

## A CHAPTER ON SAILS.

MANY Candidates, having done all or most of their time in steam, often find a difficulty at the examinations in answering correctly even simple and practical questions on sails.

This chapter is included specially for their benefit, and they should study it well and thoroughly. The illustrations are not drawn to scale, but, with the explanations, are intended to give a little information on the subject to those who have not been able to gain it by practical experience at sea.

It is very rarely that square sails form part of a steamer's equipment nowadays, but in the event of the propeller being lost, or a serious accident happening to the machinery, they are very useful things. All candidates must be prepared to answer any practical questions regarding them. Steamboat men are not likely to be asked how to clew a royal up, or set a topgallant sail, but they should be able to deal with any fore-and-aft sail, also a foresail or topsail.

### A Steamer's Trysail.

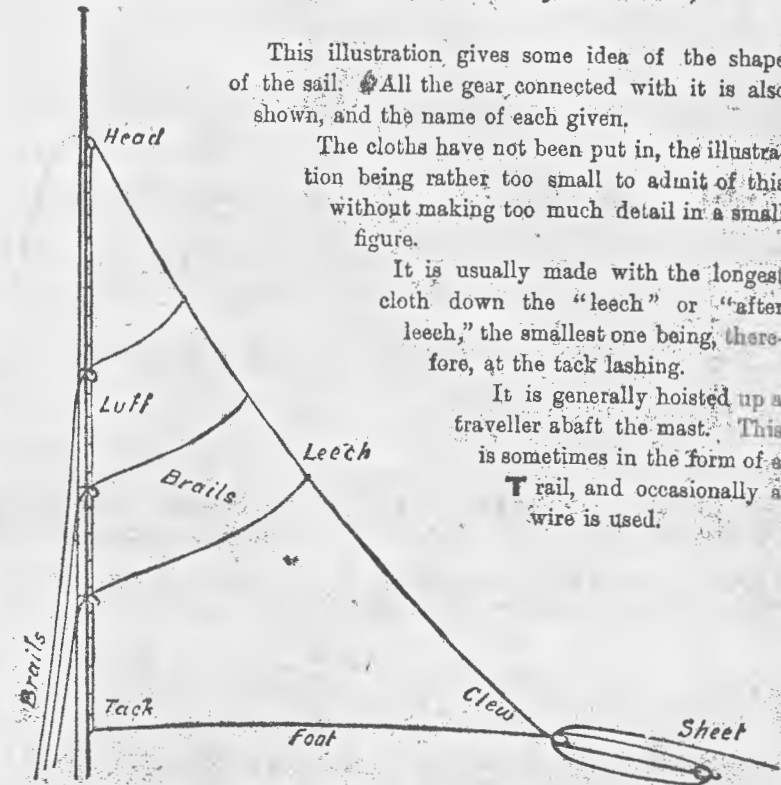
(Also used in some Sailing-Ships as a Heavy Weather Sail).

This illustration gives some idea of the shape of the sail. All the gear connected with it is also shown, and the name of each given.

The cloths have not been put in, the illustration being rather too small to admit of this without making too much detail in a small figure.

It is usually made with the longest cloth down the "leech" or "after leech," the smallest one being, therefore, at the tack lashing.

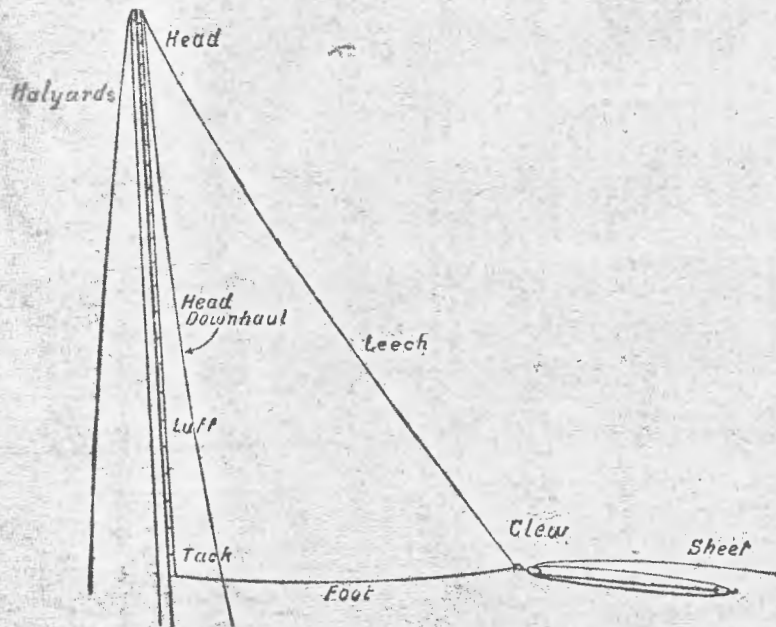
It is generally hoisted up a traveller abaft the mast. This is sometimes in the form of a **T** rail, and occasionally a wire is used.



It is set by loosing the sail and hauling the sheet aft. The sheet is generally formed by a "gun tackle" or "luff tackle" purchase.

It is taken in by "brails," which are hauled in (lee ones best) as the sheet is slacked away. The brails are made of, say, 2½-inch rope. The middle of each pair of brails is seized on to the after leech of the sail, and the two ends rove through brail blocks secured to eye bolts on the mast (sometimes seized on to the jackstay) on each side of the jackstay; these brails lead down alongside the mast and are made fast at the pin band.

The sail helps the ship along when the wind is suitable, and also helps to steady her greatly in bad weather.



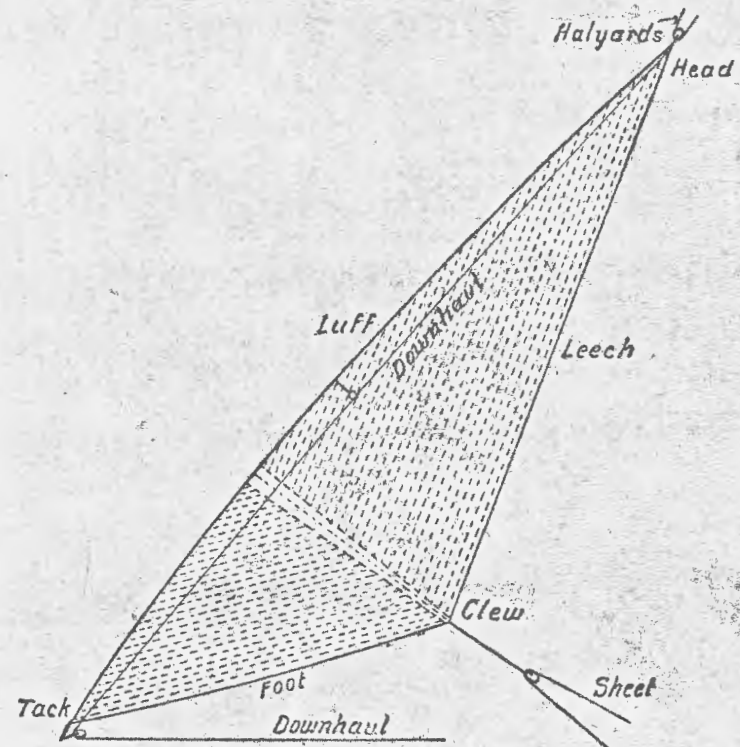
**Steamer's Hoisting Trysail.**

This is another form of trysail sometimes used in steamers. As in the previous one, it runs up and down a traveller on the after side of the mast. It is fitted with halyards for hoisting, and a downhaul for hauling it down, no brails, of course, being necessary. In shape it is about the same as the trysail shown and explained on the preceding page.

The rope on all fore-and-aft sails is generally put on the port side of the sail, and the name stencilled near the after leech and close to the clew on the port side. Fore-and-aft sails should be made up on the after leech, the sail being stretched along the deck, rope to the deck. When rolled up, this leaves the mark outside.

**To set it.**—Loose the sail and haul the slack of the sheet aft. Pull the luff up tight, and trim the sheet.

**To take it in.**—Man the head downhaul, slack away the halyards, haul the sail down, tending the sheet as necessary. Pass the gaskets.



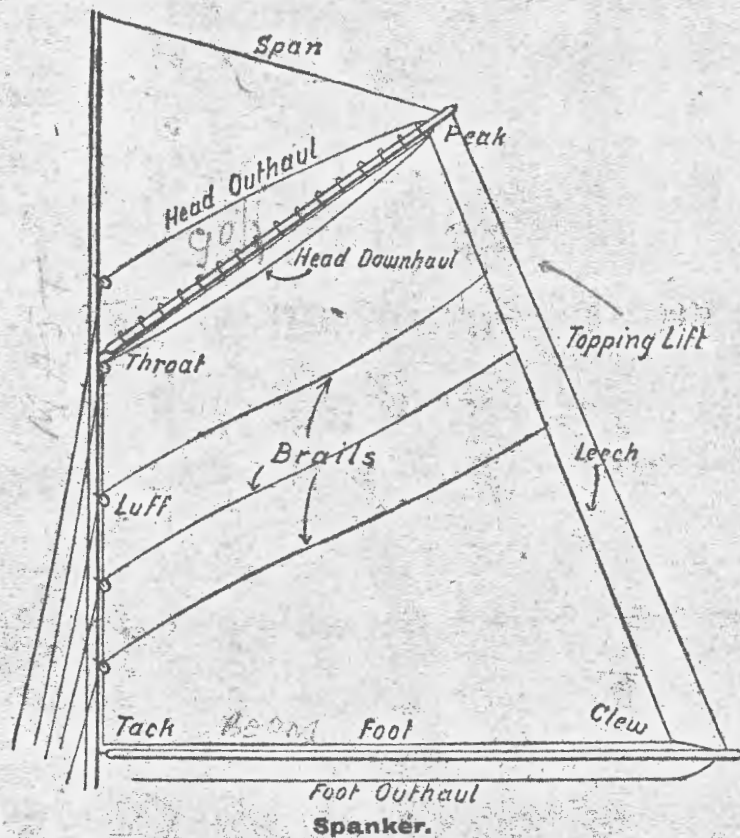
**Jib or Staysail.**

This sail is set on a stay, being bent to hanks which run up and down the stay.

**To set it.**—Loose the sail, let go the downhaul and haul the slack of the sheet aft. Man the halyards and "swig" the sail up tight. Trim the sheet.

**To take it in.**—Man the downhaul, and when all is ready, let go the halyards. Haul the sail down, slacking the sheet away as necessary. Let go the sheet and make the sail fast.

The dotted lines are put in this sketch to show how the cloths go, and the diagonal band is also shown. This method of cutting and making a sail is much better than the fashion of having *all* the cloths parallel to the after leech. The sail is stronger and keeps its shape much better.



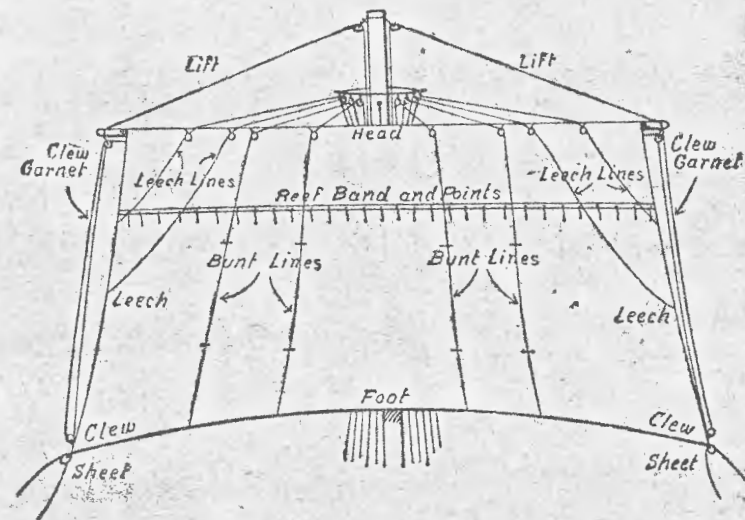
This illustration shows an ordinary spanker as used with a standing gaff and spanker boom.

The **Luff** is bent to a jackstay abaft the mast, and the head to rings on the gaff. The rings are generally made of galvanised iron. There is a good "throat" and "tack" lashing. It is fitted with head outhaul and downhaul, also with a foot outhaul and brails. These brails are fitted as for a steamer's trysail.

**To set it.**—Hook the foot outhaul on to the clew and haul the slack out, easing off the brails and head downhaul. Pull the head up tight and "swig" the foot out well. Attend to the "vangs" and "boom sheets."

**To take it in.**—Let go the head outhaul and haul the head snug down first, slacking away some of the foot outhaul if necessary. Man the lee brails, slack away the foot outhaul, finally letting go, and brail it close in. Pass the gaskets. Haul the gaff and boom amidships.

**NOTE.**—Some vessels have a hoisting or "leg of mutton" spanker. This is practically the same as a steamer's hoisting trysail.



**Foresail.**

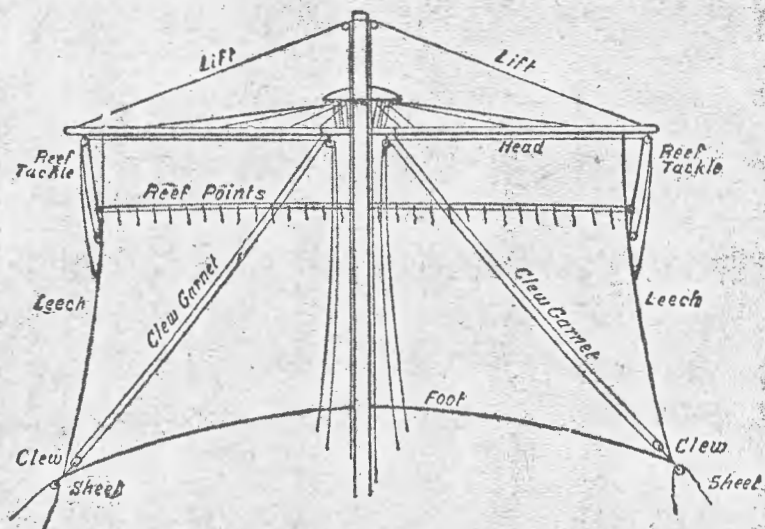
This is an illustration of a square foresail viewed from the fore side. All the gear is shown.

The head is stretched tight along the yard and bent to the jackstay.

The clew garnets, which in this case lead to the yardarm, are used in conjunction with the buntlines and leechlines for hauling the sail up.

The buntlines and leechlines are rove through blocks on the rim of the top, thence through another block on the yard, and secured to the foot and leeches of the sail by an "inside clench." In some ships they are rove through bull's-eyes in the foot and leeches of the sail, and brought up on the after side and made fast to the yard. The hauling part of the buntlines is generally fitted with a single whip.

The sheets are made of wire or good cable-laid rope.



**Foresail.**

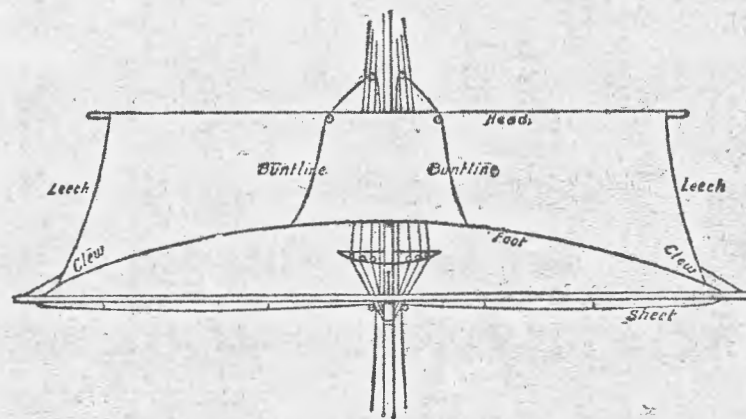
This is another foresail, as seen from the after side. The buntlines and leechlines are the same as for the foresail shown on the previous page.

The clew-garnets are rigged differently, the sail in this case being clewed up to the quarter of the yard instead of to the yardarm.

Note the reef tackles. These are formed by a double block hung underneath the yardarm, and a single block secured to a cringle in the leech of the sail. The hauling part leads down on deck, and the standing part is secured to another cringle in the leech of the sail. They are used for lifting the leeches up when reefing the sail.

A mainsail is somewhat the same as a foresail. It is a little different in shape, not being so squarely cut. The foot is considerably longer than the head, whereas in a foresail there is not much difference. The gear on it is the same.

For stowing away in the sail locker, square sails are generally made up on the foot. The foot is stretched along tight (rope to the deck) and the head cringles carried down to it, keeping the leeches straight. By this method the wire is not bent. Roll the sail up tight to the foot.

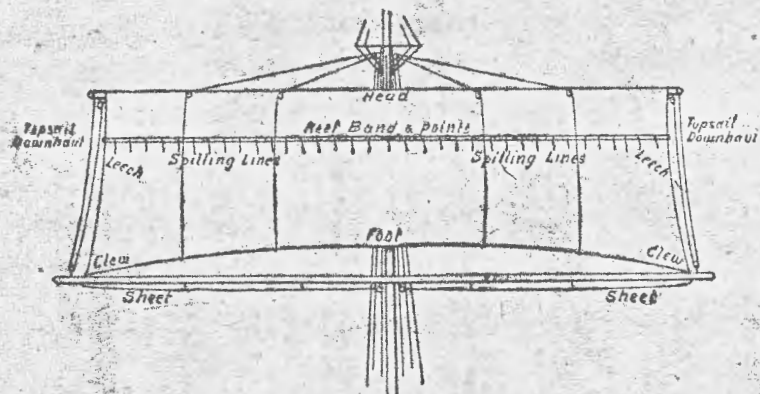


**Lower Topsail.**

This sketch represents a view from the fore side. This sail is set on the lower topsail yard, the clews being hauled out to the fore or main yardarm by means of chain sheets. These sheets are rove through an iron sheave hole generally on the after side of the yardarm, through "butterfly" blocks underneath the midship part of the yard, and thence down on deck. It is a heavy weather sail, and generally made of No. 1 canvas.

