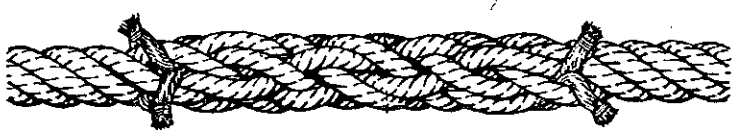


FIG. 7-65. Finishing a short splice by dogging

The normal method of splicing is used and five full tucks should be made if the ends of the strands are to be finished off dog-knotted and whipped, using a dead fox (which is a yarn taken from the strand being worked) for the purpose; or four full tucks, one half tuck and one quarter tuck if the splice is tapered and served over. The serving should be put on tightly and the first three tucks left uncovered. During splicing care should be taken that:

1. Strands lifted for tucking under are not kinked.
2. Strands are not allowed to run forward but are pulled back as far as possible.
3. The rope is kept level the whole time and strands are only lifted high enough for the tuck to take place.
4. The rope itself is not allowed to kink.

WORMING, PARCELLING AND SERVING

A rope or part of a rope is wormed, parcelled and served for three reasons:

1. To protect its outer surface against wear from chafing.
2. To make its outer surface smoother, so as to prevent other ropes from chafing when led over it.
3. With a steel wire rope, to protect the hands of those using it from the sharp ends of wire projecting from any splice in it.

Worming, parcelling and serving is not necessarily watertight or damp-proof, and there is a danger that damp may rot a rope underneath its covering. Ropes so treated should therefore be inspected frequently for signs of deterioration.

Worming

This consists of filling in the spaces between the strands with lengths of spunyarn or small stuff laid along the lay of the rope, and its object is to make the rope smooth and round.

Parcelling

This consists of binding the rope with strips of tarred canvas. The strips should be from 2 to 3 inches wide and it is customary to bind them on in the direction of lay of the rope, working towards the eye. Each turn should overlap that preceding it by half the width of the strip, and the rope should first be well tallowed.

When parcelling and serving a stay throughout its whole length the parcelling should be worked upwards from the eye of the lower splice to the eye of the upper splice, as this affords the maximum obstruction to the entry of water.

Serving

This consists of binding a splice or a length of rope with close turns of spunyarn. Each turn is hove taut with a special serving mallet, which has a score in its head to fit the rope and a wooden handle about 15 inches long. A

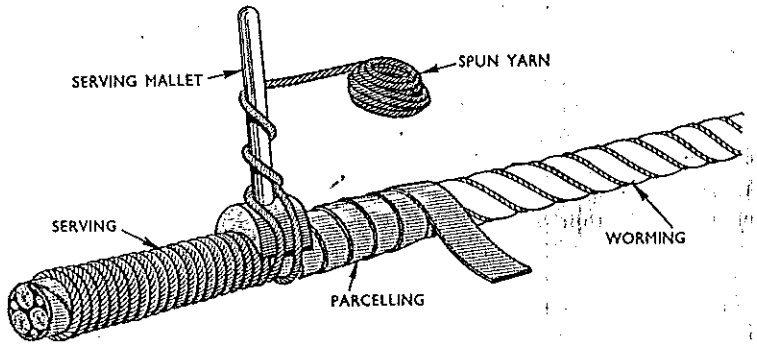


FIG. 7-66. Worming, parcelling and serving

service is always bound on in the opposite direction to the parcelling, so as to avoid bunching up the latter. It is therefore put on against the lay of the rope, which may be memorised thus:

Worm and parcel with the lay,
Turn, and serve the other way.

A service is begun as for a common whipping, and for an eye splice it is usual to work from the splice to the eye. The first few turns are put on by hand and hauled taut with a spike or heaving mallet. The serving mallet is then placed on the rope and the turns of the service are passed as follows:

take a half-turn round the handle; then one turn round both the fore end of the head of the mallet and the rope; then dog the serving round the handle of the mallet.

Some mallets work better if a preliminary round turn is taken round the rope and after end of the head, and then followed by the turns described above.

To put on a service, stand with the rope on your left side while facing in the direction in which the turns are advancing. Then pass the ball of spunyarn round and round in step with the service. Having completed the required length of service, finish it off by passing the end back under the last four turns, haul all parts taut, and make a crown and wall.

