0	4	6
Three times the round of the thimble, 6in.	0	1	6
Three times the round of the rope, 2½in.	0	0	7½
And three times the round of the rope at each end for splicing	0	1	3
	1	1	10½
Length to marry the strand:			
Take once the round of the block ...	0	1	6
Once the round of the thimble ...	0	0	6
And once the round of the rope ...	0	0	2½
The length to marry the strand ...	0	2	2½
For a single 6in. block:			
Length to cut the rope for three straps ...	1	1	3½
To prove it.			
Take three times the round of the block	0	3	10½
Three times the round of the thimble ...	0	1	6
Three times the round of the rope ...	0	0	7½

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	Ftms.	Ft.	In.
And three times the length of the rope at each end for splicing	0	1	3
	1	1	3
Length to marry the strand :			
Take once the round of the block ...	0	1	$3\frac{1}{2}$
Once the round of the thimble	0	0	6
And once the round of the rope ...	0	0	$2\frac{1}{2}$
The length to marry the strand	0	2	0

If the grommet is made from four-strand rope, it will only require three times the round of the block, three times the round of the thimble, and sufficient end to splice it.

Length to marry the strand : Take once the round of the block, and once the round of the thimble.

SEIZINGS FOR BLOCK STRAPS, &c.

DIRECTIONS to measure for the length of seizings for straps of blocks or collars, &c.

Allowing there are seven lower turns, six riding turns, and three crossing turns.

Measure where the centre turn would come, take that for the average length of one turn, and the six riding turns will take as much as the seven lower turns, which will be fourteen turns ; then allow three turns for the crossing turns and splicing the eye, and there will be sufficient end left to heave the last crossing turn on, making seventeen turns in the whole.

If there are six lower turns, five riding turns, and three crossing turns, allow the length of fifteen turns in the whole.

If there are five lower turns, four riding turns, and three crossing turns, allow the length of thirteen turns in the whole.

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If the block is double strapped, such as jeer blocks, topsail sheet blocks, &c.

Allow five turns for the crossing turn, as they cross two ways.

DIRECTIONS TO PUT THE SEIZINGS ON.

Well stretch the seizing, take some turns out of it, rub it down smooth, splice an eye in one end, put the strands in once, but do not cut them off, pass the eye round the strap, reeve the end through it, round the strap as many times as is required for the lower turns, reeve the ends underneath the parts, and through its own eye, leaving sufficient bight to heave the turns on. Place it square round the strap, lay two strands of the splice down the strap, for the seizing to lay over it, heave the lower turns on taut, haul the slack through the eye, and heave it taut; lay the third strand of the splice on top of the lower turns, and pass the riding turns over it, put the end between the two last parts of the lower turns, and put the crossing turns on; pass one round turn, that will be the centre turn, heave it well taut; then form a half hitch each side of the round turn, that will form a clove hitch will three parts, unlay the end, make a wall or crown knot, cut the ends off and it is finished.

A double strap should be crossed both ways: first, pass two turns between the strap that faces the side of the block, then bring the end out in the same direction as the sheave of the block, and pass three turns there, as before stated.

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BOBSTAY COLLARS, &c.

BOBSTAY COLLARS, HEMP.

WHAT is the length of rope required to make a bobstay collar?

It will take twice the round of the bowsprit and one foot to make a collar.

Suppose we take a bowsprit for example.

It will take twice the round of the bowsprit to make a collar.

	Fthm.	Ft	In.
The length to cut the rope for the inner collar would be	3	0	0
To prove it			
Once the round of the bowsprit ...	1	3	0
14in. heart, once the round of it ...	0	3	2
10in. rope, it will take up one-third the round of the rope in going round the heart	0	0	3
For all bobstay collars above 8in. allow half what the seizing takes up ...	0	0	5
Length from eye to eye	2	0	10
Allow 5ft. 2in. for the two half eyes, and splicing	0	5	2
Length of rope required for inner collar	3	0	0

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Large ship's bowsprits have three collars. The middle collar should be cut four inches shorter than the inner one, and the outer four inches shorter than the middle collar; and, when fitted, they would be two inches shorter than each other, from the heart to the back of the eyes, as the bowsprit is that much smaller towards the cap.

What is the length of these collars, after the two eyes are spliced and served, before the heart is seized in?

Take once the round of the bowsprit, once the round of the heart, one-third the round of the rope, and half what the seizing takes up.

After the heart is seized in, the length from the heart to the back of the eye would be two and a-half inches more than half the round of the bowsprit.

What these collars take up in going round the bowsprit, will give sufficient drift between the eyes for lashing.

TO FIT BOBSTAY COLLARS.

THE length has already been given. You may cut two collars in one length, and splice an eye at each end; the length for the eye should be eleven lays from the strand, the marlinspike is entered to the whipping and the fid is driven in as far as required, before the eye is formed; after which there are nine clear lays from the fid to the first strand, that is put in. The strand is put in once whole strand, and once half strand; then set it up and worm it with spunyarn: if it is a 10-in. rope, it will take fourteen-yarn spunyarn, and backed with four-yarn ditto to fill the lays of the rope; then parcel it with canvas, and well tar it, then serve length required with six-yarn spunyarn, after which

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lower it down, and cut it at the centre, and splice the other eyes, then set it up and stretch the other splice, and serve over it.

The two eyes in each collar may be spliced before they are set up—if so, you must deduct one inch to every foot for stretching.

TO SEIZE THE HEART IN THE COLLAR.

THE heart is seized in the centre of the collar; the size of the seizing should be one-fourth the size of the collar, with six lower turns, five riding turns, and three crossing turns.

To measure for the seizings:

Measure round the collar for one turn, allowing six lower turns; and the five riding turns would take as much as the six lower turns; then allow the length of three lower turns for the crossing turns, that will be the length of fifteen lower turns in the whole: then there would be sufficient end left to heave the last crossing turn on.

You may measure for all seizing in the same manner, either for rigging or blocks; if there are to be seven lower turns, then allow the length of seventeen turns in the whole.

BOBSTAY COLLARS—WIRE.

What is the length of wire required to make a bobstay collar?

It will take twice the round of the bowsprit and one foot to make a collar?

For example, a 9-ft. bowsprit.

	Fthm.	ft.	in
Length to cut the wire for the inner collar	3	1	0
To prove it.			
Once the round of the bowsprit ...	1	3	0
14-in. heart, once the round of it ...	0	3	1

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	Fthm.	ft.	In.
Length from eye to eye	2	0	1
Forming the two eyes will shorten the collar once the round of the rope	0	0	5
Allow 6ft. 6in. for the two half eyes and splicing	1	0	6
Length of wire required for inner collar ...	3	1	0

For all bowsprits under 9-ft. in circumference it will take twice the round of the bowsprit and 2-ft. to make a collar.

Allowing the bowsprit to be 8-ft. $4\frac{1}{2}$-in. wire.

Length to cut the inner collar	3	0	0
To prove it.			
Once the round of the bowsprit ...	1	2	0
14-in. heart, once the round of it ...	0	3	2
Length from eye to eye	1	5	2
Forming the two eyes will shorten the collar once the round of the rope	0	0	$4\frac{1}{2}$
Allow 6-ft. 6-in. for the two half eyes and splicing	1	0	6
Length of wire required for inner collar ...	3	0	$0\frac{1}{2}$

Allowing the bowsprit to be 7-ft. 4in. wire

Length to cut the wire for the inner collar	2	4	0
To prove it.			
Once the round of the bowsprit ...	1	1	0
14-in. heart, once the round of it ...	0	3	2
Length from eye to eye	1	4	2
Forming the two eyes will shorten the collar once the round of the rope	0	0	4

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	Fthm.	ft	in.
Allowing 5-ft. 6-in. for the two half eyes and splicing	0	5	6
Length of rope required for inner collar ...	2	4	0

For a bowsprit that has three collars, cut the middle collar 4-in. less than the inner collar, and the outer 4-in. less than the middle collar; and, when fitted, they will be two inches less from the heart to the back of the eye.

After the heart is seized in, the length from the heart to the back of the eyes would be half the round of the bowsprit; and what the collar takes up in going round the bowsprit, will give sufficient drift between the eyes for lashing.

Allowing the bowsprit to be 6-ft. $3\frac{1}{2}$in. wire.

Length to cut the inner collar ...	2	2	0
To prove it.			
Once the round of the bowsprit ...	1	0	0
12-inch heart, once the round of it ...	0	2	9
Length from eye to eye	1	2	9
Forming the two eyes will shorten the collar once the round of the rope ...	0	0	3
Allow 5-ft. for the two half eyes and splicing	0	5	0
Length of rope required for inner collar...	2	2	0

Allowing the bowsprit to be 5.ft. $3\frac{1}{4}$in.wire.

Length to cut the wire for the inner collar	2	0	0
To prove it.			
Once the round of the bowsprit ...	0	5	0

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	Fthm.	Ft.	In.
A thimble, once the round of it ...	0	1	9
Length from eye to eye	1	0	9
Forming the two eyes will shorten the collar once the round of the rope ...	0	0	3
Allow 5ft. for the two half eyes and splicing	0	5	0
Length of rope required for inner collar	2	0	0

Allowing the bowsprit to be 4ft. 2½in. wire.

Length to cut the wire for the inner collar	1	4	0

To prove it.

Once the round of the bowsprit ...	0	4	0
A thimble, once the round of it ...	0	1	4
Length from eye to eye	0	5	4
Forming the two eyes will shorten the collar once the round of the rope ...	0	0	2
Allow 4ft. 6in. for the two half eyes and splicing	0	4	6
Length of rope required for inner collar	1	4	0

For a bowsprit under 7ft., which has only two collars, cut the outer collar 2in. less than the inner one; and, when fitted, it will be 1in. less from the heart to the back of the eye.

TO FIT WIRE BOBSTAY COLLARS.

THE length from eye to eye has already been given. Put a mark on the centre of each eye, then worm, parcel and serve each side of the centre the required length for the eye, which is as follows:—

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For a $4\frac{1}{2}$in. wire, serve 10-in. each side of the centre
„ 4-in. „ 9-in. „ „
„ $3\frac{1}{2}$-in. and $3\frac{1}{4}$-in. 8-in „ „
„ 3-in., $2\frac{3}{4}$-in. or $2\frac{1}{2}$in. 7-in. „ „
„ $2\frac{1}{4}$-in. and 2-in. 6-in. „ „

To form the eye, place the centre of the eye over the bit pin, or lash it to some convenient place, put a tackle on each part, and haul on it until the eye is formed, and the ends of the service are abreast of each other; then put a strand round both parts, and heave them close together with bolts, and put a spunyarn stop round them to keep them together. It will require a jigger tackle to haul the strands in; in putting a strap, or strand, round the wire strand for hauling it in, put a marlinspike through the strand as a toggle, and put a half-hitch with the strand or strap the other side of it, towards the end.

Then to splice the eyes. The strands are put in once whole strand, once two-thirds of a strand, and once one-third. If it is a five strand wire rope, put the strand in as follows :—The first strand to be put in would be the second strands from the right hand, then put the left hand strand in under three lays, and the next to it under two lays, and the next under one lay; then put the back strand in, which is the right-hand strand; after the strands are all hove in taut, put a stop on all to keep them from rendering back; then put two-thirds of the strands in once, and put on another stop; then one-third of the strands in once, and put another stop on. Let the collar up, stretch the splice, and break the wire yarns off close to the rope; then worm, parcel, and serve it from eye to eye.

The heart is then seized in the collar, as before directed for the hemp collars.

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BOWSPRIT SHROUD COLLARS, &c.

BOWSPRIT SHROUD COLLARS—HEMP.

WHAT is the length of a rope required to make a bowsprit shroud collar?

For a bowsprit that is 9-ft. in circumference, it will take once and five-sixths the round of the bowsprit; and for all bowsprits under 9-ft., it will take twice the round of the bowsprit to make a collar.

For example :—A bowsprit, 9-ft.

	Fthm.	ft.	in.
Length to cut the rope for one collar ...	2	4	6
To prove it.			
Once the round of the bowsprit ..	1	3	0
12-inch heart, once the round of it ...	0	2	9
7-inch rope, one-third the round of it ...	0	0	2
Length from eye to eye	1	5	11
Allow 4-ft. 7-in. for the two half eyes and splicing	0	4	7
Length to cut the rope	2	4	6

For all bowsprits, under 9-ft. in circumference, allow twice the round of the bowsprit to make a collar.

Allowing the bowsprit to be 7-ft.

Length to cut the rope	2	2	0

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To prove it.

	Fthms.	ft.	in.
Once the round of the bowsprit ...	1	1	0
10-in. heart, once the round of it ...	0	2	4
6½-in. rope, one-third the round of it ...	0	0	2
Length from eye to eye	1	3	6
Then allow 4-ft. 6-in. for the two half eyes and splicing	0	4	6
Length to cut the rope	2	2	0

For example:—A bowsprit, 5-ft.

Length to cut the rope	1	4	0
To prove it.			
Once the round of the bowsprit ...	0	5	0
A thimble, once the round of it ...	0	1	4
5½-in. rope, one-third the round of it ...	0	0	2
Length from eye to eye	1	0	6
Allow 3-ft. 6-in. for the two half eyes and splicing	0	3	6
Length of rope required for inner collar	1	4	0

Allowing the bowsprit to be 4-ft.

Length to cut the rope	1	2	0
To prove it.			
Once the round of the bowsprit ...	0	4	0
A thimble, once the round of it ...	0	1	0
4½-in. rope, one-third the round of it ...	0	0	2
Length from eye to eye	0	5	2

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	Fthm	Ft.	In
It will take 2-ft. 10-in. for the two eyes and splicing	0	2	10
Length to cut the rope	1	2	0

TO FIT BOWSPRIT SHROUD COLLARS.

THE length has already been given.

An eye is spliced at each end, it is wormed, parcelled, tarred, and served, the same as bobstay collars. The heart, or thimble, is seized in the collar at one-third, giving the long leg the advantage of four inches more than the two-thirds.

BOWSPRIT SHROUD COLLARS, WIRE.

FOR example:—A bowsprit, 8-ft. 10in. $3\frac{1}{2}$in. wire.

What is the length of wire required to make a collar?

It will take twice the round of the bowsprit.

The bowsprit is 8ft. 10-in., length to cut the wire	2	5	8
To prove it.			
Once the round of the bowsprit ...	1	2	10
12-in. heart, once the round of it ...	0	2	9
Length from eye to eye	1	5	7
Forming the two eyes will shorten the collar once the round of the rope	0	0	3
Allow 5-ft. 10-in. for the two half-eyes and splicing	0	5	10
Length of rope required for a collar ...	2	5	8

A 3-in. wire.

The length to cut the wire would be twice the round of the bowsprit.

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To prove it.

	Fthm.	Ft.	In.
Once the round of the bowsprit ...	1	1	0
10-in. heart, once the round of it ...	0	2	4
Length from eye to eye	1	3	4
Forming the two eyes will shorten the collar once the round of the rope ...	0	0	3
Allow 4-ft. 6-in. for the two half-eyes and splicing	0	4	6
Length of rope required for a collar ...	2	2	1

A bowsprit, 5-ft. $2\frac{1}{2}$in. wire.

The length to cut the wire would be twice the round of the bowsprit	1	4	0

To prove it.

Once the round of the bowsprit ...	0	5	2
A thimble, once the round of it ...	0	1	0
Length from eye to eye	1	0	2
Forming the two eyes will shorten the collar once the round of the rope... ...	0	0	2
Allow 3-ft. 8-in. for the two half-eyes and splicing	0	3	8
Length of rope required for a collar ...	1	4	0

A bowsprit, 4-ft.

It will take twice and one-fourth the round of the bowsprit.

The length to cut the wire would be ...	1	3	0

To prove it.

Once the round of the bowsprit ...	0	4	0
Once the round of the thimble ...	0	1	2
Length from eye to eye	0	5	2

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	Fthms.	Ft.	In.
Forming the two eyes will shorten the collar once the round of the rope	0	0	2
Allow 3-ft. 8-in. for the two half eyes and splicing	0	3	8
Length of rope required for a collar ...	1	3	0

For a bowsprit that has four shroud collars, let the two outer ones be four inches shorter from eye to eye than the two inner collars

What is the length of these collars, after the two eyes are spliced and served, before the heart is seized in?

Take once the round of the bowsprit, and once the round of the heart and thimble.

The heart, or thimble, is seized in the collar at the thirds giving the long leg the advantage of four inches.

What the collar takes up in going round the bowsprit will give sufficient drift between the eyes for lashing.

Take the same directions for the eyes, according to the size rope, as before directed for the bobstay collars.

FORE STAY COLLARS, &c.

FORE STAY LONG COLLARS.—HEMP OR WIRE.

For example,—A bowsprit 9 ft. in circumference.

What is the length of rope required to make one collar?

It will take four times and two-thirds the round of the bowsprit.

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	Fthms.	Ft.	In
Length to cut the rope	7	0	0
To prove it			
When fitted, the length of collar from the heart would be five-sixths the round of the bowsprit, that would be 7-ft. 6in., and four times that would be ...	5	0	0
18-in. heart, twice the round of it ...	1	1	4
$8\frac{1}{2}$-in. rope, twice the round of it ...	0	1	5
The length to marry the collar ...	6	2	9
Allow 3-ft. 3in. for splicing	0	3	3
Length of rope required for a collar ...	7	0	0

Cut the outer collar 2-ft. less. Seizing, $1\frac{1}{2}$in. 6-fthms.

Allowing the bowsprit to be 8-ft.

It will take four times and five-sixths the round of the bowsprit to make the inner collar	6	2	8
To prove it,			
When fitted, the length of collar from the heart would be five-sixths the round of the bowsprit, that would be 6-in. 8 in., and four times that would be ...	4	2	8
18-in. heart, twice the round of it ...	1	1	4
8-in. rope, twice the round of it ...	0	1	4
Length to marry the collar	5	5	4
Allow 3-ft. 4-in. for splicing	0	3	4
Length of rope required for a collar ...	6	2	8

Cut the outer collar 2-ft. less. Seizing, $1\frac{1}{2}$-in. 6-fthms.

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	Fthm.	Ft.	In.
Allowing the bowsprit to be 7-ft.			
It will take five times the circumference	5	5	0
To prove it.			
When fitted, the length of collar from the heart would be seven-eighths the circumference of the bowsprit, that would be 6-ft. 1-in., and four times that would be	4	0	4
16 in. heart, twice the round of it ...	1	0	4
7-in. rope, twice the round of it ...	0	1	2
Length to marry the collar	5	1	10
Allow 3-ft. 2-in. for splicing	0	3	2
Length of rope required for inner collar	5	5	0

Cut the outer collar 2-ft. less. Seizing $1\frac{1}{4}$-in. $5\frac{1}{2}$-fthms.

Allowing the bowsprit to be 5-ft. 8-in.			
It will take five times and four-fifths the circumference of the bowsprit ...	5	2	10
To prove it.			
When fitted, the length of collar from the heart would be once the round of the bowsprit, 5-ft. 8-in., and four times that would be	3	4	8
15-in. heart, once the round of it ...	1	0	2
$6\frac{1}{2}$-in. rope, twice the round of it ...	0	1	0
Length to marry the collar	4	5	10
Allow 3-ft. for splicing	0	3	0
Length of rope required for inner collar	5	2	10

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Cut the outer collar 1-ft. 8-in. less. Seizing, 1-in. 5-fthms.

Allowing the bowsprit to be 5-ft.

	Fthms.	Ft.	In.
It will take five times and four-fifths the circumference of the bowsprit ...	4	5	0
To prove it.			
When fitted, the length of collar from the heart would be once the round of the bowsprit, 5-ft., four times that would be	3	2	0
13-in. heart, twice the round of it ...	0	5	10
$5\frac{1}{2}$-in. rope, twice the round of it ...	0	0	11
Length to marry the collar	4	2	9
Allow 2-ft. 3.in. for splicing	0	2	3
Length of rope required for inner collar	4	5	0

Cut the outer collar 1-ft. 4-in. less. Seizings, $\frac{3}{4}$-in $4\frac{1}{2}$- fthms.

Allowing the bowsprit to be 4-ft.

It will take five times and four-fifths the circumference of the bowsprit ...	3	5	2
To prove it.			
When fitted, the length of collar from the heart would be once the round of the bowsprit, 4-ft., four times, that is ...	2	4	0
10-in. heart, twice the round of it ...	0	4	3
$4\frac{1}{2}$-in. rope, twice the round of it ...	0	0	9
Length to marry the collar	3	3	0
Allow 2-ft. 2-in. for splicing	0	2	2
Length of rope required for inner collar ...	3	5	2

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Cut the outer collar 1-ft. less. Seizings, ¾-in. Length, 4-fthms.

TO FIT FORE STAY COLLARS.

In making the long collars, the rope is set up and stretched, wormed, parcelled, and served the required length.

The splice is married slack, and the strands of the splice are put in once whole strand, one half strand and one quarter strand, each way, so that the splice lies neatly round the heart; the strap is set up to stretch the splice and then serve it all over.

SECURING THE COLLAR ROUND THE HEART.

The heart for this collar has two scores, one larger than the other, for the splice to lie in; the splice is stopped in the centre of the score with a strand, and hove taut with a bolt; the heart is lashed to some place convenient. a strand rove through the bight, brought round a bolt, and hove taut with another.

If fitted on board, put a tackle on, and haul the two parts straight till the rope is close to the heart.

Put a good stop on the two parts close to the heart, make a chalk mark at the centre of the bight, and bring to the centre of the heart, take the strand of the first part and pass it round both parts and nipper it as before; bend the two bights down, and heave them taut, till the last part is as close round the block as the first part; put a stop on the last two parts the same as on the first, then set it up with a luff tackle till the rope is close round the heart.

SEIZING THE HEART ROUND THE COLLAR.

There is a score each side of the heart for the seizing to lay in, there are seven lower turns and six

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riding turns, and it crosses in three places, first above the strap, then between the two parts of the strap, and underneath the strap,

The wire is set up and wormed, parcelled, tarred, and served the required length.

Splice the collar as follows, viz :—Put the strands in three times each way, once whole strand, once two-thirds, and once one-third each way. Put a good stop round each tuck, to prevent the wire yarns from starting back ; then set it up, break the wire yarns off short, by working the strands backward and forward quickly two or three times ; worm, parcel, and serve over the splice, and seize the heart in as before directed for the hemp collars.

WIRE FORE STAY BALE SLING COLLARS.

THESE are short collars, fitted with a short splice, with a single scored heart or thimble.

The length of rope required to make one collar for any size bowsprit :

It will take twice and three-quarters the round of bowsprit :

For example—Take a bowsprit of 9-ft. in circumference.

	Fthm.	Ft.	In.
Length to cut the rope	4	0	9

To prove it.

Length of collar when fitted from heart to the back of the eye would be eight-ninths ; twice that would be round of bowsprit	2	4	0
16-in. heart take once the round of it ...	0	3	4
5-in. wire take once the round of it ..	0	0	5
That would be the length to marry the collar	3	1	9

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	Fthm.	Ft.	In.
It would take twelve times the round of rope for the splice	0	5	0
Length of rope required	4	0	9

For example:—Allowing the bowsprit to be 6ft. in circumference.

It will take twice and a-half the circumference of bowsprit for one collar, viz.	2	3	0
To prove it.			
From thimble to the back of eye, when fitted, would be 5 ft., twice that would be	1	4	0
Take once the round of thimble ...	0	1	3
$3\frac{1}{2}$-in. wire rope, allow once the round of it	0	0	$3\frac{1}{2}$
Length to marry the collar would be ..	1	5	$6\frac{1}{2}$
Allow twelve times round of rope for splicing, that would be	0	3	6
Length of rope required	2	3	0

TO FIT THE COLLARS.

SET the rope up, worm, parcel, tar, and serve it the required length; bend the rope up for splicing, the same as for a block-strop; whip all the strands before you unlay the ends, marry the strands at the marrying mark, and put a good stop round all; put the strands in once, whole strand, put a good stop round all, to prevent the ends from starting back, put the strands in two-thirds and a stop round it, set it up, break the wires of the strands a few at a time, marry your wormings, parcel, and serve over: lash the centre of splice to the upper part of heart, set the collar up with a tackle, and heave the two parts together for seizing; a flat seizing is the best.

There is a wire grommet fitted to go round the collar, under the heart, for the eye of collar, to set up to on top of bowsprit.

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The outer collar should be cut 8-ins. shorter than the inner collar, and 4-ins. when fitted.

FORE STAY COLLARS—WARPED.

SOME officers prefer the above collars.

These collars are warped round a cask and over a spar that is lashed athwart the cask. Let the cask be as near the size of the bowsprit as you can.

For the length, take once the round of the bowsprit, and the length of the heart, pass a line round the cask, and half round both ends of the spar; if that does not give the required length, set the cask off from the spar with wedges till you get the length required.

I will give the dimensions of two bowsprits, say 8ft. 6-in. in circumference; and the length of the heart was 1-ft. 6-in.; there was a cask 8-ft. 6-in. in circumference, and the spar that was lashed athwart it was 2-ft. in circumference; a line 10-ft. long was passed round the cask and spar, and the cask was wedged off from the spar to that length.

Hang a number of two-yarn spunyarn stops up and down the cask, and along each end of the spar, to stop all parts together when passed.

The length of rope for this collar was 96 fathoms of two-inch; the rope was well stretched. Splice a long eye round one end of the spar, then pass the turns round the cask, and round the other end of the spar, then back round the cask, and round the other end of the spar; so continue till all the turns are passed. Secure the end by splicing a long eye round the opposite end of the spar to where the first end was spliced.

Number of lays round the cask, and number of turns in each lay: first lay nine turns, second lay nine turns, third lay eight turns, fourth lay seven turns fifth lay six turns, six lay six turns, and the seventh lay five turns.

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Number of lays round the spar, and number of turns in each lay: first lay seven turns, second lay seven turns, third lay six turns, and fourth lay five turns.

Tie the stops round all parts to keep them together, slack up the wedges, and marl the collar all over with four-yarn spunyarn; give it a good coat of tar, parcel it with canvas, tar it, and serve it with four-yarn spunyarn; it is not served as any other rope, for every turn is hove on with a seizing mallet.

For example, a bowsprit 5-ft. 10 in. in circumference; and the length of collar, when fitted, from the heart to the back of the eye was 5-ft. 10-in.

The collar was made from $1\frac{1}{2}$-in. rope, the length it took was 50 fathoms; there were 38 turns round the cask, and 19 turns round the spar.

Number of lays round the cask, and the number of turns in each lay: first lay eight turns, second lay eight turns, third lay seven turns, fourth lay six turns, fifth lay five turns, and the seventh lay four turns.

Number of lays round the spar, and number of turns in each lay: first lay eight turns, second lay five turns, third lay four turns, and the fourth lay four turns.

TO FIT THE COLLARS.

THE heart is seized in one of the eyes that are round the spar, the other eye serves for lashing when round the bowsprit.

The seizing is a flat seizing, there being no riding turns. The length of seizing is $3\frac{1}{4}$ fathoms of $1\frac{1}{2}$-in. rope.

QUESTIONS AND ANSWERS.

I HAVE here thought it requisite to insert a few Questions and Answers, which will be found very

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serviceable for a reference when rigging ships, or fitting rigging, they are as follows, viz :—

What is the first thing to be done when you commence clothing a bowsprit ?

Rig a good stage.

Where would you place your inner bobstay collar ?

Two-thirds out from the knight head to the cap.

How far would you place the second and third collar ?

The diameter of the bowsprit outside of the inner collar, for the second collar; and the same distance outside of No. 2 collar for the third collar.

Where would you place the bowsprit shroud collars when there are four collars ?

Place the two inner ones outside and close to the inner bobstay collar; the other two outside and close to No. 2 bobstay collar.

Vessels that have only two bobstay collars, have only two bowsprit shroud collars, and they are placed outside and close to the inner bobstay collar.

Where would you place the fore stay collar ?

Place the inner stay collar outside and close to the inner bowsprit shroud collar; and the outer stay collar, outside and close to the outer bowsprit shroud collar.

In lashing the two sheers heads together, which should be the upper leg, if the mast is to be taken in from the starboard side of the ship ?

The port leg should be the upper leg; that would allow the starboard leg to be the diameter of the spar further aft than the port leg, and will give more room for the mast to enter: the purchase fall, also, will lead clearer.

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How would you raise a pair of large sheers?

Have a derrick, or a small pair of sheers, abaft the large sheers, to lift the heads; and the purchase that is rove to hoist the mast in, take the lower block forward to the knight head, for raising the sheers.

Which mast would you step first?

The mizen mast; then the main, then the fore, and then droop the sheers for the bowsprit.

In stepping the mast, and it is on the wrong slue, how would you put it on the right slue, fair for entering the step?

To do so, take a rope and pass three turns round the mast; make a timber hitch in one end, and put a capstan bar in it; put a timber hitch in the other part, and put a capstan bar in that, to prevent the mast from going too far round.

A ship which has two gammonings, which one would you put on first?

The outer gammoning should be put on first; if otherwise, in heaving on the outer it would slacken the inner one.

Your sheet anchor being alongside in a lighter, and you have no yards across, how would you get it in its place?

Place the fish davit in the after part of the fore channels, or where it would plumb the centre of the shank of the anchor.

To rig the davit, take two luff tackles for guys, hook the double block to the davit, one forward and one aft; take a runner and tackle for a topping lift, lash the runner block to the davit head, reeve the runner from aft forward, and make it fast to the opposite side of the ship, hook the single and a leading block abaft

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it. For a purchase, take the davit head blocks for the davit head, the spare davit head double block, lash it to the anchor four inches from the centre towards the fluke, then the anchor will be a little stock heavy; put a jigger tackle on the lower stock, hook the single block to a strap round a dead eye; you may require two jigger tackles, one forward and one aft, for placing the anchor, and a stock tackle.

How would you get the sheet anchor aft from the bows? It is cat and fished as a bower.

Brace the fore yard a little forward, pot the Burtons on the yard, haul them and the lift well taut alike.

Use the launch's purchase, or a runner and tackle, on the fore yard, the yard tackles, and the fore and main stay tackles.

How would you shift the sheet anchor from the starboard to the port side?

Brace the fore yard in and the main yard forward, use the same tackles on the yards as before stated, the, stays, and the up and down tackle; hoist the anchor inboard, unhook the yard tackles and shift them to the opposite side, brace the yards round the opposite way, hook the yard purchase on, and hoist the anchor out into its place.

What is the length of the four spritsail guys, when fitted?

If hempen rope, the length from the fork of the eye that goes over the jib-boom, to the fork of the eye that goes over the spritsail gaff, would be one foot less than the jib-boom is from hounds to heel.

If wire ropes, the length would be from hounds to heel, as the wire will not stretch.

What is the length for jib-boom foot-ropes?

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Once and a-half the length of the jib-boom from hounds to heel is the length for the two.

What is the length of the lower pendants when fitted?

The length of the long leg, from the seizing of the eye to the thimble, should be one-third the length of the mast from the deck to the lower side of the trestle-trees, and the short leg one-fourth less than the long leg. The mizen mast, and all small vessels, have a single pendant; in this case the eye is formed by a cut splice, the starboard pendant is spliced into the port, and the port into the starboard: they are the same length sa a long leg, when there are a pair on each side of the mast.

In putting the pendants over the mast-head, which should be the after leg?

The long leg should be the after one.

How would you measure for a gang of hempen lower rigging, to cut it out and fit on board of a ship?

Send a man to the mast-head with a line, let him hold it to the centre of the mast, the port side, above and close to the bolster; then haul it taut down to the forward dead-eye in the starboard channels, mark the line at that length, by putting a yarn through the lays of it, that would be the length of foremost shroud, and twice that length would be the length of No. 1 pair starboard shrouds. Then add twice the circumference of the rope to each following pair, which will allow for the rise at the mast head, and the spread in the channels.

What is the length of service required for lower rigging;

If the rigging is warped round two Sampson posts, similar to being warped round pins in the rigging

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house, the length for the service would be one-third the length of the mast from the deck to the lower side of the trestle-trees, and at that length from the post mark the shrouds straight across; the forward legs of No. 1 and No. 2 pair are served all the way down.

If the shrouds are cut out on the straight, the length for the service should be two-thirds the length of the mast from the deck to the lower side of the trestle-trees, and add once the circumference of the rope to each following pair longer than each other.

EYES OF STANDING RIGGING.

THE eye should be once and one-sixth the circumference of the mast-head, above the bolster; or after the eye is formed, take half the round of the mast-head, and a-third of one square; that would be from the inside part of the eye to the first turn of seizing.