There is a good roach in the foot to enable the sail to clear the fore or main stay as the case may be. It may be clewed up to the yardarm or to the quarter of the yard. The clewlines being on the after side of the sail, it is not possible to show them in this case.

Note that the foot and leeches of all square sails are made of good flexible steel wire—the head is of bolt rope.



**Upper Topsail.**

This sail, which sets on the upper-topsail yard, is a more squarely-cut sail than the lower topsail, and the gear connected with it is quite different.

In some ships the clews are shackled to the lower topsail yardarm; in others they are fitted with sheets which are generally hove out with a gun tackle purchase.

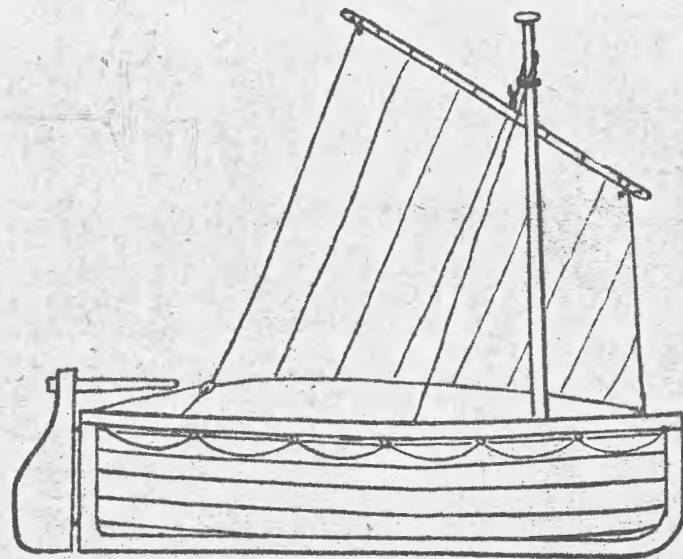
The spilling-lines are rove through a block below the topmast head (generally seized on to the topmast rigging) through blocks on the yard, through bull's-eyes in the foot of the sail, and up on the after side of the sail, and made fast round the yard. No clewlines or leechlines are required. Downhauls are fitted on each side for hauling the yard snug down, preparatory to reefing the sail or making it fast.

**To Set the Sail.**—Loose the sail, and the clews being properly out, overhaul the gear, not forgetting to let the topgallant sheets go, and hoist the yard up. Tend the braces as the yard goes up; the lee one is generally let go, and the weather one slacked away as necessary. When the leeches are well tight, make the halyards fast and trim the yard with the braces. Haul the topgallant sheets tight.

**To Reef it.**—Lower the yard down on to the lifts. Take in on the downhauls as the yard comes down, and when you have got the yard squarely down make them fast. Take in the slack of the braces. Haul the spilling-lines up. Haul the halyards tight. Lay aloft and reef it. Set it in the usual way.

**To Shake the Reef out.**—Lower the yard down a foot or so. Take in slack on downhauls and braces. One hand on each side should start amidships and let the reef points go, working out to the yardarms. Ease off and let go both reef ears at the same time. Set the sail as before.

**To Make it Fast.**—Lower the yard right down, having it nice and snug with downhauls and braces. Haul the gear up. Haul the halyards tight. Make it fast. Do not forget to take in the slack of the topgallant sheets.



**Lifeboat with Dipping Lugsail.**

The illustration shows the type of sail generally fitted in ships' life-boats. It is a free-footed sail, no boom being used. The only gear required for it is the mast, yard, hooks for the tack to hook on to halyards and sheet.

Some life-boats are fitted with a **standing lug**. This differs from the dipping lug by the foot of the sail being laced along a boom. The boom is kept down in its place by a rope tack or small tackle secured with a strap round the boom and hooked into an eye-bolt near the heel of the mast. It has more gear connected with it, but is a more efficient sail. When turning to windward the boat sails with the sail to windward of the mast on one tack, and to leeward on the other. It is not necessary to dip it.

Some boats have a mainsail set by means of a gaff and boom, and a separate foresail. This is a better rig than either, but has the disadvantage of requiring more gear.

## THE STANDING RIGGING.

### SENDING MASTS AND YARDS UP AND DOWN, ETC.

*Q.* What is meant by standing rigging?

*Ans.* The various shrouds, stays, backstays, etc., used for supporting the masts, bowsprit, and jibboom. It includes the portion of a ship's rigging which is practically a fixture, only requiring to be set up at intervals.

*Q.* What does the standing rigging of a lowermast consist of?

*Ans.* Shrouds, stay, and generally a cap shroud or backstay on each side.

*Q.* In what order is it placed on?

*Ans.* The starboard forward swifter or pair of shrouds are placed over the masthead first, followed by the port one; then the starboard second pair, and port second pair, and so on alternately until all the shrouds are on. The stay is then placed over. Cap shrouds when fitted are shackled to bolts on the sides of the cap abaft.

*Q.* What are bolsters?

*Ans.* Pieces of wood placed on the trestletrees on each side of the mast, for the eyes of the rigging to lead over and rest upon. For this reason the part on which the rigging rests is rounded off so that the rigging will not be bearing on a sharp angle. They must, of course, be placed in position before the rigging is put on.

*Q.* How would you get the shrouds over the masthead?

*Ans.* With a block and line on the trestletrees or after rim of the top. I would have one for each side, and bend the line to the shroud low enough down to allow the eye to go over the masthead. The eye can be stopped to the line until it reaches the block, when it must be cast adrift. Then haul away again until high enough to place over the masthead.

Lloyd's Rules require six shrouds and one cap shroud on each side of the fore and mainmasts for all vessels over 1000 tons register. Vessels over 2000 tons, or vessels with pole masts (that is lowermast and topmast in one) must have an additional cap shroud on each side.

*Q.* When placing the eye of a pair of shrouds over the masthead, how would you know which was the after leg of the pair?

*Ans.* It would be the longer one.

*Q.* Suppose you have placed the rigging on the lowermast, what would you set up first, and how would you do it?

*Ans.* After seeing that it was all properly placed at the masthead I should set up the stay. This usually rests in cleats at the masthead two or three feet above the eyes of the shrouds. Each part of the stay sets up on its end, that is, without a lanyard. I would have the single block of a tackle a little way up the stay, and the double block on the end. I would have a second tackle from the masthead in line with the stay with its lower block on the fall of the stay tackle, and set up. I would see that both parts of the stay had an equal strain. The frapping seizing is put on after setting up.

*Q.* How would you secure the ends?

*Ans.* With three or four good seizings at least. The throat seizing would need to be the strongest one.

*Q.* In what order would you set up the shrouds?

*Ans.* In the same order as placed over the masthead. If setting it up for the first time, I would set up the starboard and port forward swiftners together; also, when setting up a pair of shrouds (if they had not been set up before) I would set up both parts together, so as not to bring an undue strain upon the seizing at the eye.

*Q.* How would you set them up where you had lanyards?

*Ans.* I would have a single block on the shroud a few feet above the deadeye, and another on the end of the lanyard. I would have a line with one end made fast to the middle part of the lanyard, close down to the deadeye, and rove through the block on the shroud, and then down through the block on the end of the lanyard, and hitched to the lower block of a luff tackle from the after part of the trestletrees; then set up and rack off. Setting up new rigging I would set up on the middle part first.

*Q.* What general object would you keep in view in staying any mast?

*Ans.* All masts must be vertically amidships. The lowermast must be fair in the middle of the coamings of the masthole. Topmasts and topgallantmasts I would be careful not to strain out of their natural position, and I would aim at having all the rigging well taut with an even strain on all parts.

*Q.* How would you ascertain if all your shrouds were equally taut?

*Ans.* By shaking them.

*Q.* How would you reeve off the lanyards?

*Ans.* The knot must be inboard at the upper deadeye, aft on the port side, and forward on the starboard side, and the hole of the deadeye where the knot comes is not rounded off like the others. If reeving lanyards already made, I would reeve through this hole first; but if from a coil I would reeve outwards in the lower deadeye through the after hole on the starboard side, but forward one on the port side. After reeving off, I would form the knot and then set up.

*Q.* Most modern rigging sets up with screws; what precautions would you take with them after setting up?

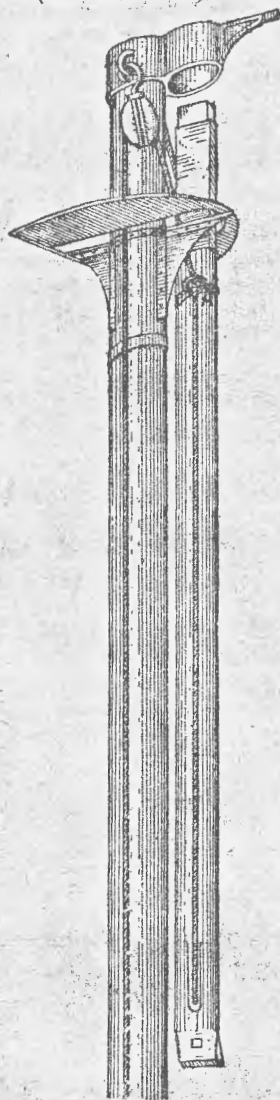
*Ans.* Have an iron rod or wire passed through them to prevent them working loose, also protect them by covering exposed parts of the thread with white lead and tallow, and parcel and serve over the top; or else sew canvas over, and paint it in order to keep water out and prevent rusting.

*Q.* How would you send a topmast up?

*Ans.* If the lower cap was on,\* I would hook a block into the eyebolt on one side of it (say the starboard side), then reeve the mast-rope from aft forward down between the trestletrees, and through a big thimble or lizard lashed on the starboard side of the topmast head, through the sheave hole in the heel, up through another lizard on the port side of the topmast head, and make the end fast to the eyebolt on the port side of the lower cap. Heave away, and the lizards will keep it on end

\* Practically all modern vessels have iron lowermasts, where the cap is a fixture forming part of the mast. It would, therefore, be in its place.

for pointing the masthead through the cap, after which they must be cast off (see illustration).



SENDING UP A TOPMAST.

Viewed from the Starboard Side, a little forward of the Mast.

A, the lizard through which the mastrope is rove, in order to keep the topmast on end until it is pointed through the trestletrees, after

which it is taken off. A similar one should be put on the other side. For heavy topmasts, instead of making the standing part fast to the other side of the cap, put a block there and continue the mastrope through it, and through another block at the heel, and up to the cap again on the starboard side, thus getting double the purchase; or a tackle may be used.

The illustration is engraved from a photograph, but the lower rigging is not shown for the sake of clearness, though of course it would be in its place.

If the lower cap was not on,\* it would be easier to proceed as follows:—Lash a block to the side of the lowermasthead, clear of the place where the cap is to be placed on. Reeve the mastrope through it down between the trestletrees and through the sheavehole of the topmast, and clove-hitch the end round the topmasthead and the other part of the mastrope. Rack the two parts of the mastrope together along the after side of the topmast and heave away. Have the lower cap in the top with its round or forward hole placed over the trestletrees, and as the topmasthead comes up point it through the cap. When a couple of feet through, avast heaving, and lash the cap to the topmast. Heave away again, and the cap goes up with the topmast, and when above the lowermasthead slew round, lower gently, and place the square or after hole of the cap over the lowermasthead; cast off the lashing and knock the cap on securely. So far the topmast has been hanging by a single part of the mastrope; it is now necessary to double it. Cast off the end hitched round the topmast, and hitch it to the eyebolt in the cap on the opposite side to the block. Ease up the mastrope, letting the mast hang by the end whilst the block is unlashd and shifted on to the eyebolt in the cap, heave tight, cast off the rackings, and the mastrope is doubled.

*Q.* How could you tell the fore from the after side of a topmast?

*Ans.* By the shape of the heel; also by the score in the sheavehole in the heel, which inclines slightly towards the after part.

*Q.* Is there anything more to be done before the topmast is hoisted right up?

*Ans.* Yes; put on the trestletrees and standing rigging of the topmast.

*Q.* How would you get the trestletrees on?

*Ans.* I would lash a block to the topmast head, reeve a gantline

\* This might be the case with a wooden lowermast.



through it and overhaul down abaft, and then heave the topmast up a few feet above the cap. Band the gantline on to the trestletrees and send them up, landing them on the lower cap, resting with the under part leaning against the topmast. As a precaution I would secure them loosely with a line to the bolts in the cap, leaving a little slack; lower the topmast down, taking off the gantline block, and the trestletrees will fall forward over the topmasthead, and can then be placed on properly.

*Q.* What are the topmast trestletrees for?

*Ans.* They support the weight of the topgallantmast and topgallant and royal yards, etc.

*Q.* How would you know which was the after part of the trestletrees?

*Ans.* I should know by their shape or by the crosstrees, which would be bolted to them. The after crosstree legs would be longer than the forward ones.

*Q.* Why are the forward ones made shorter?

*Ans.* To have less chafe on the topgallantsail.

*Q.* What would you do after getting the trestletrees on?

*Ans.* Heave the mast up a little, place the bolsters in position, and put on first the shrouds, then the backstays (starboard and port alternately, the same as on the lowermast), and last of all the stays.

By Lloyd's Rules vessels of 1000 tons and upwards are required to have at least three topmast backstays on each side. Also where double topgallant yards are adopted a topmast cap backstay should be fitted in addition.

*Q.* When putting the backstays over would you bring them down abaft the crosstrees or between them?

*Ans.* Between them.

*Q.* How many fore-and-aft stays are usually fitted on the foretopmast?

*Ans.* Three. The foretopmast stay and the inner and outer jib stays.

*Q.* How are they placed on?

*Ans.* They are put over the masthead, and then the eyes opened out and placed under the forward crosstree leg. The eye is made large enough for this purpose.

*Q.* What would you do next?

*Ans.* Send the topmast right up, place the fid in position, ease down, come up the mastrope, and proceed to set up the rigging.

*Q.* In what order would you set it up?

*Ans.* I would steady tight the shrouds and stays to get the eyes into proper position at the masthead, and set up the stay first and then the backstays—starboard and port forward ones first.

*Q.* What are the topmast shrouds for?

*Ans.* To furnish (when rattled down) a convenient means of getting aloft. As they are not intended as a support to the topmast, I would not have them as taut as the backstays.

*Note.*—The proceeding for sending a topgallantmast up is similar to that described for a topmast, but the rigging is put on in the following order:—First the fore-and-aft stay, then the shrouds, then the starboard forward backstay, followed by the port forward one, etc. At the royal masthead also, the stay goes on first, and afterwards the backstays.

*Q.* Do the topgallant shrouds set up to the crosstrees?

*Ans.* No. The crosstrees only act as spreaders, the shrouds being set up to chains rove through them leading from the spider band on the topmast.

All the foregoing applies to either of the masts—fore, main, or mizen.

*Q.* What is the first thing set up in rigging a vessel?

*Ans.* The bobstay or bowsprit stay.

*Q.* How would you set it up?

*Ans.* Rig out the boom if possible. Have one block of a tackle on the end of the lanyard and the other on the stay, see that a good lead is secured so that the tackle is in line with the stay, and heave away until set up.

*Note.*—In many vessels the bobstay is a fixed iron bar, known as the bobstay bar, and, when adjusted and secured, would not require setting up.

*Q.* Where do the bowsprit shrouds set up to?

*Ans.* To each side of the bowsprit cap with lanyards or screws. If with lanyards, I would set them up in a similar manner to the bobstay.

*Q.* In what order is the lower rigging set up?

*Ans.* Working from forward to aft, setting up the rigging of the fore, main, and mizen lowermasts. After the topmasts were up I would proceed in the same order with them. The fore-stay first and then the shrouds, following with the main and mizen.

*Q.* Your fore or mainyard being alongside to port, how would you get it on board?

*Ans.* I would have a good threefold purchase from the masthead lashed to the middle of the yard, and a gantline on the starboard yardarm, which I would have forward. Heave away on the purchase, topping the starboard yardarm up a little as it comes inboard, pass it under the stay, let it swing easily athwartships, and land it on the rail. If necessary a line could be passed out through the bow pipe for easing the yard inboard. The following is a handy way if it can be done:—Have the yard brought abreast of the mast, but instead of laying it alongside fore and aft, place it at right angles with the starboard yardarm next the ship. Lash the purchase on the starboard yardarm, and heave it partly aboard; then land it on the rail and fleet the purchase to the middle of the yard and heave it right aboard.

*Q.* What would you do before sending it aloft?

*Ans.* Rig it by putting on the footropes, braces, and lifts.

*Q.* Proceed to get it aloft.

*Ans.* Round up the purchase used for heaving it aboard and pass it down between the two parts of the stay, and lash it to the middle of the yard. I would also have a tackle leading forward, to heave the yard forward for trussing. Heave away; when high enough, truss and sling the yard, ease down gently, and steady tight the lifts and braces.

For heavy yards in large vessels I would use two purchases—one from each side of the lower cap.

*Q.* How would you send up a lower topsail yard?

*Ans.* Supposing I had it along the starboard side of the deck, I would have a luff tackle from the topmast head on to the middle of the yard, and a single line on to the port yardarm

(which would be forward). Heave away, topping the port yardarm up to get it across the lower stay. When clear of the stay the yard can be allowed to hang square. The braces can be put on from the mainyard by topping up first one side, then the other, or overhauled over the stay and put on before it leaves the deck; when high enough, ship it on the crane at the lower cap, and haul tight the braces. The upper yard is sent up in a similar manner to the lower, the braces being put on from the lower yard.

*Note.*—Where a lower topsail yard is being sent up, and the upper one is aloft, the upper yard may require to be hoisted a few feet in order to get the lower one in its place.

*Q.* How would you rig out a jibboom?

*Ans.* I would reeve a heelrope through a block on the bowsprit cap, in through the heel of the boom, and out to the cap on the other side. Have the jib halyards or some other line from the foretopmast head on to the boom end, grease the spar underneath and heave away. Knock the guy and staybands on as it goes out, and when far enough heave the heel down and clamp it.

*Q.* What would you set up first?

*Ans.* The backropes, then the fore-and-aft stays, and next the guys.