NOTES:

(i) If serving over a restricted length of rope—up to an eye splice, for example—which does not allow the mallet to advance ahead of the last turns, the spunyarn should be brought to the mallet as follows:

up over the cut in the fore end of the head; one quarter-turn round the handle; one turn round the rope and rear end of the head (taken in the direction of the service, i.e. against the lay of the rope); and then dogged round the handle.

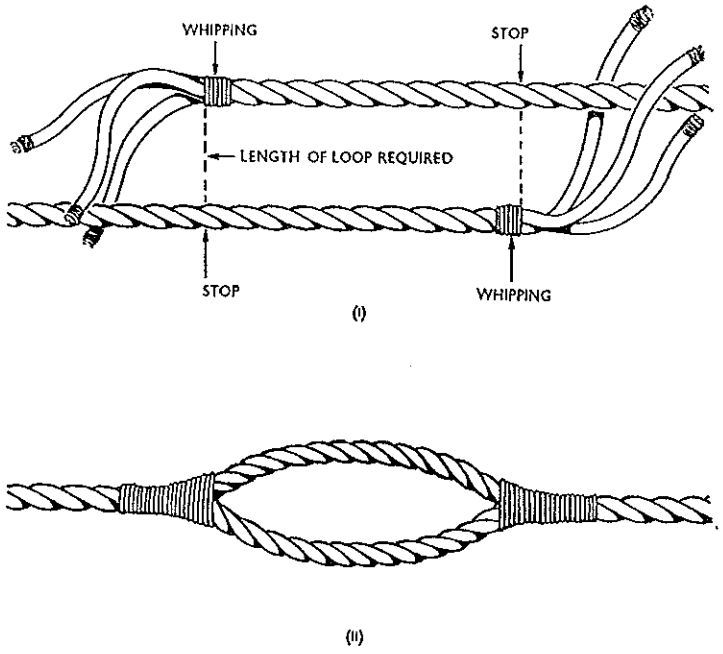


FIG. 4–1. Making a cut splice

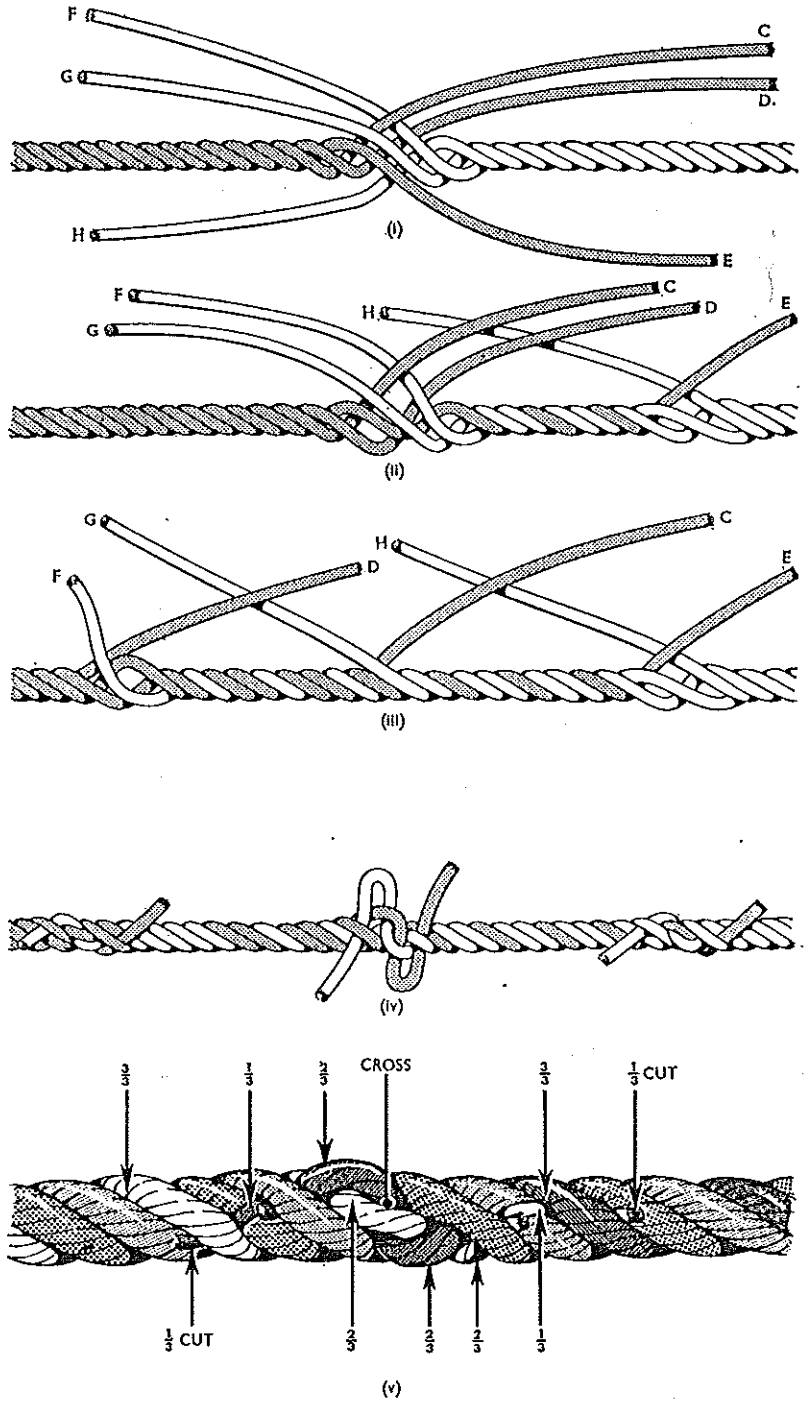
a gradual taper (fig. 4–2(v)). The splice is finished off by stretching it, hauling taut all ends (including the discarded yarns) and then cutting them off.