DEAD EYES LOWER RIGGING.

TURNING dead eyes in lower rigging before it is put over the mast-head. Cutter stay fashion.

STARBOARD SHROUDS.

TAKE a small line with a knot in the end of it; measure the length the eye of the shroud should be from the knot, then put a yarn through the rope; send the line up to the mast-head, pass it round the mast, and tie the knot to the yarn, that will form the eye; haul the line taut down to the forward dead eye in channels, there mark the line by putting a yarn through it with one knot; take the line to No. 2 dead eye, as before, and make two knots in the yarn; continue measuring this way until you get the number required to their respective dead eyes; now cast the eye off from the mast-head and tie the knot again to form the eye; then put the knot of the line to the

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eye seizing of the shroud, haul it taut along the shroud and put a chalk mark on the shroud abreast of the mark, which is one knot in the line for the forward leg, and two knots for the after leg of No. 1 pair starboard shrouds; continue to measure all the starboard shrouds the same way, then add to each following shroud twice the diameter of the rope for the rise at the mast-head, that will be the length from the mast-head to the dead eyes in the channels, then allow the drift for setting up. Mark the shrouds by tying a yarn round them two feet above the chalk mark that was put on the shrouds at dead eyes in channels, that will be the mark for the back of the eye that goes round the standing part for the dead eye.

The two feet which were deducted from the shroud, and what the shroud takes up in going round the dead eye, would give sufficient drift for setting the shroud up.

Length of rope it takes from the lower part of the dead eye to the nip, is half the circumference of the dead eye, and once the circumference of the shroud.

PORT SHROUDS.

MEASURE the port shrouds with the same marks in the line as you did the starboard, but you must allow once the diameter of each port shroud longer than the starboard, that will allow for the rise at the mast-head.

SHROUD LANYARDS.

LANYARDS should be half the size of the shroud.

LOWER STAYS.

FOR the length, take the distance from the after-part of the mast-head to the place where they are set up

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adding once the length of the mast-head for the half collar.

STAY LANYARDS.

STAY lanyards are one-half inch smaller than the shroud lanyards.

What tackles do you require for staying the masts, and setting the lower stays and rigging up?

Runners and tackles, up and down tackles, and luff tackles. To use them, lash the runner blocks to the long legs of the pendants, and frap the two pendants together abaft the masts. Sometimes the runner blocks are lashed to the mast, one block one-third down from the hounds, the other half-way down, which is considered more support to the mast. Lash the up and down tackles to the short legs of the pendants, and frap the pendants together for setting the stays up. Hook the single block of the luff to a strap round each stay, and the double block hook to the lanyard, and the up and down tackle to the hauling part of the luff. After the stays are set up, cast the frapping off from the short legs of the pendants. Then use the up and down tackles and the luff tackles for setting the lower rigging up; hook the tackles the same as for the stays.

Stay the mizen mast with the main-stay tackle, and set the stay up with the mizen burtons and jigger tackles; set the rigging up with the burtons and a runner, the same way as the topmast rigging.

How would you set the topmasts stays, backstays, and rigging up?

The stays are set up with a luff tackle, the shrouds and backstays with a runner and top burton tackle. The runner is a spare piece of rope, about four fathoms in length, rove through a block; an eye is spliced in one end, and the other end is tapered

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and marled down, and hitched to the shroud. When used, the single block of the burton is hooked to the eye, the lanyard of the shroud is rove through the strap of the runner block, and swab hitched; put a toggle in to prevent its being jambed.

What purchase would you use in taking your guns in or out?

Use the top tackle purchase blocks and fall for an up and down purchase, and the main tackle for an out-hauler.

Reeve the pendant through the top block, send the end up over the cap, take a round turn and secure it to the opposite quarter of the yard with a round turn round the yard; hook the top block to the thimble of the double block of the main tackle, hook the single block of the tackle to a strap round the yard arm, hook a leading block to the same place for the hauling part of the fall, and hook a leading block to the cap for the hauling part of the fall to lead on deck.

Using a garnet for the lower-deck guns on the lower deck: Lash the centre of the yard to the mast, and hook both burtons to support the yard.

How would you get a lower yard on board from alongside?

If the yard is the port side, have the starboard yard-arm forward, hang studdingsail booms over the channels, and up and down the side; reeve the jeer fall, and put the up and down tackles on to assist hoisting the yard in; put a guy on each yard-arm. If a main yard, put the fore-stay tackle on, to keep the yard off from the rigging; if it is a fore yard, put a luff on the fore stay, and hook it to the yard.

Another way to hoist the yard on board, viz.: Bring it alongside, with the opposite yard-arm forward, rig a derrick with a mizen topmast or a jib-boom, stepping

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it, and lashing the heel between the main betts, taking two sail tackles for guys, and a runner and tackle for topping lift, and a luff for a martingale; reeve the hawser through a top or snatch block at derrick head, through the after jeer block on the yard, take the end to the derrick head, or through a block lashed there for that purpose, and then made fast round the lower mast-head; reeve the jeer-fall through the upper block, down through the foremast block on the yard, through the upper block, and make the end fast to the centre of the yard; use two top burtons for lower lifts, hoist the yard up clear of the netting with the hawser, taking in the slack of the jeers; a rope's-end on each yard-arm for guys. If a main-yard, put the fore-stay tackle on the centre, to keep it off the rigging; if a fore-yard, put a luff tackle on the fore-stay.

WIRE RIGGING.

DIRECTIONS TO MEASURE FOR LOWER RIGGING.

If the mast is stepped, take a small line, put a knot at the end of it, then measure the length the eye of the shroud should be from the knot, there put a yarn through the line; send the line up to the mast head, pass it round the mast above the bolster, and tie the knot to the yarn, that will form the eye; haul the line taut down to the starboard channels, abreast of the forward dead eye; (this being wire rigging, you need to allow the diameter of the dead eye below channels;)

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there mark the line by putting a yarn through it with one knot. It is necessary to measure for every starboard shroud separately, if the dead eyes in the channels deviate much in the distance from each other, in the opening in the gunwhale for the long gun; it will be seen in the table for turning the dead eyes in, that the distance from No. 5 dead eye to No. 6, is 11-ft. 6-in., whereas the other dead eyes do not exeed 2-ft. 9-in. Then add to that length the circumference of the rope to every starboard shroud, for the rise at the mast-head; then cast the line off from the mast-head, and form the eye again; from the back of the eye to the mark in the line, that will be the length of the starboard shroud; then allow the circumference of the rope to every port shroud, longer than the starboard, for the rise at the mast-head.

A simple way to measure and cut out lower rigging, for a man that is no scholar:—Take a small line, say thirty fathoms of three-quarter or one inch rope, pass it round the mast-head, form the eye by putting a yarn through each part of the line, on top of the bolster, and stop the two parts together with the same; then haul both parts down to No. 1 and No. 2 dead eyes, at that length put a yarn through each line, make one knot in it for No. 1, and two knots for No. 2. If wire shrouds, measure the diameter of the dead eye below channels. Then take the line to No. 3 and 4 dead eyes, proceed the same as before, and so continue until you have the number required. Then take the line down, and form the eye again with the two yarns that were in the line, as before; and lay the two parts of the line straight along the deck, then form the back of the eye, to the first knots, No. 1 and 2, would be the length of No. 1 and 2 shrouds, that would be No. 1 pair; put a chalk mark on the deck

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at these lengths, and measure and mark for the other shrouds the same way, allowing twice the diameter of the rope to each following shroud, in addition to the lengths on the line.

The above statement is for the starboard shrouds.

Then add to each port shroud the diameter of the rope longer, for the rise at the mast-head.

The deck being marked for the length of each starboard shroud, make another mark between them for the port shrouds; say it is a 6in. rope, then put a chalk mark two inches longer than has been marked for the starboard shrouds.

CUTTING OUT WIRE RIGGING.

WIRE rigging is not warped round pins or Sampson posts, the same as hemp rigging.

Wire is cut on the straight, viz.: make one end fast, and put a tackle on the other part above where you want to cut; when the wire is straight along the deck or floor, mark the wire where it is to be cut, put a whipping on each side of the mark, then lay the axe under the wire at the mark, and beat it down with the commander.

There is another way to cut the shrouds out, viz.: lash a snatch block at the distance required for the length of the shroud, from the pin where the end of the shroud would be made fast.

Make one end of the wire fast to the pin, put the bight in the snatch block, put a tackle on the other part, haul on the tackle until both parts are straight along the deck or floor, cut it at the marks which are chalked on the floor for each leg, put a mark on the eye to denote the number of the shroud; the first pair cut out is No. 1, put one knot; cast off the end, put the bight out of the snatch, put it aside, and cut out No. 2 pair, and so continue.

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FITTING WIRE RIGGING.

ALL wire requires more end for splicing than hemp.

In splicing, put the strands in as follows:—once whole strand, once two-thirds of a strand, and once one-third of a strand, that will make a good taper; then set it up and well stretch the splice, break the yarns off close to the rope, by working them backward and forward quickly two or three times, and parcel and serve over the splice with spunyarn, also serve a sufficient length for the eyes before splicing them.

The stays are served the same as hempen rope, and fitted the same, except the lashing eyes, which are spliced eyes; but in cutting stays out, you must allow the half collar and sufficient end for splicing, for there is no stretch to be got out of wire rigging; the shrouds are parcelled and served all over from end to end; if the shrouds were not served, the ratlines would slip down the shroud. If you turn the dead eyes in the shrouds temporarily for setting up, stop the shrouds round the dead eye and rack the end up to the standing part; for if you turn it in cutter stay fashion, and have to alter it, it is not very easy to get the nip out of the wire.

The length of the eye of wire shrouds should be half the round of the mast-head, and one-fourth of one square.

FUTTOCK SHROUDS.

IF the mast is stepped, the top over, and the futtock plates in their respective places, to measure for the shrouds, take two battens of sufficient length to overlap each other, drive a nail in each of the other ends, hook one nail into the eye of the forward futtock plate, and the other into the links of the necklace it sets up to; then mark the upper batten at the upper

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part of the lower batten, and mark it No. 1. Measure for the remainder of the shrouds in the same manner.

If the shrouds should be iron, that would be the length of the shroud including the shackle.

The forward shroud would be chain.

If the shrouds are rope, lay the battens along the shroud, with one nail at the bosom of the hook; and 15-in. less than the battens are from nail to nail, would be the length of the shroud from the bosom of the hook to the back of the lashing eye, hooks being previously spliced in.

TOP BURTON PENDANTS.

LENGTH when fitted from the fork of the eye to the thimble, would be one-fourth the length of topmast from hounds to heel.

DIRECTIONS FOR CUTTING TOPMAST SHROUDS.

TAKE the length of topmast from hounds to heel; if fitted on board, allow for half the eye; the rope will stretch the other half.

DIRECTIONS FOR THE SERVICE.

LENGTH from the centre of the eye will be one-fifth the length of topmast from hounds to heel; the foremost legs of No's. 1 and 2 are served all the way down.

SISTER BLOCKS.

THEY are seized in No's. 1 and 2 pairs of shrouds.

The distance they are seized in from the seizing of the eye would be once and three-fourths the length of the block for No. 1 pair, and the diameter of the rope more for No. 2, for the rise at the mast-head; that will allow the lift and reef tackle to lead clear of the

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hanging blocks. If there are no hanging blocks, the sister blocks may be seized near the eye seizing.

DEAD EYES IN TOPMAST SHROUD,

TURNING dead eyes in topmast shrouds, before putting over the mast-head.

Take the length of topmast from hounds to fid hole, that will be the length of No 1 pair of shrouds, from the seizing of the eye to the nip.

Then add the diameter of the rope to every following pair of shrouds, for the rise at mast-head.

You need to allow from four to six inches more on the forward legs of No.'s 1 and 2 pairs; as they are served all the way down, they will not stretch so much as the other shrouds.

TOPMAST BACKSTAYS.

DIRECTIONS to cut topmast backstays; Take the length of lower mast from deck to trestle-trees, and topmast from upper part of bolster to fid; if fitted on board, allow for half the eye, and what the rope will stretch will give the other half, and for taking the backstay out to the channels.

The service is one foot more than the shrouds.

SERVICE IN WAKE OF TOP RIM AND LOWER YARDS.

BREAST backstays, from the fork of the eye to the commencing of the service, would be three feet less than the topmast is from hounds to heel, and serve eighteen feet down for a line-of-battle ship; for smaller vessels less service will do.

The after backstays, from the seizing of the eye to the commencing of the service, would be three feet more than the topmast is from hounds to heel, and serve twelve feet down.

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TOP-GALLANT SHROUDS.

DIRECTIONS to cut top-gallant shrouds: Take the length of topmast from hounds to heel, and top-gallant mast from hounds to heel.

Length of service for the eye part: Take one-fifth the length of top-gallant mast from hounds to fid hole.

Length of service in wake of the cross-trees and futtock bolt: Length from the seizing of the eye to the commencing of the service, would be three feet less than the top gallant mast is from hounds to fid hole, and serve twelve feet down.

TOP-GALLANT BACKSTAYS.

DIRECTIONS to cut top-gallant backstays: Take the length of lower mast from deck to trestle-trees, topmast from hounds to heel, and top-gallant mast from hounds to heel.

Length of service for the eye part: The service is three inches more than the shroud.

Service in wake of lower yards: Length from the seizing of the eye to the commencing of the service, would be three feet more than the topmast and top-gallant mast are from hounds to heel, and serve twelve feet down.

ROYAL BACKSTAYS.

DIRECTIONS to cut royal backstays: Take the length, of lower mast from deck to trestle-trees, topmast from hounds to heel, and from the hounds of the royal mast to the heel of the top-gallant mast.

Service for the eye part: Take one-fifth the length of the royal mast.

Service in wake of lower yards: Length from the seizing of the eye to the commencing of the service, would be three feet more than the topmast, top-gallant and royal masts are from hounds to heel, and serve twelve feet down.

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Directions to Cut out and Fit the Rigging for Lower Yards, Topsail, Top-Gallant, and Royal Yards.

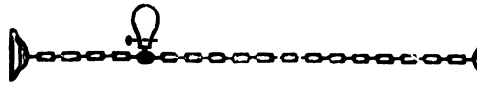
FOR directions for the blocks, refer to pages 46, 47, 48, 49, and 50.

TRUSS STRAPS.

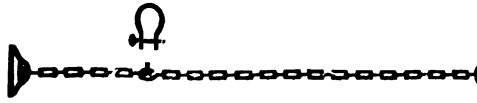
SHIPS are generally supplied with chain trusses and chain truss straps, which are four in number; two for the standing part, and two for the truss to reeve through; they are lashed on the yard the same as rope straps

The advantage to be gained by the chain straps is, in striking lower yards, not having the truss pendants to unreeve; two men in the bunt of the yard can unscrew the eye bolts, and that will free both the hauling part and the standing part; there should always be lanyards in the eye of the bolts, to prevent them falling on deck.

For the standing part.



For the hauling part of Truss.



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All officers prefer them before the rope straps.

Four inches less than the yard is in circumference, would be the extreme length of the strap, and the eye that is welded in between the links to receive the bolt of the shackle, should be at one-third the length of the strap.

ROLLING TACKLE STRAP.

THIS is a grommet strap; a four-strand rope is the best to make a three-strand grommet.

Length of rope it will take to make four straps, if made from a four-strand rope, viz :—

Take three times the round of the yard, and three times the round of the thimble; then allow sufficient end to splice it, which would be six times the round of the rope.

Length to marry the strand: Take once the round of the yard, and once the round of the thimble.

Length of rope it will take to make three straps, if made from a three-strand rope, viz. :—

Take three times the round of the yard, three times the round of the thimble, and three times the round of the rope; then allow six times the round of the rope to splice it.

Length to marry the strand: Take once the round of the yard, once the round of the thimble, and once the round of the rope.

Put a chalk mark on the rope at the length required to be married, before you unlay the rope.

Directions where it should be placed on the yard: At two-thirds from the slings to the quarter iron.

To prove it.—Three-strand rope.

For example :—

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	Ft.	In.
The round of the yard where the strap should be placed is	6	0
Once the round of the thimble	1	0
6-in. rope, once the round of it	0	6
Length to marry the strand	7	6
Then mutiply it by three	0	3
	22	6
Allow six times the round of the rope for splicing	3	0
Length of rope required for three straps ...	25	6

Take the same directions for head ear-ring straps, and all grommet straps to go round a yard or mast, with a thimble in them.

LOWER YARD FOOT ROPES.

WHAT is the length of rope required to make them?

It will take once the extreme length of the yard, and 4-ft. 6-in.

For example :—

	Ft.	In.
The main yard is 105-ft. and 4-ft. 6-in. make	109	6

To prove it.

Length it will take for the eye, once the round of the yard-arm	4	0
Once the round of the rope	0	$5\frac{1}{2}$
Allow for splicing	1	4
Then 1-ft. from the centre of the yard to the shoulder would be	47	2
Allow 1-ft. 10-in. for half the thimble and splicing	1	10

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	Ft.	In.
Length of rope required for one side ...	54	9
Multiply by two	0	2
Will give the length of rope required by both sides	109	6

To fit them :—Splice an eye in each, to fit the yard-arm, put the strands in once whole strand and once half strand ; then set it up and stretch the splice, taper the yarns down, and serve it with spun-yarn two feet from the fork of the eye. The thimbles are spliced in after the stirrups are rove on them ; then the length from the fork of the eye to the thimble should be 1-ft. less than the yard is from the centre to the shoulder ; and the droop below the yard would give sufficient drift between the thimbles for lashing, which would be about 4-ft.

LOWER YARD FOOT ROPE STIRRUPS.

STIRRUPS are short pieces of rope, four in number on each side for large ships, and three for small ships, an eye spliced in each end, one to reeve on the foot ropes and the other eye to go over the jack-stay eye bolts on top of the yard.

The length they should be when fitted,—The extreme length from the back of one eye to the back of the other, should be once the circumference of the yard-arm, close to the shoulder, for the short stirrup, which would be the first from the yard-arm ; the second, two inches longer ; the third, two inches longer than the second ; the fourth, or inner one, the same length as the second.

For example :—

The round of the yard would be 3-ft. 8-in.

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	No. 1.	No. 2.	No. 3.	No. 4.
	Ft. In.	Ft. In.	Ft. In.	Ft. In.
Length from eye to eye	3 8	3 10	4 0	3 10

The same length will do for the main yard.

LOWER YARD JACK STAYS, HEMP.

LENGTH of rope required for the two, for all classes of ships: Take once the extreme length of the yard, and 3-ft.

For example :—

	Ft.	In.
Length of main yard	105	0
To which add	3	0
Length of rope required	108	0

To prove it.

Length it will take for the eye, once the round of the yard	4	0
Once the round of the rope	0	$4\frac{1}{2}$
Allow for splicing it	1	3
1-ft. 6-in. from the centre of the yard to the shoulder of the yard-arm would be ...	46	8
Allow for splicing the thimble in ...	1	9
Length of rope required for one side ...	54	0
Multiply by two	0	2
Length of rope for both sides	108	8

LOWER YARD JACK STAYS, WIRE.

FOR Example :—

Allowing the yard to be 74-ft.

It will take the extreme length of the yard	74	0
And one-twelfth	6	4
	80	4

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To prove it.

	Ft.	In.
Length it will take for the eye, once the round of the yard	3	0
Once the round of the wire	0	2
Allow for splicing	1	8
1-ft. from the centre of the yard to the shoulder	33	0
Allow for half the thimble and splicing ...	2	4
Length for one side	40	2
Multiply by two	0	2
Length of wire required for both sides ...	80	4

To fit them :—Worm, parcel and serve a sufficient length for the eye, which would be once the round of the yard-arm, and two-thirds the round of the rope; then form the eye, and put a stop round the two parts, to keep them close together while splicing; then splice the eye, putting the strands in once whole strand, once two thirds of a strand, and once one-third; put a good stop round the wire at each tuck, to prevent the wire from starting back when breaking the ends off; then break the strands off close to the rope, by working them quickly backwards and forwards a few times; worm, parcel, and serve it all over. The thimbles are spliced in after it is rove through the eye bolts on the yard.

YARD TACKLE PENDANTS.

ALL large ships have the yard tackle pendants on the yards.

Length of rope required to make one pendant :—It will take one-third the extreme length of the yard; the length of pendant, when fitted, from the fork of the eye to the block, would be one-fifth the extreme length of the yard.

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For example :—Allowing the yard to be 105ft.

	Ft.	In.
One-third the extreme length of the yard would be	35	0
To prove it.		
Length required for the eye, once the round of the yard, and once the round of the rope.	4	7½
Allow for splicing	1	8
A 28-in. long tackle block will take for going round the block and splicing	7	9
Length of pendant from the eye to the block, when fitted, would be	21	0

Length of rope required for one pendant ... 35 0

To fit the pendant :—Splice an eye at one end to fit the yard-arm, put the strands in once and a-half, and serve over the splice ; splice a long eye in the other end, and seize the block in it ; the length of the eye should be 9-in. longer than the block.

SMALL SHIPS' PENDANTS.

THEY are fitted with a hook in one end, to go round the yard and hook to its own part, and a double block at the other end ; the block is strapped with a short eye, and the pendant spliced through it.

Length of rope required to make one pendant. It will take one-third the extreme length of the yard, and, when fitted, it would be one-fourth the length of the yard from the hook to the block.

Allowing the yard to be 52-ft.

	Ft.	In.
One-third the length of the yard ...	17	4
To prove it.		
Allow for half the thimble and splicing ...	2	2

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	Ft.	In.
And for splicing the other end through the eye of the block strap	2	2
Length of pendant from the hook to the block should be one-fourth the length of the yard	13	0
Length of rope required for one pendant ...	17	4

TOPSAIL YARDS.

PARREL.

TOPSAIL yard parrels are fitted with two legs, one long and one short, with an eye in both ends of each; the short leg is seized to the centre of the long one, marled together, and leather sewed round both. The seizing should be a flat seizing.

Length of the long leg from eye to eye, when fitted. Take twice the round of the yard, and two-thirds the round of topmast.

Length of the short leg from eye to eye when fitted Take two-thirds the round of the topmast, then allow for splicing the eyes.

FOOT ROPES.

DIRECTIONS for the length: Take once the extreme length of the yard and one fourth for the two.

Splice an eye in one end to go over the yard-arm, and serve about three feet; the eye is spliced in the other end after the stirrups are rove on; that eye would lash on the opposite quarter of the yard, a foot less than one-third from the centre to the yard-arm cleat.

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I have seen the foot ropes taken out to the goose neck at the yard-arm, spliced round a thimble, and an additional stirrup fitted with an eye to go over the yard-arm, before the jack stay is put on; that does away with the Flemish horse, and they are considered much better for the men to stand on out at the yard-arm, as they have a longer drift.

It will require once the extreme length of the yard and one-third for the two, if fitted as above described.

To fit them:—Splice a thimble in one end, to go over the goose neck at the yard-arm, and, after the stirrups are rove on, splice an eye in the other end to lash on the opposite quarter of the yard.

FOOT ROPE STIRRUPS.

STIRRUPS are short pieces of rope, three in number on each side for the fore and main topsail yards of large ships, and two for mizen topsail yard and for small vessels.

To fit them:—Splice an eye in each end, one to reeve on the foot rope, and the other end to go over the jackstay eye bolts on the top of the yard.

Length when fitted: from the fork of one eye to the fork of the other, would be once the circumference of the yard-arm, close to the shoulder or cleat, for the short stirrup, which will be the first from the yard-arm; the second, three inches longer than the first; the third, or inner one, one and a-half inches less than the second or middle one.

For brigs and small steamers, allow a few inches more, as their yard-arms are very small.

For example:—

The round of the topsail yard arm would be 2-ft. 9.in.

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The lengths for	No. 1.		No. 2.		No. 3.	
	Ft.	In.	Ft.	In.	Ft.	In.
From eye to eye, when fitted ...	2	9	3	0	2	10½
For half the eyes and splicing ...	2	6	2	6	2	6
Length of rope required for one side	5	3	5	6	5	4½

The round of the mizen topsail yard-arm would be 2-ft. 1-in.

The lengths for	No. 1.		No. 2.	
	Ft.	In.	Ft.	In.
From eye to eye	2	1	2	3
For half the eye and splicing	2	6	2	6
Length of rope required for one side ...	4	7	4	9

JACK STAYS—WIRE.

For example :—

It will take once the extreme length of the yard to make the jack stay.

	Ft.	In.
Length of fore topsail yard	68	0
To prove it.		
Length it will take for the eye, once the round of the yard-arm	2	10
Once the round of the rope	0	2
Allow for splicing it	1	6
1-ft. from the centre of the yard to the shoulder of the yard-arm would be ...	27	4

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	Ft.	In.
Allow for half the thimble and splicing ...	2	2
Length for one side	34	0
Multiply it by two		2
Length of wire required for both sides ...	68	0

For all topsail yards, the extreme length of which are less than 54-ft., you must allow the under-mentioned lengths in addition to the extreme length of the yards :—

	Ft.		Ft.	In.
Extreme length of yard	51	Allow	0	6
" "	48	"	1	0
" "	45	"	2	4
" "	40	"	3	0

They are fitted the same as lower yard jack stays.

JACK STAYS—HEMP.

DIRECTIONS for the length of rope required :—Take from one to three feet less than the extreme length of the yards, according to the under-mentioned scale :—

Extreme length. Ft.	Less than the yard. Ft.	In.	Length required. Ft.	In.
74	3	0	71	0
68	2	6	65	6
54	2	0	52	0
51	1	6	49	6
48	1	0	47	0

For all topsail yards, the extreme lengths of which are less than 48 ft., take the extreme length of the yard to make the hempen jack stays.

To fit them :—An eye is spliced in one end of each, to go over the yard-arm, then set them up and serve them : the thimbles are spliced in the other ends, after they are rove through the eye bolts on top of the yard.

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FLEMISH HORSES.

A THIMBLE is spliced in one end, to go over the goose-neck at the yard-arm and an eye is spliced in the other end, to seize on top of the yard.

Directions for the length: Take three times the length of the yard-arm, that would be from the shoulder or cleat to the goose-neck, and where the eye would be seized on the yard would be twice and a-half the length of the yard-arm from the goose-neck.

TOP-GALLANT YARDS.

PARREL.

THE parrel is fitted with two straps, one long and the other short.

The long strap is spliced round the yard, and two seizings put on it, one close to the yard, and the other to seize the thimble in.

For the length: Take once the round of the yard, once the round of the mast, and once the round of the rope, that would be the length to marry the strap; then allow sufficient end to splice it.

The short strap is spliced round the yard with a thimble seized in it.

For the length: Take once the round of the yard, once the round of the thimble, and twice the round of the rope.

The strands of the splice are put in once and a-half, and serve all over.

These straps are spliced, served, and the seizings put on, before placing them on the yard.

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JACK STAY—HEMP.

LENGTH of rope required to make the jack stay, would be once the extreme length of the yard and one foot.

For example :—

	Ft.	In.
The extreme length of the fore top-gallant yard is	43	0
Then add one foot	1	0

To prove it.

Length for the eye, once the round of the yard and once the round of the rope ...	1	10
Allow for splicing	0	6
Length of rope required for the eye ...	2	4
Then 1-ft. from the centre of the yard to the shoulder of the yard-arm would be ...	18	8
Allow for half the thimble and splicing ...	1	0
Length for one side	22	0
Multiply by two		2
Will give the length of rope required for both sides	44	0

If wire jack stays, allow 4-ft. more than above stated

FOOT ROPES.

AN eye is spliced in one end, to go over the yard-arm, and a lashing eye in the other end, to seize on the opposite quarter of the yard, one-third out from the centre of the yard to the cleat.

Directions for the length : Take once the extreme length of the yard and two-fifths.

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	Ft.	In.
For example :—The extreme length of the top-gallant yard is	43	0
And two-fifths would be	17	2
Length of rope required for the two ...	62	2

To prove it

Length for the eye, once the round of the yard	1	8
Once the round of the rope	0	$2\frac{1}{2}$
Allow for splicing it	0	7
Length of rope required for the eye ...	2	5
Allow for the lashing eye and splicing ..	1	0
Then from the yard-arm cleat to where the eye would be lashed on the opposite quarter of the yard, one-third out would be ...	26	0
Allow for the droop below the yard ...	0	8
Length required for one side	30	1
Multiply by two	0	2
Length of rope required for both sides ...	60	2

BRACE BLOCKS.

THESE blocks are strapped with a long eye, to go over the yard-arm.

Length to cut the strap: Take once the round of the yard, twice the round of the block, and once and a-half the round of the rope.

Length to marry the strap: Take once the round of the yard, once the round of the block, and once the round of the rope.

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ROYAL YARDS.

TAKE the same directions for the parrel, jack-stay, quarter strap, and foot ropes, as are given for the top-gallant yards.

RIGGING LOWER YARDS.

HAVING given directions for cutting out and fitting the rigging and blocks for all the yards, I will now state how it should be placed on the yards.

FIRST.—JEER BLOCKS.

THEY are placed on the top of the yard, the two eyes of the straps are lashed to the foreside of the yard, leaving sufficient room between the blocks for the slings; the size of the lashing should be half the circumference of the strap, and passed rose-seizing fashion.

SECOND.—TOP-SAIL SHEET BLOCKS.

THESE blocks are called quarter blocks; they are lashed close to the jeer blocks, and hang under the yard, the eyes lash on top. The size of the lashing should be half the circumference of the strap, and is passed rose-seizing fashion; there is a span put round the straps above the blocks to keep them in their place; the two eyes of the span are lashed together, and all parts frapped together with the same lashing.

THIRD.—TRUSS STRAPS, CHAIN.

THESE are four in number, two to shackle the standing parts to, and two for the hauling parts to reeve through; they are lashed on the same as rope straps, close to quarter blocks; let one thimble be above the other, and the shackle for the standing part the same way. See page 91.

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FOURTH.—CLEW-GARNET BLOCKS.

THESE blocks are lashed at twice the length of the block outside of the truss strap, the blocks underneath the yard inclining a little forward, to clear the topsail sheet; the size of the lashing should be one-third the circumference of the strap, and passed rose seizing fashion.

FIFTH.—YARD SLINGS CHAIN.

THERE are two parts; the length for each part is once the round of the yard, and one foot six inches, or two feet, according to the size of the yard; one end of each piece is welded through a ring, a long link at the other end, to receive the bolt of a shackle that connects the slip; reeve them round the centre of the yard; the ring comes up the aft side, the two ends come up the fore side and reeve through the ring; haul them well taut and seize them to the ring, keeping the ring well forward; put a bolt of a shackle through the two end links, and the slip goes through the shackle, the other end of the slip is shackled to the two ends of the mast-head slings.

JACK STAY EYE BOLTS.

THE eye bolts on all the yards should be served or hitched with a ropeyarn or fine spunyarn.

ROLLING TACKLE STRAP.

Is a grommet strap worked round the yard at two-thirds out from the slings to the quarter iron; a thimble is seized in it on top of the yard abaft the jack stay. See page 92, and allow half the round of the rope more than is there stated, to marry at.

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TO RIG THE YARD ARMS.

FIRST.—FOOT ROPES.

PUT the eyes over the yard-arms, beat them close to shoulder, put the eyes of the stirrups over the eye bolts, lash the two thimbles that are in the ends of the foot ropes, and trice them up to the slings of the yard.

Length of the foot rope from the fork of the eye to the thimble should be one foot less than the yard is from the centre to the shoulder of the yard-arm.

SECOND.—HEAD EAR-RING STRAP.

MAKE a grommet strap round the yard-arm, seize a thimble in it, and beat it close home to the foot rope.

THIRD.—JACK STAY.

REEVE the end through the eye bolts, beat the eye close home to the head ear-ring strap, splice a thimble in each end, allowing two feet six inches drift for setting up with a lanyard; the size of the lanyard should be half the circumference of the jack stay.

FOURTH.—YARD TACKLE PENDANT.

IN large ships they are fitted to remain on the yards, viz :—

Put the eye over the yard-arm, and beat it close home to the jack stay.

In small ships they are fitted with a hook and thimble, and are put on and taken off as required.

FIFTH.—BRACE BLOCKS.

PUT the strap over the yard-arm, with the head of the pin of the block upwards, and beat it close to the yard tackle pendants.

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SIXTH.—LIFT BLOCKS.

PUT the strap over the yard, and beat it close to the brace block.

LEACH LINE BLOCKS.

THERE are two on each side of the yard, the outer one is seized on the jack stay, five or six feet inside of the quarter iron; the inner one five or six feet outside the clew-garnet block.