*Q.* How would you send up a royal yard at sea, wind abeam?

*Ans.* I would have the yard on the weather side of the deck; reeve the yardrope through the sheavehole or a block at the royal-masthead, and overhaul it down to windward abaft the yards. Take a half-hitch with it on the lee quarter of the yard close to the middle, and finally hitch it securely to the other quarter. Form the hitches on the top of the yard so that when hanging it will be right side up ready for parralling. Lay the yardrope alongside the jackstay, and stop it to the lee yardarm to keep it on end when going aloft, hitch the lift lashings loosely to the yardrope. Heave away, and when the stop is level with the topgallant stay, put on the lee brace from the masthead, and the weather one from the topmast rigging; take off the yardarm stop, and heave away again. Parral it as soon as possible to keep it steady, get hold of the lift lashings, heave up a bit and secure the lifts, lower down and put on the halyards. Pass the footropes abaft the mast, and seize the ends in their places.

*Q.* How would you send up a topgallant yard?

*Ans.* The same way as a royal yard if not too heavy. If too large for this, I would double the yardrope, by lashing a block to the middle of the yard, and a big thimble for a lizard at the lee yardarm. Reeve the mastrope down through the lizard, through the block at the middle of the yard, and back to the masthead. The lizard will keep it on end whilst going aloft, and when the braces are on, it can be taken off in order to cross the yard.

*Q.* How would you send down a royal yard at sea?

*Ans.* Reeve the yardrope through a block at the masthead, or unreeve the halyards and reeve the rope through the sheavehole, and hitch it securely to the middle of the yard as in sending it up. Cast the footropes adrift from abaft the mast, hoist up a bit and take off the lifts, unparrel the yard, and lower away. The lee yardarm can be pulled up with the lift and a yardarm stop put on, and when on end the braces can be taken off, and the yard lowered down to the deck.

*Q.* How would you send a foreyard down, and get it fore and aft along the deck, without disturbing your lower rigging?

*Ans.* Suppose I wanted it along the starboard side. I would get a good purchase from the topmast head, lashed to the middle of the yard, having it on the starboard side of the forestay. I would also have another tackle leading forward for untrussing, and a topping line on the starboard yardarm. Heave away, unslung and untruss, top the starboard yardarm up, and bring the port one in over the rail, across the forehatch, to the starboard side of the deck. Lower away, pointing the port end aft, and it can be landed fore and aft along the deck.

*Q.* How would you send a topsail yard down and get it on the deck on the same side?

*Ans.* I should top it up the reverse way, having a good tackle on the middle of the yard, and a tripping line on the port yardarm.

*Q.* How would you send a topgallantmast down?

*Ans.* Reeve a mastrope through a block hooked into the topmast cap, down through the sheavehole in the heel of the topgallantmast, and make it fast to the cap on the other side. See that

all the rigging is cast adrift, and heave the mast up until high enough to take out the fid. Then lower away, and, before the masthead clears the cap, single the mastrope by racking the two parts together and casting the end adrift from the cap. This end must be clovehitched round the masthead, and also round its own part. Then lower right down to the deck.

*Q.* How would you send a top up and get it over the lowermast head?

*Ans.* I would place the top ready for sending up leaning against the afterside of the mast with its fore rim uppermost. I would have two gantlines rove from forward aft through blocks at each side of the cap. Overhaul the ends down, and pass them under the fore rim on the underneath side of the top, and make them fast to the after rim, one on each side. Stop the gantlines to the fore rim and also to the middle of the top; bend a guy to the fore rim leading forward, and one to the after rim leading aft. Then hoist away, and when the fore rim reaches the blocks cut the stops. Hoist away again, pulling forward on the fore guy until high enough to be brought over the cap. Then lower away, get it into position, and bolt to the trestletrees.

*Q.* How would you parcel the eye of a stay?

*Ans.* I would begin at the seizing or splice, and work round both ways towards the middle of the eye, with the lay.

*Q.* Why put it on in this way?

*Ans.* Because it is meant to keep the water from getting into the rope, and by putting it on thus, each part overlaps the one below it. For the same reason swifters, shrouds, etc., should be parcelled upwards so as to shed the water.

*Q.* How is the lower topsail yard slung when aloft?

*Ans.* It fits on a crane projecting forward from the lower cap.

*Q.* What do you understand by running rigging?

*Ans.* The various lines and gear used in working the ship, such as braces, halyards, sheets, etc.

*Q.* What gear is required for a course?

*Ans.* Buntlines, leeclines, clewgarnets, reef tackles, sheets and tacks, and bowline.

**Q.** Describe the gear on a foreyard, mainyard, or crossjack yard.

**Ans.** The weight is held by the chain "sling." It is kept in its proper position with regard to the mast by means of the "truss," which is fitted to allow the yard to swing round. Lifts are fitted to top the yard up or steady it as required. These consist of a good wire rove through an iron block at the lower mast head and shackled to the lift bolt at the yard-arm. The vertical part comes down alongside the mast and is fitted with a luff tackle purchase hooked or shackled into it. The yard is trimmed by means of the braces. Butterfly blocks are fitted under the midship part of the yard, and a sheave at the yardarm, for the lower topsail sheets.

**Q.** How is an upper topsail yard rigged?

**Ans.** When the sail is not set, the weight is held by the lifts, the yard being lowered down. When the sail is set, the yard is hoisted, and the weight is held by the halliards. The yard is kept in its proper position, with regard to the mast, by means of the parrel. This is fitted round the mast and allows the yard to swing. Downhauls are fitted to haul the yard down. It is trimmed—that is squared, or canted—by the braces. "Butterfly" blocks are fitted under the yard amidships and a sheave at the yardarm for the topgallant sheets.

**Q.** What gear is required on a topgallant yard?

**Ans.** Halyards, lifts, and braces. In the case of a single topgallant yard the clewlines act as downhauls. With an upper topgallant yard downhauls are generally fitted in the same way as for an upper topsail yard.

All yards have a jackstay on the top for bending the head of the sail to.

**Q.** What gear is required for a jib or staysail?

**Ans.** Halyards, downhaul, and sheets.

**Q.** What is necessary for a spanker?

**Ans.** Head outhaul and downhaul, brails and foot outhaul.

**Q.** Describe how you would put a sheer ratline on the starboard lower rigging?

**Ans.** Take the end of my ratline stuff up, after first splicing a small eye in the end and putting my seizing in. Take a loose clove hitch round each shroud except the forward and after ones, seize on to the forward shroud. Tighten up the line and hitches towards aft, cut off at the required length, splice another small eye and seize on to the after shroud.

**Q.** What size ratline stuff would you use?

**Ans.** 18 or 21 thread. It is not usual to measure ratline stuff by circumference (such as  $1\frac{1}{2}$  inch). It is identified by the number of threads it contains.

**Q.** Is ratline stuff used in all vessels?

**Ans.** No. Sometimes iron or hard wood battens are used instead.

## NOTES.

MANAGEMENT OF A SAILING VESSEL  
UNDER CANVAS.

*(Candidates for Steamship Certificates will not be examined in this subject. It will be well for them however to read the portions up to Questions on Self-Examination).*

**Preliminary Remarks.**—Before proceeding to give questions and answers on this subject, it will be advisable to caution intending candidates against committing to memory certain questions and answers, under the impression that this will help them to pass their examinations. Such a proceeding would probably lead only to disappointment and failure. These pages are addressed to those who have had experience at sea, and this experience rightly used will be of more service, when being examined in subjects such as this, than any bookwork.

On the other hand useful and valuable information may often be obtained from books which would not be obtained in other ways, and especially so in the case of apprentices and others, who, during their first years at sea, are often left to acquire a knowledge of their profession as best they can. The mistake arises when candidates try to substitute bookwork for experience, and rely upon the former instead of the latter.

It frequently happens that some of the best and most practical candidates find themselves at a disadvantage in the examination room. They experience more difficulty in telling the examiner how certain things should be done, than they would in actually performing them on board a ship. This often arises from the fact that though the examination is conducted with the aid of models as far as possible, yet of necessity many of the questions are purely imaginary, and the candidate has to picture the circumstances in his mind, and if not gifted with a sense of imagination he finds difficulty in answering. This, however, need not discourage anyone, as the examiners can generally discern whether the difficulty arises from causes such as this, or from want of knowledge.

**The Use of the Helm.**—This is one of the first points to be considered. When a vessel's course is altered she turns or pivots round a point somewhere amidships—the centre of gravity, to be more exact.

Therefore, when a vessel has headway and the helm is put a-port, her head cants to starboard, the stern at the same time moving to port. With the helm a-starboard the effect is of course the reverse. When under sail the terms "down" and "up" helm are generally more natural and convenient for use. "A-lee" and "a-weather" are sometimes used for down and up respectively.

When making sternway the effect of the helm is the reverse to that described above, but if there is any sea at all on it is best not to use it, and it should be kept amidships.

**Wind Pressure on the Sails, and its effect on the Steering.**—This is mainly a question of leverage. It has been stated that when a ship turns she does so about a point somewhere near amidships. Side pressure forward of this point tends to make the ship's head pay off from the wind, pressure abaft this point having the opposite effect. It is obvious that the sails furthest forward and aft, such as jibs and spanker, exert the most leverage in proportion to their size; also that the sails on the fore and mizen masts have considerable turning effect. The mainmast is too near the middle of the ship\* to have much leverage, but as it is always placed some distance abaft the turning point, it has a tendency to make the ship come up to the wind.

Also note particularly that the turning effect of all square sails, whether full or aback, is greatest when the yards are braced sharp up, and least or almost nil when quite square.

In setting, trimming, or shortening sail, if the wind is anywhere near the beam, an effort should be made to, as far as possible, equalise the pressure forward and aft, so that the one balances the other, and the helm can be carried nearly amidships. When running with the wind aft, or on the quarter, in strong breezes it is generally advisable to have a preponderance of sail pressure forward to counteract any tendency to broach to.

When occasion arises for altering the ship's course as quickly as possible, in order to avoid some immediate danger, the action of the helm must be supplemented by a proper trim of the sails. In this respect the following two rules should be noted:—

**To make a Vessel pay off quickly.**—When a vessel is close-hauled or has the wind on the side, and it is necessary to make her pay off as quickly as possible, put the helm up and reduce the pressure aft by brailing in the spanker, hauling down the gaff topsail and mizen staysails, and shivering the afteryards.

\* That is, in a full rigged ship with three masts, or in a barque.

If required to reduce the headway at the same time throw the mainyard aback; but remember that when reducing headway the helm will not be so effective; also, if the mainyard is braced sharp a-box; it really tends to prevent paying off.

**To make a Vessel come up quickly.**—The wind being aft or on the quarter, it will be necessary to increase the pressure aft, and reduce it forward as much as possible. Therefore put the helm down, brace up the afteryards, hauling out the spanker, etc., if not set. Also, if any headsails are set let them run down or let go the sheets. The foreyards can be braced up when the sails begin to lift.

The foregoing applies only to cases of emergency. In trimming yards at sea under ordinary conditions you must, of course, follow the usual precautionary practice of trimming the headyards first when bracing up, and beginning aft when squaring in.

**Effect of Heeling on the Steering.**—When a ship heels over from the force of the wind or from any other cause, the lee bow becomes submerged to a greater extent than the weather one. The pressure of the water against the lee bow will then be greater than against the weather bow, which has the effect of forcing the ship's head to windward. An experienced helmsman, when he feels the wind freshening and ship heeling, instinctively meets or checks this by putting the helm up sufficiently to counteract it.

In going over the questions and answers, you should read each question and form an answer to it before looking at the given answer. This will lead you to think for yourself, and you can afterwards see if the answer given is substantially the same, and note if it gives you any further hints. It would also be best to have a rough model to use for illustrating each question.

## QUESTIONS FOR SELF-EXAMINATION.

### Wind Aft.

*Q.* Suppose you were in a ship going before the wind, and it hauled out to the port quarter or beam, what would you do?

*Ans.* If the sails were lifting, I should keep her off a bit whilst I trimmed the yards. I should trim the foreyard first, following with the main and mizen. I should then keep her on her course, and set the mainsail, jibs, staysails, and spanker.

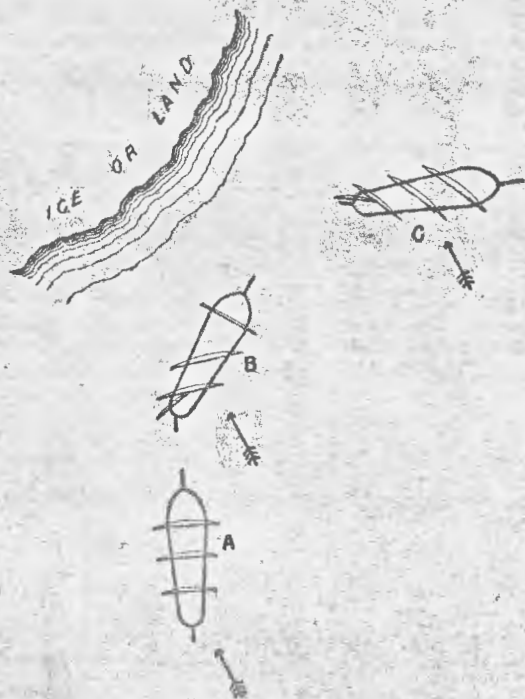
*Q.* You have the wind aft, and require to take a cast of the lead?

*Ans.* Suppose I intended to take the cast on the port tack, I would

pass the end of the leadline from aft forward along the port side and bend it on to the lead. When ready, put the helm a-starboard, and as the ship comes to brace up the foreyards, leaving the afteryards aback. When she loses headway, heave, and take the sounding from the weather quarter.

*Q.* You are running before a moderate breeze in thick weather, and you see land close to, ahead and on your port bow?

*Ans.* I should bring her to the wind as quickly as possible on the starboard tack by putting the helm a-port, and bracing up the afteryards for the starboard tack. I would set the spanker and any other aftersail I could. When the foreyards began to lift, I should brace them up also (see illustration).



Avoiding danger such as ice or land close to ahead, and on port side. The wind being aft or on the quarter.

*A.* The vessel running.

*B.* The helm put hard down, afteryards braced up, spanker set, to bring her to quickly.

*C.* The foreyard braced up when she comes to.

*Q.* What is your reason for bracing up the afteryards first?

*Ans.* By doing so the ship will come to quicker than if I braced up the headyards first.

*Q.* You are running before a gale of wind with a heavy sea, and your ship broaches to, bringing the wind and sea on the port beam; how would you get her off again as quickly as possible?

*Ans.* Put the helm a-port and brace the foreyards sharp up by hauling in the starboard braces; when she pays off again, attend to the helm, and square the foreyard.

*Q.* Why do you brace up the foreyard in the above case?

*Ans.* Because by doing so, I help the ship to pay off.

*Q.* You have a strong breeze on the quarter; how would you trim the yards?

*Ans.* I would give the headyards a point or so more cant than the afteryards, and be careful not to carry too much aftersail. Attention to this will considerably assist the steering, and the ship will not be so liable to broach-to.

#### Wind Abeam, Closehauled, Tacking, Wearing, Etc.

*Q.* You have the wind abeam and it hauls right aft, what would you do?

*Ans.* Brail in the spanker, haul up the mainsail and crossjack, and square the afteryards; then square the foreyards, and haul down the fore-and-aft sails.

*Q.* You are closehauled and want to take a cast of the lead?

*Ans.* Pass the leadline forward, outside and to windward, and bend it on to the lead. When ready, haul the mainsail up, put the helm down a little, and back the mainyard. When the way is off the ship, heave the lead forward, and take the sounding from the weather quarter.

*Q.* You are going along closehauled, and you see danger ahead and on your weather bow; what would you do?

*Ans.* Run her off quickly by putting the helm hard up; brailing in the spanker, hauling down the after staysails, and shivering the afteryards.

*Q.* You are closehauled on the port tack in a fog, and you hear a single blast of a fog horn; you then see a vessel on the starboard tack close to ahead crossing your bow, what would you do?

*Ans.* Run her off quickly,\* etc. (same as the last answer).

*Q.* How would you tack ship?

*Ans.* See all clear for going about, keep the ship clean full, and station the hands. When ready, put the helm a-lee, ease off or let go the head and fore sheets, and haul the spanker boom amidships. When from 1 to 2 points from head to wind, mainsail-haul. Haul the head sheets over when the wind gets on the other bow, and ease off the spanker boom. When filling aft, fore-bowline, let go and haul, and trim all sail for the other tack.

#### Notes on Tacking.

If a ship loses headway before she gets head to wind, she may miss stays. Hauling the afteryards too soon deadens the ship's headway and makes her more likely to miss stays. On the other hand, if the afteryards are not hauled before coming head to wind, they will not come round easily. The best time, therefore, is when the lee side of the sails at the main are getting becalmed by those on the fore. The crossjack should be started just before the main. If the mainsail is not being worked, the order, "maintopsail-haul" is used instead of "mainsail-haul."

*Q.* Why do you ease off the head sheets and haul the spanker boom amidships when the helm is put a-lee?

*Ans.* By doing so I help the ship to come up in the wind.

*Note.*—If the mainsail is not hauled up when getting ready for going about, the tack and sheet must be raised as soon as it lifts, ready for swinging the yard.

*Q.* If ordered to see all clear for going about, what would you look to?

*Ans.* I would have the weather jib sheets put over the stay and the slack hauled aft; also the weather foresheets out of the becket ready for hauling aft, mainsail ready for hauling up if necessary, and the braces clear for running with their ends hitched.

\*The same answer would apply if the other vessel was a steamer, assuming that she was similarly placed and so close that collision could not be avoided by her action alone.

*Q.* When is a ship likely to miss stays?

*Ans.* When she has very little headway, that is, in very light airs; or again, in a strong breeze when under low sail and in a head sea.

*Q.* What would you do if your ship missed stays in light winds, supposing you had hauled the afteryards round?