To make a long splice whip each rope at a distance from its end equal to twelve times the circumference of the rope, then unlay the strands to the whipping and whip their ends. Marry the two ropes together, as in a short splice. Each strand unlaid as described above is followed up by the strand from the other rope which lies on its right in the marriage, so that H is unlaid and followed up by E, D is unlaid and followed up by F, and C and G remain at the marry. Each strand is unlaid until the length of the end of the strand following it up is reduced to four times the circumference of the rope. In splicing a 2-inch rope, for example, H is unlaid until 8 inches of E remains, and D is unlaid until 8 inches of F remains. The splice is now finished off as described above.

This splice is used to join two ropes together which are required to pass through a block. A well-made splice will not increase the diameter of the rope nor reduce the rope's strength.

Chain splice (natural cordage only)

Prepare the rope as for an eye splice, but do not place a whipping round the rope, and unlay the strands rather more than for an eye splice. Then unlay one strand, A, for another 6 inches, or twice the intended length of the eye (fig. 4–3(i)). Now pass strands B and C through the link on the end of the chain and marry up with A, thus forming the eye (fig. 4–3(ii)). Then further unlay strand A and lay up B in its place for about 12 inches, and finish off these two



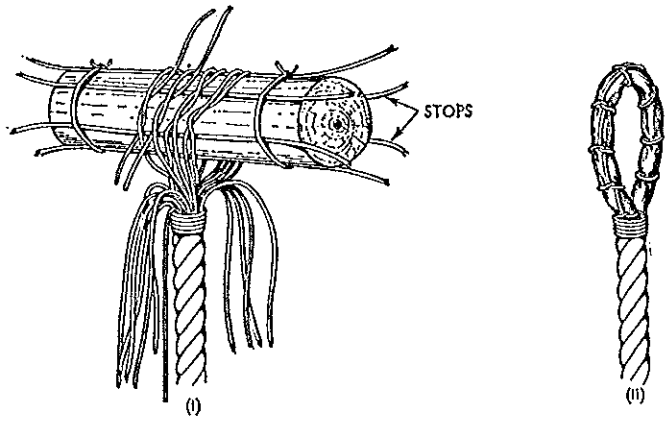


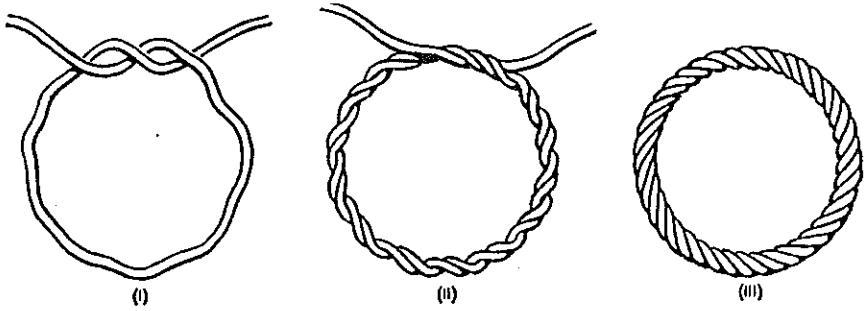
FIG. 4–5. Making a Flemish eye

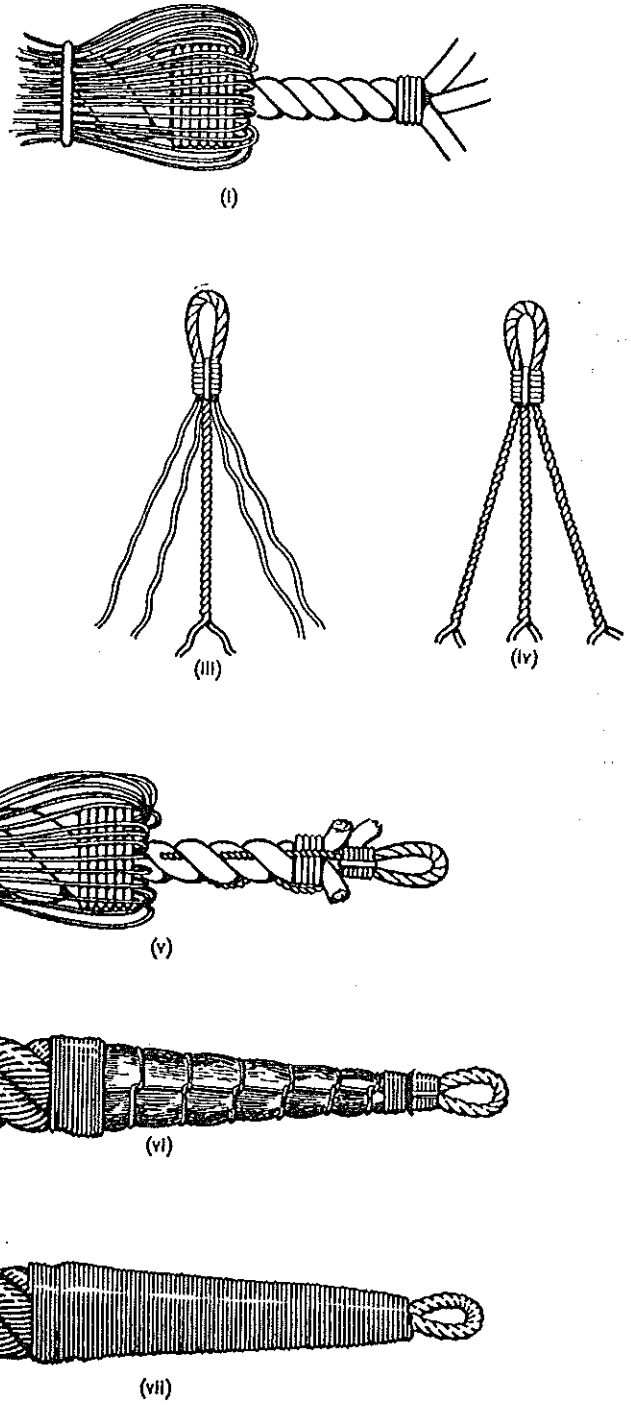
them in pairs over the fid; each pair should be knotted at different parts of the fid, thus placing the knots all round the eye. Now free the stops on the fid and secure the eye temporarily in position with them. Then remove the fid, cut away the unwanted ends, taper the outside yarns and lay them up the eye, then marl down (fig. 4–5(ii)). Finish off by ringbolt hitching or cockscombing the eye as described later in this chapter.

Rope grommet (natural cordage only)

Cut a length of rope equal to three and a half times the circumference of the grommet required and then unlay the strands, being careful not to disturb their lay. Each strand will make one grommet, a right-handed grommet from a right-handed rope.

Take one strand and close it up in the form of a ring of the size required (fig. 4–6(i)) and then pass the ends round and round in their original lay until all the intervals are filled up (fig. 4–6(ii)). Finish off as in a long splice (fig. 4–6(iii)).