SLABLINE BLOCKS.

Two on each side, fitted with tails; they are hitched to the jack stay at the same place as the leach line blocks. These blocks hang down before the yard abaft the sails. There are two double blocks fitted with tails made fast to the jeer block strap; they hang down before the yard to lead the slablines on deck.

BUNT SLABLINES.

A SINGLE block fitted with a tail, made fast to the slings of the yard, and hangs down before the yard abaft the sail.

Lay the yard tackle pendants straight along the yard, and stop it to the jack stay.

TO RIG A MAIN YARD.

FIRST, lash jeer blocks, leaving sufficient room between the blocks for the yard slings; 2nd, quarter blocks close to the jeer blocks; 3rd, lash truss straps close to quarter blocks; 4th, clewgarnet blocks are lashed on twice the length of the block outside of the

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truss straps; 5th, place the yard slings between the jeer blocks. Serve the eye bolts on the yard and put the rolling tackle strap on.

YARD-ARMS.

FIRST, put the foot ropes on, put the eyes of the stirrups over the jack stay eye bolts, lash the thimbles, and trice them up to the slings; 2nd, head earring strap; 3rd, jack stay, reeve it through the eye bolts, splice the thimbles in and set it up; 4th, the yard tackle pendant; 5th, preventor brace block; 6th, the after brace block; 7th, put on the lift block.

Seize the leechline and slabline blocks on the same way as the fore.

TO RIG A CROSS JACK YARD.

FOR the slings, there is an iron band round the centre of the yard, with an eye to it, and a shackle to it to receive the slip that is shackled to the mast-head slings.

1st, lash the topsail sheet blocks; 2nd, lash the truss straps on each side.

Cross jack yards are now allowed jack stays in Portsmouth Dockyard, and are necessary for a man to hold on by in going out to the yard-arm.

YARD-ARMS.

FIRST, put the eye of the foot over the yard-arm, splice a thimble in the other end; the length of the foot rope from the eye to the thimble should be one foot less than the yard is from the centre to the shoulder of the yard-arm; lash the thimbles together and trice it up to the slings of the yard; put the eyes of the stirrups over the jack stay eye bolts; if there should be no jack stay, the ends of the stirrup are plaited, and nailed round the yard.

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2nd, put the eye of the jackstay over the yard-arm, reeve the end through the eye bolt, and splice a thimble in it; splice a lanyard in, and set it well up.

3rd, put on the brace block; 4th, put on the lifts, which are single.

RIGGING TOPSAIL YARDS.

FIRST, the topsail tye block; this is an iron bound block with swivel and lugs, which is bolted to an eye in an iron band round the yard: 2nd, lash the parrel; the long leg is passed round the yard, and is lashed to the short leg abaft the yard; 3rd, the quarter blocks; these are double blocks for the topsail clewlines and top-gallant sheet to lead through—they are lashed outside the parrel.

A mizen topsail yard has only one tye block on the yard.

The rolling tackle strap is a grommet strap made round the yard, with a thimble seized in it, half way out from the centre of the yard to the shoulder or cleat.

Serve the jack stay eye bolts with a ropeyarn.

YARD-ARMS.

FIRST, foot ropes. Put the eyes over the yard-arms, beat them close to the shoulder, splice an eye in the other end, and seize it to the opposite quarter of the yard, a foot less than one-third from the centre to the yard-arm, cleat or shoulder; put the eyes of the stirrups over the jack stay eye bolts.

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Some officers prefer carrying the foot rope out to the goose neck; to do so, it requires an additional stirrup round the shoulder of the yard. Refer to page 103.

2nd, head ear-ring strap.

3rd, jack stay. Reeve the end through the eye bolts on top of the yard, and beat the eye close home to the head ear-ring strap, splice a thimble in each end allowing two feet drift for setting up with a lanyard, splice the lanyard in, and set it well up.

4th, brace blocks. Put the strap over the yard-arm and beat it close to the brace block.

A mizen topsail yard has single lifts, the same as a small ship's fore and main topsail lifts.

6th, Flemish horses. Put the thimble over the goose neck at the yard-arm, an eye spliced in the other end to seize on the yard inside of the shoulder, at once-and-a-half the length of the yard-arm from the shoulder.

RIGGING TOP-GALLANT YARDS.

FIRST, the slings, put a strap on the centre of the yard, with a thimble seized in it; 2nd, the parrel, put the long strap on one side of the slings, the short strap on the other side; 3rd, quarter blocks, these are double blocks for the top-gallant clewline and royal sheets to lead through; they are lashed outside of the parrel; 4th, a grommet strap placed one-third out from the centre, with a thimble seized in it.

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YARD-ARMS.

First, the foot ropes, put the eye over the yard-arm, beat it close to the shoulder, splice an eye in the other end, and seize them to the opposite quarter of the yard, one-third from the centre; 2nd, the jack stay, put the eye over the yard-arm, splice a thimble in the other end, and set it up at the centre of the yard with a lanyard; nail the jack stay to the yard with strips of hide.

Make a grommet to fit slack on the yard-arm, for the yard rope to reeve through.

ROYAL YARDS.

These yards are rigged the same as a top-gallant yard.

FORE AND MAIN RUNNERS.

For the length: Take twice the length of mast from deck to upper part of trestle trees, for one runner. A long eye is spliced in one end to seize the double block in, the same as the topsail halliard block.

FORE AND MAIN STAY TACKLE PENDANTS

For the length: Take three-fourths the length of mast from deck to lower side of trestle-trees, a hook and thimble are spliced in one end; the other end is spliced in the eye of the strap of the double block; the strands of the splice are put in once and a-half, and served over.

SPAN BETWEEN THE FORE AND MAIN STAY TACKLE PENDANTS.

For the length when fitted, you must be guided by the longest boom boat; an eye spliced in one end to go

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over the strap of the double block of the fore stay tackle, and stopped round the neck close to the seizing, and a hook and thimble spliced in the other end, to hook to a thimble that is strapped round the neck of the double block of the main stay tackle.

FORE STAY TACKLE STRAP.

INSTEAD of having a rope strap fitted with a thimble and lashing eyes to lash round the foremast, have a chain necklace fitted to the foremast head under the bolster, with two legs to hang down abaft the mast, to hook the fore stay tackle pendant to. All who have seen these necklaces consider them far better than rope straps.

FORE STAY TACKLE PENDANTS FOR SCREW SHIPS.

THESE are fitted as a span; the pendant is rove through the strap of the block, and seized in the cross before the hooks are spliced in; there is a hook spliced in each end, one end hooks to the leg of the necklace at the foremast head, the other to the spare links of the mast-head slings, at the mainmast head.

For the length: Measure with a small line, make one end fast to the necklace abaft the foremast, the other end to the spare link of the mast-head slings, at the mainmast, allowing the block to hang down abaft the funnel, and is a parallel line with the main stay tackle block.

FORE AND MAIN STAY TACKLE FALLS.

FOR the length: Take four times the length of mast, from deck to cap.

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RUNNER TACKLE FALLS.

DIRECTIONS for the length of the falls: Take four times the length of mast from deck to the cap, and five fathoms.

FORE AND MAIN TACKLE FALLS.

FOR the length: Take four times and a-half the length of mast, from deck to cap.

TO CUT AND FIT BOBSTAYS.—HEMP OR WIRE.

DIRECTIONS for the length to cut them: Take twice the length from the hole in the cutwater, or stem, to the bowsprit, where their respective collars should be lashed on the bowsprit. Set them up, and stretch them six inches to the fathom. Worm, parcel, and serve them the length required.

Commence putting the parcelling on from the centre, and parcel towards the ends; in putting it on that way, it will prevent the wet from penetrating between the edges, as one edge overlays the other.

Tar the parcelling, and serve it over with spunyarn.

If chain bobstays, one end is fitted with a slip to connect to the shackle in the stem, and a thimble in the other end, or an iron-bound heart to set up to a shackle at the bowsprit with a lanyard.

Instead of leathering bobstays, put on sennit made of three parts of three or four-yarn spunyarn, plaited up. It is hove on over the service with a serving mallet, the same as in serving with spunyarn.

The length to be sennited would be one-sixth the length of the bobstay.

If wire bobstays, allow two feet more to each bobstay than is stated from the hempen bobstays.

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BOWSPRIT SHROUDS.—WIRE.

DIRECTIONS to measure for the length: Make a piece of spunyarn fast to the eye bolt at the bows, haul it taut to the heart or thimble of the collar, cut the spunyarn at the collar and at the bolt. Then allow four feet more for splicing the heart and the slip in; and, when fitted, there should be about fifteen inches drift for setting up with a lanyard.

To fit them: Splice a slip in one end, and the heart in the other; the strands of the splice should be put in once whole strand, once two thirds and once one-third. Put a stop round each tuck, to prevent the yarns from starting back in breaking them off; set it up and stretch the splice, break the strands off, take the stop off the tucks, worm, parcel, tar, and serve it all over with spunyarn.

If chain shrouds, deduct one foot six inches from it for setting up with a lanyard; if hempen shrouds, allow three feet drift for setting up. If chain, there is a heart, iron bound, or a thimble link at one end, to set up the collar with a lanyard, and a slip at the other end, to connect to the eye bolt at the bows.

All chain is neat, and answers well for the above purpose; but there should always be a slip at the end that comes to the bow or stem, in case of carrying away a spar.

RUNNING-IN BOWSPRITS.

SHIPS intended to be used as rams are fitted with running-in bowsprits which are wood, and four-sided; the heel is kept in place between bitts on the fore-castle and with a slip fid, chocks are bolted to the knightsheads, and the bowsprit runs out between them over a roller let into the stem head, and is kept

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down by an iron band which goes over it, screwing down to the chock.

The bowsprit cap in iron with bolts for the whiskers and dolphin striker on it, also two matches or iron-bound sheaves for the topmast stays: inside the cap are iron-bound hearts for the bobstays to set up to; bowstay and bowsprit shrouds are chain, and the standing part secures to a slip to the bows, setting up to the bowsprit with a lanyard in large ships; in small vessels it is fitted with a screw, which can be tautened when required.

A Scale for Spritsail Guys, before the Bowsprit is Stepped.

Example:—

THE length of spars are as follows:—

Bowsprit from the knight head to the outer edge of the cap, 51-feet.

Length of jib-boom from hound to heel, 49-feet.

Length of spritsail gaffs from jaws to hounds, 24-feet 6-inches.

Length of the martingale from jaws to hounds, 20 feet.

The jib-boom is supposed to house one-third of its length from the outer edge of the cap.

The jaws of the spritsail gaff, when placed to the bowsprit, would be 10-feet from the outer edge of the cap, and 6-feet 4-inches from the heel of the jib-boom.

SPRITSAIL GUYS.

THE length of the fore guys, when fitted, from the crutch of one eye to the crutch of the other, will be one foot less than the length of the jib-boom is from hounds to heel.

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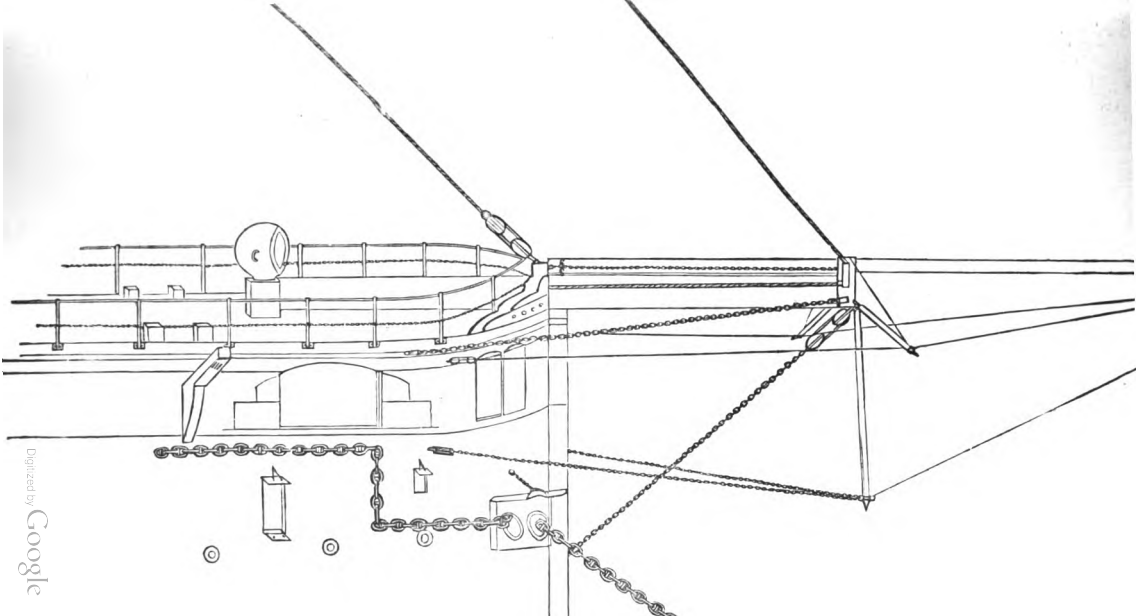

A RUNNING-IN BOWSPRIT.

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If wire guys, the length from eye to eye would be the length of jib-boom from hounds to heel.

EYE FOR JIB-BOOM.

PUT a good whipping or stop on the rope at twice and a-half the circumference of the rope, from the end.

Length for the eye: Take once the round of the jib-boom, and once the round of the rope from the whipping to the strand, where the marlinspike is first entered, put the strands in once whole strand, and once half-strand, then set it up and stretch the splices, marl the ends down and serve over it; serve eighteen inches from the crutch.

EYE FOR THE SPRITSAIL GAFF.

Take the same directions as for the other eye.

The guys should be made from well stretched rope; one-eigthth worn is best.

AFTER SPRITSAIL GUYS.

To measure for the guys before the bowsprit is stepped, you must make your drawings as follows, viz: First ascertain what distance the cat head is abaft the knight head. (Suppose the cat head was 6ft. 6in. abaft the knight head.)

In making your drawings, allow the gaff to incline a little forward, then measure from the hounds of the spritsail gaff to the cat head; add to that length sufficient to make the eye, which would be once the round of the gaff, once the round of the rope, and sufficient end to splice it; then what it will take to turn or splice the thimble in the other end, will give the drift for setting up with a lanyard to the cat head. If wire, allow 3ft. more.

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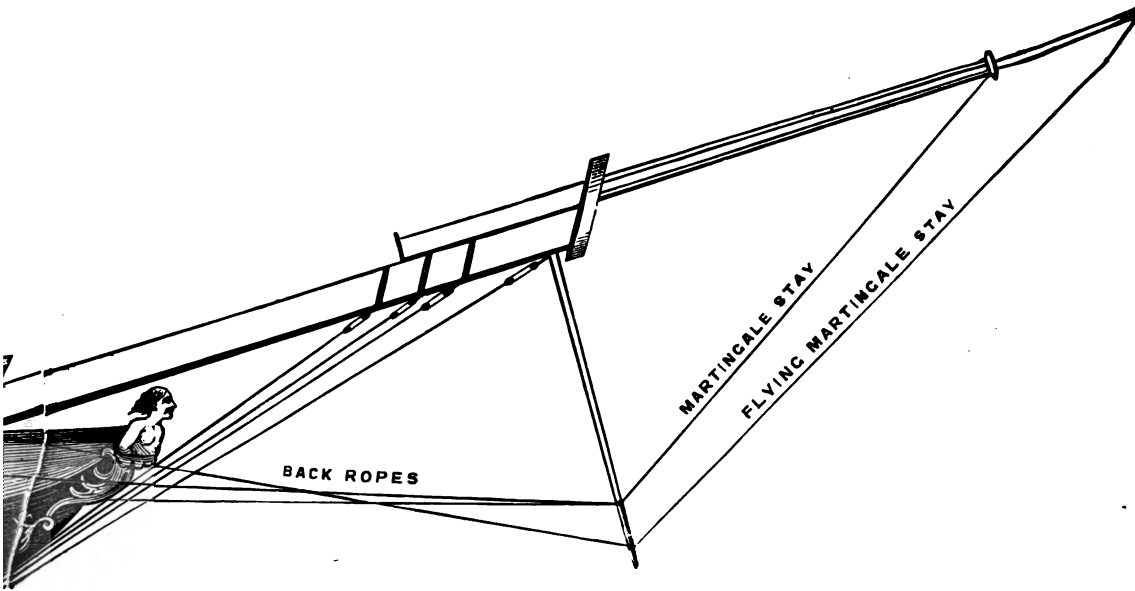
MARTINGALE STAY
FLYING MARTINGALE STAY
BACK ROPES

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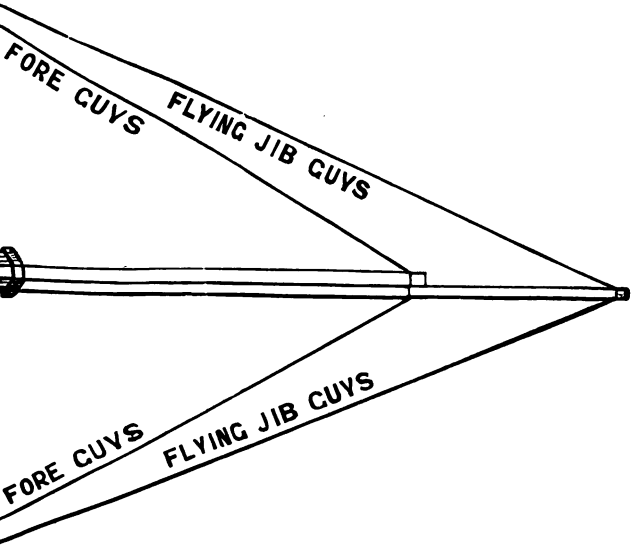

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After the bowsprit is stepped, to measure for the after guys, take a line athwart the deck from one cat head to the other, haul it well taut, then measure from that line to where the jaws of the spritsail gaff should be on the bowsprit; that will be the length of the guy from the eye to the thimble.

MARTINGALE GUYS, OR JUMPERS.

For the length: Measure from the spritsail gaff to the iron-bound clump block in the stem; and from the clump block to the knight head; that will be the length. Splice an eye in one end to go over the spritsail gaff, the other end reeves through the block; a thimble is turned in, and it sets up to the knight head with a lanyard.

Frequently the after guy and jumper is one piece of rope with a horse-shoe spliced in it.

MARTINGALE STAY.

To measure for the martingale stay before the bowsprit is stepped: Draw the bowsprit and jib-boom the length and steep required.

The length of the martingale stay, from the fork of one eye to the fork of the other, would be seven-eighths the length of the jib-boom from hound to heel.

If it is a wire stay, allow it to be six inches longer from eye to eye.

Then from the hounds of the jib-boom to the hounds of the martingale, allowing it to incline forward, that will be the length from the fork of one eye to the fork of the other. Splice an eye in each end, one to go over the jib-boom, the other over the martingale. Set it up, stretch the splice, and worm it from end to end with 1¼-in. rope; marl the ends of the splice down, and serve over it; the length of service is 1-ft. 6-in.

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For the length of each worming for this or any other rope, would be once and a half the length of rope required to be wormed, for each worming.

If it is a wire stay, it would be wormed, parcelled, tarred, and served from end to end, and the eyes served before being spliced.

BACK ROPES, OR MARTINGALE GUYS.

For the length: Measure from the hounds of the martingale to an eye bolt in the cat head. Cut the two in one, splice a short piece of rope in the centre to form the eye to go over the martingale; or some have a thimble seized in the bight, and it is then shackled to a band round the martingale. A thimble or a block is spliced in each end, to set up to the cat head with a lanyard.

JIB-BOOM FOOT ROPES.

For the length, take once and a-half the length of the jib-boom, from hounds to heel; splice a short piece of rope in the centre, to form an eye to go over the jib-boom; put the strands of the splice in once whole strand and once half strand, marl the ends down, and serve over it. An eye is spliced in the other end, to set up to an eye bolt in the cap.

Make a Turk's head at every three feet, to prevent the men's feet from slipping.

FLYING JIB GUYS.

For length of the flying jib guys, see drawings; measure from the flying jib-boom end to the end of the spritsail gaff, and from the gaff to the cat head, where it will set up to.

Splice a short piece of rope in the centre to form an eye to go over the flying jib-boom end; after it is rove through the spritsail gaff, splice a thimble in each end to set up to the cat head with a lanyard.

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FLYING MARTINGALE STAY.

For the length, measure from the flying jib-boom end to the sheave in the martingale, and from ditto to the knight head.

Splice an eye in one end to go over the flying jib-boom end, and after the end is rove through the sheave hole in the martingale, a clump block is turned in the end to set it up to the knight head.

FLYING JIB STAY.

For the length, measure from the top-gallant mast-head to the flying jib-boom end, and from ditto to sheave hole in the martingale. and from the martingale to the knight head.

Splice an eye in one end to go over the top-gallant funnel, turn a double block in the other end to set up to the knight head after it is rove through the martingale.

FLYING JIB-BOOM FOOT ROPES.

For the length, take once the extreme length of the flying jib-boom for both foot ropes.

Splice a short piece of rope in the centre to form an eye to go over the flying jib-boom end.

Splice an eye in each end to seize to the jib-boom foot ropes, and make six over-hand knots in each foot rope, to prevent the men's feet from slipping.

Directions for Cutting Out Lower Rigging before the Mast is Stepped.

First ascertain if the channels are above, flush with or below the upper deck; all this must be ascertained before you make your drawings; you must add or

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diminish to the length of mast in the drawing, whichever it may be; also add the thickness of the channels to the length of the mast.

FOR THE DRAWINGS.

MEASURE the length of the mast from the upper deck to the lower side of the trestle-trees, then add the depth of the trestle-trees and bolster, and the thickness of the channels to it.

Draw a perpendicular line at that length for the mast, then draw a horizontal line from the mast for the half-breadth of beam.

To measure for the breadth of beam, measure from the centre part of mast-hole to the outer edge of channels, abreast of the foremast dead eye; then draw a line from the top of the perpendicular line to the end of the horizontal line, that will be the same as if it were from the upper part of the bolster to the lower edge af the channels, abreast of the foremast dead eye, that will give you the length of the first pair of shrouds; and by adding twice the circumference of the rope to each following pair of shrouds, will give you the required length of the whole number of pairs—likewise the quantity of rope you require.

Having stated the information that is required for measuring and cutting out standing rigging, the reader is referred to the illustration of the fore shrouds. 11-in. rope.

A SCALE FOR CUTTING FORE SHROUDS, 11-in. ROPE.

For example:—

	Fthm.	Ft.	In.
Length of fore mast from upper deck to lower side of trestle-trees	9	1	0
Depth of trestle-trees and bolster ...	0	2	8

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	Fthm.	Ft.	In.
Channels below deck...	0	0	8
Depths of channels	0	0	6
	9	4	10

Draw a perpendicular line from the mast, 58ft. 10-in. and a horizontal line 24-ft. for the half breadth of beam, that would be from the centre of the mast hole to the outer edge of the channels, abreast of the forward dead eye in the channels. The breadth of beam gave 4-ft. 4in. for taking the shroud out of channels. Distance from the upper part to bolster to the lower edge of channel would be ... 10 3 3
Place the warping pins 10-fms. 3-ft. 3-in. apart
Multiply it by two for No. 1 pair of shrouds 0 0 2

Length of No. 1 pair of shrouds ..			21	0	6
Ditto " 2 ditto			21	2	6
Ditto " 3 ditto			21	4	6
Ditto " 4 ditto			22	0	6
Ditto " 5 ditto			22	2	6
Ditto " 6 ditto			23	0	6
Ditto " 7 ditto			23	0	6
Ditto " 8 ditto			23	2	6
No. 9 is fitted as two single shrouds ...			23	4	6
Allow for half the eyes and splicing ...			3	0	0
Length of rope required			204	4	6

To measure for the rigging after the mast is stepped with an angle line. An angle line is twenty-three fathoms of quarter-inch rope, well stretched, with an over hand knot 2-ft. from the end.

Send a man to the mast head by the starboard girt line, in a bowline knot, only sufficiently large enough for the man to sit in; for if the bowline knot is too

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long, the man is liable to fall out: I have seen that accident happen more than once.

	Fthm.	Ft.	In.
Put the knot of the angle line close to the centre of the mast, the starboard side, above the bolster, haul it taut down to the outer lower edge of the starboard channels, abreast of the fore mast dead eye, there mark the line with a yarn put through the strand, measure the line, and it will prove to be	10	3	2
If the rigging is to be fitted on board the ship, allow one-fourth the round of the mast head in addition to the angle, which will be	0	2	4
	10	5	7

The simplest method to measure for rigging when cut out and fitted on board of a ship, is as follows, viz :—

Put the knot of the angle line to the centre of the mast, the port side, above the bolster, and haul it taut down to the upper part of the foremast dead eye in the starboard channels, then twice that length will give you the length of No. 1 pair of shrouds; then add twice the round of the rope for each following pair. That will allow for the rise at masthead, for the spread in the channels, and for going aft.

WARPING THE RIGGING ROUND THE PINS.

MAKE one end of the hawser fast to the lower pin with a piece of spun-yarn, haul it taut, and take the bight round the upper pin, and haul it taut below the lower pin. Let the men be some distance from the pins when they haul it taut; station three men at each

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pin, to stand on the hawser to keep it down on the floor, close to the other part, and from rendering back; it is passed round the pins. Every shroud follows its own part round the pins, flat on the floor; this allows for the rise at the masthead and the spread in the channels.

There are eight pairs of shrouds, and two single ones; they are called swifters.

When the ninth part is warped round the pins, make a chalk mark on the hawser, at the centre of the lower pin, haul the hawser straight, and measure three fathoms from the chalk mark, and then cut it; that will allow sufficient rope, with what it will stretch, for the two eyes; put the of end it abreast the centre of the lower pin, round back on the bight, and centre it above the upper pin; put a spunyarn stop on the centre of the bight, that is where it would be cut after it is served for the two eyes.

Dimensions for the length of service for the eye part is, one-third the length of the mast from deck to lower side of trestle-trees which will be 18-ft.

Draw a chalk line straight athwart the shrouds, 18 ft. from the upper pin, except the foremost leg of No's. 1 and 2 pairs, which are served all the way down.

When the shrouds are cut, put two or three turns of yarn round the rope where it is chalked.

Draw a chalk line at the centre of the shrouds, at the back of the upper pin, that is where they would be marked according to their respective numbers; chalk the shrouds at the lower pin the same way, that is where they should be cut

Cut the bights at the lower pin; put the axe under neath the rope, and beat it down with a commander that cuts it off clean: whip all the ends.

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TO MARK THE SHROUDS.

MARK all the rest of the shrouds with two-yarn spun yarn, take a clove hitch round the chalk mark at the centre of the shroud, and lay the two ends up, make as many knots as the shrouds are in number, the first knot to be eight inches from the shroud, viz, : For the 8th pair, 8 knots; for the 7th pair, 7 knots; for the 6th pair, 6 knots; for the 5th pair, 5 knots; for the 4th pair, 4 knots; for the 3rd pair, 3 knots; for the 2nd pair, 2 knots; and for the 1st pair, 1 knot.

The ninth pair with be for two single shrouds; instead of making nine knots, put two turns of spun-yard round the centre of the shroud, that is where it will be cut, after it is served for the eyes.

FITTING THE SHROUDS.

MAKE a bend at each end of the shroud, the same as for a clinch at the end of a rope, put a chalk mark at 4ft. from the end, and another mark 1ft. 4in. from the end. In forming the bend, these two marks are brought abreast of each other and seized, with fourteen-yarn spunyarn, over the chalk marks.

Toggle one end to a strap that is round a post, the other end toggles through a strap of a four-fold block, and the fall brought to the windlass.

When the shroud is straight along the floor, chalk a mark on the floor opposite the back of the bend, and then it will be seen what the shroud has stretched, without measuring it, and when it is stretched six inches to the fathom, put a chalk mark on the floor opposite the back of the bend.

The first shroud to be hove out is No. 1, and every shroud heaves out twice the circumference of the rope longer than each other. Set them up by their following numbers, and mark the floor for every pair.

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Worm No. 1 and 2 pair from the quarter mark on the after legs to the end of the fore mast legs, with fourteen-yarn spunyarn, and back it with four yarn spunyarn, that will fill up the lays of the rope.

Parcel the shrouds with strips of canvas from the end towards the centre of the eye, and from the quarter mark towards the eye.

Why should it be parcelled towards the eye?

Because if it were parcelled from the eye towards the end, the wet might penetrate between the edges of the parcelling and have no way to escape; but if parcelled up, the wet cannot penetrate, as one part overlays the edge of the other.

Put the parcelling on with the lay of the rope, and near the centre of the eye put it on thicker, or else in bending up the shroud to form the eye, the service and parcelling will open, which will allow the wet to get in.

Give it a good coat of tar.

Serve the shrouds with six-yarn spunyarn put it on against the lay of the rope.

The foremast legs of Nos. 1 and 2 are served all the way down; all the other shrouds are wormed, parcelled, and served from quarter mark to quarter mark.

The ninth pair is for two single shrouds; set it up and stretch it, and at twice and a-half the circumference of the rope from the centre mark, worm, parcel and serve it once the circumference of mast-head and one-sixth, for the eyes, each side of the centre mark; then let it down and splice the eyes, and put the strands in once and a-half.

After being spliced, lash the two eyes together, the bends being left in the ends; toggle them as before, set them up, marl the ends of the strands down, and serve over the splice.

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FORMING THE EYES IN SHROUDS.

To form the eyes in shrouds, take one end of the shroud to the other, allow one end to be a little longer than the other for the after leg, according to the range of the dead eyes in the channels; break down the bight, pass three turns of a small rope round the two parts of the shroud, four feet from the back of the eye; set two men on the floor, each side, with their feet against the shroud, and haul on the two ends of the rope; haul both sides equal, and keep the shroud square till the two parts meet.

Put a spunyarn stop on, to keep the two parts close while you prepare the seizing.

SEIZING THE EYE IN FORE SHROUDS.

PUT a piece of tarred canvas round the two parts of the shroud, under the seizing; length of seizing, 5-fthm. 1-ft. of $1\frac{3}{4}$-in. rope. Splice an eye in one end, put the strands in once, and do not cut them off; well stretch it, pass the eye round the shroud, and reeve the end through it; wind seven turns round the shroud, and reeve the ends underneath the parts and through its own eye, leaving sufficient bight to heave on; place it square round the shroud; two strands of the splice are laid down the shroud, the turns of seizing to lay over it. Make a yarn fast to the third strand, and pass it round the shroud, above the seizing, to keep the eye in its place, or when you heave the first turn, it will render too far round. Heave the seizing on with a mallet, after the seven turns are hove taut on.

Take the yarn off the third strand, and lay the strand on the top of the lower turns, and pass six riding turns

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over it; put the end between the sixth and seventh turns of the lower parts.

Put a stop of spunyarn round the shroud, four inches above the seizing, and one four inches below, and drive the marlinspike down between the two parts of the shroud, close to the upper part of the seizing; relieve the spike by driving a wedge between it and the spike, and the spike will become loose; take it out, drive it in below the seizing, and relieve it with another wedge; pass one crossing turn and heave it taut, pass the second turn, let the end come up underneath its own part, and heave it well taut, take half hitch round the shroud and heave it taut, unlay the end and make a crown knot, cut the ends off and tar the seizing.

A SCALE FOR TURNING DEAD EYES, LOWER RIGGING.