*Ans.* I would wear her round. In this case I would square the afteryards, haul aft the head and foresheets again, and take in the spanker, gaff topsail, and after staysails. When the sails filled and she gathered headway, I would put the helm hard up, when the wind was aft, brace the afteryards up ready for the other tack, and brace up the headyards and haul over the headsheets as she was coming to.

*Q.* How would you wear a ship round in very light winds?

*Ans.* Put the helm up, brail in the spanker, haul down the gaff topsail, and after staysails, and as she pays off square in the afteryards, keeping the main full and the crossjack lifting. By the time the wind is aft have them braced up for the other tack, set the spanker again as soon as it will take, and brace round the headyards and get the jib sheets over as she comes to.

*Q.* How would you boxhaul her round where you had not much room?

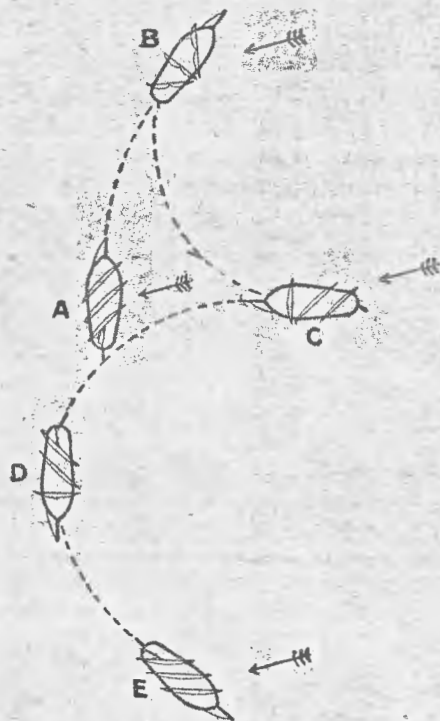
*Ans.* First put the helm down and throw her up in the wind, and when she loses headway haul the foreyard right round to box her off, keeping the helm down. As she falls off keep the afteryards lifting, and have them braced round for the other tack by the time the wind is aft, shifting the helm when she gathers headway. As soon as the wind draws out on the other quarter, set the spanker, gaff topsail, etc. As she comes to, let go the head sheets and haul them over, but not flatten them aft until she is closehauled (see illustration on following page).

*Q.* Wear ship in a gale of wind under three lower topsails, foretop mast and mizen staysails.

*Ans.* Haul down the mizen staysail and put the helm up, but not hard over. As she pays off, check in the afteryards, aiming to have them square by the time the wind is aft. When right before, it keep her so whilst hauling the foreyard round for the



other tack and getting the foretopmast staysail sheet aft on the other side. When all is ready forward, stand by aft, choose a favourable opportunity, then brace up and bring her to.



#### BOXHAULING.

- A.** The ship close-hauled on the starboard tack.
- B.** Helm put down, and the ship brought up in the wind. The foreyards hauled right round, the main squared. She then gathers sternway, the foreyards boxing her off. The main and mizen kept shivering as the wind draws aft.
- C.** When she loses sternway fill on the fore, and shift the helm for headway.
- D and E.** When the wind comes on port quarter, set the spanker and brace up forward as she comes to.

#### Caught Aback, Etc.

When caught aback with head winds, put the ship on the tack on which she will be nearest her course. In the neighbourhood of land, put her on the tack that will take her clear of the land.

**Q.** You are close-hauled in light winds—say, on the port tack—and it hauls a point or two further ahead, taking the ship all aback, what would you do?

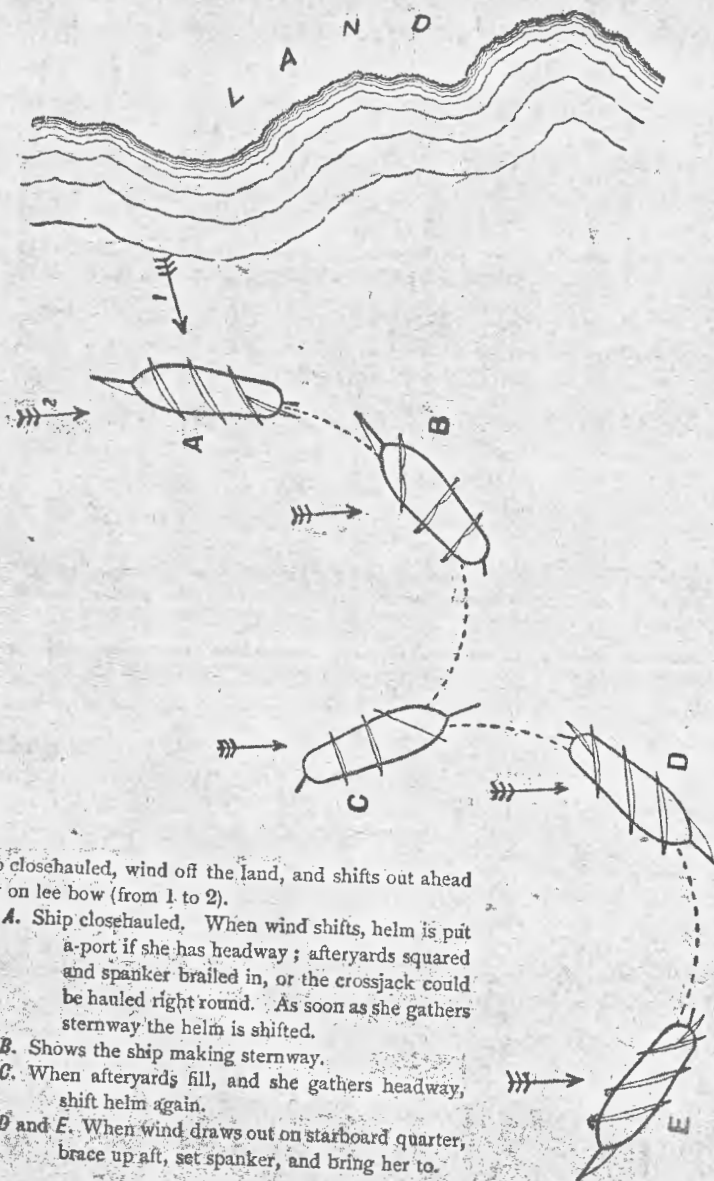
**Ans.** Put the helm up, brail in the spanker, down gaff topsail and after staysails, and flatten in the head sheafs. If she was not then paying off, and the wind was still on the same bow, I would haul the foreyard right round and box her off, and when full aft, haul the foreyards back again.

**Q.** Suppose, before you hauled the foreyard round, she came up and brought the wind right ahead, what would you do?

**Ans.** It would then be too late to try and box her off with the foreyard; and if I wanted to keep her on the same tack as before I should put her round by squaring the afteryards and leaving the foreyards a-box, keeping the helm a-port if she had sternway. She will then fall off with the wind on the starboard side; when it draws aft shift the helm as she gathers headway, brace up the afteryards for the port tack again, and, as she comes to, set the spanker and other after sails.

**Q.** If your ship was on the starboard tack and you had land on your weather beam, what would you do if the wind hauled out right ahead?

**Ans.** Keep her on the starboard tack. If she has headway put the helm a-port, directly she gathers sternway shift it. Square the afteryards, brail the spanker in. She will now come round with her head to starboard. As the wind draws aft and she gathers headway, port the helm again; as it comes on the starboard quarter brace the afteryards up, haul the spanker out, and ease the helm as she comes to (see illustration on the following page).



Ship closehauled, wind off the land, and shifts out ahead or on lee bow (from 1 to 2).

**A.** Ship closehauled. When wind shifts, helm is put a-port if she has headway; afteryards squared and spanker brailled in, or the crossjack could be hauled right round. As soon as she gathers sternway the helm is shifted.

**B.** Shows the ship making sternway.

**C.** When afteryards fill, and she gathers headway, shift helm again.

**D and E.** When wind draws out on starboard quarter, brace up aft, set spanker, and bring her to.

**Q.** Suppose in the last question the land had been on your lee beam?

**Ans.** I would have put the ship on the port tack by hauling the afteryards right round, leaving the foreyards to box her off. As soon as the aftersails began to fill, I would haul round the foreyards and get the jib sheets over.

**Q.** You are closehauled on the starboard tack heading North, your course being N.N.E., and the wind flies out on your lee bow; what would you do?

**Ans.** Put the ship on the other tack (similar to the last answer).

**Q.** You are becalmed, and your yards are square. A breeze springs up from ahead and you want your ship on the port tack; what would you do?

**Ans.** Brace the foreyards for the starboard tack to box her off, putting the helm a-starboard as she gathered sternway, and bracing up the afteryards ready for the port tack. As soon as they fill, haul the foreyards round and set the mainsail, fore-and-aft sails, etc.

**Q.** You are going along on the starboard tack in light winds and variables, with all sails set, and you see a squall working up on your lee bow; what would you do?

**Ans.** Take in the lighter sails and the fore-and-afters, and haul the courses up, so as to be all ready for a shift of wind.

**Q.** The wind on your starboard side dies away, and the squall is coming towards you?

**Ans.** I would then haul the afteryards round and put the helm hard a-port if the vessel had any headway, leaving the foreyard a-box. As soon as the squall struck the ship she would pay off quickly, and if she got sternway I would shift the helm, and, when far enough off, haul the foreyard round. If it proved a very heavy squall I would let her pay right off, and bring her to again when it moderated.

**Q.** You are going along with a light wind well out on the port side, and it shifts to the starboard quarter, taking the ship by the lee?

**Ans.** Put the helm a-starboard, in spanker, down gaff topsail and after staysails if set, and haul the foreyard round; then trim

the main and crossjack yards, bring her to her course again, haul the head sheets over, keeping them set if they draw; also set the spanker again if necessary.

*Q.* You are becalmed, with the yards braced up for the starboard tack. A light breeze springs up on the port bow and you want the ship on the starboard tack; how would you proceed?

*Ans.* I would leave the foreyards as they were to box her off, put the helm a-starboard for sternway, and square the main, keeping the crossjack yards lifting as she fell off. When the wind is aft have the afteryards (main and crossjack) braced up for the starboard tack. As the wind draws out on the starboard quarter set the spanker and other fore-and-aft sails and bring her to.

## BENDING, SETTING, TAKING IN, AND REEFING SAILS, Etc.

*Q.* How would you bend a course?

*Ans.* Stretch it across the deck, foreside uppermost. Overhaul all the gear down and reeve the buntlines and fecchlines through the bullsyes, and clinch them into the foot and leeches of the sail. Put on the clewgarnets, reef tackles, and tacks, stop the head of the sail to the gear, and hitch the head earrings loosely to the reef tackle hooks. Send it aloft, pass the head earrings, stretching the head tightly along the yard, so that the midship stop is at the middle of the yard, and bend it.

*Q.* How would you bend a topsail in a gale of wind?

*Ans.* I would make it up all ready for bending before it left the deck, so that it could be bent without casting it adrift. If an upper topsail I would tie the reef points alternately round the head and the foot and send it aloft with a gantline. Put the spilling lines on it and stretch it along the yard. When stretched out, cast adrift the reef points round the head and tie them loosely round the yard, so that the head can be stretched out and bent to the jackstay. A lower topsail I would secure with good stops, tying it up so that the gear could be put on without casting it adrift; and after putting the gear on it and stretching it along the yard, I would pass the gaskets round it and the yard, but not too tight, then take the stops off, stretch the head along the jackstay, and bend it.

*Q.* How would you bend a jib at sea?

*Ans.* Fake it down on the forecastle ready for bending, head on top, tack underneath, bend the downhaul round it near the luff,

hook on the halyards, bend a line in the clew, and haul it out to windward of the boom; start bending from the tack. If a fresh breeze was blowing I would pass gaskets round the sail and the boom after sending it out, leaving the luff clear for bending.

*Q.* How would you know the head from the tack of a fore-and-aft sail?

*Ans.* The roping should be on the port side of the sail.

*Q.* How would you set a course in a fresh breeze?

*Ans.* Loose the sail, slack away the lee gear, and haul the sheet far enough aft to steady the sail. Then haul the tack down, trim the sheet as far aft as required, and haul out the bowline if necessary.

*Q.* How would you set a topgallant sail, the ship being closehauled?

*Ans.* Loose the sail, slack up the weather gear, and haul out the weather sheet. Then trim the yard so as to keep the sail lifting, and haul out the lee sheet, seeing that the clews are equidistant from the sheaveholes in the topsail yard when the foot is taut. Let go the lee brace and royal sheets, hoist the yard up, tending the weather brace, and trim to the wind.

*Q.* How would you set a jib?

*Ans.* When the sail is loosed haul aft the sheet, letting go the downhaul. When the sheet is well aft, haul away the halyards, stretching the head taut, and then trim the sheet.

*Q.* How would you haul up a course for furling?

*Ans.* Slack off the sheet a bit, man the weather gear, unreeve the bowline if hauled out, slack away the tack and haul up the weather side, also the lee buntlines as much as possible. Then slack away the sheet and haul up the lee side.

*Q.* When hauling up the lee side, which would you put the most hands on to—the clewgarnet, or the buntlines and leechlines?

*Ans.* I would have most on the buntlines and leechlines, and be careful not to haul too much on the clewgarnet, as by doing so I should balloon the lee side and make it more difficult to haul up.

*Q.* How would you reef a foresail?

*Ans.* Haul it up in the manner described in the foregoing answers, then haul out the reef tackles, weather one first, easing away any necessary gear, and lay aloft and reef it.

*Q.* How would you haul up a fore lower topsail when head reaching in a gale of wind?

*Ans.* See the fore lifts are hauled well tight. Slack away the weather sheet, hauling up the weather clewline and buntlines; when the weather side is up, haul in the weather brace until the yard points to the wind, slack off the sheet, and haul the lee side up.

*Q.* How would you haul up a topgallant sail or a royal if on a wind?

*Ans.* Lower away the yard, taking in the slack of the clewlines and hauling in the weather brace as it comes down to point the yard to the wind. When on the lifts slack away the lee sheet and haul up the lee side. Then man the weather gear, haul it tight, slack away the sheet and haul it up. When close up steady tight sheets and halyards, and when the sail is furled and the men off the yard, trim it to the wind.

*Q.* Suppose the wind in the last question was aft and blowing strong?

*Ans.* Lower the yard as before. Start away the port sheet, man the port clewline, buntlines and leechline, and haul in the starboard brace at the same time. When close up, slack away the starboard sheet, and haul all the gear up, pulling the yard fore-and-aft at the same time. Haul the halyards and sheets tight, lay aloft and furl the sail. Square the yard as the men come down.

In answering such questions as these, which relate to matters of frequent occurrence at sea, you should tell the examiner exactly how you have been accustomed to do it. If he sees that you display an intelligent practical knowledge you will not be likely to fail, even if your method is not just the one of which he most approves.

*Q.* How would you get your inner jib down and furled with the ship diving heavily into a head sea?

*Ans.* Keep the ship off until the wind is abaft the beam, man the downhaul and let go the halyards, tending the sheet as it comes down. When furled, and the hands are in off the boom, bring the ship to the wind again.

*Q.* How would you take in the spanker in a strong breeze?

*Ans.* Man the head downhaul and lee brails, leaving one hand to take in the slack of the weather ones. Let go the head out-haul, and when the head is down, slack away the sheet or foot outhaul and brail close in.

*Q.* After a spell of dry weather it sets in wet, what would you do to your running gear?

*Ans.* Ease up any that is very taut, such as halyards, to allow for shrinkage.

#### Accidents.

*Q.* What would you do if one of the topgallant sheets carried away?

*Ans.* Man the clewline and other gear of the side on which the sheet carried away and start hauling them up, at the same time lowering the yard and hauling in the weather brace. Then haul the other side up, repair the sheet, and set the sail again, or furl it, as required.

*Q.* The parral of a yard carries away; what would you do?

*Ans.* Keep the yard at the masthead and see the braces were hauled tight to keep the yard as steady as possible, and send some hands aloft to secure it temporarily with a lashing.

*Q.* You are closehailed and a man falls overboard; what would you do?

*Ans.* Heave him a lifebuoy, send a hand aloft to watch him, and back the mainyard immediately. Get the lee boat out and pick him up.

*Q.* You are sent away in charge of the boat; in what direction would you steer?

*Ans.* If it was daylight the man aloft could point out the direction. If at night time I would pull away in the opposite direction to

the course the ship had been steering. By recovering the life-buoy I should know, if the man was not in it, that I was in the neighbourhood of the spot in which he fell over, and would search it well.

*Q.* How would you temporarily secure a spar that was sprung?

*Ans.* By fishing it; that is, by laying another spar alongside the part that was sprung, and lashing the two together.

*Q.* How would you strengthen your topmast trestletrees if they appeared to be settling down on the fore part?

*Ans.* By a good wire or chain lashing under the fore part of the trestletrees and over the topmast cap, wedged up tight.

*Q.* You are head reaching under full topsails, and a lanyard of one of your foretopmast backstays carries away?

*Ans.* Lower the topsail on to the cap, and haul down the inner jib to take the weight off the topmast head. Then reeve off a new lanyard. If necessary the ship could be wore round to the other tack whilst setting it up.

*Q.* How could you temporarily repair the foot or leech rope of a sail if it was stranded?

*Ans.* By putting a stopper on it; that is, by getting a piece of rope of a suitable size, putting a knot in each end, and seizing it across the stranded part.

## RIGGING SHEERS, TAKING LOWERMASTS AND BOWSPRIT IN AND OUT, Etc.

The operation of taking the lowermasts or bowsprit in or out of a vessel is not of frequent occurrence, and it is possible to be many years at sea without having actual experience of these matters.

In a new vessel the masts are stepped expeditiously by means of a crane after she is launched. Our object here, however, will be to show, by means of question and answer, how they can be taken in or out without the aid of any special appliances. It is assumed that the lowermasts are of iron or steel.

*Q.* In taking in the lower masts and bowsprit of a vessel, which is usually taken in first?

*Ans.* The mizen, followed by the main and foremasts, and the bowsprit last.

*Q.* What length would you have your sheer legs for taking a lowermast in or out?

*Ans.* At least  $\frac{3}{4}$  of the length of the mast. If more than one mast had to be taken in or out I would allow for the longest.