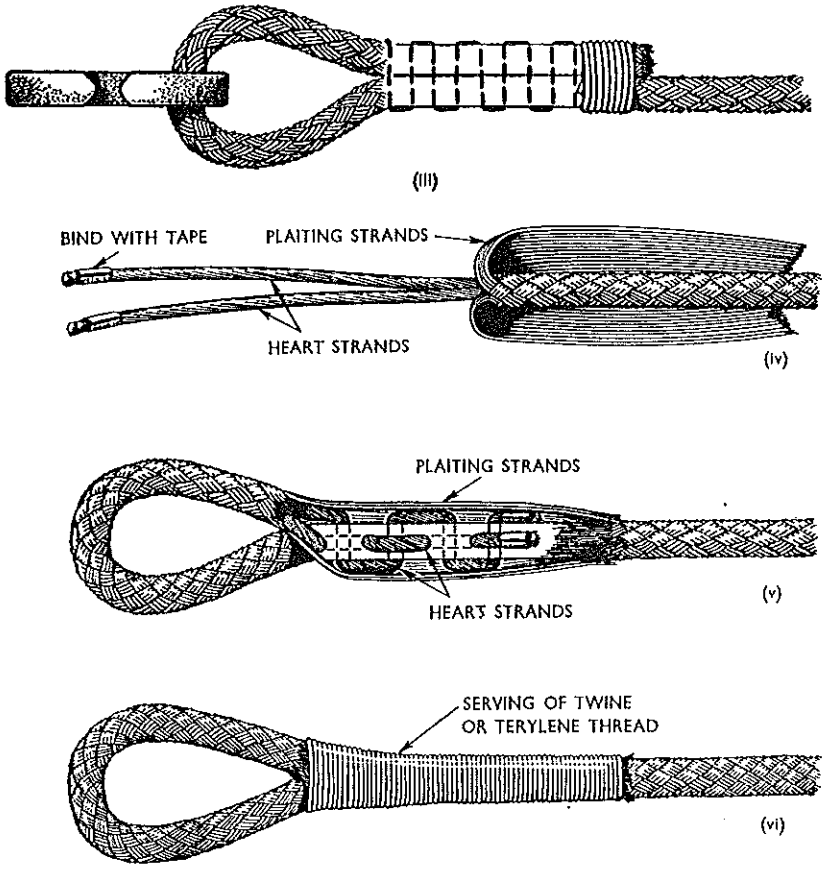


Fig. 4-8 (*cont.*). Splicing signal halyards of Terylene

Method A. Pass the end of the rope through the Inglefield clip and secure the end to the standing part by stitching through both parts with seaming twine for a distance of 2 inches; then further secure with a seizing (fig. 4–8(iii)).

Method B. Unlay the plaited sheath of the rope for a distance of approximately 4 inches. Divide the heart fibres into two strands; lay up and secure them with adhesive tape (fig. 4-8(iv)). Pass the strands through the standing part of the rope at least twice in each plane, using a spike inserted between the intersections of the plaited covering at the point where the splice is required (fig. 4-8(v)). The ends of the unlaid plaiting and the projecting heart strands are then laid along the rope, tapered down, and served over with twine (fig. 4–8(vi)).

Difficulty may be experienced in passing heart strands through the rope, because of the tightness of construction. This may be overcome by sliding the plaiting back over the heart to give a looser structure at the point of splice. After heart strands have been threaded through, the plaiting may be pulled back

KNOTS, AND GENERAL ADVANCED WORK IN CORDAGE

KNOTS

The functions of a knot are to prevent a rope from unreeving through a block or bullseye, or to provide a handhold, a weight or a stopper on any part of a rope. Most knots today are used only for decorative purposes.

To assist in describing how these knots are made, the strands are here lettered A, B, C, etc., and their respective bights *a*, *b*, *c*, etc.