For example :—

	Fthm.	Ft.	In.
Take the length of fore mast from the upper deck to the upper part of bolster, that will be	9	3	8
The channels were 8-in. below deck ...	0	0	8
Draw a perpendicular line at that length for the mast	9	4	4
Draw a horizontal line to the right of it, 23-ft. for the half breadth of beam, that would be from the centre of the mast hole to the outer edge of channels, abreast of the forward dead eye; the breadth of beam gives	0	3	8
Length of foremast shroud, from bolster to channels	10	2	0

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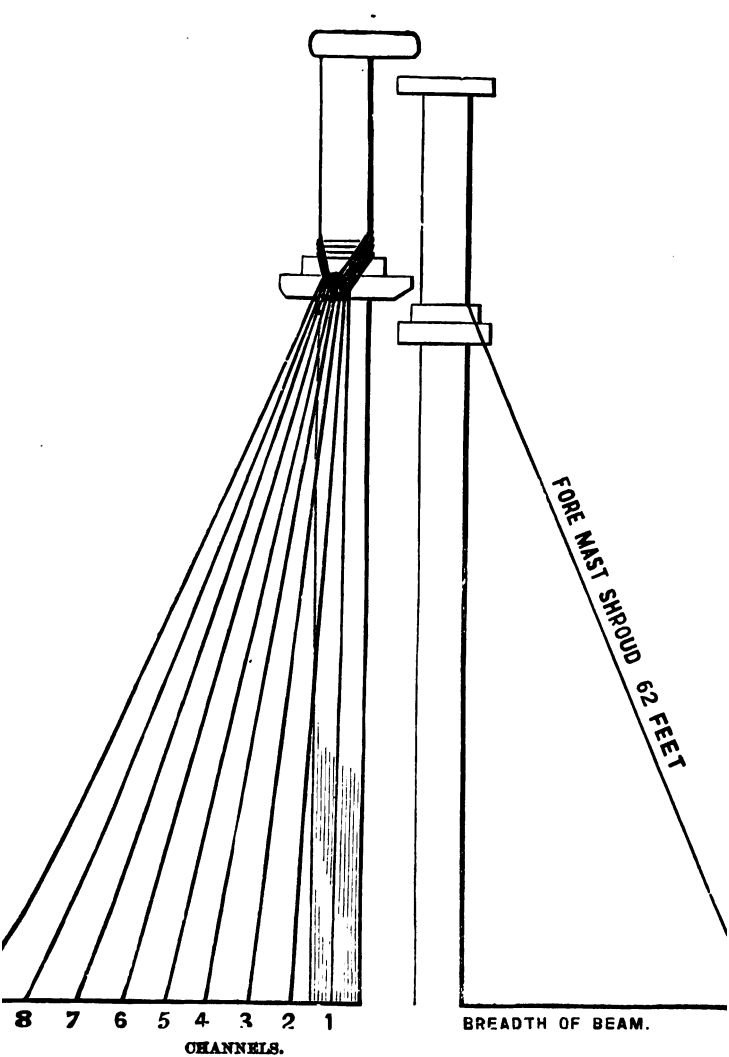

The drawings here laid down show the length of the shro
from upper part of bolster to the channels.

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Draw another mast, 10-fthm. 2-ft., with three-eighths of an inch rake to every six feet in length, that would be the length of the foremast shroud from bolster to channel; then draw a horizontal line to the left of it for the length of channels; measure what distance the dead eyes are apart in the channels, and mark the same distance in the drawings. There are eleven dead eyes in the channels, therefore two are left as spare dead eyes.

Draw every shroud separate from the upper part of bolster to channels, abreast of their respective dead eyes.

When the first pair of shrouds are over the mast-head, the seizing of the eye would be one foot three inches from the mast.

Allow once the diameter of the shroud to every following pair for the rise at mast-head.

The drift between dead eye in shroud and dead eye in channels, for wire shrouds, would be 2-ft.; for hemp shrouds should be 5-ft., if new rope; if hemp, after the shrouds have been set up two or three times, there would be about 3-ft. drift between the dead eyes.

The standing part of the shroud takes up in going half round the dead eye, once the circumference of the shroud. Length of shroud it will take from the lower part of the dead eye to the nip, dead eye 17 inches in diameter, it will take half the circumference of the dead eye and once the circumference of the rope.

It will be found by measuring 7-ft. perpendicular up the foremost shroud, and by drawing a line straight athwart all the shrouds at 7-ft. perpendicular from the channels, that the after shroud will measure 7-ft. 10-in. up the shroud from channels, and the same in proportion to every shroud for going aft, which is shown in the table, or you can ascertain it by the drawings.

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Table for turning in dead eyes in fore shrouds, showing the number, and also the number of dead eyes in the channels, and the distance of one dead eye from the other.

	No. 1	No. 2	No. 3	No. 4	No. 5	No. 6	No. 7	No. 8 Spare.	No. 9	No. 10 Spare.	No. 11
	fm ft. in.	fm ft. in.	fm ft. in.	fm ft. in.	fm ft. in.	fm ft. in.	fm ft. in.	fm ft. in.	fm ft. in.	fm ft. in.	fm ft. in.
Distance of one dead eye from the other		0 3 0	0 5 6	0 2 3	0 2 3	0 2 2	0 4 4	,,	0 2 1	,,	0 4 9
From under part of bolster to channels	10 2 0	10 2 0	10 2 4	10 2 8	10 3 1	10 3 4	10 4 6	,,	10 5 10	,,	11 2 4
Distance of seizing of eye from mast ..	0 1 3	0 1 3	0 1 3	0 1 3	0 1 3	0 1 3	0 1 3	,,	0 1 3	,,	0 1 3
	10 0 9	10 0 9	10 1 1	10 1 5	10 1 10	10 2 1	10 3 3	,,	10 4 7	,,	11 1 1
Add what the channel lowers going aft ..			0 0 1	0 0 2	0 0 2	0 0 3	0 0 4	,,	0 0 6	,,	0 0 7
	10 0 9	10 0 9	10 1 2	10 1 7	10 2 0	10 2 4	10 3 7	,,	10 5 1	,,	11 1 8
Deduct drift for setting the shrouds up..	1 1 0	1 1 0	1 1 0	1 1 0	1 1 0	1 1 0	1 1 0	,,	1 1 0	,,	1 1 0
	8 5 9	8 5 9	9 0 2	9 0 7	9 1 0	9 1 4	9 2 7	,,	9 4 1	,,	10 0 8
Deduct on the after shrouds for the sheer			0 0 1	0 0 3	0 0 4	0 0 4	0 0 6	,,	0 0 8	,,	0 0 10
	8 5 9	8 5 9	9 0 1	9 0 4	9 0 8	9 1 0	9 2 1	,,	9 3 5	,,	9 5 10
Standing part takes up going half round the dead eye, add ..	0 0 11	0 0 11	0 0 11	0 0 11	0 0 11	0 0 11	0 0 11	,,	0 0 11	,,	0 0 11
Length from dead eye to the nip, add ..	0 3 0	0 3 0	0 3 0	0 3 0	0 3 0	0 3 0	0 3 0	,,	0 3 0	,,	0 3 0
What one shroud rises above the other at the masthead, add			0 0 6	0 0 6	0 1 0	0 1 0	0 1 6	,,	0 1 6	,,	0 2 0
The foremast shroud being served all the way down, will not stretch the same as the other shrouds, therefore allow 6-in. more than other shrouds	0 0 6										
Length of starboard shrouds from seizing to nip	9 4 2	9 3 8	9 4 6	9 4 9	9 5 7	9 5 11	10 1 6	,,	10 2 10	,,	10 5 9
What each port shroud rises above the starboard	0 0 3	0 0 3	0 0 3	0 0 3	0 0 3	0 0 3	0 0 3	,,	0 0 3	,,	0 0 3
Length of port shroud from seizing to nip	9 4 5	9 3 11	9 4 9	9 5 0	9 5 10	10 0 2	10 1 9	,,	10 3 1	,,	11 0 0

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SEIZING THE SHROUDS FOR THE DEAD EYES.

PASS the end of the shroud underneath the up and down part.

The ends of the shrouds will be inside and aft, both sides of the ship.

Nip the two parts together, where the end is crossed with a strand and a bolt, so that the mark will be at the centre of the nip.

Bring the end round to its own part, and pass a strand round the two parts, put a bolt close to the up and down part, pass the end of the strand round the end of the bolts, and heave the two parts together, the same as for the strap of a block; when the two parts are close, put a spunyarn stop on to keep the two parts together, and it also keeps the seizing from slipping down while heaving it on. The size and length of the seizing is 2-in., length 5-fthm. 3-ft.

This seizing is called a throat seizing. The first turn is put on close to the stop, and the turns passed up towards the standing part of the shroud; it is hove on and secured the same as the seizing of the eye, seven and six turns, and the end is left to pass round the shroud.

QUARTER SEIZING.

THIS is a flat seizing, for there are no riding turns; size and length, $1\frac{1}{2}$-in. $3\frac{1}{2}$-fthm.

This seizing should be four inches below the throat seizing.

The shroud being seized, place the dead eye in and beat the eye down the shroud till it is close round the dead eye.

Directions for the size of dead eyes that are required for different size shrouds.

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The diameter of the dead eye should be once and a-half the circumference of the rope.

SHROUD LANYARDS.

THE lanyards should be half the circumference of the shrouds, if hemp; if wire the same size as shrouds; the standing part spliced into an eye bolt in the chains, the afterside of dead eye, reeve the other end through the after-hole in dead eyes, from in out, and when rove full, the hauling part will be found under the standing part of the shroud, for there it is that the first and greatest strain comes when setting up, which if the lanyard were rove any other way would be brought on the seizing, and would cause the dead eye to slew. By bringing the standing part to the chains, the purchase is increased and the tendency to capsize, which dead eyes in new rigging are liable to, is prevented. The old system was to make a Matthew's knot in the lanyard, and rove through the hole on which the end part of the shroud was rove, from in out.

TO CUT OUT FORE STAYS, 14-in. ROPE.

For example:—

Directions for the length: Measure from the after-part of mast-head to the bow-sprit where the collar would be lashed on, and the length of mast-head for the half collar; or, once the round of the mast-head and four-fifths, and twice and a half the circumference of the rope for splicing the half collar.

If fitted in the rigging house, it would be stretched six inches to the fathom, and would be sufficient to make the two flemish eyes; if fitted on board, you may allow half what it would take to make the eyes.

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TO FIT THE FORE STAY.

If the stay and collar are in one piece of rope, make a flemish eye in each end, as in page 16. Rope maker's eyes are made in the stays, before being laid up, which is the better way.

TO SET THE STAY UP AND SERVE IT.

Put the two bights of a pair of slings over the toggle at each end, one toggle to a strap round a port, the other to a strap of a purchase block.

TO STRETCH THE FORE STAY AND SERVE IT.

Bring the fall to the windlass, and heave the stay out six inches to the fathom.

Worm 19ft. at each end, from the back of the eye, with fourteen-yarn spunyarn, and back it with six-yarn spunyarn. Parcel it with canvas and tar it, put the parcelling on towards the eye, and serve it with six-yard spunyarn.

Lower the stay down, cut 3fm. 3ft. 6in. off from one end to splice to the other end, to form the collar, Take the toggles out of the eyes, lay the half collar on the top of the other part, lash the two eyes together to keep them square, and put two stops on the other parts to keep them together.

TO SPLICE THE HALF COLLAR.

Put the strands of the splice in once and a-half. Put a toggle through both eyes, and make a bend at the end of the stay, and toggle it to the purchase ; stretch the splice, taper the strands and marl them down, worm, parcel and serve ten feet down the stay from the fork.

Lower the stay down and cavil up the crutch, finish the eyes by serving them with four-yarn spunyarn,

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round the eye twice; each turn is hove on with a mallet, leaving sufficient room between the turns on the outside, for one turn to go between each in going round the second time; the inside turns will ride a little when finished.

Fid the eyes out and stop them together.

WIRE STAY.

For wire stays, allow 6-ft. for the two half eyes and splicing, in addition to the measurement given for hemp.

To fit them: Serve a sufficient length for the eyes before splicing them; then splice the eyes, putting the strands in once whole strand, once two-thirds, and once one-third: serve sufficient for the half collar, and splice it; then serve ten feet down the stay from the fork.

TO TURN THE HEART IN THE FORE STAY, CUTTER STAY FASHION.

Length of rope it takes from the lower part of the heart to the nip, would be half the round of the heart, and once the round of the stay; the standing part would take up half the circumference of the stay.

The heart is turned in the same way as the dead eyes in the fore rigging.

The outer or starboard stay the same as the starboard shroud.

The port or inner stay the same as the port shroud.

The upper stay is two feet longer than the inner stay.

Seize the heart in with 2in. rope; length it will take for each stay, 6-fm. 4-ft. 6-in.

The seizing should be a racking seizing; and

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instead of riding turns, each turn is put between the racking turns, and the seizing is crossed in two places.

CUTTING OUT WIRE RIGGING.

In cutting out wire rigging, ascertain what distance the dead eyes in the channels are from each other, and whether the channels droop forward or aft.

For example :—

FORE CHANNELS.

The distance from the forward dead eye to the after one is 27-ft., and the after pair of shrouds, which is No. 7, was 12-ft. 6-in. longer than the forward pair, which is No. 1 : that is 5-ft. 9-in. on No. 7 leg, and 6-ft. 9-in. on No. 8 leg longer than the foremost pair, No's. 1 and 2 legs.

MAIN CHANNELS.

The distance from the forward dead eye to the after one is 18-ft., the after pair of shrouds was only 6-ft. 6-in. longer than the forward pair, No. 1 ; that was 2-ft. 5-in. on No. 7 leg, and 3-ft. 1 in. on No. 8 leg, longer than the forward pair No's 1 and 2 legs.

MIZEN CHANNELS.

The distance from the forward dead eye to the after one is 9-ft., ; the after shroud being a single one, it was only 9-in. longer than the forward leg of No. 1 pair.

N.B.—This is owing to the mizen mast having more rake than the other masts, and less spread with the dead eyes, and only five shrouds.

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FORE MAST.

	Fthm.	Ft.	In.
Length of mast from deck to lower side of trestletrees	8	3	0
Depth of trestletrees and bolster ...	0	2	0
Breadth of beam from the after centre part of mast hole to the outer edge of channels is 21-ft. 3-in., thus giving for carrying the shrouds out	0	4	0
For wire allow 2-ft. below channels ...	0	2	0
Allow for half the eye for wire rigging, which would be	0	4	6
From the opposite side of mast above the bolster, to 2-ft. below channels ...	10	3	6
Multiply it by			2
Extreme length of No. 1 pair of shrouds	21	1	0
" " 2 "	21	1	6
" " 3 "	21	2	6
" " 4 "	21	2	10
" " 5 "	22	1	1
" " 6 "	22	1	5
" " 7 "	23	1	8
" " 8 "	23	2	0
Length of wire required for fore shrouds, $4\frac{1}{4}$-in. wire, 16-in. dead eyes ...	176	2	0

FORE TOPMAST SHROUDS, $7\frac{1}{2}$-in. ROPE.

THE following table will show the length to cut the shrouds out.

For example :—

	Fthm.	Ft.	In.
Length of topmast from hounds to heel, which would be the length of the fore-mast shroud	9	0	3
Multiply by			2

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A TABLE FOR TURNING DEAD EYES IN FORE SHROUDS, WIRE ROPE.

Showing the No. and also the No. of dead eyes in channels, and the distance of one dead eye from the other.

	No. 1.	No. 2.	No. 3.	No. 4.	No. 5.	No. 6.	No. 7.	No. 8.
	ft, in.	ft. in.	ft. in.	ft. in.	ft. in.	ft in.	ft. in.	ft. in.
Distance of one dead eye from the other ..		2 8	2 5	2 4	2 8	11 6	2 9	2 8
From upper part of bolster to channels ..	57 0	57 0	57 2	57 6	57 10	60 9	61 9	62 9
Distance the seizing of eye would be from mast	1 0	1 0	1 0	1 0	1 0	1 0	1 0	1 0
From seizing of the eye to channels	56 0	56 0	56 2	56 6	56 10	59 9	60 9	61 9
Standing part of shroud taken up in going half round the dead eye	0 8	0 8	0 8	0 8	0 8	0 8	0 8	0 8
Drift for setting shrouds up from channels ..	56 8 4 0	56 8 4 0	56 10 4 0	57 2 4 0	57 6 4 0	60 5 4 0	61 5 4 0	62 5 4 0
From lower part of dead eye to nip	52 8	52 8	52 10	53 2	53 6	56 5	57 5	58 5
What one shroud rises above another ..	2 5	2 5	2 5 0 4	2 5 0 4	2 5 0 8	2 5 0 8	2 5 1 0	2 5 1 0
Length of starboard shroud from seizing of the eye to the nip	55 1	55 1	55 7	55 11	56 7	59 6	60 10	61 10
What the port shrouds rise above the starboard	0 2	0 2	0 2	0 2	0 2	0 2	0 2	0 2
Length of port shrouds from seizing of the eye to the nip	55 3	55 3	55 9	56 1	56 9	59 8	61 0	62 0

N.B.—There will be four feet end left from the nip, that should be stopped round the dead eye; allow 4-ft. 6-in. on each leg for the eye, which would be 9-ft. on each pair, and you will find that will correspond with the statement that is given on the other side.

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	Fthm.	Ft.	In.
The warping pins are placed at that distance from each other.			
Length of No. 1 pair of shrouds ...	18	0	6
" 2 "	18	1	9
" 3 "	18	3	0
" 4 "	18	4	3
" 5 for two single shrouds	18	5	6
Allow for half the eye and splicing	1	1	0
	93	4	0

WARPING THE SHROUDS.

THEY are warped round the pins the same as the fore shrouds.

	Fthm.	Ft.	In.
The length required for service at the eyes is one-fifth the length of the top-mast from hounds to heel	1	4	10

At 10ft. 10in. from the pin, draw a chalk line straight athwart the shrouds, that is where the service should come to (except the foremast legs of Nos. 1 and 2 pairs, for they are served all the way down); put a yarn on the chalk marks, cut the bights at the lower pin, and whip them; mark the eyes with two-yarn spunyarn, the same as for the fore shrouds.

Set the shrouds up and heave out three inches to the fathom (if fitted in the rigging house, they should be hove out six inches to the fathom); worm with eight-yarn spun-yarn. They are fitted the same as the fore shrouds.

SISTER BLOCK.

THERE will be a 24-in. sister block seized in the first and second pair of shrouds; the block should be seized in the shroud, at the distance of once and

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three-fourths the length of the block from the eye seizing, that would be 3-ft. 6-in.; you must allow the diameter of the shroud more for No. 2 pair, for the rise at mast head. There will be three seizings round the shroud and block, and one close underneath the block.

TURNING DEAD EYES IN TOPMAST SHROUDS CUTTER STAY FASHION, 7½-in. ROPE.

DIRECTIONS for turning the dead eyes in before putting it over the mast head, viz. :—

	Fthms.	Ft.	In.
Take the length of topmast from hounds to lower part of fid hole, that will be ...	8	3	10
Add the depth of cross-trees and bolster which is	0	1	7
Draw a perpendicular line at that length for the length of the topmast ...	8	5	5
And a horizontal line 9-ft. 6-in. for the half breadth of the top, that will give for taking the shroud out to the top rim ...	0	1	3
The length from upper part of bolster to top rim	9	0	8

If the shroud was over the mast-head, the seizing of the eye would be one foot from the mast; you must allow the diameter of the rope to each following pair of shrouds for the rise at the mast-head. The standing part takes up six inches in going half round the dead eye; dead eyes eleven inches in diameter. Length of rope it will take from the lower part of dead eye to the nip, is half the circumference of the dead eye, and once the circumference of the rope. You need allow six inches more on the

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TABLE FOR TURNING DEAD EYES IN TOPMAST SHROUDS

	No. 1.	No. 2.	No. 3.	No. 4.	No. 5.
	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.
Angle from upper part of bolster to the top rim ..	54 8	54 7	54 8	54 8	54 10
Distance the seizing is from the mast	1 0	1 0	1 0	1 0	1 0
	53 8	53 7	53 8	53 8	53 10
For rise at mast head			4	4	8
For standing part	6	6	6	6	6
For going ½ round dead eyes	2 0	2 0	2 0	2 0	2 0
	56 2	56 1	56 6	56 6	57 0
Drift from top rim	5 0	5 0	5 0	5 0	5 0
	51 2	51 1	51 6	51 6	52 0
Foremast shroud being served	6				
Length of starboard shrouds from seizing to nip ..	51 8	51 1	51 6	51 6	52 0
What the port shroud rises above the starboard ..	2	2	2	2	2
Length of port shrouds ..	51 10	51 3	51 8	51 8	52 2

forward leg of Nos. 1 and 2 pair, as they are served all the way down, and will not stretch as much as the other shrouds. Allow five feet drift from top rim for setting the shroud up.

	Fthm.	Ft.	In.
Length of the foremast shroud, from the seizing of the eye to the nip that goes round the standing part of the shroud, for the eye	8	3	8

FORE TOPMAST BACKSTAYS.

DIRECTIONS to cut them :—

Take the length of foremast from deck to the lower side of trestle-trees, that will give	9	1	0
Topmast from hounds to heel ...	9	0	3
Depth of crosstrees and bolster ...	0	1	7
What the channels are below deck ...	0	1	0

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	Fthm.	Ft.	In.
Place the warping pins at that distance apart	18	3	10
Multiply it by			2
Length to cut No. 1 pair, viz., the breast backstay	37	1	9
Length to cut No. 2 pair	37	3	3
Ditto No. 3 pair	37	4	9
Length of rope required for the three pair	112	3	9

What the rope stretches, will allow sufficient for the eyes, and the spread to the channels.

Warp them round the pins the same way as the shrouds.

The length of service for the eye part would be one foot more than the shroud.

Draw a line straight athwart the backstays, at 10ft. 10in. from the pin; mark them with a yarn after they are cut, whip the ends, and mark the eyes. For the breast backstay, put three turns with a yarn at the centre of the pin, and mark the after backstays, No. 1 and No. 2.

To fit them: Set them up and stretch them six inches to the fathom, and worm the part for the eye and top rim with eight-yarn spunyarn, parcel it with canvas, tar it, and serve it with five-yarn spunyarn.

The length for service in the wake of top rim and fore yard, is three feet less than the topmast is from hounds to heel.

That would be from the seizing of the eye to the commencing of the service, and serve down eighteen feet.

Breast backstays, one on each side. Instead of cutting the backstay to make a cut splice, serve three feet at the centre for the eye, and splice a piece of

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served rope in to form the other half eye ; in that case you can deduct three feet from the given length ; put the strands in once and a-half, and serve ten feet down from the splice.

After backstays.—Heave the eyes to and seize them, the same as the shrouds, with $1\frac{1}{2}$ in ; length $4\frac{1}{2}$ fathoms.

If the backstays are cut out and fitted on board of a ship, you must allow for half the eyes, in addition to the directions above stated, as there is not the convenience to stretch them as there is in the rigging house. All vessels below the fifth class of a frigate, have only one pair of a side.

FOR TOPMAST STAYS, 8½-in ROPE.

DIRECTIONS for the length to cut the inner stay :—

	Fthm	Ft.	In.
From the after part of topmast head to the inner hole in the bees of the bowsprit will be	18	4	0
From ditto to knight head	7	3	0
Length of the half collar, which will be the length of the mast-head, or once and four-fifths the round of ditto ...	1	3	1
Length of rope required for the inner stay	27	4	1

OUTER STAY.

FROM the after part of topmast head to the outer hole in the bees of the bowsprit will be	18	5	0
From ditto to knight head	8	0	0
Length of the half collar	1	3	1
Length of rope required for the outer stay	28	2	1

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What the rope will stretch will allow sufficient to make the Flemish eyes, and splice the half collar. For the Flemish eyes, see page 16. The stays are set up and stretched six inches to the fathom, and fitted the same as the fore stays. After the half collar is spliced, serve seven feet from the fork down.

FORE TOP-GALLANT SHROUDS 4½in. ROPE.

DIRECTIONS for the length to cut the shrouds.

	Fthm.	Ft.	In
Take the length of the topmast from hounds to heel	9	0	2
Top-gallant mast from hounds to heel ...	4	5	0
Place the warping pins at that distance apart	13	5	2
Multiply it by 2 for No. 1 pair ...			2
Length of No. 1 pair of shrouds ...	27	4	4
Ditto No. 2 ditto ...	27	4	6
Length of rope required for the two pair	55	2	10

Mark them at the centre of the eye with a yarn Nos. 1 and 2.

What the rope stretches will be sufficient for the eye, and for going through the crosstrees, and over the futtock bolt, or through a thimble in the necklace, that may be round the topmast.

Length of service for the eye part is one-sixth the length of top-gallant-mast from hounds to heel, that is 4-ft. 10-in.

Length for the service in wake of the crosstrees and roller in the necklace round the topmast, from the seizing of the eye to the commencing of the service

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will be three feet less than the top-gallant mast is from hounds to fid hole; and serve twelve feet down.

Directions for the eye: The length it would take for the eye, would be once the round of the funnel, and once the round of the shroud.

A thimble, an iron roller, or a sister block, is seized in each pair of shrouds, close to the seizing of the eye, for the top-gallant lifts; a sister block is the best.

FORE TOP-GALLANT BACKSTAYS.

DIRECTIONS for the length to cut them.

	Fthm.	Ft.	In.
For example :—			
Take the length of foremast from deck to trestle-trees	9	1	0
Topmast from hounds to heel ...	9	0	3
Top-gallant-mast from hounds to heel ...	4	5	0
Place the warping pins at that distance apart	23	0	3
Multiply it by two			2
That will give the length of No. 1 pair of backstays	46	0	6
Length of No. 2 pair ditto	46	1	0
Length of rope required	92	1	6

What the rope will stretch will allow for the eye, and for the breadth of beam, for going to the after part of the channels. Length of service for the eye part is three inches more than the shrouds.

Seize the eye the same as the shrouds, with $\frac{1}{4}$-in.; length, $2\frac{1}{2}$ fathoms.

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FORE TOP-GALLANT STAY 5-in. ROPE.

	Fthm.	Ft.	In.
For example :—			
Length from the fore top-gallant mast-head to the jib-boom end will be ...	23	4	0
From jib-boom to knight head ...	13	3	0
Length of rope required	37	1	0

What the rope stretches will allow for the eye, and for going down through the martingale up to the knight head.

An eye is spliced in one end to go over the top-gallant funnel; for the length, once round the funnel and once the round of the rope; that length must be served for the eye, one foot from the end.

To splice the eye, enter the marlinspike close to the service, put the strands in once and a-half, and serve over it.

FORE ROYAL BACKSTAYS 3½-in. ROPE.

DIRECTIONS for the length to cut them.			
For example :—			
Take the length of foremast from deck to trestle-trees	9	1	0
Topmast from hounds to heel	9	0	3
From the hounds of the royal mast to the heel of the top-gallant mast ...	8	0	0
Place the warping pins at that distance apart	26	1	3
Multiply it by two			2
Length of No. 1 pair	52	2	6
„ No. 2 pair...	52	3	0
Length of rope required for two pairs ...	104	5	6

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What the rope will stretch will allow for the eye and the breath of beam; length of service for the eye part, is one-fifth the length of the royal mast.

An eye is seized in the bight to go over the royal mast-head; the length for the eye is once the round of the royal mast-head, and once the round of the rope.

A thimble is seized in each pair, close to the seizing of the eye for the royal lifts.

DIRECTIONS FOR THE LENGTH OF SERVICE IN WAKE OF THE TOP AND FORE YARD.

For the breast backstay: From the seizing of the eye to the commencing of the service, will be three feet less than the topmast, top-gallant mast, and royal mast is from the hounds to heel, and serve fifteen feet down.

After backstay, from the seizing of the eye to the commencing of the service, will be three feet more than the topmast, top-gallant mast, and royal mast is from hounds to heel, and serve twelve feet down.

FORE ROYAL STAY, 3½-in. ROPE.

Directions for the length:—

For example:—

	Fthm.	Ft.	In.
From the Royal mast-head to the flying jib-boom end will be	26	4	0
And from ditto to knight-head will be ...	16	2	0
Length of rope required will be ...	43	0	0

Splice an eye in the end, after it is served, to go over the royal mast-head; length for the eye is once the round of the mast-head, and once the round of the rope.

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The strands of the splice are put in once and a-half, and are served over.

FORE PENDANTS.

For example :—

After the fore and main shrouds are cut out, the remnants of the hawsers will cut out the fore and main pendants and deck stoppers.

The length to cut the starboard pair will be six-sevenths the length of mast from deck to lower side of trestle-trees.

To prove it.

	Fthm.	Ft.	In.
The length of mast being 9-fthms. 1-ft. 6-in.			
Long leg from seizing of the eye to the thimble will be	3	0	6
Short leg from ditto to ditto	2	2	0
Length it will take for the eye is once the round of the mast	1	3	6
And two-thirds of one square will be ..	0	1	7
It takes up once the round of the rope in forming the eye	0	0	11
Length of rope it takes for the two thimbles	0	3	0
Length of rope for the starboard pendant	7	5	6

If wire rope, it will take 6 feet more.

What the rope stretches will allow sufficient end to splice the thimbles in.

The port pendants should be cut six inches longer, that will give three inches on each leg, and will allow for the rise at mast-head.

Take the same directions for the main pendants.

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DECK STOPPERS.

THESE are cut from the remnants, after the lower rigging and pendants are cut out, they are six in number. The length of each will be two fathoms.

There is a double wall knot made at one end, and a shackle and thimble spliced at the other.

MAIN STAYS, 13-in. ROPE.

DIRECTIONS for the length to cut them.

For example :—

	Fthm.	Ft.	In.
Take the length from the after part of the mast-head to the cross piece before the fore mast, that will be	18	3	0
And the length of mast-head for the half collar	3	2	8
Twice the circumference of the rope for splicing it.	0	2	2
Length of rope to draw for one stay ...	22	1	10

What the rope stretches will make the Flemish eyes.

These stays are fitted the same as fore stays.

Take the same directions for the main and mizen rigging, and topmast, top-gallant, and royal rigging and backstays, as are stated for the fore.

If wire, it will take nine feet more for the two eyes and splicing.

MAIN TOPMAST STAYS.

For example :—

Directions for the length of the upper stay :

From the after part of the topmast head to the block, at foremast head, above the eyes of rigging	18	0	0
From the block to the deck will be ...	11	2	0

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	Fthm.	Ft.	In.
Allow the length of the mast-head for the half collar	1	3	6
Allow for splicing the half collar ...	0	2	6
Length of rope required for one stay ...	31	1	6

What the rope stretches will make the Flemish eyes.

SCREW SHIPS' MAIN TOPMAST STAYS.—There are two iron-bound clump blocks fitted with lugs, to connect to the bands that are round the foremast head, which are fitted with eyes; they are on the after quarters of the mast, as low down to the eyes of the rigging as they can come, allowing sufficient room to to peak the gaff-foresail; the peak halliard block shackles on the same band as the lower main-topmast stay on the opposite stay.

The stays are rove through the blocks, and set up each side of the trysail-mast to iron-bound hearts in the deck.

Paddle wheel steam vessels have only one main-topmast stay, which reeves through the fore cap, and sets up to a strap placed on the foremast head, under the third pair of shrouds.

LOWER TOPMAST STAY.

THIS stay reeves through an iron-bound clump block, bolted to the after part of the foremast, under the upper stay, and sets up to a heart in the deck.

MAIN TOP-GALLANT STAY, 5-in ROPE.

DIRECTIONS for the length :—

	Fthm.	Ft.	In.
From the main top-gallant mast-head to the fore cap	18	0	0

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	Fthm.	Ft.	In.
From ditto to the fore top	3	0	0
Length of rope required	21	0	0

This stay is fitted the same as the fore top-gallant stay.

MAIN ROYAL STAY, 3-in. ROPE.

DIRECTIONS for the length :—

From the main royal mast-head to the fore topmast cross-trees	18	0	0
From ditto to the fore top	9	0	0
Length of rope required	27	0	0

This stay is fitted the same as the fore royal stay.

DIRECTIONS FOR TURNING DEAD EYES IN THE MIZEN SHROUDS BEFORE THE MAST IS STEPPED.

The length of mast from deck to the upper part of bolster is	9	0	6
The fore part of channel below deck ...	0	1	0
Draw a perpendicular line for the length of mast at	9	1	6
And a horizontal one to the right of it, for the breadth of beam 21-ft., that would be from the mast to the outer edge of channels, abreast of dead eye No. 1. It will be found that the breadth of the beam gives	0	3	6
Then the length of foremast shroud from the upper part of bolster to the channels would be	9	5	0

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Table for turning dead eyes in mizen shrouds, cutter stay fashion, before they are put over the mast-head.

Number of dead eyes in channels ..	No. 1	No. 2	No. 3	No. 4	No. 5	No. 6
	ft. in.	ft. in.	ft. in.	ft. in.	ft. in.	ft. in.
Distance the eyes are apart		1 8	4 7	1 10	1 10	1 10
Commencing from upper part of bolster to the channels	59 0	58 10	58 10	58 10	59 0	59 2
Distance the seizing of the eye will be from the mast	1 0	1 0	1 0	1 0	1 0	1 0
	58 0	57 10	57 10	57 10	58 0	58 2
What the channel rises aft		2	4	5	6	7
	58 0	57 8	57 6	57 5	57 6	57 7
Drift from channel for setting the shroud up	6 0	6 0	6 0	6 0	6 0	6 0
	52 0	51 8	51 6	51 5	51 6	51 7
What the shroud rises at the mast-head			5	5	10	10
Standing part of shroud takes up in going half round the dead eye ..	6	6	6	6	6	6
Length from lower part of dead eye to the nip	2 2	2 2	2 2	2 2	2 2	2 2
Length of starboard shrouds from the seizings of the eye to the nip.	54 8	54 4	54 7	54 6	55 0	55 1
What the port shroud rises above the starboard	2	2	2	2	2	2
Length of port shrouds from seizing to nip.	54 10	54 6	54 9	54 8	55 2	55 3

Draw another mast the length of the foremast shroud, with $3\frac{1}{2}$-in. rake to every six feet, and a horizontal line to the left of it, for the length of the channels, or from No. 1 dead eye to No. 6, which will be twelve feet.