*Q.* Suppose you were getting spars from the shore to use as sheer legs for taking a mast in; how would you get them on board?

*Ans.* I would have the small ends aft if for a mizen or mainmast, but forward if taking in a foremast only. If I had no convenient place to rig a purchase to for heaving them on board, I would parbuckle them over the rail and ease them down to the deck on stout spars placed on an incline.

*Q.* How would you rig them and get them in position for taking in, say the mainmast?

*Ans.* I would lay them fore and aft, with the after ends (small ends) resting on the break of the poop or other convenient position—

a raised one if possible. I would see that the heels were level and then cross the heads, putting that sheer leg on top which is on the same side as the mast is coming in from. I would then lash them together securely about four or five feet from the ends. I would next open the heels out, one to each side of the deck, and place them on the beds or shoes, and proceed to rig the sheers as follows:—

Put two heel tackles on each heel—one to lead forward, the other aft.

Four good guys from the sheer heads made fast below the cross lashing—two led forward and two aft.

A trussackle on the extreme head of the under leg.

The main purchase for lifting the mast. I would lash the upper block of this to the sheer heads, passing the lashing over each sheer head alternately, and leaving it long enough for the block to hang free.\* Next get them on end by leading the main purchase forward and heaving away on it, first hauling tight the after heel tackles. Tend the guys as the sheers go up, and when on end, transport them to the fore side of the mainmast hole, resting the shoes over a beam and shoring up from down below. Then set up the guys and lash the heels securely.

*Note.*—When starting to raise the sheers, if they are lying nearly horizontal, give them a start with a small derrick.

*Q.* Why do you put the sheer-legs on the fore side?

*Ans.* Because the mast has a rake aft, and it is therefore easier to take it in or out with the sheers before than it would be if they were abaft. Also, where more than one mast is to be taken in they are conveniently placed for fleting forward.

*Q.* When crossing the heads of the sheers, why do you put the one that is on the same side the mast is coming in from, uppermost?

*Ans.* Because it gives a clearer lead for the upper block when heaving the mast in.

\* Great care must be taken to ensure that all parts of the lashing shall have an even strain, both when heaving up and after the mast is swung amidships.

*Q.* How would you have the mast brought alongside?

*Ans.* With its head aft.

*Q.* Where would you lash the purchase block on to the mast?

*Ans.* I would measure the distance from the coamings of the mast-ring or masthole to the lower block of the purchase when it was "two blocks," measure the same distance upwards from the heel of the mast, and lash the block two or three feet below this. If put higher the purchase will be "two blocks" before the mast is high enough to bring in over the rail and point down the masthole.

Another measurement is sometimes taken. That is, to measure the distance from the keelson to the upper deck, and measure this distance upwards from the heel of the mast. This marks the part of the mast that will be level with the deck when stepped. The block must be lashed above this to permit the heel to be stepped in its place before the lower purchase block reaches the mast coamings. This measurement, however, is only necessary where the sheer legs are short, or in the case of a mizenmast going through a poop deck where the distance from keelson to deck is considerable. The purchase block must be lashed to the fore side of the mast. The lashing must be put on as tightly as possible. Every turn should be hove taut with a hand spike.

The circumference of iron masts is usually greatest at the partners. For example: by Lloyd's Rules an iron or steel lowermast, 90 feet in length, would require to have a diameter of 30 inches at the partners, 23 inches at the heel, 25 inches at the hounds (the part round the trestletrees), and 20 inches at the cap.

The mast may therefore taper slightly from the partners to the head, and thus there may be risk of the lashing slipping up. To prevent this back it to the iron pin rail band.

*Q.* To which side of the ship would you lead the hauling part of the purchase?

*Ans.* I would lead it down on the side opposite to that on which the mast was coming in on.

*Q.* Proceed to get the mast aboard and stepped.

*Ans.* Having lashed the lower purchase block to the mast I would heave away, and, as the masthead came level with the rail, I would make the trusstackle fast to it. Then heave away again until the heel comes above the rail, easing it inboard, and keeping it on end with the trusstackle. Put heeltackles on the mast a couple of feet or so from the heel, and steady it over the masthole to get it fair for lowering. When ready ease down on the main purchase, and when entered through the mastring take off the tackles from the heel and lower away, being careful to point it fair through the tween decks. When stepped wedge it and take off the purchases.

*Q.* Suppose you have taken in a lowermast, and want to shift the sheer legs forward for taking in another mast; how would you transport them?

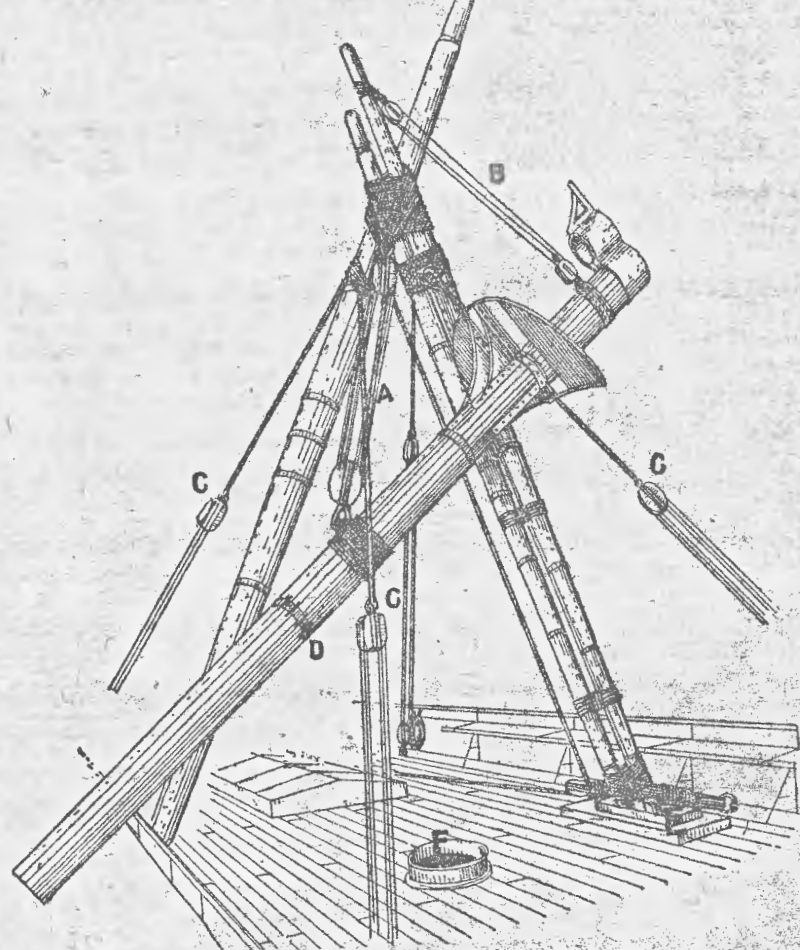
*Ans.* I would fleet them forward as they stood, by hauling alternately on the heeltackles and guys, wetting the deck in the way of the beds.

*Q.* What spars have you on a ship that could be used for sheer legs for taking a lowermast out?

*Ans.* The fore and main yards; or a lower yard on one side, and two topsail yards lashed together on the other.

*Q.* How would you rig sheers for taking a mainmast out, using the main and maintopsail yards?

*Ans.* When sending down the topsail yards I would place them on end together, say on the port side, having a good bed under them, and lashing them aloft temporarily to keep them in position. I would next get the main yard on end on the opposite side, placing it so that it crosses the topsail yards at their upper ends, and then put a good cross lashing round them. Rig good guys on them and set them up, also main-purchase, heeltackles, and trusstackle. Cast off the temporary lashing put on the topsail yards, and get the heels into position and secure them. The topmast could then be sent down and the sheers left standing in position for taking out the lowermast.



**TAKING IN A MAIN LOWERMAST.**

A. The main purchase.

B. The truss tackle.

C. C. C. The fore and aft guys.

D. Iron pin band to which purchase lashing can be backed to prevent it slipping up when the mast is up-ended.

E. Bed for heels of sheers to rest on.

F. The mastring.

If the yards taper very fine at the yardarms, lash a stout short spar to the yardarms which rest on the beds to strengthen them.

To keep the heels of the sheers from any tendency to spread a lashing could be put across the deck from heel to heel.



*Q.* Proceed to take the lowermast out.

*Ans.* I would take off the standing rigging, lash the lower purchase block to the mast and heave it taut, put the trusstackle on the masthead, take off the mast coat, knock out the wedges and heave away.

*Q.* Where would you lash the lower purchase block to the mast?

*Ans.* I would measure the length of the lowermast from the deck to the keelson. This will be the amount I shall require to heave it up. I would therefore have two or three feet more than this between the purchase blocks when lashing it on.

*Q.* How would you take a bowsprit out?

*Ans.* I would rig sheers in the same manner as before, and get them into position with the head inclined forward over the bow. Owing to their inclination they will need specially good heel lashings on the fore part, and correspondingly good guys on the after part. I would also lash a spar horizontally to the forecastle head alongside, but clear of, the bowsprit, with an outhaul tackle from its outer end for heaving the bowsprit out. Mark a place midway between the heel and the cap, and lash the lower main purchase block a foot or so inside this mark; also put a small toppingtackle on to the cap leading to the sheer heads. The standing rigging being all off, I would lash the outhaul purchase on, heave the main purchase taut, knock out the wedging, and heave the heel out clear with the outhaul purchase.

## MANAGEMENT OF A SAILING SHIP UNDER CANVAS IN STORMY WEATHER.

There has been a strong tendency in recent years on the part of the examiners to subject candidates to a more rigorous examination on the handling of a sailing ship in stormy weather before granting them the ordinary (*i.e.*, square rigged) certificate. More especially is this the case where the candidate has performed all his qualifying service in steamships.

The purpose which the author has in view will be best carried out by first describing in a general way some of the principal points—such as **lying to, running, wearing, clubhauling**, etc.—and then proceeding to give questions and answers bearing on the management of a ship in stormy weather. Whatever may be here written with respect to such must, however, only be understood to apply in a general way, and it must be borne in mind that in practice there are always special points to consider in dealing with particular cases. For example, some vessels behave well when running in heavy weather, whilst others show to the worst advantage, and it is quite possible that under conditions where in the former vessel it would be advisable and advantageous to “run,” it may in another vessel be equally advisable to “lie to.” The ship herself, therefore, and her sea-going qualities form a special point for consideration.

Then the proper management of a ship in stormy weather demands some knowledge of storms, more especially in the locality in which the

vessel happens to meet with one, so that possible shifts of wind may be anticipated and prepared for. This is only mentioned here to point out its importance. It is outside the scope of this book to discuss it; also the *Barometer Manual for Seamen*—which candidates are supposed to have read—contains in a most approved and concise form the special information which seamen require.

**“Lying to” or “Heaving to” in Heavy Weather.**—This is resorted to in exceptionally heavy weather, when, on account of the force of the wind and high sea, it is either impossible or inadvisable to carry sufficient sail to make any appreciable headway against it. A vessel consequently, when lying to, drifts almost bodily to leeward. There will generally be a tendency to fall off and come to alternately. When she falls off she will gather a little headway, but the helm being down will tend to bring her to again. The main object is to prevent her falling off as much as possible, so as to keep the wind and sea on the bow. This is usually best attained by setting such storm sails as will tend to keep her up (such as reefed mizen-staysail or storm spanker), having the foreyards checked in, and not keeping the helm down too much. The main lowertopsail should be kept set if possible, especially in a stiff ship, as it will help to steady her as well as to prevent her falling off. Much depends on the individual characteristics of a vessel; that is, her build, stability, trim, etc. Some vessels lie to easily while others are difficult to keep out of the trough of the sea. In general, trying to keep a ship too close by means of the helm results in a considerable falling off, for if she comes up too close, owing to the helm being too far down, she will fall off more quickly, and consequently further, before it brings her up again. It is best to find the point at which she will lie easiest, and aim to keep her there.

It is when hove to that oil can be used to the best advantage, the wake being to windward, and as the ship does not drift very rapidly it has time to spread. The author remembers a case in his own experience where oil used from the weather quarter, whilst lying to in a heavy gale, was much more effective than when used from the bow. The maintopsail having been blown away, the mizenstaysail (reefed) was the only sail that could be carried, and at times the ship fell off considerably, bringing the wind and sea abeam.

**Head Reaching or Fore Reaching.**—When head reaching, a vessel is not quite “hove to,” as she is carrying sufficient sail to give her an appreciable amount of steerage way. The ship, therefore, can be kept

up better than when hove to, but obviously the more headway she has the greater will be the stress or strain upon the ship by the head sea. Oil on the weather bow will be most beneficial in smoothing the sea.

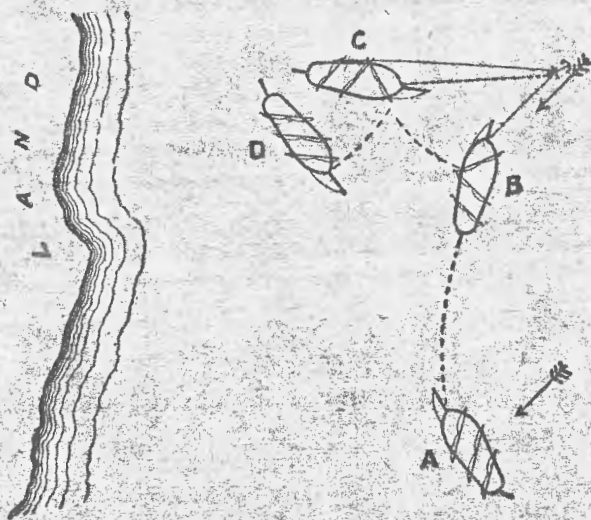
**Running in Heavy Weather, or Scudding.**—When running a good helmsman is of the utmost importance. Careless or indifferent steering may result in broaching to, which would probably be disastrous. To assist the steering the foresail should be kept set if possible. The mizentopsail is best furled.

Long narrow vessels are usually very “wet” when running if fully loaded, as when the crest of a wave reaches the waist of the ship, the bow and stern being partly unsupported, she sinks deeply into the wave and the water pours aboard from both sides, flooding the decks. The water on the deck helps to submerge the vessel still deeper, and one or two heavy seas in succession may fill her level with the rail. This adds enormously to the weight of the ship, and renders her liable to be pooped should a heavy sea overtake her at this time. Oil on the water, though not so beneficial as when hove to, is still advantageous, and should be used from a point as far forward as possible.

**Wearing Ship in Heavy Weather.**—This was described in Part II., but it may be added that if hove to, it may be necessary to set some head sail to assist the ship in paying off. It is well to make her pay off as quickly as possible, to get her out of the trough of the sea. Also, if the maintopsail is set, keep it clean full as she pays off, so that she may gather good headway and thus render the helm effective. Watch the steering carefully when before the wind whilst the foreyard is being hauled round.

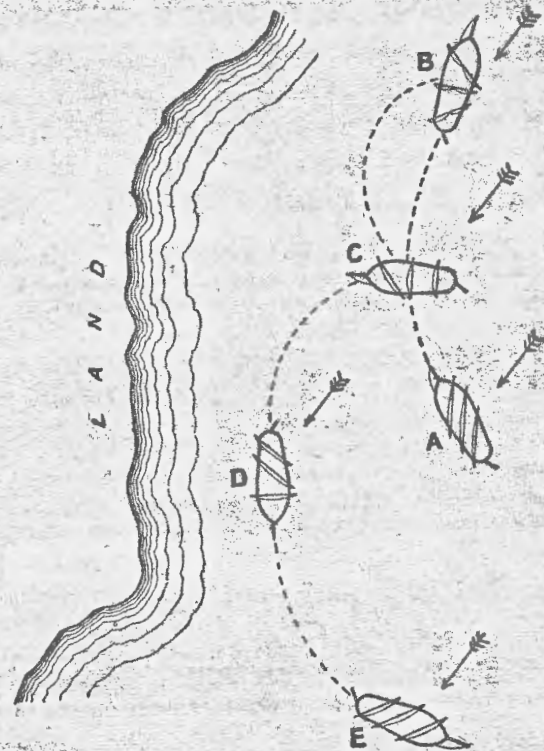
**Clubhauling.**—This practically amounts to tacking ship with the aid of an anchor. The object is to get the ship round on the other tack when on a lee shore with no room to wear and unable to tack in the usual way. It can only be done where the water is shallow enough to enable the anchor to be used with effect. If the ship can be brought head to wind she can be got round, and in clubhauling the anchor is used to bring her head to wind, and afterwards to hold her from the quarter whilst falling off on the other tack. The manœuvre is one which is probably only performed on rare occasions, and on this account is often looked upon as impracticable for large modern vessels, but it is quite conceivable that circumstances may arise where clubhauling would offer the safest method of getting a ship round.

Suppose the ship to be on the starboard tack (as in illustration). A good hawser is passed out from the lee quarter along the lee side and bent on to the ring of the lee anchor. The cable is unshackled abaft the windlass according to the depth of water, sufficient chain being kept on the anchor to bring the ship up with, and the end secured by a stopper. When all is ready the helm is put a-lee, as in tacking, and the ship brought as high in the wind as the helm will bring her. When headway is lost the helm loses its effect, and the ship, if allowed to do so, would fall off, but just at this point the anchor is let go and the afteryards hauled round. The anchor holds her by the head until she swings head to wind. The hawser is then hauled taut and made fast aft, after which the cable is first surged over the windlass to bring the strain gradually on to the hawser, and when safely canted for the other tack the cable is slipped altogether, and the foreyard hauled round. When the sails fill, the hawser is cut or slipped.



#### CLUBHAULING.

- A. The ship on a lee shore. The helm is first put "a-lee" as in tacking.
- B. When she loses headway "let go the anchor" and "main topsail haul," holding on from the windlass to get her head to wind.
- C. When head to wind get the hawser tight and made fast. Then surge the cable, bring the strain gradually on to the hawser. When safely canting for the other tack slip the cable, holding on to the hawser.
- D. Haul the fore yard round in good time, and when she fills all slip the hawser.