Manrope knot

This is a decorative knot made at the ends of gangway manropes to prevent them unreeving, and to afford a handhold for anyone climbing aboard. To make the knot whip the rope at a distance from its end equal to six times its circumference, unlay the strands to the whipping, and whip their ends. Make a wall and crown (see Volume I), keeping the knot fairly loose (fig. 4–9(i)). Then

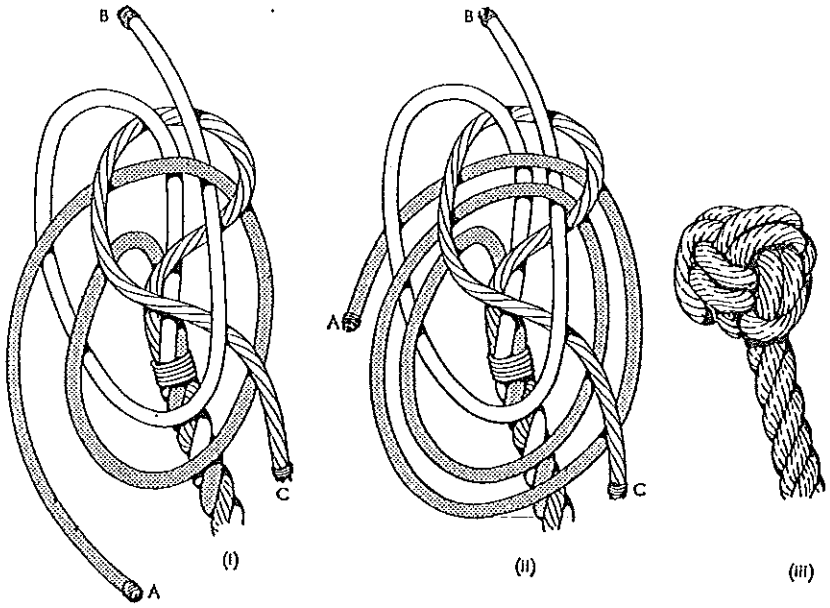


Fig. 4–9. Manrope knot

take strand A and follow it round its own part, thereby doubling up strand A (fig. 4–9(ii)). Work the other two strands similarly, haul all parts taut, and cut off the ends where they protrude from the base of the knot (fig. 4–9(iii)).

Turk's head

This is an ornamental knot supposed to resemble the turban once worn in

times. It may be made either as a standing or a running knot, according to whether it is to be fixed to an end or a bight, or is to be formed round another part of rope, a stanchion or an oar, for example. Five different forms of this knot are described below.

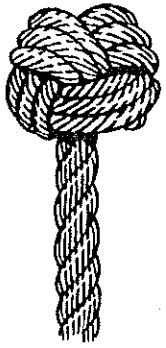


FIG. 4–10. Standing Turk's head

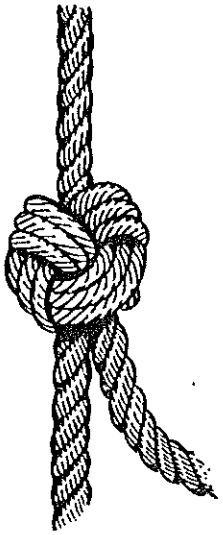


FIG. 4–11. Running Turk's head

Standing Turk's head, made at the end of a rope. This is a manrope knot, but the ends are followed round a third or fourth time. Before starting the knot, however, the strands must be unlaid for a distance of not less than eight times the circumference of the rope. (See fig. 4-10.)

Running Turk's head, made at the end of a rope and round its own bight (as in a running lanyard), is similar to a standing Turk's head made at the end of a rope, except that the wall and crown with which it is begun are made round the bight of the rope. The strands are then followed round twice or more, thereby forming a knot which will slide up and down the bight. (See fig. 4-11.)

Standing Turk's head, made on the bight of a rope. This is formed from a three-parted length of line called a 'spider', which is tucked into the centre of the rope so that its parts emerge from the strands equidistantly. The spider is made up by tucking a length of line into the bight of another line (fig. 4-12(i)). The length of each leg should not be less than five or six times the combined circumferences of the rope and line. Having inserted the spider (fig. 4–12(ii)), crown the ends round the rope left-handed (fig. 4–12(iii)), and then turn round and crown them back right-handed (fig. 4–12(iv)). Now follow each part round with its own end two or more times (fig. 4–12(v)), work all parts taut, and cut off the ends.