For all other information, refer to the fore shrouds and engravings.

MIZEN BURTON PENDANTS. $5\frac{1}{2}$-in. ROPE.

For example :—

Length to cut this pendant will be five-sixths the length of mizen mast from deck to lower side of trestle-trees, that will be 7-fthm. 2-ft.

	Fthm.	Ft.	In.
The length the pendant will be from the fork of the eye to the thimble is one-third the length of mast from deck to trestle-trees	5	5	0

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	Fthm.	Ft.	In.
Length it will take for the eye	1	1	0
Allow for splicing it	0	2	0
Length of rope required	7	2	0

If wire rope, allow six feet more.

What the rope will stretch will allow sufficient for splicing the thimbles in the lower ends.

Serve 3-ft, 6-in. each side of the centre, leaving 2-ft. in the centre not served, for splicing the eye; it should be cut at the centre, and a cut splice made to form the eye.

After the eye is spliced, it is set up and wormed with six yarn spunyarn, from end to end.

The splices are tapered and marled down, they are parcelled, tarred, and served over with five-yarn spunyarn, from end to end.

MIZEN STAY, 9-in ROPE.

DIRECTIONS for the length :—

From the after part of mizen mast-head to the eye bolt in the deck at the side of the main mast, will be	14	4	0
And the length of the mast head for the half collar	2	1	0
And for splicing it	0	2	0
Length of rope required	17	1	0

What the rope will stretch will be sufficient to make the Flemish eyes.

If wire rope, allow 6-ft. more.

This stay is fitted the same as the fore stay.

If the stay is to set up with two legs, one each side of the mast, splice a piece of the same, 16-ft. long, into the stay, 14-ft. from the end.

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Turn the thimbles in for setting it up, viz., to turn a thimble in each leg, at 84-ft. from the back of the eyes, that will allow 4-ft. drift.

MIZEN TOPMAST STAY 6-in ROPE.

	Fthm.	Ft.	In.
Length from the topmast head to the eyes of the main rigging will be	11	5	0
Length of half collar when fitted ...	1	0	6
And for the splice	0	1	0
Length of rope required	13	0	6

What the rope stretches will be sufficient to make the Flemish eye.

It will take 2-ft. 3-in. to make each eye.

The eyes are made the same as the fore, and the stay is fitted the same.

MIZEN TOP-GALLANT STAY, 3½in ROPE.

From top-gallant mast-head to main cap	10	0	0
From ditto to top	3	2	0
Length of rope required	13	2	0

What the rope stretches will make the eye.

This stay is fitted the same as the fore top-gallant stay.

MIZEN ROYAL STAY.

From the royal mast-head to the main top-mast crosstrees	10	5	0
From ditto to top	10	0	0
Length of rope required	20	5	0

This stay is fitted the same as the fore royal stay.

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RIGGING A PAIR OF SHEERS, TO PUT A SHIP'S MAST IN.

FOR A LINE-OF-BATTLE SHIP: Parbuckle the sheers on board, with their heads aft. Hang long spars over the ship's side for fenders, and have the waist netting well chocked and shored up. Rig two derricks over the waist netting, with their heels secured on the main deck, and lashed to the skids; lash a block to the head of each derrick, and reeve the end of a hawser through each block, from out in, and through a leading block at the heel of the derrick, and take it to the capstan; overhaul the bights down, and put them under one of the sheer legs, haul it taut up over the waist netting, and secure it on the main deck. For the standing part, pass two slip ropes out of the main deck ports, round the sheer leg, to ease it over the netting; man the capstans and heave round, take in the slack of the slip ropes, and ease the spar over the netting. Get the other spars in the same way.

Then transport them aft. Lay chocks of wood or casks under them, to raise their heads while lashing them and the blocks.

For small vessels, you may land their heads on a spar from one netting to the other, or land them on the taffrail.

For a frigate or small vessel's mast: Hoist them in through the stern port; to do so, rig a small pair of sheers over the traffrail, hook the purchase to a strap about six feet from the heel; when the heel is high enough to enter the stern port, hook the double block of the fore and aft purchase to it, the single block being hooked as far forward as it will reach, and haul

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the spar in as far as you can; then fleet the purchase down to the water's edge, and haul on the fore and aft tackles as the purchase lifts the spar. When the spars are on board, place them as before directed.

In crossing the heads of the sheers, always put the off leg on top: that is to say, if the mast is to be taken in the starboard side, put the port leg on top. Lash them with three or four inch rope; it will take from twenty to thirty fathoms according to the size spars. Pass the lashing on both ends, commencing from the centre, and work both ways; put on ten turns, and ride with nine turns; work both ends towards the centre, and reef knot the ends.

PURCHASE BLOCKS.

If they are not provided from the rigging house, use the ship's blocks, viz.: for the main purchase, strap the careening blocks with 10-in. rope. One is a 30-in. four-fold block, the other is a 30 in. three-fold block, for a line-of-battle ship.

For the small purchase, take the fore and main jeer blocks, which are 24-in. blocks, or the propeller purchase blocks.

For the topping lift blocks, use the fish davit head blocks.

MAIN PURCHASE BLOCK.

Lash the upper block under the cross, allowing the block to hang low enough to swing clear of the sheer legs; if the block is strapped with a double strap, pass the lashing as bight and bight; if strapped with two separate straps, pass the lashing round and round over the cross, and through the strap of the block. Lashing, 5-in. 40 fathoms.

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MAIN PURCHASE.

REEVE the fall and the lower block forward to the knight head, and lash it there; lash it with a hawser through the strap of the block and the two bow parts, and slack it off to the length required, that is to say, till you have fall enough to reach the capstan; lead the fall through a snatch block, and take it to the capstan.

LASHING SMALL PURCHASE BLOCKS.

THIS block lashes on the after side of the sheers with 5-in. rope, 50 fathoms. The lashing is passed the same as the other, allowing the block to hang below, just clear of the other. Take the lower block forward and reeve the fall.

SHEER HEAD GUYS.

TAKE two 8-in. hawsers, make a clove hitch round the sheer heads, with the cross on the fore part for the after guys, and the cross on the after part for the fore guys, that will give the guys more spread for the entrance of the mast, and less strain on the hitch; after the sheers are rose, put a luff tackle on each guy, to haul them taut.

TOPPING LIFT BLOCK.

THIS block is lashed on the after horn of the sheer leg, above the guys, for the mizen mast; then shift it on the fore part for the bowsprit.

GIRTLINES.

PUT one girtline on each sheer head.

BELLY GUYS.

LASH the fore and main runner blocks, one on the fore and one on the after side of each sheer, nearly

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half way down ; reeve the runner through them, take one forward and one aft each side, and make them fast.

SHOES OR STEPS FOR THE SHEERS TO STEP IN.

A SHOE is a piece of wood about four feet long, two feet wide, and nine inches thick, with a hole in the centre for the sheer to step in, and an eye bolt at each corner for lashing it to the sheer leg.

Place the heels of the sheers on the shoes, and lash them to the eye bolts in the shoes ; nail cleats on the heel of the sheers to prevent the lashing slipping down.

HEEL TACKLES.

LASH the fore and main tackles on the heel of each sheer, one forward and one aft, hook the single block to a lashing through the ports or some secure place, haul them well taut, and secure them, put a good lashing on the heel of the sheers, from aft, to prevent the heels from slipping forward in raising them. Put a thwart ship lashing on the two heels, to prevent too great a strain coming upon the water ways—a luff tackle is the best ; haul it well taut, and expend the fall from one heel to the other, and frap all parts together.

DERRICK, OR A SMALL PAIR OF SHEERS.

IF it is to raise a large pair of sheers, rig a derrick or a small pair of sheers abaft the heads of the large sheers, to assist in raising them.

TO RAISE THE SHEERS.

MAN the fore and main capstan ; when the head is as high as the small sheers will lift, then paul the main capstan and take the fall off.

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Heave round the fore capstan, and top the sheers up; attend the guys. When the sheers are perpendicular, paul the capstan, wet the deck in wake of the heels, man the after heel tackles and guys, and transport the sheers aft to plumb the mizen mast hole.

Put a good lashing on the sheer leg opposite to the side the mast is coming in, about eight feet from the deck, to ring bolts in the ship's side, to prevent the heel from rising; a luff tackle hauled well taut, and the remainder of the fall expended in the same direc tion, is the best lashing you can have. Nail cleats on the sheer leg, to prevent the lashing slipping down.

DIRECTIONS WHERE THE MAIN PURCHASE SHOULD BE LASHED ON THE MAST.

TAKE the length from the upper deck to the lower part of purchase block at the sheer head, and six feet less than that will be the length from the heel of the mast to the upper part of the lower purchase block, when lashed to the mast.

For the mizen-mast, lash the small purchase block, at the length above given.

SMALL PURCHASE.

LASH the small purchase block to the head of the mast, until the mast is above the gunwale, then fleet it down, if required; the topping lift will do for the mizen mast.

HEEL TACKLE FOR MAIN AND MIZEN MAST.

PUT a tackle on the mast, to keep the mast forward for entering between the sheer legs; take the main stay tackle, pass the pendant round the mast, above the main purchase block, and hook it to its own part; hook or lash the single block to the cat head, and a

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leading block for the hauling part of the fall; haul the mast well forward with that tackle, before you heave round the purchase.

HEEL PENDANT FOR THE FORE MAST.

If there should be a buoy or a ship ahead, lash a snatch block to the buoy or the ship's taffrail, send a hawser out of the hawse hole opposite to the side the mast is coming in, reeve it through the block, and make it fast to the mast, above the purchase block; haul it well taut, and put a tackle on it; haul the mast forward. If there is no ship or buoy ahead, bend a hawser to the stream anchor, and lay it out ahead; keep the hawser in the boat, and lash a snatch block to it; then reeve the hawser through the block for a heel rope, as before stated.

Hang long spars up and down the ship's side for fenders, in wake of the mast coming up the side.

TAKING IN THE LOWER MASTS AND BOWSPRIT.

The masts are alongside, with their heads aft.

Take the mizen mast in first.

Overhaul the small purchase and topping lift to water's edge, and lash them to the fore part of the mast, as before directed.

HEEL ROPE.

Put a heel rope on the mast out of the main deck port, to ease it on board, heave round the capstan; when the mast-head is up to the gunwales, lash the two girtlines to the mast-head.

HEEL TACKLES.

When the heel of the mast is on board, put two tackles on the heel, one on the after-part, and one on

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the fore-part, to act against it; when the mast is high enough, haul on the after tackle till the heel is over the mast hole, then lower the mast, and when the mast is nearly low enough, put two slue ropes round the mast and with two capstan bars slue the mast; when the mast is on the right slue, lower it into the step, wedge the mast in the hole, unlash the purchase and overhaul it down.

TRANSPORT SHEERS FORWARD.

FOR taking the main mast in, man the four guys and heel tackles, slack the after ones, haul the sheers forward, place them over the mast hole, and secure the heels as before; shift the spars from aft forward for the main mast, and lash the main and small purchase on the fore part of the mast, as before stated; after the mast is stepped, transport the sheers forward for the fore mast, and secure them as before.

TO PUT THE FORE MAST IN.

THE mast is alongside with the head aft. Take the same directions for lashing the purchase blocks, &c., as are given for the main mast.

PLACE THE SHEERS FOR THE BOWSPRIT.

LASH a snatch block each side of the fore mast-head for the sheer guys to go through; if there is no block in the ship large enough to take the guys, lash the lower block of the small purchase to the mast-head, and a leading block for the hauling part of the fall. Lash the running tackles to the mast, take them aft, and haul them well taut to support the mast.

DROOP THE SHEERS.

SLACK the after guys, man the heel tackle, and haul the heels as far forward as you can, then droop the

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sheers as much as is required; put a good lashing on the heels from forward, in addition to the tackles, and lash the off leg down as before stated.

TO LASH THE MAIN PURCHASE.

THE purchase block should be lashed on the bowsprit, just outside the housing mark.

TOPPING LIFT.

PUT a pair of 5-in. slings round the bowsprit inside of the bees, and through the hole in the cap; lash or toggle the topping lift to it, and take the fall to the capstan.

Put a man rope on each side of the cap, and a heel rope on the bowsprit through one of the ports, and heave round both capstans when the bowsprit is high enough.

Lash the single block of a luff tackle to the heel, and the double round the stem, and haul the heel forward till it is fair for going in the hole, then walk back the topping lift, and the purchase as required, put a tackle on each man rope to haul the bowsprit into the step.

If the bowsprit is on the wrong slue, slack up the main purchase, land the bowsprit on the bed, and slew the slings round in the direction required for slewing the bowsprit fair for entering the step; then heave round the purchase, and haul the bowsprit into the step.

When the bowsprit is stepped, unreeve the purchase falls, haul the heels aft, and lower the heads of the sheers on chocks of wood or casks, unrig them, and hoist them over the side.

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TO SEND THE TRESTLE-TREES UP.

LASH three more girtlines to each masthead, one on each side, and a small one on the after part, to send the men and their tools up.

Make a bowline knot in the girtline, and lash the bight with a strand to each score of the trestle-trees, hoist them up and place them to the mast, pass a strand round both, on the fore and after part, and heave them close to the mast with treenails.

Send the stage up by the other two girtlines, and the men and their tools, &c., by the after girtlines.

BOWSPRIT.

FOR example :—A first-class ship.

Commence with the gammonings of the bowsprit, the spar being properly secured by the mastmakers, and the gammoning-fish fitted on.

GAMMONINGS.

THE gammonings of the bowsprit are two in number, viz : inner and outer, 13-16 inch chain.

Ascertain the length of each gammoning in the following manner :—First the outer ; take a small line, pass it over the bowsprit, where the first turn would come through the hole in the cutwater, and bring the end up to the bowsprit, and haul it well taut, then measure the length of the one turn, say 27 feet.

There being 8 turns on the bowsprit, and 3 for frapping the same, making 11 turns, the whole length of the outer gammoning will be 11 multiplied by 27, which will be 49 fathoms 3 feet.

Measure for the inner gammoning in the same manner.

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STAGES.

RIG two stages, one each side of the gammoning holes, the men stationed there, as well as those in the head, are supplied with tar, mallets, wedges, spunyarn, tallow, &c.

Take the chain into the head on the same side as you are going to put the purchase on, pass the end over the bowsprit through the hole in the cutwater, up again over the bowsprit, shackling the end to its own part underneath the bowsprit in the centre, keeping the shackle close up. Thus, having one turn passed, it is ready for the purchase.

GAMMONING ALONGSIDE THE DOCKYARD.

THERE is a $7\frac{1}{2}$-in. pendant, 12-fthms. long, with an eye spliced in one end and a salvagee rove through it, to hitch to the gammoning.

The other end of the pendant reeves through the strap of an 18-in. treble, double-scored block, hitched and seized at the distance required, the other block for the purchase is an 18-in. double-scored double block, the fall is 4 inches, and length 60 fathoms.

A snatch block is required for the leading part, a jigger tackle for overhauling the purchase, a tail block made fast over the bowsprit, and a rope rove through it, to haul the pendant on board.

Hitch the salvagee to the gammoning, one end over, and the other under, dog the ends along the chain, and seize them with spun-yarn.

OUTER GAMMONING.

HEAVE round the capstan, and continue striking the chain with mallets to make it render. The gammoning being hove as much as it will bear, wedge the chain in the hole, and drive four nails through the links of the

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chain into the gammoning-fish, overhaul the purchase, haul the pendant on board, take off the salvagee (this turn is the after one on the bowsprit, and the foremast turn in the hole), pass the next turn from forward aft, inside of the other part, and aft in the hole, pass it up from aft, forward on the bowsprit, inside of the other part, seeing it clear of turns before putting the purchase on, every turn reeves inside of the other parts between the bowsprit and cutwater, which is called thorough footing. After the last turn is hove on pass the chain down alongside of its own part, and tar it, that it might render through the piece of hide about a foot long, and 8 inches wide, well greased, and lashed over the last part of the chain, with three parts of six-yarn spun-yarn laid up. The lower edge of the hide is about 1-ft. from the cutwater, and the chain is passed over the cutwater, round all parts of the gammoning. Put the purchase on it, and heave on it till it is as taut through the hide as the other parts, then pass the stop to prevent the chain from starting back.

The stop is passed by a piece of spun-yarn made fast to the standing part of the chain, and rove through a link of the last part hove, haul it taut, pass it round the standing part, and through another link of the part last hove, then hitch it to the standing part; this spun-yarn is called a bull rope.

Stop every frapping turn the same way, the last two turns form a figure of 8, the chains cross in the bosom with the end underneath its own part; if any chain is left, cut it off, and seize the end link up to the standing part.

The outer gammoning should always be hove on first, if otherwise, in heaving on the outer would slack the inner one.

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INNER GAMMONING.

PASS and heave the inner gammoning on the same way as the outer.

TO GAMMON THE BOWSPRIT ON BOARD.

USE the runner and tackle, and lash a snatch block to the cutwater, in the direction required for the gammon to lead through; the runner will lead through the hawse hole, and the fall is taken to the capstan.

FRAPPING TURNS.

IF heaving the frapping turns on, heave one turn of the outer gammoning, and one turn of the inner, and continue heaving turn and turn until finished.

Iron bands screwed down over the bowsprit to the knight-head takes the place of gammoning in many ships.

MAN ROPES FOR BOWSPRIT.

THERE are two; they are spliced round a thimble through an eye bolt each side of the cap, and a thimble spliced in the other ends to set up to the stanchions at the knight-head, with a lanyard.

There is a stirrup spliced round a thimble on each and is seized up to the fore stay.

RIGGING A STAGE FOR CLOTHING A BOWSPRIT.

TAKE two spars the length of the studding-sail boom, put them out of the head port over the rail, hook a double block of a tackle to the bowsprit cap, and lash the single block to the end of the spar; haul them out and secure their heels in the head, spread the outer ends open, and lash a spar athwart them to keep them open, put a lashing round them over the bowsprit, outside of the figure head; lash two short stout planks athwart the two spars, one close to the

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figure head and the other near the tackles, then lay two or three long planks fore and aft each side, and nail them to the planks underneath.

CLOTHING THE BOWSPRIT.

BOBSTAY COLLARS.

No. 1 is the inner collar, and is lashed on at two-thirds the length of the bowsprit from the knight-head to the outer edge of the cap.

No. 2 is the middle collar, and is lashed on the diameter of the bowsprit outside of the inner collar.

No. 3 is the outer collar, and is lashed on the diameter of the bowsprit outside of the middle collar.

Lash one eye to any convenient place, put a tackle on the other, and haul the collar well open; jamb a piece of wood three inches long close to the seizing, to keep it from closing, or put it round the cable bits and wedge it out round.

Place the collar round the bowsprit, reeve two turns of a strand through the eyes, then place a chock of wood fore and aft on the bowsprit, with a score cut in the under part wide enough to lay over clear of the lashing; place a long bolt or a spar horizontal on top of it, for a Spanish windlass; the ends of the strands being on at each end, pass them round the bolt or spar, and heave it round with two other bolts until the collar is taut round the bowsprit.

To secure the collar while passing the seizing, put a strand round the bowsprit, over the collar, just clear of the eyes, put a bolt through the strand, and twist it up as taut as possible, and stop the bolt down out of the way.

Take the Spanish windlass off, unreeve the strand

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out of the eyes, lash the eyes with 3-in. rope, length 6-fms., pass the lashing rose seizing fashion, heave on both ends with a Spanish windlass over the bowsprit, pass eight turns through the eye, and heave every turn well taut.

Reeve the crossing turns, one each way, between the lashing, and heave it taut, pass another turn with each end, and form a half knot at the side of the lashing, heave it well taut, pass the ends up between the centre turns, unlay the ends, and make a wall and crown knot with the strands; lash a bolster to the collar above the heart, to project it from the bowsprit.

The best way to heave these collars on and lash them, is as follows:—Instead of heaving the Spanish windlass on top of the bowsprit, have one each side; have two stout short spars hung perpendicular each side of the bowsprit, and lashed or frapped to each other, under and over the bowsprit; then lay the large bolt for the Spanish windlass, horizontal outside of the spars, one each side of the bowsprit, and bring the ends of the lashing to them, and heave them with small bolts; the spars must be shifted out as the work proceeds.

It might appear to give a great deal of trouble, but there will be both time and labour saved by it, particularly for the fore stay collars and the bale sling collars.

BOWSPRIT SHROUD COLLARS.

THESE collars are opened out and hove taut round the bowsprit, and lashed the same as the bobstay collars.

No 1 is the inner starboard collar, and is lashed on outside and close to the inner bobstay collar.

No. 2 is the inner port collar, and is lashed on close to No. 1.

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No. 3 is the outer starboard collar, and is lashed on outside and close to the middle bobstay collar.

No. 4 is the outer port collar, and is lashed on close to No. 3.

FORE STAY LONG COLLARS.

THE two bights of No. 1 are lashed together, the lashing is passed rose seizing fashion, under the bowsprit, outside and close to No. 2 bowsprit shroud collars.

No. 2 collar is lashed outside and close to No. 4 bowsprit shroud collar.

FORE STAY BALE SLING COLLARS.

No. 1 collar is lashed outside and close to No. 2 bowsprit shroud collar, with the heart the port side. The strand is rove through the eye, and through the grommet that is round the collar under the heart, and is hove taut with a Spanish windlass the same as the bobstay collars, which is much better than lashing the eye to the collar under the heart.

No. 2 collar is lashed outside and close to No. 4 bowsprit shroud collar, the heart on the starboard side, and secured the same as No. 1.

These collars are often lashed on inside of the bobstay collar, with a large chock cleet to keep them out in their place.

FORE STAY COLLARS, WARPED.

THESE collars are lashed on the bowsprit the same way as the bale sling collars; they require no fidding out, as they are warped round a cask.

BOBSTAY, No. 1.

REEVE the bobstay through the upper hole in the cutwater, let the two parts of sennit come square with

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each other through the hole; reeve a rope through the heart of each collar, and make it fast round both ends of each bobstay, haul them up to the collars, put a luff tackle on each rope, and haul them up taut to their respective collars.

Drift for setting the bobstays off for splicing:—Set the inner one off the diameter of the bowsprit, the middle one 3-in. less, and the outer one 6-in. less, that will be from the lower part of the collar down the bobstay: there make a chalk mark to marry the splice.

If wire, 1-ft. drift would do.

SPLICING BOBSTAYS.

UNLAY the ends and marry the strands, bringing the two chalk marks together; let it be married slack, so that the fid can be put in by hand each time; put the strands in once and a-half each way, taper the ends, and marl them down, so that it will be a good taper to lay round the heart. Parcel and serve over the splice.

SEIZING THE HEARTS IN BOBSTAYS.

STOP the back of the heart to the centre of the splice with a small strand nippered with a bolt, put a strap through the heart, hook a tackle to it, haul the bobstay out straight in a line with the stem, put a strand round the two parts close to the heart, and leave the two parts close. With a Spanish windlass, put a stop of spunyarn on to keep the two parts close, take the strand off, pass the seizing six and five turns, and three crossing turns.

Lanyards should be half the size of the bobstay. Splice a running eye in one end, put it over the heart on the collar, reeve the other end through the heart in the bobstay, pass two turns, well tar and grease the parts; set them up with luff tackles, hook the single block to the lanyard, the double block to a strap

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round the two parts of bobstay near the stem, reeve the hauling part through a block hooked to a strap round the bowsprit, haul it taut, make a cat's paw in it, and hook the double block of another luff tackle to it, and the single block to the knight-head. Man the fall, and haul every turn taut; when the last turn is taut, rack the end to the other part

Sometimes the bobstays are set up on both ends of the lanyard; if so, one end must be rove through a leading block round the bowsprit.

If wire, the lanyard should be the same size as bobstay.

BOWSPRIT SHROUDS.

THERE are two each side for large ships, and one for smaller vessels, with a slip at one end; the slip is rove up through the eye bolt in the bow, and a heart or thimble in the other end, to set up to the collar with a lanyard.

FORE MAST.

TOP tackle falls are used for girtlines.

The girtlines are lashed round the mast-head; before the mast is stepped, put man ropes on the mast-head.

FORE CROSSTREES.

IF the crosstrees are sent up the port side, bend the port girtline to the centre, and stop it to the starboard horn, that will take it up endways; when it is high enough, cut the stop and bear the crosstree to its place. Send the other crosstree up the same way. The mast makers will bolt them before anything else is done aloft.

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FORE TOP,

To send the starboard half up, take the starboard girtline, pass it under and take a round turn round the top, reeve or stop it to the third futtock plate hole, and take two half hitches round the standing part; the girtline to be kept at the underneath part of the top, and stopped to the fore part with a strand.

Put the main girtline on the after part of the top, man the girtlines and walk the half top up, keep it clear of the trestletrees with the main girtline; when the stop on the fore part of the top is close up to the block, cut it, and the top will hang square in the girtline, and may be easily placed.

Send the port half-top up by the port girtline, in the same manner.

Mast makers bolt the top and nail the bolster on.

LOWER CAPS.

SEND the lower caps up into the top before rigging the mast, there being more room in the lubber's hole for it to go up, and there is sufficient room in the fore part of the top for it to lay without obstruction to the eyes in the rigging; to do so, double the girtline by reeving it through another block, and make the end fast to the mast-head; lash the block to the fore part of the cap, and land it on the fore part of the top, with the after-part the same side as the top block is lashed.

RIGGING FORE MAST.—BOLSTER CLOTHES.

THERE are six parts of canvas the length and breadth of the bolster, well tarred and nailed on the bolster.

Lash a girtline block on the after-part of the mast-head, as high up as you can lash it, for sending the lower pendants and shrouds up; a 3-in. girtline is large enough for a 12-in. shroud.

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LOWER PENDANTS.

LASH one side of the eye to any convenient place, put a jigger on the other side, and haul the eye open. Make the girtline fast to the starboard pendant with a rolling hitch, about three feet below the seizing; let the hitch be on the after part, which would be the long leg, and stop it to the eye; make a small rope fast to the centre of the eye to haul it over the mast head, and when the pendant is high enough, haul the eye over and place it at the centre of the mast; unreeve the girtline out of the block, and reeve it the reverse way for the port pendant. The hauling part that is between the eye and the mast, remains there until all the shrouds are over the mast.

PENDANT BLOCKS.

THESE blocks are lashed to the thimble of the long leg of the pendant, and are frapped together on the after part of the mast.

FORE RUNNERS.

TWO in number: they are rove through the blocks that are lashed to the thimble of the long leg of the pendant, and make fast round the bowsprit, outside of the inner gammoning; the lower block and leading block are hooked to a bight of the same pendant.

STAYING THE MAST.

MAN both tackle falls when the mast is stayed well forward, rack and hitch the falls to their own parts, and coil them up out of the way.

Frequently the mast is stayed with one runner one-third down the mast, and the other half way down, with salvagee straps round the mast.

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FORE TACKLE BLOCKS.

THESE blocks are lashed to the thimble of the short leg of the pendant.

LOWER SHROUDS.

OPEN the eyes, and bend the girtline to the shrouds, the same as for the lower pendants, and send them over the mast-head by their respective numbers, commencing No. 1 starboard, No. 2 port, and so on, placing No. 1 and No. 2 well forward.

Set each pair of shrouds up as they are put over the mast-head; put a luff tackle on the shroud, and the up and down tackle on the luff.

With a mast that has nine shrouds on each side, it is considered best to put the single shroud on first, which is the after shroud; by doing so, it gives more spread for the other shrouds, and the seizings will lead clear of each other.

TURNING DEAD EYES IN.

IF the dead eyes are not turned in, put a strand round the shroud, reeve it through the dead eye in the channels, and haul as much as the strand will bear; after all the shrouds are over the mast and all taut alike, then mark them off for turning the dead eyes in. Put a mark on the forward and after shroud, five or six feet from the channels according to the size ship; fasten a small line to the mark on the forward shroud, and haul it taut to the mark on the after shroud; then mark every shroud abreast of the line, that will be for the lower part of the dead eye; the length below the mark is wanted for going half round the dead eye and the nip, viz.: take half the round of the dead eye and once the round of the shroud; put a yarn round the shroud for a mark at that length, then let go the

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shrouds and stop the mark to the standing part of the shroud, bring the end round to its own part, and heave the two parts to with a strand and bolts; put the seizing on, put the dead eye in and beat the shroud down to it; reeve the lanyard, and set the shroud up as before stated.

FORE STAYS.

HOIST them both up together, by placing the upper one on top of the lower one, have the forks of the collar fair with each other, lash them together, put a seizing of spun-yarn on under the fork of the crutch, and two on each side of the half collar.

Put a girtline on each side of the mast-head, send the ends down the lubber's hole, bend them both on below the crutch, and stop the starboard one to the starboard half collar, and the port one to the port half collar, hoist the stays up and lash the eye abaft the mast, above the eyes of the rigging; the lashing is put on rose seizing fashion.

After the rigging is turned in for a full due, and well pulled up, place the collar down over the eyes of the rigging.

TURNING THE HEARTS IN FORE STAY.

DIRECTIONS for the length :—

Send the end of the girtline down the fore part of the lubber's hole, and make it fast to the heart of the collar, and haul it taut up; then measure with a line from the after part of mast-head to the upper part of the collar, and four or five feet less than that is will be the length of the stay from the eyes to the lower part of the heart; then allow once the round of the stay and half the round of the heart for going half round the heart and the nip. The heart is seized in the same way as dead eyes in shrouds.

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Lanyards: splice a running eye in one end to go round the collar; render it taut underneath the heart.

If it is the long collar, splice the lanyard into the heart of the collar. Reeve the lanyard through the heart of the stay and through the heart of the collar; put a luff tackle on the stay before hauling it out.

SETTING UP FORE STAY.

FRAP the short legs of the pendants together abaft the mast, for setting the stays up. Let the men in the top attend with a strand each side of the lubber's hole, to keep the stays close to the cross-trees. Put the fore tackle on the lanyard and haul the slack through, then rack the lanyard, unhook the fore tackle, and hook the double block of the luff; the best way is to have a strap and toggle, take a round turn with the lanyard round the toggle, and a round turn with the strap round the two parts of the lanyard under the toggle, and hook the double block of the luff to it, and the fore tackle to the hauling part of the luff. Set both stays up at one time, haul on the fore tackle until the stays are well taut and the runners slack, then rack the lanyard, reeve another turn, and haul it taut as before. Every turn of the lanyard is hauled taut and racked, and the end seized to its own part; then take the frapping off the pendant, and take the fore tackle and luffs and set the fore rigging up.

TOPMAST FUTTOCK SHROUDS.

THE forward shroud is chain, the remainder are made of iron rods; the upper part is fitted with lugs to bolt to the futtock plates, the lower part is fitted with a shackle, to shackle to the necklace; they should be parcelled and served over with spun-yarn. Send the

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futtock plates up, and reeve them down through the holes in the top rim; send the shrouds up one at a time, and shackle them on.

MAIN MAST.

TAKE the same directions for rigging the main mast as are given for the fore mast.

Send the half top up the same way as the fore, only use the mizen girtlines for the after part of the top.

MIZEN MAST.

PEAK and throat halliards are used for girtlines, with two blocks strapped with lashing eyes.

MIZEN TOP—A WHOLE TOP.

To send the top up abaft the mast, reeve both girtlines under the top, one each side, through the lubber's hole, and through the second futtock plate hole, a round turn round the top, hitch the end to the standing part, put a stop on the girtlines at the fore part of the top (the main girtline may be put on the fore part of the top to haul it over the mast-head), make a rope's end fast to the after part and stop it to the fore part, and take it aft to the taffrail, to keep the top clear of the trestle-trees. When the top is up to the mast-head, cut the stops on the fore part of the top, haul on the girtlines, and as soon as the top is entered on the

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mast-head, haul on the main girtline, and the top will fall over and hang square in the girtlines, then lower away and place the top.

MIZEN BURTON PENDANTS.