#### Turning Short Round on a Lee Shore, with no Room to Wear, no Anchorage, and unable to Tack.

- A. The ship on a lee shore. The helm is put "a-lee," and the ship brought up in the wind.
  - B. Having lost headway the head yards are hauled a-box and the main squared. The helm is put amidships as she falls off, and the crossjack yards kept lifting until square.
  - C. When the wind gets on the starboard quarter the foreyards will be lifting by the lee. They should be hauled round to help her to pay off, and the helm put a-starboard as she gathers headway.
  - D. and E. As the wind draws out on the port side brace up and bring her to.
- These diagrams and explanations must not be interpreted too literally, as they are only given for the purpose of illustration. The manœuvre must be varied to meet any special circumstances. For instance at B, if the land is close, all the yards could be hauled a-box instead of the fore ones only. She would then back much further astern before gathering headway. Much sternway, however, should be avoided if possible, hence the afteryards are kept square in the figure.

*Note.*—The ship could be clubhailed without the hawser from aft, but in this case after getting her head to wind and when the cable was slipped she would drive considerably to leeward. Where time did not permit of preparation being made, it would probably have to be done in this way.

### Boxhauling, or Turning Short Round, in Heavy Weather.

—This would only be done when (on account of the depth of water or from any other cause) clubhauling was impracticable and it was absolutely necessary to get her short round to avoid danger. Suppose the ship to be on the starboard tack. The helm is put *a-lee* and the ship brought up in the wind. When she has lost headway the head yards are hauled right round and the main ones squared, and if the mizen staysail is set it is hauled down. She then gathers sternway, the foreyard boxing her off, and the helm should be put amidships. The crossjack yards should be kept lifting until square, after which, if not advisable to gather much sternway, they must be kept full. When she gathers headway the helm must be put *a-starboard* and the ship brought to on the other tack. If necessary the foreyard can be hauled round when the wind is on the starboard quarter in order to help her head round (see illustration on preceding page).

### QUESTIONS FOR SELF-EXAMINATION.

*Q.* What is "backing and filling" in a tideway?

*Ans.* In backing and filling the ship is drifting broadside on to the tide. The object of this manoeuvre is to take a ship up or down a river with the tide, when the wind is unfavourable and the waters are too narrow to admit of tacking.

The vessel is brought athwart the tide so that it may have its greatest effect, and in order that the wind may have least effect only sufficient sail to work the ship with is set—say the main topsail or the three topsails if the wind is light. By filling them she can be forged ahead; by backing them she is driven astern. When neither headway or sternway is required they are kept shivering. The ship can thus be kept in the main stream of the tide where it is strongest.

A vessel when backing and filling is not so much under control as when dredging, but she would drift faster.

*Q.* How would you take a cast of the lead if lying to in heavy weather?

*Ans.* I would pass the lead line forward along the weather side, taking the end round to the lee bow clear of the head gear, and bending it to the lead. I would then watch for a favourable opportunity, and as the ship came up to the wind and lost headway, I would heave it to leeward, and take the sounding from the weather quarter.

*Q.* Why heave it from the lee bow?

*Ans.* Because the ship would be drifting to leeward considerably, and I should get a more up and down cast.

*Q.* You are running before a gale under lower topsails, reefed main upper topsail, and foresail and you want to heave to under the main lower topsail only. How would you bring her to, assuming that you want her on the starboard tack?

*Ans.* I would first clew up the fore lower topsail as it would be sheltered a bit by the main. Then I would lower the main upper topsail and haul the gear close up. If necessary these sails could be furled before heaving to. Lastly, I would haul the foresail close up and the fore topmast staysail down, brace up the head yards for the starboard tack, but not sharp up, and get all ready forward for coming to. Then stand by aft, and as soon as a favourable opportunity for doing so occurs, brace up the after yards, put the helm down and bring her to.

*Q.* You are running in a gale of wind, the weather comes on thick, and it is necessary to take a cast of the lead; how would you proceed?

*Ans.* I should first shorten sail, and assuming that it was blowing too hard to bring her to with the mainyard aback, I should heave to altogether, and take the cast as before.

*Q.* You are running in a gale under foresail and topsails with the wind on the port quarter. A heavy squall approaches and you order the man at the wheel to keep her off during the squall. He gives her too much helm and brings her by the lee. What would you do?

*Ans.* I would put the helm *a-starboard* and haul the foreyards round to get her off before the wind again. When she brings the

wind aft, watch the steering carefully, trim the foreyard again, and bring her to her course when the squall is over.

*Q.* Suppose you were running as in the last question, and you were taken by the lee with a shift of wind?

*Ans.* I would first haul in the port fore braces and cant the foreyard the other way, then trim the main and mizen. I would not run her off as the sea would still be running from the port quarter; if I ran her off it would be abeam.

*Q.* You are running in a heavy gale under foresail and lower topsails. The ship broaches to, and before you can get her off the foresail blows away, and also a heavy sea breaks aboard, sweeping the decks and doing considerable damage; what would you do?

*Ans.* I should brace all the yards up, shorten sail, and heave her to. I would afterwards bend a fresh foresail as soon as possible.

*Q.* You are head reaching on the port tack under full topsails, foresail, foretopmast staysail, and mizen staysail, and the wind suddenly shifts to the lee bow; what would you do?

*Ans.* Lower the upper topsails to the cap. Haul down the mizen staysail, and haul the afteryards round, keeping the helm amidships as she gathers sternway. When she fills at the main I would haul the foreyard round. As the sea would still run from the same direction as before I should keep it on my weather bow, keeping the ship off a bit if necessary for that purpose. The ship being head on to the sea I should not carry much sail and would furl the foresail.

*Q.* You are in the North Atlantic outward bound, and you encounter a heavy S.W. gale; what would you do?

*Ans.* I would heave to on the starboard tack, as that in the probable event of a sudden shift of wind to the N.W. I should not be caught aback.

*Q.* What probable indication would you receive before the shift occurred?

*Ans.* The barometer would start to rise, and the shift generally occurs in a heavy rain squall.

*Q.* Which tack would you have to heave to on in a S.W. gale in high southern latitudes?

*Ans.* I should heave to on the port tack, as the wind will probably shift round to the S.W.

*Q.* You are in the Indian Ocean during the cyclone season, and there are indications that a cyclone is approaching; what action would you take, and what preparations would you make?

*Ans.* I should heave to on the port tack as it would be safest to assume that I was in the dangerous or left-hand semicircle. I should shorten sail to lower topsails, seeing that every sail was well furled, with the clews rolled right inside the sails and extra gaskets put on wherever necessary. Send down the royal yards if time and weather permits. Secure all the gear about the deck, having the braces clear in a place where they will not be washed away. Examine the hatches carefully, and see that they are well battened down and securely wedged at every cleat. Have the topsails ready for stowing up, oil bags prepared and filled with oil and with lines ready for putting them over. I would also see that I had a good mizen staysail or storm spanker bent with a reef put in it, and have it set.

*Q.* You find that the wind shifts so that the ship comes up; what information would that give you, and what action would you take?

*Ans.* I should know that I was in the dangerous semicircle, and I should remain on the port tack taking in the fore and mizen topsails, and lie to under the maintopsail and reefed mizen staysail.

*Q.* Suppose the direction of the wind was changing opposite to the above so that the ship was breaking off; what action would you take?

*Ans.* I should know that I was in the right-hand semicircle, which is the less dangerous one. Running with the wind on the port quarter would take me away from the storm's centre, so I would do this if possible, keeping as much sail as could be carried with safety. If not advisable to run I should lie to on the starboard tack, so that the ship would not get caught aback as the wind shifted.

*Q.* Suppose when the cyclone first began, the wind, after shifting a point or two to the left, had afterwards remained steady in direction, but increasing in force, with falling barometer. What would you know from this, and what action would you have taken?

*Ans.* I should know that I was on the line of progression, and in the direct path of the storm's centre. In this case it would be necessary to run, carrying all possible sail, and gradually bringing the wind out on the port quarter as it was found to change in direction.

*Q.* What preparations would you make for weathering Cape Horn in the winter time?

*Ans.* Before getting clear of the finer weather latitudes, I would bend the best suit of sails, taking particular care to have them well bent and to see that all the necessary gear was on them, reeving new gear wherever required. I would examine all gear aloft to see that it was in good working order. Examine lashings of spare spars. Send royal yards down on deck.

#### ACCIDENTS TO SPARS.

*Q.* If one of your lowermasts was sprung; how would you secure it until you reached your port?

*Ans.* I would fish it with the best spare spar I could get, lashing it abaft the mast with chain or wire lashings, putting them on as tightly as possible and afterwards wedging them.

*Q.* Suppose one of your topmasts was sprung?

*Ans.* I would secure it in a similar manner with a spar abaft, and then either fit a preventer parral to the topsail yard to enable it to be lowered and hoisted; or rig it as a standing yard with lifts to the topmast cap, and sheets, clewlines, and gear for clewing the upper topsail up.

*Q.* Suppose one of your lower yards was sprung; how would you secure it?

*Ans.* I would fish it with a spar underneath

*Q.* The truss of a lower yard carries away?

*Ans.* Get a good tackle on it midships led forward, and heave it tight to keep the yard away from the mast; also get rolling tackles on each side. This will keep it steady until a preventer truss is fitted.

*Q.* How would you fit a preventer truss?

*Ans.* I would endeavour to rig one with a kedge anchor, by lashing the stock vertically to the fore side of the mast, and having the arms lashed to the yard underneath or on top as most convenient, and using small chain for lashings. The stock must not be lashed close against the mast, but blocks of wood must be placed between, as sufficient room must be allowed to enable the shank to turn round the stock when bracing the yards. The rolling tackles must be kept on.

*Q.* Suppose you carried away the bobstay through pitching heavily into a head sea; what would you do?

*Ans.* I would put the helm up and run the ship off, hauling down the main staysail if set, so that she may pay off as quickly as possible. I would then secure the bowsprit.

*Q.* How would you secure it?

*Ans.* I would repair the old bobstay if possible. If not possible, or, if after repairing it I judged it to be unsafe, I would pass lengths of stream chain out of each hawsepipe and shackles the ends to the bowsprit cap, or clovehitch them round the bowsprit, and set them up with the windlass.

*Q.* Suppose you are head reaching and your bowsprit carries away, taking the fore topmast with it?

*Ans.* I would keep her to, and clear away the wreck as quickly as possible. I would afterwards rig a jury topmast and bowsprit.

*Q.* Where would you step the heel of your jury bowsprit?

*Ans.* If the original bowsprit had been of wood I would leave the broken stump out and step the jury bowsprit in its place. If the bowsprit had been of iron I would step the jury one inside it.

*Q.* Your ship gets on her beam ends through shifting of the cargo or heavy weather; what would you do?

*Ans.* Let by any sails that were set, and take steps to get the ship upright again. If possible, by shifting cargo over to windward, but

if there was not time to do this, and there was danger of the ship getting farther over, I would start cutting away the masts.

*Q.* Suppose you found that your ship being on her beam ends the helm was useless; how would you keep her out of the trough of the sea?

*Ans.* By rigging a sea anchor and riding to it from ahead.

*Q.* You decide to cut away one of your masts; which would you cut away first?

*Ans.* The mizenmast. If it was possible I would cut the lee rigging first, but if I could not get at the lee side I would cut away the weather rigging at once.

*Q.* After the mizenmast is gone you find it advisable to further relieve the ship by cutting away something else; what would you cut away next?

*Ans.* The main topmast.

*Q.* You have an accident with your steering gear in bad weather, which renders it useless; what would you do?

*Ans.* If hove to I should set after sail to keep her from falling off, also rig a sea anchor. If running she would broach to, and I would brace up the yards, shorten sail, and lay her to with a sea anchor as before.

*Q.* Suppose one of your lower caps was sprung or worked loose?

*Ans.* I would rig a Spanish cap—that is, a chain lashing round the lower masthead and the topmast close under the cap. After passing the lashing I would drive wedges in between the doublings to tighten it.

*Q.* You are hove to under a main lower topsail, and the weather sheet carries away?

*Ans.* Haul the weather side up and make it fast, leaving the lee side set.

*Q.* What is the last resource to prevent a sailing-ship diving ashore from her anchorage?

*Ans.* To cut away the masts.

*Q.* Running in a heavy gale, your foremast goes by the board owing to heavy rolling; what would you do?

*Ans.* The ship would broach to. The mast falling over the side would drag that side to windward. I should let her come to and cut away the wreckage as quickly as I could.

## GETTING UNDER WAY.

### SAILING SHIPS.

#### Preliminary.

Sailing ships of the present day are most frequently got under way or brought to an anchor with the assistance of a tug, so that opportunities of gaining experience in this branch of seamanship are not so frequent as they would otherwise be. This is especially the case with very large vessels. There are still, however, times and places where the assistance of a tug may be unnecessary or not available.

Much practical knowledge may be acquired when lying in ports where other vessels are frequently getting under way or bringing up. The movements of a vessel are often more apparent to an outside observer than to those on board, and afford a practical demonstration to young seamen desirous of gaining knowledge of this subject.

#### General Remarks.

**Heaving Short.**—As a rule in getting under way from an anchorage, the cable is first hove short, but not necessarily up and down, as consideration must be paid to the force of the wind, and also to the tide (if any). Sufficient cable should be left out to ensure that the ship will not drag her anchor whilst sail is being made, especially if there are other vessels near.

**Making Sail.**—In setting sail regard must also be had to the force of the wind. Before tripping the anchor sufficient sail should be set to have the ship under control when the anchor is weighed; if too much is made the anchor may be started before all is ready.

**Casting.**—To cast a ship is to box her off with the headyards, when riding head to wind, so as to cant her in a desired direction. The head yards braced as for the starboard tack will cast a vessel to starboard, that is, her head will fall off to starboard. The jibs may also be used to assist in casting.

When casting, the after yards must be trimmed according to circumstances. If the ship is to be close-hauled, the after yards should be braced

up for the tack the ship is going on. If she is to go before the wind they should be kept square.

**To Clear a Danger.**—With the wind ahead a square-rigged vessel will gather sternway when the anchor is weighed, therefore, if there is danger on one quarter, the rule is to cast towards it so that she will back astern clear of it. If it is necessary to go a considerable distance astern, have the afteryards "a-box" as well as the foreyards.

Danger on both sides can be avoided by dredging astern till clear; or in very light winds the ship could be swung to a ledge.

Danger astern must be avoided by laying out a kedge and warp from the quarter to hold her whilst casting. If blowing too hard to use a kedge, and getting under way is a case of necessity, get a good hawser as a spring from aft on to the cable, and slip the cable. The hawser will hold her whilst casting.

### EXAMPLES OF GETTING UNDER WAY.

*These should be followed with the aid of a Model.*

**To get under way at slack water—wind ahead—and go to sea on the starboard tack.**—Heave in to a short scope, brace up the afteryards for the tack the ship is to go on, and the headyards "a-box." Set the topsails and other sail according to the force of the wind; have the jib sheets hauled aft ready for hoisting, and spanker, etc., loosed. When ready "man the windlass," and as soon as the anchor is "a-weigh" put the helm "a-port" for sternway, and she will cast to port. Hoist the jibs as soon as they will fill; and when she begins to fill aft, haul the foreyard round, ease off the jib sheets, and set the spanker to prevent her paying off too far; also, shift the helm if she still has sternway. Heave the anchor up, cat and fish it, setting such sail as may be necessary.

In very light winds the topgallantsails may also be set, the courses loosed, the foremast dropped to assist in casting, and the mainsail set as soon as it will fill.

If the vessel is head to wind and tide the only difference to make will be in the use of the helm, which will require to be put "a-starboard" before tripping the anchor, in order to give her a sheer in the right direction; after the anchor is "a-weigh" and she gets sternway, shift it.

The vessel would necessarily go much better when head to wind and tide than when in slack water. Allowance must be made for this if there are vessels astern.

**To get under weigh at slack water, and go to sea before the wind; no danger being near.**—Heave short. No danger being near, it will be best to cast from the anchor. If the port anchor is down, cast to starboard by leading the headyards for the starboard tack. Keep the afteryards square. Set sail, dropping the foremast if the wind is moderate or light. Trip the anchor, putting the helm "a-starboard" for sternway, and she will cast to starboard. When the wind is abate the beam square the foreyard, hauling aft the fore-sheets. As she loses sternway right the helm, putting it "a-port" as she gathers headway, and keep her before the wind. Get the anchor up, cat and fish it, etc.

**To clear another vessel at anchor, or a shoal, on the port quarter (wind ahead).**—Heave short and make sail as before. Brace the headyards as for the port tack, keeping the afteryards square. Trip the anchor and put the helm a-port as she gathers sternway. She will cast towards the danger. When clear she can be brought to the required course, and sail trimmed accordingly.

If it is necessary to make a long starboard to clear the danger, brace all the yards "a-box" when tripping the anchor.

**To get under way with a vessel on each quarter.**—If head to wind and tide dredge astern until clear. In very light wind with no tide, heave short, run a kedge and warp from aft to a point some distance ahead. Trip the lower anchor and swing to the ledge. Then set sufficient sail to give steerage way, trip the kedge, and run between the other vessels.

**To get under way with land, or a shoal, astern: wind ahead, and moderate or light. No tide. Ship wanted on the port tack.**—Heave short. Run a kedge and guss warp out from the port quarter, dropping it on the port bow some distance ahead. Trim the afteryards for the port tack and the headyards a-box and make sail. (Too much end runs out for us in view of the fact that there is danger to leeward, and when the anchor is weighed all the strain will come on the guss warp.) When she fills, however, it will be necessary to make sail quickly, therefore have the courses and topgallantsails,\* spanker, etc., loosed ready for setting as

\* The topgallantsails could be loosed and tied up by steps, and the ports could be hoisted previous to tripping the anchor. It will now only be necessary to run the steps and haul up the sheets when required to set them.



rapidly either the anchor will not hold, or all the chain will be run out of the locker, or something will have to go. Note that it is the ship's motion over the ground that has to be taken into consideration, not her motion through the water only.