THEY are fitted the same as the top burton pendants. Put them over the mast-head and lash the lower ends together abaft the mast, hook the mizen burton tackles to the thimbles, hook the lower blocks to eye bolts in the deck at the side of the main mast, and stay the mast.

RIGGING THE MIZEN MAST.

TAKE the same directions as are given for the fore-mast.

If there are no cheek blocks at the side of the mizen mast for the boom topping lifts to reeve through, you must lash the boom topping lift blocks before the mizen shrouds are put over the mast-head. Take the same directions for turning dead eyes in as the fore; the drift for setting up is one foot less.

MIZEN STAY.

THERE is only one mizen stay, that sets up with two legs, one each side of the main mast, to eye bolts in the deck.

TO HOIST A TOPMAST ON BOARD FROM ALONGSIDE.

ALWAYS fid the spare topmast first, to ascertain that it is all right. The mast should be the same side of the ship as the top blocks are lashed, with the head forward.

Lash the top block as high up the mast-head as you can, the fore and mizen the starboard side, and the

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main the port side. Reeve a hawser through it from aft, down through the live sheave in the heel of the topmast, haul enough through to reach the topmast head, stop it to the other part, and rack the two parts together, at one-third down from the hounds, sufficient to hold the weight of the mast. Put three good lashings round the hawser and the topmast, one close to the head, one at the hounds, and one 10-ft. below the hounds. The reason there should be three lashings on, is as follows:—In some ships, when the mast-head is up to the trestle-trees, the heel is not clear of the netting, then cast off the upper stop and let the head go over the other side; if it does not then go far enough to clear the netting, cast off the middle stop; when the heel is clear, lower the mast and point the head through the trestle-trees.

TO PUT THE LOWER CAPS ON.

HANG the cap up above the eyes of the lower rigging with the top burton tackles, fair for the topmast to enter; let the after part be the same side as the top block is lashed; put the two up and down tackles on the heel, to assist the hawser; put a small spar in the fid hole, with a rope fast to it, and when the mast head is three feet through the cap hole, slue the mast one square forward; then lash the cap to it with two pieces of rope, clove hitched round the topmast head, and through the eye bolts in the cap, one forward and one aft each side, for the cap to go up square.

Heave round the capstan, man the up and down tackles by hand. When the cap is above the lower mast-head, slue the mast till the cap is fair for going on, then lower the mast, and beat the cap on with a commander; then make the end of the hawser fast to the forward eye bolt in the cap, keeping the weight of

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the mast in the tackles, unlash the top block, and hook it to the after eye bolt in the cap, heave taut the hawser, take the tackles off the heel, and the lashing off the mast-head and cap, and the racking off the two parts of the hawser, put a girtline on the after part of the topmast head, and heave the mast one-fourth up for the cross-trees.

TO SEND TOPMAST CROSSTREES UP.

SEND one end of the girtline down abaft the top, make it fast to the centre fore part of the crosstrees, bend an after girtline on it to keep it clear of the top and cap, sway the crosstrees above the cap, slack the after girtline, let the fore part rest against the mast, and the after part on the cap, make a strand fast to the after part of the crosstrees, and to the eye bolts in the cap, to prevent them slipping off; lower the topmast down, take the girtline off the mast, and the crosstrees will gradually come down on the cap and over the topmast head, then sway the mast up and fid it, to ascertain it is all right, then take the fid out and lower the mast below the deck. Then rack the two parts of the hawser, cast the ends off from the cap, put a good lashing round the hawser and topmast head, for lowering it on deck; take the heel aft for stowing it on the booms, and the heel of the main forward.

Unreeve the hawser, and reeve it through the live sheave of the other topmast, and secure as before, sway it up high enough to rig it.

TOP TACKLE.

HOOK the top block to the after eye bolt in cap, port side, reeve the top tackle pendants through it, and through the dumb sheave in heel of topmast, and make it fast to the foremast eye bolts in cap, starboard side.

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Hook the top tackle blocks and reeve the fall, and haul it taut, the standing hook will be the upper block; the swivel hook, the lower block.

Unreeve the hawsers, and reeve the starboard top tackle pendant, hook the blocks, reeve the fall, haul it taut, and rack the falls.

RIGGING TOPMAST WHEN FIDDED.

To save both time and labour in rigging the mast, fid the second mast with the hawser, the same as the first; when the cross-trees are four feet above the cap, put a girtline and two man ropes on the after part of the topmast head. Shackle the tye blocks to the forward leg of the necklace, and the jib-stay block to the after leg, port side; the jib halliard block to the after leg, starboard side.

Nail the bolster cloths on, put the burton pendant on, and hook the burton tackles to it.

Put the sail tackle pendant round the topmast, below the crosstrees, for staying the mast; hook the lower block of the fore to the bowsprit cap, the main in the fore top, and mizen in the main top.

Fid the masts, and stay them well forward.

Send the shrouds and backstays up by their respective numbers. Bend the girtline on No. 1 starboard pair of shrouds, three feet below the eye seizing, and stop it to the eye, hoist the shroud up, and put it over the masthead; then hang the shroud with the man rope or a strand, cast the girtline off, unreeve it out of the block and the eye of the shroud, reeve it the reverse way throngh the block, and send it on deck for the port pair; so continue. After the shrouds are all on, send the breast backstays up, which are one each side; they are spliced together to form the eye. Bend the girtline on three

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feet below the eye, the port side, and stop it along the starboard leg; hoist it up, and cut the stops as they come to the block, and send the end of the backstay down the other side. Send the other two pairs up the same as the shrouds.

If the dead eyes are turned in, set the shrouds and backstays up as soon as the eyes are placed, and the stays can be lashed for a full due down over the eyes of the rigging.

If the dead eyes are not turned in, make a strand fast to each shroud, reeve it through the dead eyes in the top, and haul them all taut alike; put a mark on the shrouds at two feet six inches from the top, that will be for the centre of the nip that goes round the standing part of the shroud.

TOPMAST STAYS.

PLACE them one on top of the other; put a good seizing on the crutch, and two on each side of the collar; send the ends of the girtlines down before all; make them fast to the crutch, and stop them to the eyes, sway them up, and lash the eyes abaft the mast above the rigging; pass the lashing, rose seizing fashion.

FORE TOPMAST STAYS.

PUT the hanks on the inner stay. Reeve the ends of the stay through the holes in the bees of the bowsprit, put a tackle on each, and haul them taut through.

JIB STAY.

THIS collar is fitted the same as the topmast stays. Stop it on top of the topmast stays, and send all three up at one time.

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In Portsmouth dockyard the jib stays are fitted to reeve through an iron-bound clump block, shackled to the necklace at the topmast head, on the port side, under the eyes of the rigging, and connected to a slip at the jib-boom end, and set up on deck, abaft the mast, with a long tackle block spliced into the end of the stay, and a double iron-bound hook block for the deck.

The jib halliards reeve through a single iron-bound block, shackled to the necklace on the starboard side.

The fore topmast stay sail halliard block is lashed the port side.

MAIN TOPMAST STAYS.

In sailing ships, the upper stay leads over a chock between the fore trestle-trees; the lower one leads through a clump block bolted through the fore mast, under the top; both are set up to iron-bound hearts in the deck.

In all screw ships, they both lead through clump blocks at the foremast, above the rigging, high enough to clear the peak of the gaff foresail, and are set up to iron-bound hearts in the deck.

Paddle-wheel steamers have but one stay, that reeves through the fore cap, and sets up to a collar under the third pair of shrouds.

The mizen topmast stay sets up to a thimble strapped round the eyes of the main shrouds; in screw ships there is an iron-bound clump block above the rigging.

TO PUT THE TOPMAST CAP ON.

For a large ship, put it on with the top-gallant mast; in smaller vessels it is put on by hand.

Lash the fore and mizen top-gallant mast rope block the starboard side of the topmast head, and the

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main the port side; send the mast rope up through the lubber's hole, reeve it through the block from aft forward, down through the mast hole in the crosstrees, then through the thimble of a lizard, through the sheave hole in the heel of the top-gallant mast, and through a thimble of the other lizard; haul enough through to reach the royal mast head, and rack the two parts together; reeve the lizard that is on the hauling part through the royal sheave hole, and hitch it to its own part; the lizard on the standing part is rove through the top-gallant sheave hole, and hitched to its own part. The lizards are two pieces of rope half the size of the mast rope, about six feet long, with a thimble in one end of each.

Sway the mast up and point it through the top-mast crosstrees. Overhaul the girtline down before all, bend it to the cap, and hoist it to the mast-head; put the other girtline on, and hang the cap up square above the eyes of the rigging, fair for the mast to enter through the round hole, then sway the mast up two feet through the cap, and lash it fair for going on the topmast head, sway the mast up, and when the cap is above the topmast head, slue the mast until the cap is fair for going on, then lower the mast and beat the cap on, then unreeve the mast rope out of the block and reeve it through the sheave hole in the cap; if there is no sheave in the cap, hook the block to the after eye bolt in cap, and make the standing part of the mast rope fast to the foremast eye bolt in the cap, lower the mast and let the weight come on the standing part, with the same racking on; then unlash the block, and hook it to the after eye bolt in the cap. Haul taut the mast rope, and take a turn with it.

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PREPARE FOR RIGGING THE FORE TOP-GALLANT MAST.

1st.—Put the top-gallant stay on the funnel.

2nd.—The flying jib halliard block is strapped with a short eye, and a grommet worked through it to go over the funnel.

3rd.—Put on the flying jib stay. Then send the girtline down before all, and make it fast to the stays, six feet below the funnel, and stop it to the funnel; hoist it up and place the funnel over the hole in the topmast cap, stop the stays to the crosstrees; send the girtline down abaft the top for the starboard pair of shrouds, and place them over the funnel, then send the port pair up. Next send the starboard pair of backstays up, and then the port pair.

ROYAL FUNNEL.

THERE is a block of wood fitted to go one-fourth down the funnel, and fastened to it by screws; the upper part is of the same shape as a royal mast-head, with the lightning conductor and spindle hole in it.

Put the royal stay and backstays on the funnel, reeve the signal halliards and put the truck on, hoist it up to the mast-head, place it over the top-gallant funnel, and ship the vane staff.

JIB-BOOM.

To get the jib-boom out, hook the double block of a tackle to a strap round the fore stay; hook the single block to a strap round the jib-boom; haul on the tackle and point the jib-boom through the bowsprit cap far enough to rig it, then reeve the heel rope, hook a single block the starboard side of the cap; reeve the heel through it and through the sheave hole in the heel of the jib-boom, and make the end fast to an eye bolt in the port side of the cap.

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There is a funnel fitted to go over the jib-boom, with an iron band round it with two lugs in it; the one on top is for the slip of the jib stay, the one underneath is to shackle the martingale stay.

TO RIG THE JIB-BOOM.

FIRST, put a grommet on the funnel, close to the iron band. 2nd, put the foot ropes on; 3rd, the starboard jib or spritsail guy; 4th, the port guy. Then seize the foot ropes on to the guys, about eighteen inches from the eye, shackle the martingale stay on, and secure the jib stay to the slip. Reeve the jib halliards, and make the end fast to the jib-boom, to top it up when going out; then put the flying jib-boom iron on the jib-boom end.

There ought to be a jackstay on the jib-boom, for the men to hold on by in going out to the boom end. many a man having fallen overboard for the want of it; and also a stirrup at the centre of the foot rope for large ships.

SPRITSAIL GAFFS.

IF they are on board, put the jaws through the bow port, put a tackle on the topmast stays, hook the single block near the jaws of the gaff, man the tackle, and haul the jaws out near the bees of the bowsprit; there is a score cut in the jaws, for the topmast stay to lead through.

TO RIG THE SPRITSAIL GAFFS.

1ST.—The brace, put the eye on the gaff, the other end reeves through a block at the eyes of the fore rigging, and sets up in the channels. 2nd.—Put the lift on, reeve the end through a clump block strapped through the upper eye bolt in the cap, and set it up to an eye bolt at the knight-head. 3rd.—Put on the fore

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guys. 4th.—The after guys and spritsail martingale—some call it a jumper.

Put a clump block on the gaff, outside and close to the guys, for the fore swinging boom guys. Fit a double strap round the gaff, half way out from the jaws, with a thimble seized in it, for the flying jib sheets to lead through.

Shift the tackle block two-thirds out from the jaws, to keep the outer end of the gaff up till the jib-boom is out.

MARTINGALE.

PUT a jigger on the cap, hook the single block below the jaws, and trice it up close to the bowsprit, and to the cap, reeve a lanyard through the jaws each side, reeve them up through a hole each side in the bees of the bowsprit; an eye is spliced in one end, the other lanyard reeves through it, haul it taut and hitch it.

To rig the martingale: shackle the martingale stay to the forward eye bolt in the martingale, and the guys or back ropes to the after eye bolt.

RIG THE JIB-BOOM OUT.

MAN the heel rope, haul the boom out and secure the heel; it is secured with two chains fitted with slips, one is called the heel chain, the other is called the crupper chain. The crupper is passed round the bowsprit and over the jib-boom, the slip is put through one of the end links and secured.

The heel chain is fitted in two pieces, one end shackles to an eye bolt the port side of the cap, and leads round the heel of the jib-boom, about two feet on the opposite side; the other piece of chain is shackled to an eye bolt the starboard side of the cap, and has a slip in the other end to connect the other chain to it.

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To set the rigging up: 1st.—The martingale guys, commonly called back ropes; 2nd.—Spritsail guys; 3rd.—Reeve the spritsail martingale through an iron-bound clump block at the stem; turn a thimble in the end, and set it up to an eye bolt in the knight-head, and set the jack stay up to the bowsprit cap.

FLYING JIB-BOOM.

MAKE a tail block fast to the boom iron, reeve a rope through it, make the end fast to the heel of the flying jib-boom, put a stop on the head, haul on heel rope, and point the boom through the iron.

RIGGING THE FLYING JIB-BOOM.

1ST.—Put on a grommet close to the hounds; 2nd.—Put on the foot ropes; 3rd.—Flying jib guy; 4th.—Flying martingale stay; 5th.—Reeve the flying jib stay through the sheave hole; the royal stay leads over a half sheave in the boom end.

Splice an eye in the ends of the foot ropes, then take a half hitch, and seize it round the jib or spritsail guys, and put another seizing on before the hitch.

Reeve the stays through the martingale as follows: 1st.—Fore top-gallant stay; 2nd.—Flying jib stay; 3rd.—Flying martingale stay; 4th.—The fore royal stay; all in succession.

Walk the boom out, and step the heel in the bowsprit cap, and lash it to the jib-boom. Set up the rigging flying martingale stay, royal stay and flying jib stay to the knight-head. Reeve the guys through the ends of the spritsail gaffs, and set them up to the cat head.

FID THE TOP-GALLANT MASTS.

TAKE the racking off the mast rope, and sway the mast up; place the royal and top-gallant funnels at

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the hounds as the mast goes up, and reeve the royal and top-gallant yard ropes; fid the mast, and stay it forward.

Reeve the top-gallant and royal stay over a half sheave at the jib and flying boom end, and through the martingale, and set it up to the knight-head.

The main top-gallant stay reeves through a hole in the after part of the fore cap.

The royal stay reeves through a sheave hole at the after part of fore topmast crosstrees; turn a thimble in each, and set them up to thimbles strapped round the lower rigging.

The mizen top-gallant stay reeves through a hole in the main cap.

The royal stay reeves through a thimble strapped through the eye of the main topmast rigging, and sets up to thimbles strapped round the main rigging.

NECKLACE FOR TOP-GALLANT RIGGING.

THIS is an iron band round the topmast, with a hinge on the fore part, with two iron rollers on each side, and connected together with a screw eye bolt abaft the topmast. It is a most excellent plan, and much better for the top-gallant rigging than the old fashioned plan, and it does away with the catharpin legs and futtock bolts.

Reeve the shrouds through the horns of the cross-trees, and through the rollers of the necklace that is round the topmast; turn thimbles in the ends, and set them up to thimbles strapped round the dead eyes in the top, or splice the two together and a double block seized in the bight. The lower block is secured to the eye of lower shroud.

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BACK STAYS.

THE forward backstay sets up with a tackle abreast of the mast; turn a thimble in the after backstay, and set it up to an eye bolt in the after part of the channels.

Stay the royal mast, and set the backstays up; the forward leg sets up abreast of the mast with a tackle, the after leg sets up with a lanyard at the after part of the channels.

MASTHEAD SLING CHAINS.

THESE slings are placed two-thirds up the masthead over a thumb cleat, the two ends lead over a chock through the forward hole in the fore part of the top, and the slings of the lower yard are connected to it with a slip.

TO LASH JEER BLOCKS AT MASTHEAD.

SEND both girtlines down through the after hole in the fore part of the top, make them fast through the sheave holes and stop them to the strap, hoist the block close up under the top and lash the eyes at the after part of the mast.

RATLINE THE RIGGING.

PUT two swifters on each side, and swifter the rigging well in; mark the forward shroud all the way up, for the ratlines to be fifteen inches apart, then lash the spars five feet apart, parallel with the sheer pole.

The rope for the ratlines should be well stretched; commence putting them on as follows:—

Splice a small eye in one end, form a clove hitch round the shrouds, seize the eye to the forward shroud with two-yarn nettle stuff, let the eye be three inches from the shroud; after the hitches are

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all hove taut round the shroud, splice the other eye, allowing it to be three inches from the shroud. Every fifth ratline is seized to the after shroud, that is called a catch ratline; all the remainder are seized to the after shroud but one. Every man should be furnished with a thin batten 14½ inches long, to measure between the ratlines, and not with a rake the same as the after shrouds, which are four or five feet longer than the forward shroud.

During the time of rigging the ship, the men going up and down the rigging will cause the ratlines to stretch; after the ship is fully rigged, ready for backing down, heave taut and square the ratlines, and the eyes will come close or near the shrouds, and may not require shortening,

TO SEND UP TOPSAIL YARDS.

SLINGS shouuld be fitted with an eye in each end to all the topsail yards. Reeve the slings round the yard, outside of the tye blocks, and lash them to the opposite quarter of the yard with a good lashing; hook the lower block of the sail tackle to it, hoist the yard up high enough to rig it; reeve the braces. The fore topsail braces reeve through the main bits, up through leading blocks at the cheeks of main mast, through leading blocks on main stays; send them forward outside of all the rigging up through block on the yard; send the end up to the main topmast head, form a clove hitch above the rigging, splice the other brace to it, render the hitch back for the splice to be on the fore part of the mast,—the two parts are seized to the main topmast stays. Main topsail braces, reeve them through mizen bits, up through blocks on the mizen

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mast, up through blocks on the yard; send the end to the mizen topmast head, reeve them through clump blocks strapped round the after crosstree, under the eyes of the rigging, and then made fast to the after part of the mizen channels.

Reeve the lifts through the sister block, through block at yard arm, and clove hitch the ends round topmast head. Mizen topsail lifts are single lifts; put the eye over the yard arm, reeve the end through the sister block, turn a thimble in each, and set them up in the top with a lanyard. The fore and main set up in the channels with a tackle.

Put the topmast studding sail halliard blocks over the goose neck, and put the boom iron on.

Hoist the yard up, cast the lashing off, and square the yard by the lift and braces, keeping the yard two feet above the cap. Pass the parrel round the mast, the long leg round the yard, which is lashed to the short leg.

TOPSAIL TYES.

Reeve the ends through the blocks at the mast-head, through blocks on the yards, let the fly block be in a line with the lower cap, haul the ends taut round the topmast head, hitch and seize it to its own part, stop the spare end down the foremast shroud, hook the lower halliard block to the after part of the channels, and reeve the halliards.

The mizen topsail yard has only one tye block on the yard, and a sheave hole in the topmast.

Topsail yards are frequently sent up with a hawser rove through one of the hanging blocks and made fast to the centre of the yard, and stopped out on the quarter with a good lashing.

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PUT LOWER YARDS ON THE GUNWALE.

THE yards being on shore, or alongside the ship, the jeers will not reeve full; reeve the jeers through block at masthead, then through a block on the yard, then up through masthead block, then reeve it through the other block on the yard, hitch, and seize it to its own part.

The up and down tackles may be put on to assist.

Put a tackle on the centre to ease it off from the shore, and a small guy on each yard arm.

Take the jeers to the capstan, man the tackle and walk the yard up, chocks of wood being placed in the hammock nettings to receive the yard; place the yards on the chocks.

REEVE FORE AND MAIN LIFTS.

SHACKLE the double blocks to the caps, if strapped with chain; but if they are strapped with rope, they should be fitted in the eye bolt in the cap before sending aloft.

Reeve the lift up through the forward sheave of double block at cap, through block at the yard-arm, up through the after sheave of block at the cap; splice a running eye and put it over the yard-arm.

REEVE THE FORE BRACES.

Reeve the end through main bits, through block at the cheeks of the main mast, take it forward outside of all the rigging, reeve it through blocks on the yard, from out, in; splice a running eye round the same eye bolt as the block is strapped on at the cheeks of main mast.

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REEVE THE MAIN BRACES.

THE after brace—reeve the end through leading block at the quarter, through block at the yard-arm, from out, in, and splice the end into an eye bolt at the quarter.

Preventer braces—reeve the end up through double block at the cheeks of the foremast, through block on the yard, and down through the other sheave of the double block, then both ends will be on deck, reeve them through the sheave holes in the after fore bits.

Reeve the jeers full, take them to the capstan, heave the yard up, take in the slack of the lifts when the yard is high enough, shackle the slip to the masthead slings; the tongue of the slip is put through a shackle at the yard slings; put tackles on the lifts, and square the yard by the lifts and braces.

FORE AND MAIN TRUSS PENDANTS.

CHAIN trusses—reeve them through clump blocks at the after part of the trestle trees, through the thimble of the truss strap, take it round the after part of the mast, and shackle it to the other truss strap; the end that leads through the block comes half way down the mast, with a double iron-bound block shackled to it. A small ship would have a single block. The lower block is a single block, and is hooked to an eye bolt in the deck abaft the mast, and a fall rove through them; there is a tricing line seized on each truss half way down, and leads through a block seized to the after shrouds.

Man the truss falls and truss the yard close to the mast.

CROSS JACK YARD.

PUT it on the gunwale with the mizen burtons. Reeve the braces through the block at the necklace

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of the main mast, also through the block on the yard, and splice a running eye through one of the links close to the block. Reeve the lifts, put a running eye over the yard arm, reeve the other end through a block at the cap, splice a thimble on it to set up to an eye bolt in the deck with a lanyard.

Man the Burton falls and sway the yard up.

CROSS JACK TRUSS PENDANT.

REEVE one end up through the port truss strap, pass the other end round the mast, and up through the thimble of the starboard strap; shackle a single iron bound block on each end; there are sheaves in the after part of the trestletrees, reeve the falls and truss the yard close to the mast.

Square the yards by the lifts and braces.

TO SEND UP TOPMAST STUDDING SAIL BOOMS.

SEND them up by the top-gallant yard rope, or put a whip on the topsail yard half way out, make the end fast to the boom, a little outside of the centre, and make the heel lashing fast to the whip to form a span so that the boom will go up square; sway the boom up, and place it in the boom irons on the lower yards.

Put the lower studding sail halliard block and topmast studding sail tack on the boom end.

Lash the span blocks over the topmast cap, for the topmast studding sail halliards to lead through.

SENDING TOP-GALLANT STUDDING SAIL BOOMS UP.

SEND them up by the royal yard rope, or put a whip on the crosstrees, make the end fast to the boom a little outside of the centre, make the heel lashing fast to it to form a span; stop the whip to the heel of the

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boom, so that it may go up perpendicular to clear the lower stays, and when it is up to the topsail yard, cut the stop, and the boom will hang square; point the end of the boom through the iron, toggle the studding sail tack block to the eye bolt in the end; secure the heel with a lashing.

REEVE TOP-GALLANT BRACES.

For ships above a sixth-class frigate, the fore and main go double; they are rove up through blocks under the main and mizen topmast crosstrees, through blocks on the topmast stays, which are seized just below the collar, then through the yard arm blocks, and the end is made fast to the stay close to the blocks.

The mizen are single, and lead through blocks seized to the main topmast rigging. For vessels under a fifth-class frigate, the braces go with a pendant and a whip; one end of the pendant is spliced round a block which hangs one-third down the lower mast, with a whip rove through it; the other end is rove through the blocks under the crosstrees and stays, and an eye spliced in it to fit the yard arm.

REEVE TOP-GALLANT LIFTS.

An eye is spliced in one end to go over the yard arm, and the eye of the brace block marled to it; the other end reeves through a roller thimble or a sister block seized in the top gallant shrouds, and leads down in the top.

TO REEVE ROYAL BRACES.

The fore and main lead through blocks seized to the main and mizen top-gallant shrouds, or a grommet worked through the eyes of the block straps, to go

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over the funnel, which is put on before the rigging; the mizen goes to the main topmast crosstrees; splice an eye in the end to fit the yard-arm.

ROYAL LIFTS.

An eye is spliced in one end to go over the yard-arm and is marled to the eye of the brace; the other end leads through a thimble seized in the royal backstays, and leads down in the top.

TO BEND TOP-GALLANT AND ROYAL YARD ROPES.

Reeve them through the grommet at the yard-arm, through the thimble of the lizard, and make fast to the slings; if there are no slings, make fast to the centre of the yard, the same way as in a studding sail bend.

A lizard is a small piece of rope with a thimble spliced in one end, the other end is rove through the thimble of the quarter strap, and through the thimble of the short strap of the parrel, and a half hitch taken with the bight, ready for slipping, when the word is given to sway across.

Stop the yards up and down the rigging.

STEAMERS GAFF FORE SAIL AND MAIN SAIL.

They are fitted to run on the gaff with iron rings, instead of lacing the sail to the gaff; the gear they require is as follows:—

Peak and throat halliards, outhauler and whip, inhauler and clew-tricing lines, sheets, vangs, and middle brails.

Peak halliard block for the gaff is a double iron-bound block.

The block for the mast head is a treble iron block, two sheaves for the halliards and one for the outhauler.

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Throat halliard block for the gaff is a double iron-bound block, and a chock between the trestletrees with two sheaves in it.

The outhauler is chain, and is rove through the block at mast head, through sheave hole in gaff end, and shackled to the end of the sail. An iron bound block is shackled to the other end with a whip rove through it; strap two blocks in the eye bolts in the jaws of the gaff for the inhauler and clew-tricing line.

Vang blocks are iron-bound, with clasp hooks.

For the sheets, there is one clump block and one single block. The clump block is strapped with the end of the sheet; the single block is fitted with a hook; reeve the sheet, put the bight of the sheet through the clew thimble, and toggle it close to the clump block, then reeve the end through the single block and through the clump block, that forms the sheet.

In small steamers, peak and throat halliard blocks for the gaffs are single blocks.

All paddle and screw ships are fitted this way in Portsmouth Dockyard.

SPANKER BOOM.

JACK stay—make a Matthew Walker knot in one end, reeve the other end through eye bolts on top of the boom, from aft forward, splice an eye in it, and set it up to the inner eye bolt.

Foot ropes—splice a short piece at the centre, to form a cut splice to go over the boom end, splice an eye in the ends, and seize them to the boom inside of the traffrail.

To reeve the topping lift, the standing part is spliced into eye bolts at the boom end; the other ends reeve through the clump blocks at mast head and through

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the snatch on the boom, and sets up under the boom with a tackle; they are two long tackle or fiddle blocks and two single blocks fitted with hooks.

SPANKER BOOM SHEETS.

For all large screw and sailing ships there are two double and six single locks.

For small screw and paddle-wheel steam vessels there are two double and two single blocks.

Some large steamers have double blocks.

Where there is a stern gun, the blocks in the quarter should be fitted with a shackle.

Outhauler—there is a clump block strapped in the clew of the sail, and a sheave in the boom end.

Peak halliards—there is one double iron-bound block for the masthead, and two single iron-bound for the gaff.

Throat halliards—there is a chock fitted in the after part of the trestletrees with two sheaves, and a single block for the gaff.

Peak brails—the outer brails are two single blocks fitted with a span to go over the gaff, about two-thirds out; the inner peak brails are two double blocks fitted with a span about one-third out—one sheave is for the lead of the outer brails; there are two double blocks fitted with a span to go over the jaws of the gaff for the lead of the outer and inner brails.

Throat brails—they are two single blocks, and fitted with a spar to go over the jaws of the gaff.

Middle and foot brails are single blocks, and are seized to the eyelet holes of the sails.

Small ships are fitted the same, but they have only one peak brail.

Each brail is a single rope, middled at the leach of the sail.

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There are two blocks strapped into eye bolts in the jaws of the gaff; one is for the tack tricing line, and the other is a clump block for the gaff topsail sheet to lead through.

REEVE RUNNING RIGGING.

FORE and main tack and sheet blocks are fitted with a thimble to shackle to the clew of the sail. Splice a running eye in the fore tack, and put it over the bumpkin; reeve the other end through the tack blocks on the clew of the sail, through the blocks on the bumpkin, and through sheave holes, in the bulwark.

Main tack—splice a hook in the standing part, and hook it to an eye bolt in the deck, near the block; reeve the other end through the tack block on the clew of the sail, and through the block on the deck, from forward, aft.

Fore and main sheets—hook the standing part to an eye bolt abaft the channels; reeve the other end through the sheet blocks on the clew of the sail, and through sheave holes near the standing part.

Topsail sheets for large ships are double; they are rove up through the quarter blocks, under the quarter of the lower yards, through sheave holes in the yard arm, and through blocks on the clew of the sail; the standing part is clinched round the yard arm.

Smaller vessels have chain topsail sheets.

To measure for the length of chain, make a small line or a piece of spunyarn fast to the eye bolt in the lower cap, reeve the other end down through the sheave hole at the yard, in through the roller at the quarter of the yard, and two feet below that will be the length of the sheet; the upper end is fitted with a clasp hook, the lower end is bolted to the lugs of an iron-bound block.

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A whip wove through the block—make one end fast to an eye bolt in the deck, reeve the other end through a block or a sheave hole in the bits.

Top-gallant and royal sheets are single; they reeve through the quarter blocks, through sheave holes at the yard arm, and are bent to the clew of the sail.

Fore and main clew-garnets and topsail clewlines are rove up through the quarter blocks, under the quarter of the yard, down through blocks at the clew of the sail; the standing part is timber hitched round the yard, outside and close to the block.

Top-gallant and royal clewlines are single; they are rove up through blocks under the quarter of the yard, and made fast to the clews of the sail.

Topsail reef tackles—they are rove up through the sister blocks, down through sheave holes in the yard arm, through blocks on the leach of the sail, and the ends are clinched round the goose-neck, inside of the topmast studding sail halliard block.

The main bowline is fitted with a pendant and tackle; the pendant is rove through a thimble on the bridle, and made fast to the fore bits, ready for slipping.

All other bowlines have an eye spliced in one end to put over toggles on the bowline bridles, the other end leads forward.

The fore bowlines lead through blocks that are fitted with a span, round under the bowsprit, outside of the inner fore stay collar.

The fore top bowline leads through a sheave hole in the bees of the bowsprit.

The main-top bowline leads through the block lashed to the eyes of the fore rigging, and down through the lubber's hole.

The mizen-top bowline leads through the same block as the cross jack brace.

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The fore top gallant bowlines lead through blocks at the jib-boom end; these blocks are fitted with a span round the funnel, or seized to the eyes of the jib guys.

The main top-gallant bowlines lead through sheave holes in the after part of the fore topmast crosstrees.

The mizen top-gallant bowline leads through blocks seized to the main topmast shrouds.

Fore and main buntlines—hook a double block to the forward eye bolt each side of the lower cap, reeve the buntline through the upper shoe block, then reeve both ends through the double block at the cap, from aft forward, down through sheave holes in the fore part of the top; haul the shoe blocks close up to the double block, then toggle or clinch the ends to the foot of the sail.

The whip is rove through the lower shoe block, and both ends lead down through the lubber's hole on deck, and are rove through blocks or sheave holes.

Topsail buntlines reeve through sheave holes in the topmast crosstrees, or blocks, down through a thimble of a lizard, above the topsail yard, round the tyes, and are toggled to the foot of the sail.

The top-gallant buntline is a single rope with two legs, which are toggled to the foot of the sail; the other end is rove through a block seized to the eye of the top-gallant stay, and leads down into the top.

Fore and main leach lines—they are rove through a double block under the top, out through a block seized to the jack stay, down before the sail, and are clinched to the leach of the sail; there are two each side.

Fore and main slab lines—they are rove through a double block at the quarter of the yard, on the fore side, abaft the sail, and through blocks seized to the jack stay, between the yard and the sail, and are

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clinched to the leach of the sail; there are two each side.

The bunt slabline is a single rope rove through a tail block fast to the slings of the yard, it leads down abaft the sail, and is clinched to the foot.

TO REEVE STUDDING SAIL GEAR.

THE swinging boom topping lift reeves through a clump block that is seized between the second and third shroud of the fore rigging; and through another clump, fitted with a tail for a lizard, to take out on the fore yard, when the boom is to be got out; then splice the end round a thimble through an eye bolt at the boom end; splice an eye in the other end, and seize a double block in it, the lower block is a single one, hooked to an eye bolt in the channels; reeve the fall.

Reeve the fore guys through a fair lead in the forecastle bulwark, through a sheave on the bees of the bowsprit, out through a clump block on the spritsail gaff, and splice round a thimble through an eye bolt in the boom.

Reeve the after guy through the lower sheave at the after part of the waist netting, and splice it round a thimble through an eye bolt in the boom.

Reeve the lower studding sail tack through the sheave hole above the after guy, through the block at the boom end, and bend it to the outer clew of the sail, when required.

Reeve the lower halliards up forward of the top, through the span blocks, through the block at the boom end, send the end down on the forecastle, and bend it to studding sail yard one-third out.

The tripping line is rove through a block on the fore shroud, down through a block on the inner yard-arm,

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through a thimble in the after part of the sail, and is made fast to the outer clew of the sail.

TOP-MAST STUDDING SAIL.

THE halliards are rove up through span blocks at the top-mast cap, down through a block on the goose neck of the topsail yard-arm, between the yard and the boom, down abaft the lower yard, inside of the brace, and bend it to the studding sail yard one-third out.

Take the tack up outside of the back-stays and lower rigging, out upon the lower yard, under the brace, reeve it forward through the tack block at the boom end, then in over the fore brace, down on deck, and bend it to the clew of the sail.

Topmast studding sail boom topping lift—splice a running eye in one end, and put it over the boom, and a thimble in the other end to hook a tackle to. The tackle consists of two single blocks fitted with hooks, one is hooked to the topping lift, the other is hooked to an eyebolt in the topmast cap. Frequently officers have it different: they have a long tackle block in the lower studding-sail halliard span, with the topping lift through the upper sheave, and the lower halliards through the lower sheave; some will have a double block in the span. The down haul reeves through a block on the outer clew, abaft the sail, up through a thimble on the outer leach; splice an eye in the end, and put it over the outer yard arm.

TOP-GALLANT STUDDING SAIL.

REEVE the halliards up through span blocks at the top-gallant mast-head, through a block at the top-gallant yard-arm, before the yard, into the top, and bend it to the yard about one-third out.

Reeve the tack out through a block at the after

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dead eye in the top, and up under the topsail brace, through a block at the top-gallant studding sail boom end, in over the brace, and bend it to the outer clew of the sail.

The down haul is made fast to the inner yard-arm, and leads down in the top.

If the topmast studding sail is set, and it is blowing hard, how would you martingale the topmast studding sail boom down?

Put an over-hand knot in the bight of the lower studding sail halliards, above the block on the boom, put a toggle in the knot to prevent its being jambed, then haul on the underneath part of the halliards, and that will martingale the boom down.

POINTS FOR TOPSAIL AND COURSES.

THE points are made to go round the yard, or jack stay; some prefer having two jack stays; the first and second points to go on the bending jack stay, the third and fourth reef on the after jack stay.

Directions for the points, and how to make them: They are made from four-yarn spun-yarn, with four or five parts in the eye, and worked down with seven or nine parts; and the length of spun-yarn on the two parts to make a point, is once and a-half the length the point is required to be made.

The eye is made round a toggle, which remains in the point. If they are fitted to go round the jack stay, plait down six inches from the toggle, then separate the foxes and plait an eye eight inches long, then plait down nine inches solid, whip the end with twine, and it is finished.

In Portsmouth dockyard the points are fitted to go round the yard, with a short eye to go over the toggle, and the toggle part is seized to the jack stay.

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Directions to make them: Plait down from the toggle four inches longer than the round of the yard where it would be placed, then separate the foxes and plait an eye four inches long for large ship's courses and fore and main topsails—three inches will do for smaller vessels and mizen topsails—then plait down four inches solid, and plait another eye eight inches long; then plait down nine inches solid, whip the end with twine, and it is finished.

The distance between the points when on the yard would be five inches; every odd point is for the first and second reef, the even numbers for the third and fourth reef; or there is one sennit point and one rope, that is to say, every other one is a rope point made from four-strand rope.

See diagram, pages 212 and 213.

Directions to make them: The length to cut the rope in 3-ft. 5-in. longer than the round of the yard. Splice one end round a toggle, put a whipping round the rope at four inches longer than the round of the yard from the toggle; then divide the rope in two up to the whipping, and form an eye four inches long, with two strands each side; then lay up four inches solid, and form another eye eight inches long; then lay up nine inches solid, and whip the end with twine.

To finish the two eyes, take a strand of the same size rope, four times the length of the eye, reeve it through the rope at the lower part of the eye, and lay one end up each side of the eye to form a three-strand rope, splice them into the standing part of the rope, and it is finished.

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TO FIT THE SAIL.

THERE is a jack stay of two-inch rope at each reef band, on the after side of the sail, the length of it is two feet longer than the width of the sail, and it is spliced through the eyelet holes of the reef cringle.

There is also a reeving line on the fore side, it is passed through the eyelet holes round the jack stay, the same as lacing a sail to a yard; commence at the centre, and work both ways; the ends are spliced through the eyelet holes of the reef cringle; the length of it is once and three-eighths the breadth of the sail, or 2-ft. 7-in. to every cloth.

At the third reef band there is a pair of points put in the sail at each yard arm, and two pair in the fourth reef.

Rope bands for topsails and courses are re-manufactured rope; the sizes are from half-inch up to one inch, and the lengths are from 2-feet 6-in. up to 3-ft., according to the size of the sails; they are spliced into the eyelet holes in the head of the sail. In the two centre eyelet holes there should be a piece of two-inch rope, six feet in length, to denote the centre of the sail in bending it; it is made fast round the jeer blocks; if a topsail, it is made fast round the tye blocks. Frequently, when the sails are fitted on board, the rope bands are made with rope-yarns, or two-yarn spun-yarn rove through the eyelet holes and plaited up as sennit.

Find the length of the yard and multiply it by 12, to bring it into inches, and divide it by the number of holes in the sail, to seize the point on the jack stay

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Example, 23 feet
12

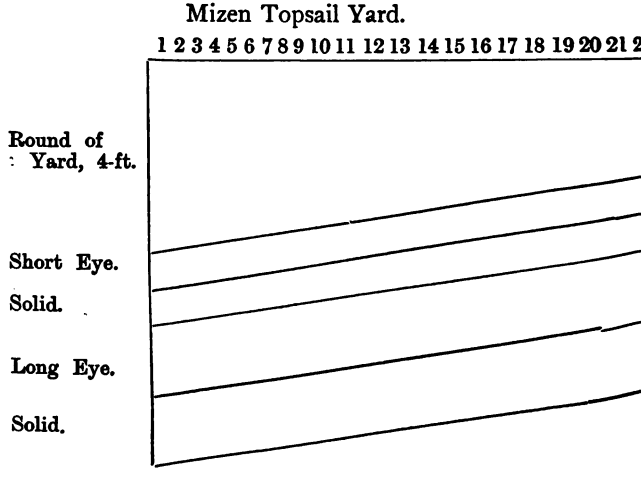
48)276(5 inches
240

36
4

48)144(3 quarters
144

...

The distance to place each point on the jack stay, as follows :—



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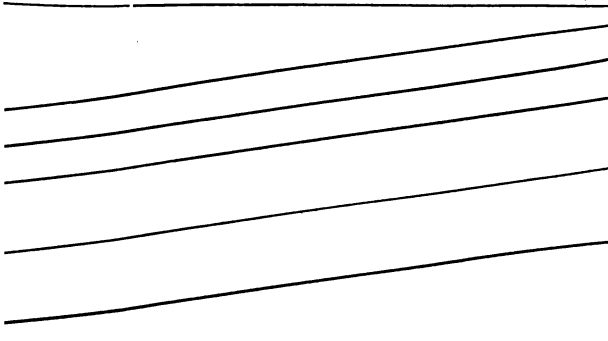
The number of points to be seized on the jack stay for line-of-battle ships :—

Fore course	...	...	...	98
Main ...	...	...	...	98
Fore topsail	...	...	...	112
Main ...	...	...	...	120
Mizen	...	...	...	96

Length from centre to shoulder, 23-ft. Yard-arm.

26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48



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DIRECTIONS TO FIT FORE AND MAIN COURSES.

REEF pendants are spliced into the second reef earring cringle, and should be a sufficient length, when the sail is bent, to reeve through the block and come along the yard from nine to twelve feet.

Length to cut bowline bridles :—

Once and two-thirds the length from cringle to cringle; and, after they are spliced in, they will be once and one third.

A main course has two bridles, the upper one is spliced into the second and third cringles, one end of the lower bridle is spliced into the lower cringle, the other end is spliced round the other bridle after the thimble is rove on it. There are two thimbles fitted with a double strap, one is rove on the lower bridle; the pendant reeves through the other when required.

The fore course has but one bowline bridle; there is a thimble and toggle fitted with a double strap, the thimble is rove on the bridle, the ends of the bridle are spliced into cringle.

There are four toggles strapped with a grommet strap through eyelet holes in the foot of the sail, for the buntlines.

Earrings are from 2½-in. 6fms. down to 1½-in. 5fms.

DIRECTIONS FOR FITTING TOPSAILS.

REEF pendants—the length to cut them should be four times the length from cringle to cringle; one end is spliced into the cringle below the fourth reef cringle, the other end is whipped.

Bowline bridles—the length to cut them is once and two-thirds the length from cringle to cringle, and after they are spliced, they will be once and one-third the length from one cringle to the other.

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A main topsail has three bowline bridles; the lower bridle is spliced into the first and second cringle, the upper bridle is spliced into the third and fourth cringles, the centre bridle is spliced round the upper and lower bridle, and a thimble and toggle travel on it.

Fore and mizen topsails have only two bowline bridles: the upper bridle is spliced into the second and third cringles, one end of the lower bridle is spliced into the lower cringle, the upper end is spliced round the upper bridle, the thimble and toggle travel on the lower bridle.

Sheet blocks—they are clump blocks fitted with a grommet strap round a thimble in the clew of the sail. Take a four-strand rope to make a three-strand grommet. For the length to marry the strand, take once the round of the block, once the round of the thimble, and half the round of the rope.

Buntline toggles—there are two toggles strapped with grommet straps into eyelet holes in the foot of the sail. Earrings are from 2 inch 6 fathoms, downs to 1½ inch 5 fathoms.

DIRECTIONS TO FIND OUT THE LENGTH OF REEF POINTS FOR TOPSAILS, IF THEY ARE PUT IN THE SAIL.

From a First-class Ship to a Fifth-class Frigate.

TAKE once the round of the yard at the centre, that will be the length of the after legs of the first reef; the foremast reefs are one foot less, except the fourth reef, which are both one length. The second reef points are six inches longer than the first, and the third six inches longer than the second, the fore and after legs of the fourth reef are the same length as the after leg of the third reef.

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For mizen topsails and small ships the after points are only six inches longer than the foremast point.

For example :—

The fore topsail yard was 5-ft. 6-in. ; main topsail yard, 5-ft. 10-in. ; mizen topsail yard, 4-ft.

No of Reefs	FORE.		MAIN.		MIZEN.	
	Fore Legs,	After Legs.	Fore Legs.	After Legs.	Fore Legs.	After Legs.
	ft. in.	ft. in.	ft. in.	ft. in.	ft. in.	ft. in.
1st	4 6	5 6	4 10	5 10	3 6	4 0
2nd	5 0	6 0	5 4	6 4	4 0	4 6
3rd	5 6	6 6	5 10	6 10	4 6	5 0
4th	6 6	6 6	6 10	6 10	5 0	5 0

All topsail yards that are less than three feet in circumference at the centre, give the round of the yard for the foremast leg instead of the after one, and allow the after leg to be six inches less than the foremast leg.

Length of reef points for courses should be 3-ft. 6-in., from a first-class ship down to a fourth-class frigate ; 3-ft. 3-in., down to a sixth-class frigate ; 3-ft., down to an eighth-class frigate ; and 2-ft. 9-in., for the remainder.

ADMIRAL ELLIOTT'S EYE IN HEMP CABLES.

Directions for making the eye in all size cables :—

Put a good whipping on the cable at the undermentioned lengths from the end. The following table also shows the size and length of the hitching for the eye, the size and length of the seizing, the length of rounding for kackling, and the length to kackle each cable.

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Cables.			End.	Hitching.		Seizing.		Roundin.		Length to tackle.
in.	in.	in.	feet.	in.	fthms.	in.	fthms.	in.	fthms.	feet.
26	25	24	14	1	27	1½	9½	3	50	9
23	22	21	13	1	26	1½	8½	2¾	46	9
20	19	18	12	¾	22	1½	8	2½	40	8
17	16	15	11	¾	19	1¼	7½	2¼	30	7
14	13	12	10	½	16	1¼	7	2	25	6
11 and 10			9	½	14	1	6½	1½	12	5

Directions for making the eye in 24-in. cable :—

Put a good whipping on the cable at 14 ft. from the end; lash the cable to any place that is convenient, then unlay the cable to the whipping; take the turns well out of the strands, put a tackle on them, haul them well taut one at a time, and beat them with a commander; the more they are beaten the better the strand will lay in for the long splice.

Place one strand round the thimble and meet it with the other, to ascertain the length to marry the long splice, so that the tucks will come clear of the thimble and seizing.

Unlay the strands and marry them together two feet six inches from the whipping, put a good stop round them, leaving out the first strand to be unlaid round the eye, and as you take out one strand, lay in the other one, keeping the turn well in the strand; for if the turn is allowed to go out of the strand, it will swell, and not lay in level with the other strand.

After the strand is laid in round the eye, so that the tuck or splice will come between the two splices on the opposite side, half knot the strands and heave them well in; do not tuck them in till the other strand is laid in, for fear the lay should come out of it; you must put a good stop on it to keep it from rendering back.

Take off the stop from the marrying part, and take out the strand that is to be unlaid, put the stop on

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again, unlay and lay in the other strand as close up to the whipping as you can splice it; half knot the strands and heave them in, take the stop off from the marrying part, knot the two strands and heave them in; tuck all the strands once with two-thirds of each strand, leaving one-third out.

Put the thimble in, and put the third strand round it to ascertain the length for the single eye, put a strap through the thimble and hook a tackle to it, haul it well taut to see that all parts bear an equal strain, for that is the principal point in making the eye; if the single strand is too taut, slack the stop that is on to form the eye, and render it round the thimble; if the single strand is too slack, ease up the tackle and take up some of the single strand, haul taut the tackle, and if the strands all bear an equal strain, put a chalk mark on where to splice it. The fork of the splice should be nine inches from the thimble, that will allow for the seizing and crossing turns.

Take the thimble out and splice the eye in the single strand the same as for an eye splice, put the strands in once; they are not cut off, but brought down the lays of the cable for wormings. Whip the strands of the long splice close to the rope, and cut them off, leaving four inches end.

Lay the cable up, and place the strands of the single eye in for wormings, put the eye on a fid and beat it down till the eye is large enough to take the thimble; after the hitching is on, take the eye off the fid, and hitch the two parts together with one-inch rope—it will take 27 fathoms; hitch the eye all round in wake of the thimble, to secure the ends of the hitching; lay the ends under the seizing between the two parts of the rope, and after the seizing is on, pass two crossing

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turns with the hitching round the seizing, the last turn comes under its own part, put a crown knot on it, that crossing secures the riding turns of the seizing as well as the hitching.

Fid the eye out and put a thimble in, then set it up with a tackle, put a strand round the cable close to the thimble, and with a Spanish windlass heave all parts close to the thimble, put a stop of spun-yarn on where the first turn of seizing should come to, then take the strand off.

Seize the thimble in with one and a-half inch rope, the length it will take is nine and a-half fathoms; there should be eight lower turns, seven riding turns, and three crossing turns; the seizing being finished, secure the hitching as before mentioned.

Kackle the cable; the size and length of the rounding should be 3-in. rope, 48 fathoms, centre the rounding, and commence putting it on 4-ft. 6-in. from the thimble, and work both ways; it takes three men each way to put the rounding on, one man to pass it round, another hauls it taut, keeping a strain on it, while the third beats it taut round the cable with a mallet.

Finish the kackling at nine feet from the thimble, take one strand out of the rounding for the last six turns.

ROPES.

SHROUD rope: this is made with four strands, hawser laid. The sizes range from two inches to fourteen and a-half inches; the length are 106 fathoms.

Hawser laid, common: this is made with three strands. The sizes are from half-inch up to ten inches; the lengths are 113 fathoms.

Bolt rope: this is made with three strands and hawser laid. The sizes are from three-quarters up to seven

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and a-half inches; the lengths are 122 fathoms, and are made from the best Italian hemp.

Cable laid rope (see page 7). The sizes are from two inches up to twenty six inch cable; the lengths are 101 fathoms.

It is also requisite to know the size ropes to reeve in all sizes of blocks, viz:—

For a common thick block, take one-third the length of the block: for instance, a 12-in. common thick block will reeve a 4-in. rope.

For a clump block, take half the length of the block, say a 12-in. clump block will reeve a 6-in. rope.

For a thin block, take one fifth the length of the block, say a 12-in. block will reeve a $2\frac{1}{2}$-in rope.

For a long tackle or fiddle block, take one-sixth the length of the block, say a 12-in. block will reeve a 2-in. rope.

MANŒUVRING SHIPS AT SEA.

CLOSE HAULED ON OPPOSITE TACKS:—The ship on the port tack is always to give way, if necessary, either by keeping away, or going about.

SHIPS WITH THE WIND FREE give way to those on a wind; therefore, the ship on the port tack stands on.

TWO SHIPS HAVING THE WIND LARGE, and meeting nearly end on, are to pass on the port side of each other; therefore the ship to the eastward keeps away, and the other hauls up.

UNDER STEAM, and *nearly* end on to each other,

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both port their helms and pass on the port side when meeting not end on.

A STEAMER always gives way to a sailing vessel, and it must be remembered that every vessel under sail, with steam ready, though not using it, is considered a steamer in the event of a collision.

EVERY VESSEL UNDERWEIGH is to carry a green light on the starboard, and a red light on the port side; steamers in addition carry a white light at the foremast head. The side lights to be fitted with inboard screens, projecting at least three feet forward from the light, so as to prevent the light from being seen across the bow. Vessels towing, carry two white mast-head lights.

DURING FOGS, vessels under steam are to sound a steam whistle; vessels under sail to use a fog horn; at anchor, ring a bell.

The signals to be sounded once at least every five minutes.

MAKING PLAIN SAIL.—"Clear lower deck;" "make all plain sail, starboard tack;" "upper yardmen aloft;" man the topsail sheets and halliards. "Away aloft;" "trice up, lay out;" "hoist the jib;" "let fall, sheet home;" upper sails to be kept up until the topsails are nearly mast headed; then let fall by order, sheeted home and hoisted.

As each sail is let fall, the loosers should lay in, and move smartly down from aloft.

"Port braces"—"fore and main tacks;" "brace forward;" "let run, haul on board"—when the sails are set, and yards braced up; "haul taut the weather braces, lifts, and trusses;" coil down ropes.

TACKING.—Keep the ship full for stays, and give the word "Ready, O!" enforce attention. *Ease* the

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helm down, that her way may not be too suddenly checked. Haul over the boom; and, when the helm is down, "Helm's a-lee!" on which the fore and head sheets are let go and overhauled. When the wind is out of the mainsail, "Raise tacks and sheets," keeping the fore tack fast till the main yard is hauled, for as the foresail bellies in to the mast (which it always does to a certain extent when the fore tack is let go), it becomes a back sail and retards the ship in coming to. This is still more the case when, in a strong breeze, it becomes necessary to check the fore bowline, to relieve it of the undue strain brought upon it. The top-gallant bowlines at the same time are let go, the lee main tack shortened in, the preventer braces and lee maintop bowline manned; and when the wind is ahead, as a general rule, or in quick working ships, a little before, taking the main top-sail as your guide,—the weather leech of which will be well aback, or, in a dark night judging by the shaking of the spanker—"Haul well taut; mainsail haul!" The after yards are swung and braced up as far as the fore yard will allow—the lee head braces in short ships being checked for that purpose, the main preventer brace run away with, and a turn taken before the main-yard can fly back again, main tack boarded, and sheet gathered aft, head sheets shifted over, and boom sheet eased off. When all safe, and the after sails begin to fill, the head bowlines are let go, the head yards brace round, and the fore tack boarded, to the order "Fore tack, head bowlines—Of all haul;" if, however, she has paid off too rapidly, the head yards should not be braced up till she has come to, or is coming to the wind. The main yard is now braced up, and the sheet hauled aft. The helm is righted if she loses her way, and shifted over if she gathers

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sternway. The lee breast back-stays, when used, are borne abaft, and the weather one crutched and pulled up in stays. Finally, the yards are all trimmed, the weather braces hauled taut, the lifts bowsed up, and the bowlines hauled. When done, pipe the sweepers, and coil down ropes.

TOP-GALLANT BOWLINES are let go, when you raise tacks and sheets, because, when the sails are aback, if the lee braces are not quite taut, the whole strain of the top-gallant sail, and great part of that of the top-sail would come upon them; and also that they may be cleared away in good time before the yards are hauled.

THE LEE FORE TACK is not shortened in like the lee main tack, because, by doing so, you would make a back sail of it, and prevent the ship coming to.

TACKING IN LIGHT WINDS.—Keep away a little and get as much way on as possible, before putting the helm down.

Man the head sail downhauls; ease the helm down; check the lee head braces, and head bowlines.

"Helm's a-lee;" haul down the head sails; brace the head yards up as she comes to the wind; when nearly head to wind, brace round the yards on the mizen mast; and when the wind is fairly round on the other bow, haul the main yard, and hoist the head sails.

MISSING STAYS.—On port tack.—Haul aft the head sheets, put the helm a-starboard, raise the main clew-garnets, brail up the spanker, and square the after yards. Then, when she fills, either brace up again on the port tack, and try it again; or, let her come round on her heel, squaring the head yards when the wind

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comes aft, shifting the helm as she gathers way, and bringing her to the wind on the starboard tack.

TACKING IN A BREEZE.—Ease away the weather head-braces with a turn, keeping a strain on them when the yards fill, and standing by to belay in time; for, if let go and overhauled, as in moderate weather, a sprung yard would be the possible consequence.

THE LARGER HELM, carried in the freshening breeze, is occasioned by the increased immersion of the bow, which throws her up into the wind; and, owing to the oblique direction given to the rudder as the ship heels over, much of the effect is lost, and a greater helm is required in consequence.

ABOUT SHIP, UP MAINSAIL.—Instead of "raise tacks and sheets;" it will be, "raise the fore-tack;" "up mainsail" and "main-topsail haul;" instead of "mainsail haul."

THE ACTION OF THE RUDDER causes a ship to rotate on an axis before the centre, the exact position of which depends upon the build and rig of the ship. A Chinese cargo boat will fly round with the bow almost stationary.

TO FORE-REACH IN STAYS.—Ease the helm down very gradually, haul the main yard the moment you can insure her staying, and, in a fresh breeze, keep fast the fore sheet if the ship works well.

TO AVOID FORE-REACHING.—Round to quickly, check the lee head-braces, and make a late haul of the main yard.

STEAM AND SAIL.—Tacking with the watch, look out and haul the after yards quickly, or you will have a bother with both them and the head yards if she gets on the other tack before you.

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TAKEN ABACK.—As she will lie her course on the other tack, pipe "about ship;" raise tacks and sheets, brace round the after yards, board the main tack, attend to the helm, and haul the head yards as in tacking.

Should she refuse to come-to to starboard, and has lost her way, port the helm, up mainsail, in spanker, square the after yards, and wear round.

When taken aback with the wind on the lee bow, there is, of course, no help for it but to go round; but if the wind is ahead or on weather bow, and you do not wish to go on the other tack, you box her off with the head yards; that is, if flattening in, easing the boom over &c., are not sufficient.

WEARING UNDER PLAIN SAIL.—Up mainsail and in spanker: put the helm up; "let go the bowlines—round the after yards;" keep bracing in as her head pays off, shivering the mizen topsail, but keeping the main just lifting. When the wind is aft, "raise the fore tack"—"square the head yards." Brace forward the after yards and bring her to the wind; haul out the spanker, brace up, set the mainsail, and haul aft the head sheets. It is a good plan, particularly if wearing with the watch and using steam, to brace the head yards right up on the new tack, after squaring them, before manning the after braces.

WEARING SHORT ROUND.—Starboard tack before going round. Throw the ship up in the wind to deaden her way; haul up the mainsail, and brail up the spanker; brace the head yards a-box, and square the after yards; put the helm a-port when she gathers sternway, amidships when she loses it, and a-starboard when the after sails fill and she gathers headway. Square the head yards as in wearing, and when you have

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brought the wind on the port quarter, brace up the after yards, haul out the spanker, and board the main tack.

WEARING IN A GALE, with a heavy sea running, requires great care, and a temporary lull in the weather should if possible be taken advantage of. Trusses, preventer braces rolling, and relieving tackles must be carefully attended; plenty of way should be kept on the ship, that the helm may be well answered.

WEARING UNDER STAYSAILS.—Put the helm up, brail up the after trysails, and turn the yards as with sail set. In a very heavy sea it may be necessary to drop the reefed fore sail for the purpose of keeping way on the ship, and preventing her being pooped, even at the risk of not being able to furl again. In the mean time shift the sheets over, and steady them aft; when before the wind, set the after sails and haul down the fore and main staysails, setting them again as soon as the sheets are shifted over.

SETTING STUDDING-SAILS.—"Trim and make sail—studding-sails both sides." "Away aloft." "Main clew-garnets and buntlines, spanker brails." "Up mainsail, brail up." "Weather braces, lifts and trusses. Raise the fore tack, round in." When ready with the studding sails, "Boom topping-lifts, fore guys topmast and top-gallant studding-sail halliards." "Haul taut." "Rig out, trice to hand." On which the lower booms are topped up, and hauled forward, topmast and top-gallant studding-sail triced up to the yards, head stops cut, sails launched over the brace blocks, and the slack of the tacks taken down. The lower halliards are then manned by the hands from the topping-lifts and fore guys, and at the word "Hoist away," everything goes out together.

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TAKING IN STUDDING-SAILS.—"Hands shorten sail—studding-sail downhauls." "Away aloft." "Top up the lower booms." Lower studding-sail tripping lines, topmast and top-gallant studding-sail down-hauls, boom jiggers and after guys manned; then "Haul taut, trip up the lower studding-sail, shorten sail."

Lizards, both for topmast and lower studding-sails, are an improvement on rope-yarn stops. For this purpose a strop, with a thimble seized in, should be fitted to the outer arm of the topmast studding-sail yard, and the lizard spliced close outside it, round the yard. After the sail is rolled up, a turn is taken round the sail and halliards, and through the thimble, passed along the sail to the bunt, and hitched round the sail; the bight being jambed between its own part and the sail, so that when hauled upon, or a turn taken round the lower lift and the halliards hoisted on, it comes adrift. For the lower studding-sail, a strop attached to the lizard is merely put round the sail; a toggle, into which the lizard is spliced, put through the bight, a turn taken on the forcastle when high enough, and the sail hoisted.

AFTER SETTING A TOPMAST STUDDING-SAIL.—Steady taut the deck sheet, get hold of the short sheet, reeve it through a tail-block on the quarter iron, bend it to a ropes-end out of the top, haul it up, haul aft and belay it; *then* come up the deck sheet, bend it to the downhaul, and pay them down before all; afterwards, shift the boom jigger for rigging in,—or, instead of shifting it, overhaul the hauling part, hitch it to the heel of the boom, and rig it with the single part.

AFTER TAKING IN A TOPMAST STUDDING-SAIL.—Unbend the tack and halliards, and bend them together; swing the halliards in to the hands on the yard,

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who haul them up, dip them abaft, and pay them down, when they are again bent ready for setting; take the burton off the topsail yard, and shift the boom jigger for rigging out.

FORE TOPMAST STUDDING-BOOM UNCLAMPED.—Round down on the lower halliards, put a knot in them, pull up and lift the boom, leaving end enough below the knot to round down again.

HEEL LASHINGS.—That of a topmast studding-boom is secured round the quarter iron; of a top-gallant studding-boom, through the quarter strop and round the jackstay.

THE ADVANTAGE OF A STUDDING-SAIL BEND is, that it lies close to the yard, and consequently permits of little or no drift between the yard and block.

DIPPING A TOPMAST STUDDING-SAIL BEFORE-ALL.—Send a couple of hands on the lower yard: lower the sail well down, and let them gather it in until they get hold of the outer leech which is then gathered down, until the inner yard-arm can be canted before the leech of the topsail, then let go, and hoist away.

It should be remembered that a touch of the helm may help a good deal in setting and taking in studding-sails.

DIPPING A TOPMAST STUDDING-SAIL ABAFT-ALL.—Gather down on the *inner* leech.

HITCH WITH THE DOWNHAUL ROUND THE CLEW.—Let the boom come in, gather it on the foot, lay hold of the clew, and then clear the downhaul.

REEFING TOPSAILS—Topmast studding-sail set; lower the topsail *when the burton or preventer lift is off the yard*, the studding-sail being in.

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COMING TO THE WIND.—Take in the royals, and one or two reefs; the jib, and a reef in the spanker if necessary. While reefing, bring the ship to the wind under the courses.

GETTING SHEETS HOME.—Always get the lee sheet home first; then ask the officer of the watch, if necessary, to give her a luff up, and get the weather sheet home while the sail is lifting.

LEE BOOM-SHEET.—By hauling it taut, you would endanger the boom.

TOP-GALLANT LIFT AND BRACE OFF.—Lower the sail, get hold of the leech, cant the yard, and rig it from the topsail yard.

REEFING TOPSAILS.—"Clear lower decks," "reef topsails," "two reefs;" "weather topsail braces," "hands by the topsail halliards," "away aloft;" "let go the top-bowlines, round in;" "lower the topsails," then haul out the reef tackles, turn the yards to the wind, and haul taut the braces, steady taut the top-gallant clewlines to keep the sheets clear of the men reefing; "trice up, lay out;" the sail is then lighted out to windward, the weather earring hauled out, then to leeward; pass the beckets through the reef-line and toggle them; "lay in down from aloft," "let go the reef tackles, attend the braces." "Hoist the top-sail."

REEF-TACKLE CARRIED AWAY.—Clew the sail up, pass the leech along, and reeve the reef-tackle afresh; haul out, take the reef in, and sheet home.

AFTER TAKING IN A THIRD REEF.—Get the pre-venter braces and preventer parrals on.

TAKING IN A CLOSE REEF.—Man the weather brace, rolling tackle, and clewline, round in, lower the topsail and clew down; check the lower braces if on a

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wind, haul the reef tackles close out, easing the sheets, and hauling up on the clewlines at the same time; haul taut both buntlines secure the yard (not forgetting to haul taut the halliards, as it is hanging by the lifts), trice up and lay out.

REEFING COURSES.—Haul the clew-garnets two-thirds up, and haul up the reef-tackles and buntlines. If on a wind, round in the weather-brace, to clear the sail of the stays; haul taut both lifts, and rolling tackle if on, and truss to; lay out and light over.

TAKING IN A COURSE.—Man the weather clew-garnet and leechlines, and both buntlines; ease off a fathom of the main sheet, before starting the tack, lest you spring the yard by suddenly relieving it of so great a strain; then ease away the main tack and bowline, and haul up the weather clew, take in the lee clew, haul the gear close up, round in the weather brace, and secure the yard for furling (which may be done over all, without tricing the booms up). When furled, place a mat, or old hammock, over the sail in the wake of the stays, previous to bracing up.

SETTING A STORM STAYSAIL.—Haul the sheet aft before hoisting, having seen the hook moused; ease away as you hoist, and haul aft again.

SENDING TOP-GALLANT MASTS DOWN AT SEA.—Get burtons on the backstays, to ease away as you sway to unfid and to steady taut as you lower. Send the mast down through lubber's hole with a heel rope through a block on deck abreast of the mast, well manned, and kept taut as the mast comes down.

SET THE FORE STAYSAIL.—*Then* shorten sail in the usual manner.