At the instant of letting go the anchor a little motion over the ground is necessary so that as soon as the anchor reaches the bottom the chain is drawn away clear of it. If let go when the ship is stationary—over the ground—the slack chain will run down on to the anchor and so foul it. Usually the ship is given sternway when letting go, but in certain cases (as when making a running moor) the anchor may be let go whilst the ship has headway. The average amount to pay out when at anchor is from three to four times the depth of water, but much depends upon the nature of the bottom, the strength of the tide, and other local considerations.

**In a tideway.**—The vessel should be as nearly as possible stem on to the tide when letting go.

**If there is no tide running.**—She should be brought as nearly head to wind as possible, and the anchor let go as she gathers sternway.

In some cases the anchor is dropped whilst the ship is going slowly ahead, and she is brought to by the chain; but this is not the usual way when coming to with a single anchor, and, if done, care must be taken that the ship has very little headway.

**Running in with a fair wind against the tide.** To bring up with either anchor.—As she is stem on to the tide she will not require to be rounded to. Shorten sail, keeping the fore and main upper topsails and as much other sail on the fore as may be necessary to stem the tide. When in position lower down the topsails, clew up any other sails that may be set, and as she drops astern with the tide, let go.

**Running in with the tide.** Wind aft. To bring up with say, the port anchor.—The ship should be rounded to, to get her stem on to the tide. Shorten sail down to the upper topsails, and have the spanker ready for hauling out. When far enough—making allowance for the set of the tide—put the helm a-starboard, lower the foretopsail, brace the afteryards sharp up with the main and mizen topsails set and haul the spanker out, hauling the boom amidships as she comes to. When the topsails begin to lift, lower the yards and let go the anchor as the tide sets her astern.

When the tide is strong it will be necessary to round to with more headway on as to stem the tide before letting go.

To bring up in slack water, the ship coming in close-hauled, say on the port tack.—Shorten down to upper topsails, spanker, and foretopmast staysail. When far enough put the helm "hard a-lee," lowering the foretopsail and foretopmast staysail at the same time, also heaving the spanker boom amidships. Lower the main and mizen topsails as she comes slack, and square the yards. When sternway is gathered "let go." In light winds keep the main and mizen topsails set when squaring the yards to back her astern when the anchor is let go.

**Under the same conditions, but with the wind aft.** Instead of being close-hauled.—Lower the foretopsail before rounding to, and when the helm is put down brace up the afteryards (the main and mizen topsails being set). Also haul out the spanker, and when she comes to, proceed as before.

**Mooring.**—In making a running moor the first anchor is let go whilst the ship has headway, and care should be taken that she is not moving too fast, as very little headway is required. A running moor should not be attempted when going in with the tide, unless weak, as the ship would be moving too fast over the ground. Therefore, when coming in on a strong tide do not make a running moor, but round to before letting go the first anchor. At slack water, with the wind blowing across the direction in which it is required to lay out the anchors, a running moor is the only course which can be adopted.

When mooring in harbours or rivers, the anchors must be laid out in the direction of the set of the tides, so that the ship will ride to the flood on one end to the ebb on the other. In open roadsteads local considerations will determine the directions in which they should be laid.

A ship must not be moored with both cables ast. Reasons for this will be explained when dealing with the management of a ship at anchor.

Also, when mooring is completed, see that the shackles are in convenient positions for unshackling and clearing taws.

**Running Moor.**—If the wind is on the side let go the weather anchor first, as it will then lead clear of the stem and fore-iron when rounding to. If the wind is aft, the first anchor let go should be the one which will be to windward when rounding to. After the first anchor is let go, the object to view is to get the ship into position for letting go the second.

Coming in with the wind aft. To make a running moor with 45 fathoms on each anchor. Tide being slack.—Shorten sail in good time so that the ship approaches the anchorage with very little headway, keeping the upper topsails or main top-sail only set, according to the wind. When in position let go, say, the port anchor, lowering the topsails. Let the first three or four lengths of cable run out freely, then put the helm a-starboard, check the ship a lot with the cable, brace up the afteryards and set the spanker to round her to. If when rounded to the necessary 90 fathoms have not been taken, pay out until they have. When the 90 fathoms are out and the chain fairly taut, drop the second anchor and pay out 45 fathoms of chain, heaving in the same amount on the first. In light winds the main and mizen topsails should be kept set when rounding to, and used to back her astern after dropping the first anchor.

Care must be taken to ensure the second anchor going down clear. When letting go she must be sheered away from it, and care taken to keep her from coming back over it before the other cable is hove in.

Coming in with the wind abeam or closehauled. To make a running moor, as before.—Suppose the wind to be on the port side. Approach the anchorage with just sufficient sail to give steady way—say, the upper topsails, spanker, and inner jib or foretop-mast staysail. When in position let go the port anchor, and at the same time the ship should be heading a little to leeward of the place where it is desired to drop the second anchor, as when rounding to with a little headway she will shoot a bit to windward. The ship must not be rounded to too quickly, or she will be head to wind before the required amount of cable is out on the first anchor, and she would then drop away to leeward. When 60 fathoms or so have been paid out lower the foretop-sail and jib, put the helm down, haul the spanker boom amidships, and check her with the windlass. When 90 fathoms are out "hold on," and when head to wind let go the second anchor, afterwards paying out on the second cable and heaving in on the first until moored.

If making a running moor and coming in against the tide, sufficient sail must be kept set after dropping the first anchor to stem the tide and carry her to the position of the second. It would, however, be better under these circumstances not to make a running moor, but to keep sufficient sail to take her to the position of the first anchor, and then lower the topsails, letting go the anchor as she comes back with the tide. Then drop her down into position for letting go the second anchor.

## MOORING AND UNMOORING OF STEAMSHIPS.

The general remarks made with respect to the getting under way, mooring, unmooring, etc. of sailing ships hold good with respect to steamships, if allowance is made for the fact that sail power is replaced by steam power, which gives greater control over the vessel's movements, with ability to move ahead or astern—either quickly or slowly—as may be desired. Generally the vessel's head is brought to the direction to which she will ride when at anchor, and when coming slowly astern the anchor is let go. In coming to in a strong tide, or when blowing hard, care should be taken that she is not drifting too rapidly astern.

(For questions on this subject, see pages 320-21, 324-25, and 331-33.)

## MANAGEMENT OF STEAM OR SAILING VESSELS AT ANCHOR.

It will be advisable to begin this subject with a clear understanding as to what is the purpose in view in managing and tending a ship when at anchor; and afterwards to consider what management is best calculated to accomplish the purpose in view.

Obviously the ultimate aim is to minimise as much as possible the danger of dragging; first, by keeping the anchor clear; and secondly, when there is risk of the ship dragging her anchor, owing to strong winds or tides or bad holding ground, to so manage the vessel that no unnecessary strain may be imposed on the cable.

Anchor buoys, although very useful for marking the position of anchors, have fallen into disuse. This may be owing to the fact that vessels do not as a rule stay long at single anchor; also, there is the possibility in steamers of getting a foul of the propeller.

**Effect of long and short scopes of cable.** The holding power of an anchor varies with the amount of cable out. The shorter the scope the more upward is the pull of the ship on the anchor, and consequently the less hold it will have. *Viz.* versa, the longer the scope the more horizontal is the pull, and the better the anchor will hold, the best position being attained when enough cable is out to ensure the pull being quite horizontal with some of the cable along the bottom. One anchor with a sufficient scope for this purpose will hold better than two anchors with an insufficient scope.

A vessel anchored in deep water, with a proportionately long scope

of cable out, will ride easier in a sea, than when in shallow water under the same circumstances, owing to the catenary\* of the cable giving more elasticity.

**Veering Cable.**—When it becomes necessary to veer cable in order to give more scope, precautions should be taken for veering it slowly and gradually. To veer away until slack, and then hold on, allowing the vessel to tighten it suddenly, would be very likely to break the anchor adrift. With respect to dragging, the saying "prevention is better than cure" applies with special force. An extra length or two of cable, given in time may ensure the anchor holding; whereas if not given and the anchor starts it may be impossible to get it to hold again.

A ship at anchor will be influenced by one or both of two forces, *i. e.*, the tide acting on the immersed part of the hull, and the wind pressure on the exposed parts of the hull, and on the spars, rigging, etc. In a tideway the principal factor in the management of a vessel is the helm. The yards, although forming but a small portion of the exposed parts, should, in strong winds, be trimmed so as, if possible, to give some advantage: if this is not possible they must be trimmed so as to offer the least resistance to the wind.

It is intended here to first discuss the management of a vessel when riding at single anchor to the tide or in strong winds, and afterwards explain how to keep a clear anchor when swinging.

A "weather tide" is a tide setting to windward.

A "lee tide" is a tide setting to leeward.

Usually the effect of the tide on a vessel at anchor is greater than that of the wind, though in strong winds, or weak tides, the reverse may be the case, especially with vessels light or in ballast.

In all that follows it will be assumed that the vessel is "tide-ride," unless the contrary is stated.

A vessel at anchor riding to the tide is moving through the water. If riding to a three or four knot tide the vessel has the same relative motion through the water as if she was being towed at the rate of three or four knots an hour in still water. It is sometimes helpful to look at the subject in this light, and to regard the anchor as towing the ship through the water.

\* A catenary is the curve which a chain or rope assumes when suspended between two points. The curve of a low rope when a ship is towed, after she has stopped, is known as the curve of the cable between the hawsepipe and the point where it comes up the bottom are examples of catenaries.

**Effect of the tide.**—The effect of the tide is least when the ship is stem on to it, and increases as she comes abwart, being greatest when broadside on. The strain on the cable is, therefore, least when the ship is stem on to the tide with the anchor right ahead. To keep her thus, however, would necessitate steering her as if under way, and under ordinary circumstances where there is no likelihood of dragging, this is not necessary or convenient, and as if left to herself with the helm amidships she would yaw about, it is best to give her a sheer to one side of her anchor with the helm, so that with the helm and cable together the ship will be kept fairly steady.

When, however, the tide is strong and holding ground bad, and there is any risk of dragging the anchor, only very little sheer should be given, as the more sheer a vessel is given the greater is the tension put on the cable. Under these conditions, therefore, in order that the ship may be kept as steady as possible, it may be advisable to steer the ship as if under way.

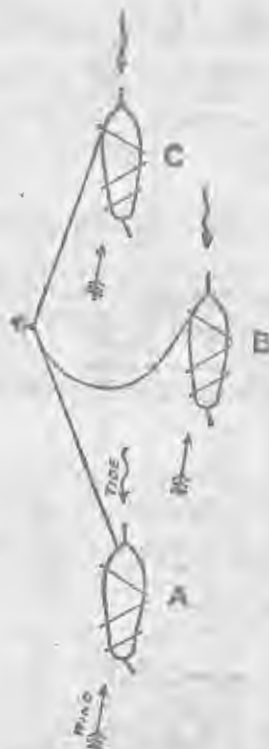
When a vessel is sheered to one side of the anchor, and the tide coming on the wrong bow shoots her across to the other side of her anchor, she is said to "break her sheer." It must be borne in mind that it is not a steady continuous strain which is most likely to start the anchor, but the coming up and sudden tightening, such as would occur if a vessel broke her sheer, or if she is rising and falling in a heavy swell or sea.

**Wind and tide.**—The effect of strong winds on a vessel at anchor may be considerable, especially if she is light. If the wind and tide are ahead the effect of the two will be combined, and if there is risk of driving the precautions already stated should be taken. In order that the yards may present as little surface as possible to the wind they should be braced up. If sheered to port, the hawlgards should be for the port track and the afteryards the reverse way.

If the wind is across the tide the ship should be kept sheered to windward if possible, which will somewhat ease the cable, especially if the wind is abaft the beam and the yards braced full. A light vessel, however, may not do this and may have to be kept sheered to leeward.

When the wind and tide are in opposite directions the ship is affected by the difference of the forces and by the management the strain upon the cable may be considerably reduced. It is for the ship to be tide-ride with the wind off; but when the wind will

be to ease the strain upon the cable. Imagine now that the wind increases until it has a greater effect than the tide, the ship then begins to forge ahead towards her anchor. She must be steered clear of the anchor until she is ahead of it, when the cable will bring her up again. Be careful to keep her head on to the tide, by meeting her with the helm, as though the wind may be strong enough to drive her up against the tide when stem on to it, if she got athwart the tide it would, unless very weak, have more effect on her than the wind, and drive her back again, probably fouling or starting her anchor.



- A. The vessel riding to the tide with the wind aft.
- B. The wind increasing, she forges ahead and must be steered clear of the anchor.
- C. When ahead of her anchor and the cable tightens, meet her with the helm and meet her as if under way.

**Keeping a clear anchor.**—The fact that the anchor when in use is out of sight frequently leads to its being ignored or neglected. Really, it should have the opposite effect, for if fouled it constitutes a hidden danger; and though the consequences may be no more serious than to cause the extra work necessary to clearing it when getting under way, it may render the anchor insecure or unsafe at the very time when it is most required.

The fundamental principle of keeping a clear anchor when swinging, is to keep the vessel as far as possible from her anchor, or in other words, to keep the cable as taut as possible. The weight of the cable itself is considerable and must be taken into consideration. Under normal conditions of wind and weather, it will, as the tide slackens, gradually sink to the bottom, and by its weight hold the ship's head to a certain extent; hence it is necessary to sheer the ship into a favourable position for swinging before the tide is spent.

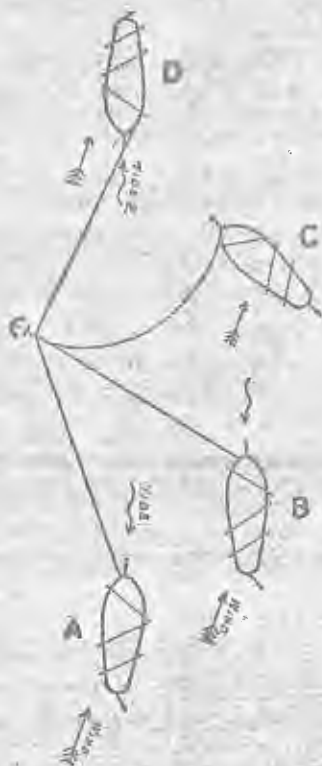
It is generally recommended to swing the ship on the same side of her anchor at each turn of the tide if possible, in order to prevent drawing the chain round the anchor. It is not always possible to do this, as a shift of wind may render it impracticable. It does not follow that, if she swings on different sides, the chain will foul the anchor, as the anchor, under average conditions of wind and tide, would probably slew in the ground at each turn of the tide. However, as you cannot be sure that the anchor does so, it will be well, when it can be done, to swing on the same side each time.

It is not possible to discuss every case that may arise, but one or two examples will indicate the general principles to be followed in keeping a clear anchor.

**Wind athwart the tide.**—Under these conditions the wind will help to swing the ship clear. As the tide slackens the vessel should be given as broad a sheer to leeward as possible. At slack water the wind will keep her to leeward, and she will be wind rode until the new tide makes, when she will first swing to the light of the cable, and as the tide acquires strength gradually drop astream of the anchor. If the wind is light a head sail could be set to help sheer her to leeward, and hauled down when of no further use.

**Riding to the weather tide. Wind aft or on the quarter. Tending to leeward.**—As the tide slackens give the ship a broad sheer to one side of her anchor; should the wind be on the quarter sheer her to leeward. At slack water, or perhaps a little before, she will forge ahead from the force of the wind, and the helm being kept easy she will

go away from her anchor as long as there is any tide. At slack water the drag of the cable will hold her bow and her stern will swing round, after which she will gradually drop to leeward from the effect of the wind and the new tide. (See illustration below.)



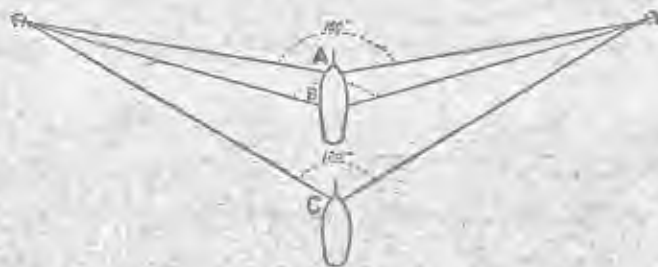
- A. The vessel riding to the weather tide.
- B. As the tide slackens she is sheered to leeward.
- C. At or before slack water she forges ahead, and then swings to the right of her cable.
- D. As the new tide (Tide 2) makes she drops astream of her anchor.

If the wind was strong she would go to leeward of her anchor before slack water.

**Tending to windward.**—At the next turn of the tide give her a sheer to port, and at slack water she will be wind rode to leeward of her anchor. As the fresh tide makes under her stern, try and get her to cant with her head away from the anchor, and if she does this brace the yards full to forge her ahead, setting the foretopmast staysail, and try to keep the cable taut. If, however, she cants the other way brace the yards abox, and if the staysail is set have the sheet to windward. As the tide acquires strength she will drop astream of the anchor.

Tending to windward in strong winds is the most difficult case. No hard and fast rules can be given suitable for all cases. Possibly the vessel, especially if light, would not ride astream of her anchor, but would have to be kept to leeward the whole time.

**Tending ship when moored.**—A vessel when moored does not occupy so much room as when at single anchor; also, she cannot under ordinary conditions foul either of her anchors. She does not therefore require tending in the manner that a ship does when at single anchor. There is, however, a great disadvantage in being moored should a strong breeze spring up across the line of mooring, as the ship will be riding to a span. This is especially dangerous if the ship is moored taut. It will be well to illustrate this with a diagram.



- A. Represents a ship riding to a span with an angle of  $160^\circ$  between the cables. The tension or force on each cable is three times as great as would be put upon a single one ahead. That is to say, an anchor and cable ahead would have three times as much holding power as the other two combined.
- B. Here the cables are supposed to be veered out so that the ship drops from A to B, with an angle of  $150^\circ$  between the cables. The tension in this case on each one would be about twice as great as on a single one ahead.
- C. The angle here is  $120^\circ$ , in which case the tension on each cable would be just equal to that on one ahead.