WEATHER MAIN-TOPSAIL BRACE GOES.—On a

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wind, put the helm down, let go the lee main brace, square the main yard and bring her to the wind with the topsail aback, lash the yard to the topmast rigging, lay out, and put on the preventer brace.

WITH THE WIND ON THE QUARTER.—Watch trim sails; keep her away, let go the halliards, bring the wind on the other quarter, get a preventer brace on, trim and make sail.

PREVENTER BRACES.—Yard-tackles for the lower yards, and the long $3\frac{1}{2}$-inch top-whips for the topsail yards.

WEATHER MAIN-TOPSAIL SHEET AND CLEWLINE GONE.—Haul up the buntlines, reef-tackles, and lee clewline; hand the leech in, pass a gasket round the sail to steady it, and reeve the clewline afresh. If, however, you cannot get hold of the leech, unreeve the main top-bowline from the fore top, send a hauling-line down for the end, reeve it through the quarter block, haul it up, and so confine the sail till you have passed a gasket, then reeve the bowline again, and the new clewline and sheet.

PARRAL GONE, ON A WIND,—Heave the sail aback and clew the yard down, hook a couple of jiggers from the cap for rolling tackles, clew up if necessary, and get the preventer parral on. If before the wind, haul the sail taut up to mast-head, and put a temporary parral on.

TOPMAST-STAY CARRIED AWAY.—Keep the ship away, shorten sail, get up and haul taut the sail-tackle, and replace the stay with a hawser, bowline-knotted round the mast-head.

JIB-SHEET CARRIED AWAY.—*Mind your weather-helm,* haul down the jib, trice the tack of the spanker up, and clear away the fore topmast staysail.

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MAIN TACK AND CLEW-GARNET GONE.—Bear up, or wear, and haul the sheet aft.

TILLER-ROPE CARRIED AWAY.—When this occurs, it may be assumed to be blowing fresh. The first thing to be done, therefore, is to steady the rudder, which, in a sea-way would fly from side to side with a great violence. The quickest way of doing so will be by means of the remaining rope ; and as the chances are that the weather wheel-rope will be the one to go, jamb the helm down, shorten sail, and heave to with the head yards a-box, if you do not want to come round. Otherwise, if there is a ship close astern of you, for instance, haul the mainsail up, and square the main yard in stays. Should the lee rope go, put the helm up, heave to on the other tack, and shorten sail as soon as possible. If unsafe, from the position of the ship, to do either, chock the rudder up (which by the way, is not done in a moment when the tiller has taken charge) ; man the head sheets and cross-jack braces, and steer the ship by the sails. In moderate weather, the relieving tackles will probably be hooked before it will be necessary to touch anything. In all cases, send hands down to hook, and work them, and reeve new wheel-ropes.

LOWER SHROUD CARRIED AWAY, AND NOT LONG ENOUGH FOR TURNING IN AFRESH.—Turn the dead-eye out, strop it with rope of equivalent dimensions, and seize a large thimble in ; knot the shroud, reeve it through the thimble, and seize the ends up ; reeve the lanyard again, and set the shroud up.

JIB DOWNHAUL CARRIED AWAY.—Unbend the lee top-gallant bowline, make a bowline round the stay, and haul down. Should it carry away, send the

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downhaul up by the weather bowline used as a hauling-line, bend it round the stay, and assist it, if the lacing jambs, by hauling down six feet at a time with a rope's end rove through the lee bowline block at the boom-end.

MAIN YARD SPRUNG ON THE WEATHER QUARTER; SHIP ROLLING HEAVILY.—Unbend the sail, clew up the top-sail, reeve the jeers and take them to the capstan. Send the studding-sail booms down to lighten the yard, and to get them out of the way. Send an up-and-down on each side through lubber's-hole, lash them to bolts in the cap, and hook them to butt slings round the quarters of the yard. A little further out, on each quarter, hook the top burtons to strops on the yard, and on deck to bolts in the fore port of each gangway. Lower the yard-tackles down, cross them and hook them in to the ship's side abreast of the mast. Unshackle one truss, and reeve a stout piece of rope down through one thimble, abaft the mast, under the necklace, and up through the other thimble of the truss stop; to reach end hook a burton from the cap, haul taut, and unreeve the other truss. Heave round the jeers, swaying on the quarter tackles at the same time, knock the slip off, and walk back, attending the lifts, yard tackles, preventer truss, and braces, and steadying the yard forward by the burtons. Land it across the nettings, and lash it there. Strip it of everything in the slings, and knock off the battens and casing to have a good overhaul. If found sprung where it was supposed, place a topmast studding-sail boom on the top of the yard, and another on the fore side—supposing the fracture to have occurred there; fill the space up above and below the spring with capstan bars, and handspikes, &c. Get sufficient of 3-inch and $3\frac{1}{2}$-inch rounding, or

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unrove rigging, if you have it; divide it into six lashings, three on each quarter, outside the clothing. Pass the lashings on both ends, each turn bowsed well taut with a jigger, rack each turn as it is bowsed taut by driving nails through it into the yard, and when finished tautened up with wedges. Then put on the slings: which will require lengthening; lash the clothing on, having tailed the lashings; and sway the yard up, in the same manner in which it was lowered down.

For a slight spring, an iron fish will probably be sufficient to prevent it opening out and spreading further.

FORE YARD CARRIED AWAY IN THE WEATHER QUARTER.—Clew the topsail up, confine and steady the weather yard arm by slip-ropes, and unbend the sail the best way you can; hook an up-and down from the cap to the weather quarter, bend the fore bowline round it, and land it on the forecastle. Reeve four parts of the jeers, and send the lee yard-arm down. Land a spar on the knight-heads, and lash it to the foremast on the lee side, level with the nettings, and across it lay the lee portion of the yard. On another spar from the knight-heads, on the weather side, suspended by a luff from the rigging, and steadied by guys, place the weather yard arm. Bring the broken parts together by luffs and burtons, crossed from opposite sides of the deck, and fish the yard with studding-sail booms. Place one on the after side, above the batten, another on the top of the yard, and a third on the fore side; fill up with capstan bars, would the whole together, and wedge it up taut. While this is being done, the fore tacks and sheets may be singled and shackled to the clews of the fore topsail, and the sail set flying. When finished, sway the fore yard up, bend and set the sails.

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BOWSPRIT BADLY SPRUNG.—Shorten all necessary sail, according to the breeze; send fore top-gallant mast down, secure foremast with runners and tackles, and topmast with sail tackle, and slacken up the stays if circumstances require it. Get head sails and flying boom in; and, if the bowsprit is so badly sprung as to lead you to think that it would be unsafe, when fished, to carry the jib with the boom rigged out the full extent, rig it in for a fish until the heel buts the stem. Place the flying-boom on one side, and a top-mast studding-sail boom on the other, and would all together, wedging and chocking up between. Out of the head ports on the forecastle, rig, on one side, the spare jib-boom, and, on the other, a hand-mast, or spare mizen-topmast; secure the heels inboard, and lash the heads securely to the head of the bowsprit on either side. Round the centre of one of the shores, secure the standing part of a lashing; reeve it down through the gammoning hole in the cutwater, up and over the opposite shore down through the cut-water again, over the first shore, and so on until sufficient turns are passed, finishing off with a few frapping turns round the lashing and over the bow-sprit. The jib may still be set outside the bowsprit cap.

If you intend to get the jib boom out again, fish the bowsprit with one or two spare anchor stocks hollowed out, assisted with the shores as before.

BROUGHT BY THE LEE.—Put the helm down, and brace round directly, unless in the mean time she answers the helm, and brings the wind on the weather quarter again; though the probability is that you will either loose the masts or be thrown on your beam-ends.

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LAYING A SHIP TO.—Haul the foresail up; and, if you find that you can run her with safety, for a short time under the topsail and staysail, furl the foresail before bringing her to the wind. If however, there is such a sea running, that you cannot keep before it after shortening sail, look out for a smooth, down with the helm, and round short to, to avoid exposing her broadside to the sea a moment longer than is absolutely necessary.

BROACHING TO, or coming up into the wind, is exclusively applied to a ship in bad weather, when it becomes a situation of great danger to the ship and spars. When running free, with the sea on the quarter, want of attention at the helm is the common cause of such a mishap. Put the helm up, lower the topsails if they are standing; and, if she does not pay off, box off or brace up, as the occasion demands. Should, however, the ship be going over, let fly everything, of course, instantly.

BITTING CABLES.

BOTH chain and hemp cables are bitted the same way. Facing forward, the starboard cable is bitted with the sun, and the port against it; the cable from the hawse-holes leading under the cross-piece or battledore, on the outside of the bitts, and the bight thrown over the bitt-head. A bitting-tackle is used to rouse the bight up; the pendant rove through a swivel-gin over the bitts.

PASSING NIPPERS.

THE *rationale* of passing a nipper rests upon the necessity for bringing the messenger to the cable, as

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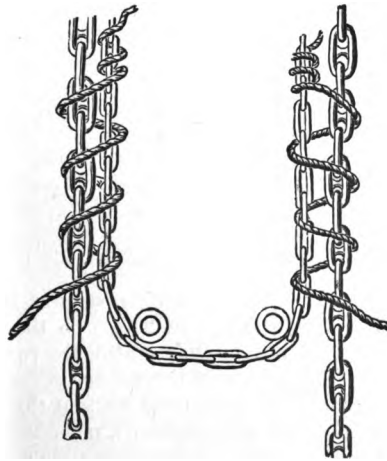
you cannot bring the cable to the messenger, and at the same time rousing the messenger up to prevent its getting underneath the cable. Two or three turns are first taken round the messenger by a hand inside ;



the coil is then passed over the cable to the hands outside, who, facing aft, pass it round, messenger and cable, as the latter comes in ; on the port side with the sun, and on the starboard side against it, rousing

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each turn taut as it is passed. The end is then dogged round the cable, and twisted up with the end of the next nipper; both ends are held on by a hand who walks aft with them, and, when far enough aft, the nipper is started and passed forward again.

HEAVING THROUGH ALL.

STREW well with sand, pass the turns thick, and, if that is not sufficient, take here and there a *round turn* round the messenger, and another round the cable. They are called racking turns.

When obliged to use a deck-tackle to break out, heave on the capstan and haul on the tackle *together*, giving the time by a *slow* pipe. It is amazing the difference that this makes.

A DECK TACKLE.

Consists of a runner and long tackle, separately fitted, the double block of the tackle hooks to the runner, the single block and the other end of the runner are secured abaft. The block of the runner is secured to the cable; the tackle may be used without the runner. Small vessels not fitted with capstans, usually have the double block of the tackle fitted with a claw to hook over a link of a chain.

BRING TO, PATENT CAPSTAN.

BROWN'S patent capstans are now in general use, and the days of messengers and nippers, are fast coming to an end. These capstans are fitted with sprocket wheels, corresponding to the links of the cable, each link in turn binding in its corresponding indention.

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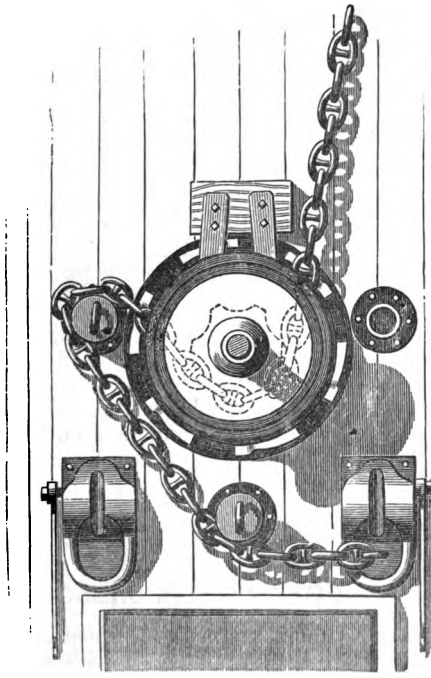
To *bring to,* put the slip on, unbitt, and haul the bight of the cable, round abaft the capstan, drop in



the roller, and lift the chain into the sprocket wheel; the slack chain is hauled clear of the capstan with

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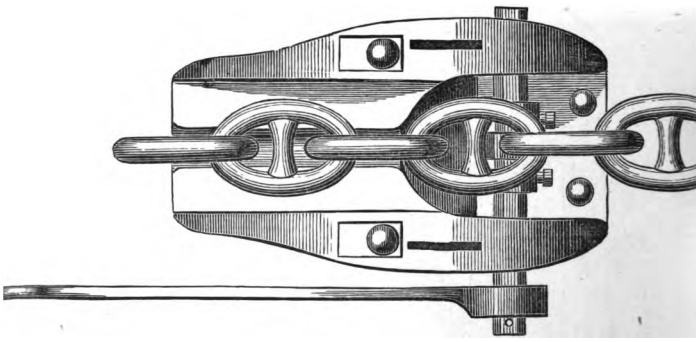
iron chain hooks. Ships fitted with these capstans, also have a controller, in which the links of the



cable successively sink as you heave in, and which of course relieves the capstan of much strain, the cable is thrown in or out of the controller by a lever at the side,

NUMBER OF SWIVELS IN A CABLE.—One in every other length.

A LENGTH OF CHAIN CABLE

Is 12½ fathoms. They are marked inboard from the shackle, and sometimes on both sides, with a piece of wire or tin round the staypin of the link, a link for every shackle; the one next the shackle without a staypin not being reckoned. At the tenth shackle, when the cable is of that length, you commence again (though a cable, as supplied, is only of eight lengths.)

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STAY-PINS.

WITHOUT them, the cable would become full of kinks; and, were they removed, the links would also collapse.

A GANGER

CONSISTS of one or more lengths of chain, shackled to the sheet anchor and brought into the hawse holes, or just outside, and renders the operations of bending or unbending sheet cable much easier.

ADVANTAGE OF HEMP CABLES.

THE one great advantage is, that they allow an anchor to be laid out farther from the ship by boats, being much lighter than chain, but in other ways they are more difficult to handle than chain cable.

STOWAGE OF HEMP CABLES.

COILED with the sun; the starboard cable in the port tier, and the port cable in the starboard tier. When both ends are fitted with an Elliot's eye, the end is generally attached, by a slip-shackle, to a chain strop round an orlop-deck beam. When not fitted with an eye, chain tails are shackled to the strop, and spliced into the cable.

STOPPERING HEMP CABLES.

IN addition to the deck-stoppers used for chain cables, bit, ring, and hatchway stoppers are required.

A bitt-stopper is a stout piece of rope, middled, with an eye which goes over the bitt-head above the cable, made by seizing both parts together. The ends are selvageed, brought aft and under the crosspiece, and dogged round the cable before the bitts.

A ring-stopper is a piece of rope middled, with the ends coach-whipped or selvageed. The bight is laid over the cable abaft the ring; the ends passed through the ring and dogged round the cable.

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A hatchway-stopper is a piece of stout rope middled, and the ends coach-whipped. The bight is laid over the cable inside the hatchway, and the ends are passed through a hole in each side of the corner and dogged round the cable outside; so that, the greater the strain on the cable, the harder the stopper will jamb.

HEMP MESSENGER.

THE ends are fitted with long lashing eyes, with the splice grafted over; but they are not brought close up to each other, as they would not lie fair round the capstan, the crown of the eyes, when brought together forming so great a rise: a drift of two or three feet is, therefore, allowed between them. Four turns are taken round the capstan, the heaving-in part being the lowermost. When the opposite cable is to be brought to, the ends must be unlashed and and passed the contrary way, which may be done, without heaving the turns off, by slacking them round the capstan, and dipping the aftermost end through; the parts then placed fair, and the ends re-lashed. Hands must be stationed to haul back on the upper part as it comes round the capstan.

AFTER UNBITTING.

YOU lift the cable up on the cross-piece, or battledore, on which the messenger should be already placed for facility in passing the nippers.

HEMP CABLES.

ARE stoppered below, round an orlop-deck beam, for bringing up at a short or long service, according to whichever it is intended to ride at; the bight, round which the lashings are passed being left outside so as to be easily got at. If intended to veer to the latter, the first must be previously taken off, and, when a

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longer scope is required, one abaft should be passed before the second is slacked off.

PREPARING FOR LETTING GO.

RUN up a range of cable, before the bitts, sufficient for the depth of water; and, according to the weather, get a long range up abaft. Stand by to clear away in the tiers, lead the hook-ropes along, see stoppers attended, and a good kackling on where required in bringing up.

THAT END OF A CABLE

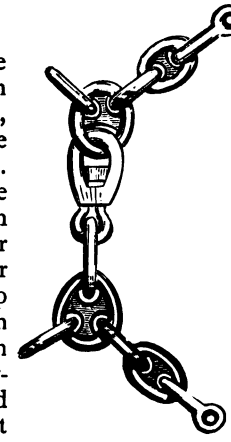
Is shackled to the anchor, which brings the bolt of the shackles and the cup of the swivels aft;—otherwise, they would catch the bitts, &c., in running out.

BEFORE SURGING.

THE cable should always be bitted; and also stoppered if the cat-fall is old.

PUTTING A SWIVEL ON.

VEER, or heave in on the riding-cable, if necessary, in order to bring the shackle, where you intend to put the swivel on, before the bitts. On slip before all, unshackle and shackle the ends to an upper and lower link. Stopper the other cable inboard, or hang it by the small slip attached to a length of stream chain, unshackle, haul each end in alongside the riding-cable by a small hawser passed round the cut-water—the bight



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being kept up by a bull-rope from the bowsprit, and shackle the ends to the remaining links of the swivel. Off stoppers of both cables (that of the riding-cable last), veer the swivel out clear of the hawse-hole, haul in the *slack* of the other cable, and make all fast. Ride, in this way, by one cable inboard. for, when the swivel is hove up amidships, the copper corrodes the cable, and the cable chafes the copper. In fine weather, as soon as the swivel is put on the riding-cable, it may, if you prefer it, be eased out, and the other cable shackled in a boat under the bows.

If you think it undesirable to heave in, you can unshackle it in a boat out-board. Riding, therefore, as before, and with the swivel hove up on the starboard side, pass the small slip attached to a length of stream chain, out of the spare hawse-hole, and put it on the port cable below the swivel; heave taut on it, unshackle, shackle the ends and off slip. Proceed in the same manner with the riding-cable, hanging the swivel with a hawser to rouse it in by.

THE CUP OF THE SWIVEL should be kept up, and tallow put into it occasionally.

HOW IS THE MOORING SWIVEL TAKEN OFF?

BRING to the weather cable and heave round, unbitt, and pay the chain down into the locker; this will bring the swivel inboard, with the outer or riding parts of both cables, and the inboard end or bridle of the lee cable shackled to it; having three parts of chain in the hawse-hole, put the slip stopper on the riding part of the lee cable and hang the bridle; walk back the capstan until the stopper has the strain; then paul the capstan and bouse to the compressor; do not take off the nipper, unshackle the two parts of the lee chain from the swivel, and shackle them

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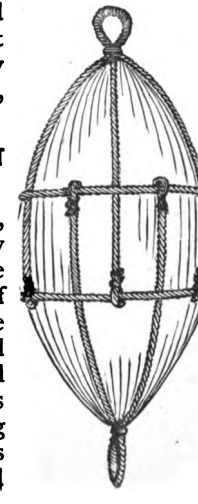
together, taking care there is not a turn in the cable in the hawse-hole, bouse to the lee compressor, see the cable clear of slip; this will bring the lee cable into its proper hawse again.

Put the slip stopper on the weather cable outside the swivel; walk back the capstan, heaving on the compressor until sufficient cable is up, to allow the swivel to be taken off and the cable bitted; off nipper; unshackle both parts of the weather cable from the swivel, and shackle them together; bitt the cable; bouse to the weather compressor of slip.

In bad weather the weather cable must not be unbitted; if the moving swivel is being taken off for a gale of wind, it may be left on the weather cable and veered out.

NUN BUOYS.

IRON nun buoys are now supplied fitted with a ring and swivel at either end, to which the buoy rope is bent, with a sheet bend, and the end seized.



TO SLING A WOODEN NUN BUOY.

THERE are two grommet straps, one is placed round the buoy at one-third the length of the buoy at each end. Length of rope required to make those straps is three times the round of the buoy where it would be placed on, and three times the round of the rope for splicing it; length to marry the strands is once the round of the buoy and

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once the round of the rope; length of rope required for the slings is ten times the length of the buoy. There are four lengths; each length should be two and a-half times the length of the buoy, that allows for splicing the ends round the grommet, the four ends of two straps are spliced round the lower grommet, and four ends of the other two straps are spliced round the upper grommet, then, reeve the two bights of the upper strap through the lower grommet, and the bights of the lower strap through the upper grommet, that secures it round the buoy, then seize all four parts together at each end of the buoy and marl and parcel together, which forms the eye; the buoy rope is bent to it when required; splice a lanyard in the eye at the upper end of the buoy for convenience in handling it. See diagram, page 245.

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TABLES.

A Table showing the Number of Yarns in a Rope, and the Weight of Hawser-laid and Cable-laid Rope. Hawser-laid Rope up to 3-in. is made from 30-thread yarn, and Cable-laid Rope is made from 20-thread yarn.

Size.	No. of Threads.	Weigt of 113 Fathom, Hawser-laid.	Size.	No. of Threads.	Weight of 101 Fathom, Cable-laid.
In.		Cwt. qr. lb.	In.		Cwt. qr. lb.
½	6	16¾	2	27	1 0 1
¾	9	25½	3	54	1 3 20
1	12	1 5½	4	90	3 0 24
1¼	18	1 20	5	135	4 3 8
1½	24	2 8	6	189	6 3 0
1¾	30	2 24	7	252	9 0 0
2	39	3 20	8	333	11 3 16
2¼	51	1 0 24	9	423	15 0 12
2½	63	1 2 0	10	522	18 2 16
2¾	75	1 3 4	11	630	22 2 0
3	90	2 0 16	12	756	27 0 0
3¼	97	2 1 26	13	882	31 2 0
3½	102	2 3 18	14	1026	36 2 16
3¾	117	3 1 10	15	1172	42 0 12
4	132	3 3 2	16	1332	47 2 8
4¼	150	4 1 4	17	1512	54 0 0
4½	168	4 3 5	18	1692	60 1 20
5	207	5 3 18	19	1881	67 0 20
5½	252	7 0 22	20	2088	74 2 8
6	300	8 2 8	21	2304	82 1 4
6½	351	10 0 3	22	2422	90 1 8
7	408	11 2 17	23	2763	98 2 20
7½	468	13 1 13	24	3006	107 1 12
8	534	15 1 0	25	3267	116 2 20
8½	603	17 0 25	26	3528	126 0 0
9	675	19 1 4			
9½	753	21 2 1			
10	834	23 3 8			

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THE TESTING STRAIN OF BLOCKS AND ROPES.

It is very requisite that every sailor should know the strain that each block, as also the rope that reeves in them should bear. I will give the proof strain of blocks and rope, bearing in mind that the strain the blocks will bear depends on the pin of the block, and as the single block has the same size pin as the double or treble block, and of the same quality, I shall only give the strain of the single blocks; also the size strapping, the length to cut each strap, and the length to marry each strap.

Descriptions of blocks, common single, thick.	Strain which each block ought to bear.	The size rope to reeve in each block.	The strain the rope will bear.	The size of strapping for each block.	The length to cut each strap.	The length to marry each strap.
Inches.	Tons.	Inches.	Tons.	Inches.	Fm. ft. in.	Fm. ft. in.
6	1⅛	2	11-16	2 & 2¼	0 2 8	0 1 11
7	1¼	2½	1⅛	2¼ & 2½	0 3 0	0 2 3
8	14-5	2¾	1¼	2¾	0 3 8	0 2 7
9	1⅞	3	2¼	3	0 3 11	0 2 10
10	23-5				0 4 3	0 3 2
11	3¼	3½	3	3 & 3½	0 4 8	0 3 5
12	4½	4	4	4	0 5 2	0 3 9
13	5¼				0 5 6	0 4 0
14	5⅞	4½	5¼	4½ & 5	0 5 10	0 4 3
15	6½	5	6¼	5	1 0 6	0 4 9
16	7¾	5½	7½	5½	1 1 0	0 5 1
17	8¼				1 1 4	0 5 4
18	9¼	6	9	6	1 1 9	0 5 8
19	10¼	6½	10	6½	1 2 2	1 0 0
20	11⅝				1 2 8	1 0 4
21	12½	7	12	7	1 3 0	1 0 8
22	13⅜				1 3 2	1 1 2
23	14½	7½	14	7½	1 4 0	1 1 6
24	16½	8	16½	8	1 4 6	1 1 9
25	18				1 4 9	1 2 0
26	20½	8½	18	8½	1 5 0	1 2 3
27	22	9	20½	9	1 5 3	1 2 6
28	24	9½	23	9½	1 5 6	1 2 9

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A Scale of the comparative strength of Wire Rigging, Hempen Rigging and Chain; also the weight of each per yard and the Breaking Strain, and the number of yarns in the hempen rope, including the heart.

Wire Rope.		Hemp Rope.			Chain.		The Breaking Strain.
Circumference.	Weight per Yard.	Circumference	Number of Yarns.	Weight per Yard.	Diameter.	Weight per Yard.	
in.	lb. oz.	in.		lb. oz.	in.	lb. oz.	ton cwt. qr.
		1¼	25 } 30-Thread Yarn.	0 5			0 17 3
		1¾	30	0 6			1 4 3
		2	38	0 7¾	3-16	2 0	1 8 0
		2¼	51	0 10¼			2 0 0
		2½	63	0 12¾	¼	3 0	2 2 0
		2¾	73	0 14			2 4 2
1½	1 0	3	89	1 2	5-16	3 10	2 8 0
		3¼	85	1 4½			2 16 0
1⅝	1 4	3½	102	1 6½	⅜	5 0	3 10 0
		3¾	115	1 11½			4 0 0
2	1 12	4	132	2 0	7-16	6 0	4 14 2
		4¼	149	2 3½	½	8 8	5 2 0
2¼	2 4	4½	166	2 8¼			5 18 0
2½	2 12	5	209	2 2½	9-16	10 0	7 2 2
2¾	3 4	5½	252	3 13			8 14 0
3	3 12	6	299	4 8	⅝	12 8	10 6 0
3¼	4 4	6½	350	5 5	11-16	14 8	12 0 0
3½	5 4	7	405	6 1½	¾	18 0	13 16 0
3¾	6 0	7½	466	7 0	13-16	20 8	15 16 0
4	7 0	8	553	8 2¾	⅞	24 0	18 0 0
4¼	7 8	8½	602 } 25-Thread Yarn.	9 2	15-16	28 0	20 4 0
4½	9 0	9	670	10 2¼	1	31 8	22 12 0
4¾	10 2	9½	751	11 6¼	1 1-16	34 8	25 4 0
5	11 4	10	828	12 9	1⅛	37 0	27 18 0
5¼	12 2	10½	913	13 13¼	1 3-16	40 0	30 0 0
5½	13 8	11	1003	15 3¾			33 12 0
5¾	14 10	11½	1097	16 10½			36 0 0
6	16 4	12	1195	18 2¼			40 5 0
6¼	17 8	12½	1297	19 9½			44 0 0
6½	19 0	13	1404	21 5			48 5 0
6¾	20 8	13½	1510	22 9½			52 5 0
7	22 3	14	1626	24 9½			56 0 0
7¼	23 12	14½	1741	26 6¾			60 0 0

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A TABLE FOR THE EYES OF STANDING RIGGING—WIRE ROPE.

THE length from the inside centre of the eye to the seizing is nine-sixteenths the round of the mast-head, or half the round of the mast and one-fourth of one square.

Round of Mast.		Length of the eye.		Round of Mast.		Length of the eye.	
ft.	in.	ft.	in.	ft.	in.	ft.	in.
3	0	1	8	7	0	3	11
3	2	1	9	7	2	4	0
3	4	1	10	7	4	4	1
3	6	1	11	7	6	4	2
3	8	2	0	7	8	4	3
3	10	2	1	7	10	4	4
4	0	2	3	8	0	4	6
4	2	2	4	8	2	4	7
4	4	2	5	8	4	4	8
4	6	2	6	8	6	4	9
4	8	2	7	8	8	4	10
4	10	2	8	8	10	4	11
5	0	2	9	9	0	5	0
5	2	2	10	9	2	5	1
5	4	3	0	9	4	5	3
5	6	3	1	9	6	5	4
5	8	3	2	9	8	5	5
5	10	3	3	9	10	5	6
6	0	3	4	10	0	5	7
6	2	3	5	10	2	5	8
6	4	3	6	10	4	5	9
6	6	3	7	10	6	5	10
6	8	3	9	10	8	6	1
6	10	3	10	10	10	6	2

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INDEX.

	PAGE
Backstays	194
Bitting cables	236
Blocks, purchase	160
——— straps and seizings for	39
Bobstay collars, hemp	56
——————to cut out and fit	57
——————wire	58
Bobstays, to cut and fit	56
Booms, seizing up topmast studding-sail	199
——— top-gallant studding-sail	199
Bowsprit shroud collar, hemp	63
—————————— wire	65
Bowsprit, running in	115
——— gammonings	167
——— clothing the	171
Braces, reeve the fore and main	197
——— to reeve	200
Bring to, patent capstan	238
Carried away, topmast stay	231
——————— jib sheet	231
——————— main tack and clew-garnet	232
——————— tiller rope	232
——————— lower shroud	232
——————— jib downhaul	232
——————— fore yard	234
Compass	1
Courses, to fit fore and main	214
Cross jack yard, to rig a	198
Deck tackle	238
Eyes of standing rigging—wire rope	250
Fogs	221
Fore shrouds, turning dead eyes in	135, 142
Fore stay collars	67

Digitized by Google

	PAGE.
Fore stays, to cut out	137
——————to fit the	138
——————to stretch and serve the	138
——————to turn the heart in the	139
Fore mast, rigging the	176
Grommet	28
Gunwale, to put lower yards on the...	197
Guys, martingale	122
—— flying jib	123
—— spritsail	116
Hemp cables, Admiral Elliot's eye in	216
Hemp cables	241
Jib boom to rig the	190
Jib stay, three-strand rope	35
——— ropemaker's eye in a	35
——— Flemish eye in a	36
Knots, forming ... ... 7—24	
Laying a ship to	236
Lead line	3
Lifts, reeve fore and main	197
Log line	4
Main yard sprung on the weather quarter	233
——— to rig a	108
Main mast, rigging the	181
Martingale	191
Masts, tripod	6
——— heel tackle for main and mizen	163
——— fid the top-gallant	192
——— heel pendant for the fore	164
Mizen mast	181
Nun buoys	245
Parrel gone, on a wind	231
Paunch mat	25
Pendants, fore and main truss	198
——— cross jack truss	199
Pointing a rope	27
Putting a swivel on	243
Questions and answers	75
Reeve running rigging	204

Digitized by Google

PAGE
Reefing topsails 229
Rigging, ratline the 194
Ropes 219
Royal yards 112
Sail, to fit the 211
——lengthen the rope of a 36
Sea gasket 24
Sennet, French 24
——— common 25
Sheers, rigging a pair of 159
——— to raise the 162
——— shoes to step in 162
——— droop the 165
Ships under steam 220
Shrouds, starboard 80
———cutting fore 125
———cutting fore topmast 141
———fore top-gallant 148
———to mark the 129
———fitting the 129
———forming the eyes in 131
———seizing the eye in fore 131
———length of 133
———seizing the 136
———warping the 143
———turning dead eyes in topmast 144
———turning dead eyes in the mizen 155
Spanker boom 202
Spanker boom sheets 203
Splicing a rope round a thimble 34
Splicing an eye in the end of a rope 34
Splice, long 30
——— short 31
——— Grecian 31
——— mariner's 32
Stays, flying martigale 124
—— flying jib 124
—— mizen 157
—— topmast, fore topmast, jib 186
—— main topmast 187
—— rigging the fore top-gallant 189
Strength of wire and hempen rigging and chains ... 249
Studding-sails, setting 226

Digitized by Google

	PAGE
Sword mat	29
Tacking	221
Tackle pendants	112
Table shewing number of yarns and weight of rope ...	247
Testing strain of blocks and ropes	248
Topsail and courses	209
Topsails, length of reef points for	215
Topsail tyes	196
Topsail yards, parrel	98
——— rigging	110
——— to send up	195
Top-gallant yards, rigging	111
Topmast crosstrees, to send up	184
Topmast, rigging	185
Wire rigging	84
——— cutting	140
Wearing under plain sail	225
Wearing short round	225
Wearing in a gale	226
Wearing under staysails	226
Yard arms, to rig the	107

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