**FOR MASTERS—SQUARE-RIGGED.**

**Ship on her beam ends.**—In the case of a sailing vessel being suddenly hove down by the force of the wind, it will be necessary to immediately let fly the sheets and halyards of any sail that may be set, and an effort made to get her to pay off before the wind. It must be noted, however, that when a ship is on her side the helm is not of much use.

If a sailing vessel is thrown on her beam ends by the shifting of the cargo, and there is immediate danger of capsizing, the masts must be cut away as quickly as possible. If the danger of capsizing is not imminent, an effort must be made to get the vessel upright again by trimming the cargo to windward.

A vessel on her beam ends has a tendency to drift broadside on to the sea. This must be prevented by rigging out a sea anchor, and riding to it whilst efforts are being made to get the ship upright again. In the case of a ship with deck cargo, it may be necessary to jettison it; also, if necessary, cargo must be jettisoned from the hold.

**Cutting away masts.**—If it becomes necessary to cut away a mast, let the mizenmast go first. If required to further relieve the ship, cut away the main topmast, especially if the lowermast is of iron or steel and the topmast wood. Iron lowermasts are apt to go below the deck and tear up a portion of the deck with them, thus exposing the vessel to another danger.

In cutting away, if the ship is on her beam ends, the lee rigging should be cut first if possible, after which cut the weather rigging, working from aft forward, and last of all cut the stays and forward shrouds. If unable to get at the lee rigging owing to its being under water, the weather rigging must perforce be cut first.

Remember that though cutting away a mast relieves a ship of top-weight, she may roll more heavily after the mast is gone than she did before it was cut away.

In modern vessels with screw rigging, or when fitted with wire lanyards, the rigging could not be cut away as easily as in the case of hemp lanyards. With wire lanyards, probably the quickest method would be to cut through the middle part of the lanyard at the lower deadeye. The opinion prevails with many that, in the case of rigging screws, they could be broken if struck heavily with a maul. This, however, is open to doubt, and if tried without success, they could easily be unscrewed.

**SUMMARY OF TRADE WINDS AND MONSOONS.**

**Atlantic Ocean.**

| Name or Direction of Wind. | Average Limits or Locality.                                                    | Season. | Remarks.                                                                                              |
|----------------------------|--------------------------------------------------------------------------------|---------|-------------------------------------------------------------------------------------------------------|
| N.E. Trade,                | 27° N. to 8° N.                                                                |         | Polar limits vary 3° or 4° N. or S., and equatorial limits 5° or 6°, according as the Sun is N. or S. |
| S.E. Trade,                | 6° N. to a line joining Cape of Good Hope and Martin Vaz and Trinidad Islands. |         |                                                                                                       |
| Anti Trades (W'y Winds),   | Between 35° and 60° N. and S.                                                  |         |                                                                                                       |
| Ely Winds,                 | English Channel.                                                               | Spring. |                                                                                                       |

**Pacific Ocean.**

|              |                                                        |               |                                          |
|--------------|--------------------------------------------------------|---------------|------------------------------------------|
| N.E. Trade,  | 27° N. to 7° N., and as far W. as the Mariana Islands. |               | Limits vary, like those in the Atlantic. |
| S.E. Trade,  | 6° N. to 27° S.                                        |               |                                          |
| Anti-Trades, | Between 35° and 60° N. and S.                          |               |                                          |
| Ely Winds,   | Cape Horn.                                             | Apl. to July. |                                          |

**Indian Ocean and China Seas.**

|               |                                                                                             |                |                                                                                                               |
|---------------|---------------------------------------------------------------------------------------------|----------------|---------------------------------------------------------------------------------------------------------------|
| E. Trade,     | 7° S. to 27° S. in Indian Ocean.                                                            |                | Limits vary, as in the other oceans.                                                                          |
| N.W. Monsoon, | Equator to 10° S. in Indian Ocean, and extending in the Pacific as far as the New Hebrides. | Nov. to March. | Not a steady Monsoon, but varies between N.W. and W.S.W.                                                      |
| N.E. Monsoon, | Mozambique Channel, East Coast of Africa, North Indian Ocean, and China Seas.               | Oct. to Apl.   | Stronger in China Seas. Is steadier in Dec., Jan., and Feb.                                                   |
| S.W. Monsoon, |                                                                                             | Apl. to Oct.   | Stronger in East Indies. Less liable to change in July, and August, than blows generally over the Indian Sea. |
| Anti-Trades,  | 35° to 60° S.                                                                               |                | Similar to Atlantic.                                                                                          |

**PRINCIPAL SAILING ROUTES.**

**Outward Routes.**

- A.—Track from England across the Equator.
- B.—To St. Helena.
- C.—To Cape Town.
- D D.—To Australia and New Zealand.
- D E.—To Calcutta, etc., in S.W. Monsoon.
- D F.—To Calcutta, etc., in N.E. Monsoon.
- B G G.—To California, Vancouver, etc.

**Homeward Routes.**

- H H.—From the Line to England.
- I I.—From the East Indies and Cape to the Line.
- J.—Cape Horn to the Line.
- K K.—Australia and New Zealand to Cape Horn.
- L L.—West Coast of North America to Cape Horn.

**Intermediate Routes.**

- M M.—Australia to the Cape; but from April to September (that is, during the southern winter) the route from Eastern Australian ports is North—about through Torres Straits along the track I.
- N N.—Australia and New Zealand to North America.
- O O.—Australia to West Coast of South America. Northerly track for southern winter; southerly for summer.

## QUESTIONS AND ANSWERS ON OCEAN PASSAGES, WINDS, AND CURRENTS, Etc.

This chapter is included specially to supply a few questions such as are likely to be given to candidates in their examinations for masters' certificates. The answers are not given in detail, but there is enough to satisfy the examiners that the candidate has some little knowledge of the subject.

For fuller information see "Ocean Passages," and the various Sailing Directions published by the Admiralty.

*Q.* What is the shortest possible distance between any two places?

*Ans.* Along the arc of a great circle passing through both of them.

*Q.* Are the Equator, and parallels of latitude, great circles?

*Ans.* The Equator is a great circle. Parallels of latitude are not.

*Q.* You want to go from one place to another in the same longitude. Is a true North or South course the shortest route?

*Ans.* Yes. A true North or South course would be along a meridian. As all meridians are great circles, there could be no shorter track.

*Q.* Two places in the Southern Hemisphere are in the same latitude. Will a true East or West course cover the shortest distance between them?

*Ans.* No. A true East or West course would be along a parallel of latitude. As parallels of latitude are not great circles, this would not be the shortest route.

*Q.* How would you take a sailing-ship from England to Cape Town?

*Ans.* On leaving the Channel I should make Westing, say, to  $10^{\circ}$  or  $12^{\circ}$  W., to avoid getting into the Bay of Biscay. Then shape a course to pass to the westward of Madeira and the Cape Verde Islands, crossing the Equator in longitude  $23^{\circ}$  W. to  $29^{\circ}$  W. according to the season. (Route A, Map III.) Steer due South through the Doldrums. I should keep a good lookout for St. Paul's Rocks if I am well to the westward. I should not have the yards too sharp in the South Lane Trades. Cross the meridian of Greenwich in  $35^{\circ}$  S. and steer East until the Cape bears N.E., when I should steer for it. (Route C).

*Q.* Speaking generally, when are the trade winds strongest, and when are they lightest?

*Ans.* The trade winds are strongest and blow in a more polar direction, when the sun is in the opposite hemisphere and at its greatest distance from the Equator; when the sun is in the same hemisphere they are lighter, and come from a more easterly direction.

*Q.* How would you get from the Equator to St. Helena?

*Ans.* After going through the S.E. trades I should make Easting till I was far enough to weather St. Helena, then run for it. (Route B). From January to April I might go by the northern route, passing inside the Cape Verde Islands, along the Coast of Africa in the Guinea Current as far as St. Thomas Island, make Southing till in  $6^{\circ}$  or  $8^{\circ}$  South; I ought then to fetch St. Helena on the port tack.

*Q.* Describe your track from England to Australia?

*Ans.* My track to the Equator and through the S.E. trades would be the same as if bound to Cape Town. On losing the S.E. trades I should shape a S.E. course until in  $39^{\circ}$  or  $40^{\circ}$  S., and run my Easting down in about those latitudes. If bound for Fremantle I should proceed direct when in about  $100^{\circ}$  E.; if bound to Adelaide, I should steer for Cape Borda directly after passing Cape Leeuwin. Going to Melbourne, or through Bass Strait to Sydney, I should haul up for Moonlight Head when in about  $135^{\circ}$  E. (Route D).

*Q.* At what times of the year do you expect to encounter the most ice while running the Easting down?

*Ans.* The greatest number of icebergs are seen in the Southern summer during the months of November, December and January, and the fewest in July.

*Q.* Is there any current on the East Coast of Australia?

*Ans.* Yes. The Equatorial Current, setting to the westward across the Pacific, splits when approaching the Australian Coast, part of it running through the Eastern Archipelago, and part running down the East Coast of Australia, at a speed of from  $\frac{1}{2}$  to 3 knots per hour.



*Q.* Describe your track to Calcutta during the N.E. monsoon.

*Ans.* My track from England through the North and South Atlantic would be the same as if bound to Australia. I should pass the meridian of the Cape in about  $40^{\circ}$  S., and continue on an East course about as far as St. Paul Island, when I should haul up to the N.E. and northward. Pass to the westward of Sumatra say, 150 miles off, also to the westward of the Nicobar and Andaman Islands.

*Q.* How do the monsoons blow in the Bay of Bengal?

*Ans.* The S.W. monsoon commences in the northern part of the Bay in April, and gradually extends to the southward, blowing fiercely all over the Bay in June, July, and August.

The N.E. monsoon commences in the Northern part of the Bay in October, and in November and December has extended southward, becoming a steady breeze with settled clear weather, which lasts until March.

*Q.* Is there any difference between a "trade wind" and a "monsoon"?

*Ans.* Yes. Trade winds generally blow all the year round, from practically the same direction. Monsoons change with the seasons.

*Q.* Describe your route from the Cape of Good Hope to Hong Kong?

*Ans.* I should run S.E. from the Cape until in about  $39^{\circ}$  or  $40^{\circ}$  S., and keep in that latitude as far as St. Paul and Amsterdam Islands, then steer to enter the Southern tropic in about  $100^{\circ}$  E. From there I should go through the Straits of Sunda, keeping well clear of Java Head. I might then go through Gaspar Strait if the weather is fine, and then up the China Sea to Hong Kong.

*Q.* How would you come home from Calcutta, meeting the S.W. monsoon in the Bay of Bengal?

*Ans.* I should work down the west side of the Bay and cross the Equator in about  $89^{\circ}$  E. I should then shape a course for the Cape, passing about 100 miles to the southward of Madagascar, and making the African Coast about 200 miles South of Natal afterwards keeping in the strength of the Agulhas current. When round the Cape, pass near St. Helena and Ascension, and cross the Equator in  $25^{\circ}$  to  $30^{\circ}$  W., steer North through

the Doldrums, and after losing the N.E. trades, I should hope to get westerly winds, and should shape a course for the Channel. (Routes I and M).

*Q.* Tell me something about the steam track to the Cape of Good Hope?

*Ans.* When leaving the Channel I should give Ushant a good wide berth, and if calling at Las Palmas or St. Vincent should steer straight for whichever one I was going to. I might coal there if necessary. Leaving there I should proceed along the Coast of Africa until below Sierra Leone, cross the Equator in  $8^{\circ}$  W., and steer direct for the Cape.

*Q.* What other coaling stations are there on or near the route to the Cape?

*Ans.* Lisbon, Madeira, Tenerife, Sierra Leone, Ascension and St. Helena.

*Q.* How would you take a ship from England to San Francisco?

*Ans.* My passage to the Equator would be the same as if bound to the Cape. I should then go down the Brazilian Coast 120 to 150 miles from the land, to take advantage of the Brazilian current. After passing the River Plate, I should keep within 100 miles of the Coast of Patagonia, and thence round Cape Horn. After passing the Horn I should make Westing to about  $80^{\circ}$  W., and then stand up into the S.E. trades, and cross the Equator in  $115^{\circ}$  to  $120^{\circ}$  W. After losing the N.E. trades I should expect westerly winds, and proceed direct for my port. (Route A and C).

*Q.* Describe your route home to England from Vancouver or San Francisco.

*Ans.* On leaving my port I should run down into the trades and cross the Equator in about  $115^{\circ}$  W. After losing the S.E. trades I should steer in a south-easterly direction, reaching  $50^{\circ}$  S. in about  $90^{\circ}$  W. After rounding the Horn, pass to the westward of the Falkland Islands, and thence to the N.E., crossing  $40^{\circ}$  S. in about  $45^{\circ}$  W. Run through the S.E. trades and cross the Equator in  $27^{\circ}$  to  $28^{\circ}$  W., steer North through the Doldrums, and after losing the N.E. trades, shape a course for the Channel. (Route L, J, H).

*Q.* What track would you take homeward bound from Callao?

*Ans.* I should run out into the S.E. trades, and after losing them and getting the westerly winds, my passage would be the same as from Vancouver or San Francisco.

*Q.* Is there any current off Cape Horn?

*Ans.* Yes. There is the **Cape Horn Current**, which runs to the Eastward and after passing the Horn, turns off to the N.E. past the Falkland Islands. It seldom exceeds a knot an hour.

*Q.* How would you go from Fremantle to the Cape?

*Ans.* After leaving Fremantle I should steer to the N.W., going in that direction to get the S.E. trades across the Indian Ocean. I should pass to the southward of Mauritius and Madagascar, and make the land about 200 miles South of Natal. I could then take advantage of the **Agulhas Current** going round to the Cape.

*Q.* What are the most important currents to be met with in the North Atlantic Ocean?

*Ans.* One of the principal ones is the **Gulf Stream**, which flows to the northward from the Strait of Florida, and then turns to the N.E. and eastward, and past the Coasts of Great Britain and Norway. In the Strait of Florida it sometimes runs as much as 120 miles a day. It may be distinguished by its deep blue colour and high temperature.

There is also the **Arctic Current**, which flows out of Davis Strait, over the Newfoundland Bank and down the Coast of America, inside the Gulf Stream. This a cold current.

The **Rennel Current** flows along the West Coast of France, passes 15 or 20 miles outside Ushant, and then to the N.W. across the entrance to the English Channel. It varies from half-a-mile to a mile an hour or more, according to the wind.

The **Guinea Current** flows along the African Coast to the eastward between Cape Roxo and the Bight of Biafra. In the summer and autumn it is found as far as 50° W., this part being called the **Equatorial Counter Current**, running between 5° N. and 9° N.

*Q.* How does the Equatorial Current set in the Atlantic?

*Ans.* It commences in the Gulf of Guinea and runs to the westward between 2° N. and 10° S. as far as the Brazilian Coast, with

an average velocity of 30 miles a day, but occasionally 60 or 70 miles a day.

*Q.* What becomes of it on reaching the Coast of Brazil?

*Ans.* It splits off Cape San Roque, one part called the **Brazil Current**, running to the southward along the Coast of South America, until near the River Plate, when it re-curves to the eastward, forming the **South Atlantic Connecting Current**.

The other part flows along the North Coast of South America, through the Caribbean Sea, round the Gulf of Mexico, and through the Strait of Florida, forming there the commencement of the **Gulf Stream**.

*Q.* Is there any current on the West Coast of South America?

*Ans.* Yes. To the southward of 40° S. the current sets straight on to the Coast. To the northward of 40° S. the **Peruvian or Humboldt Current** sets to the northward, as far as the Bay of Panama, curving off at its outer edge into the **Equatorial Current**.

*Q.* What route would you take on a passage home from Sydney to England?

*Ans.* I should pass to the southward of New Zealand, or through Cook Strait if baffled with southerly winds, and then run along in about 50° S., until in, say, 115° W. From there I should steer round the Horn, keeping a good lookout for ice, pass inside the Falkland Islands, and shape a north-easterly course, crossing 40° S. in about 45° W. I should then run through the S.E. trades, steer North through the Doldrums, and cross the Equator in 27° to 29° W. After losing the N.E. trades, I should shape a course for the Channel (Route **K, J, H**).

*Q.* You are making the Channel in thick weather, and being uncertain of your position, what precautions would you take?

*Ans.* I should feel my way along slowly and carefully, taking casts of the lead at frequent intervals. If I thought I was past the Start, and the weather was foggy, I should heave-to until I was able to verify my position.

*Q.* How would you take a sailing-ship from Cape Town to the River Plate?

*Ans.* After leaving Table Bay I should run up to the N.W. into the S.E. trades, sheer to the westward across the South Atlantic and down in the Brazil Current.

*Q.* What track would you take from the River Plate to Cape Town?

*Ans.* I should follow the great circle track. I might reasonably expect westerly winds, and should be covering the shortest possible distance between the two places.

*Q.* Describe a steamer's track both ways between the River Plate and Cape Town?

*Ans.* Bound towards Cape Town I should follow the great circle track.

Going to the River Plate I should run straight across if the westerly winds were not strong; if I found they were, should get away to the northward. I should bear in mind the fact that the farther north I go, the more distance I have to cover.

*Q.* How would you take a steamer from England to the United States?

*Ans.* From mid-January to mid-July I should go on the great circle from the Channel to a point in about  $42^{\circ}$  N. and  $49^{\circ}$  W. and thence direct for my port. From mid-July to mid-January I should go on the great circle to about  $46^{\circ}$  N. and  $49^{\circ}$  W., and then direct for my port. Mind the fogs and keep a good lookout for ice.



CHART OF THE WORLD SHOWING  
PREVAILING AND PERMANENT  
WINDS AND CALMS.  
MAP. I.



CHART OF THE WORLD SHOWING  
OCEAN CURRENTS.

MAP II.



ISSUED WITH "NICHOLLS'S SEAMANSHIP."

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CHART OF THE WORLD SHOWING  
PRINCIPAL SAILING SHIP  
ROUTES  
MAP III.