Running Turk's head, made round a bight of rope, a stanchion or other fitting is formed out of a single length of line. A half-hitch is made round the rope or fitting, and then followed by a round turn; the end is then dipped under the

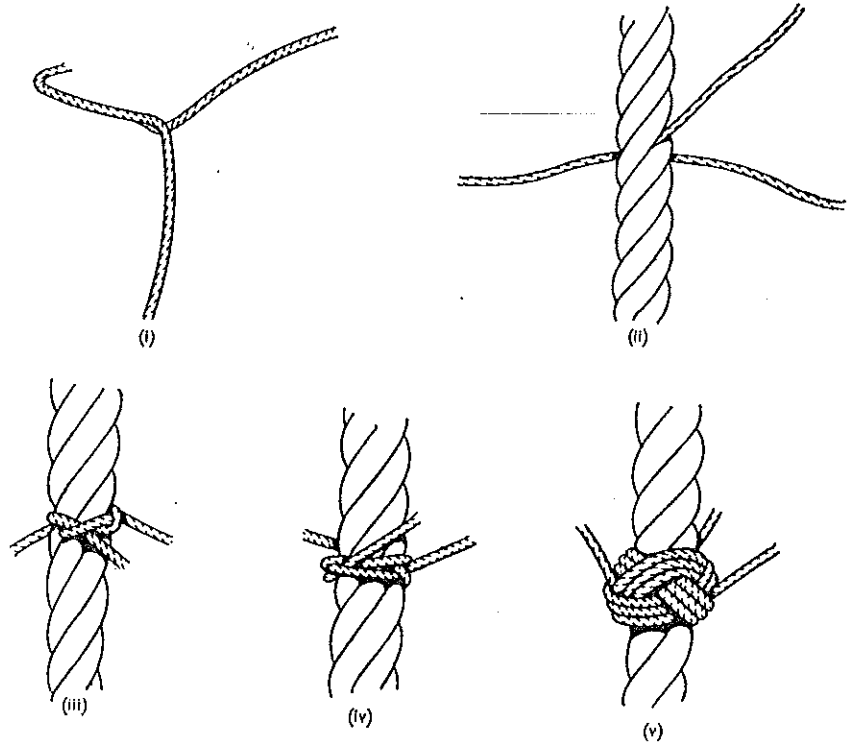
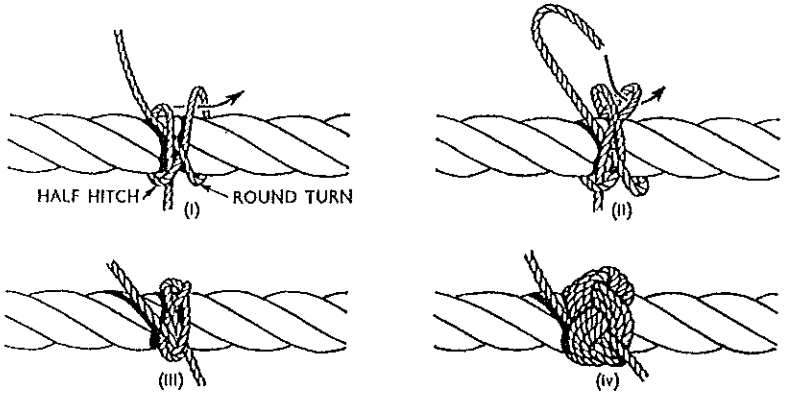


FIG. 4–12. Standing Turk's head on a bight

bight of the half-hitch (fig. 4–13(i)). The bights round the rope are crossed, the bight which is on the same side as the end of the line being placed underneath. The end is then passed down between the bights (fig. 4–13(ii)) and brought over the other side.



The second and third operations are repeated until the rope is encircled (fig. 4–13(iii)). The ends are then followed round as often as may be required, all parts are hauled taut (fig. 4–13(iv)) and the two ends finished off with a crown and wall.

Multi-parted Turk's head. The running Turk's head just described has three parts only, but one of four or more parts is a simple development of the same principle.

A multi-parted Turk's head is started, as before, with a half-hitch and round turn; in other words, two turns are taken round the object to be decorated, the end passing once over and once under the standing part (or non-working end). To make a four-parted Turk's head a third turn is now taken, the end passing over the standing part. A fifth part can be obtained by a further turn, the end going under the standing part; and this can be continued—the end passing alternately over and under the standing part—as often as is required. The end is now rove back through the turns the opposite way to the standing part. It is passed alternately over and under (or under and over), so as to keep on the opposite side of each turn to the standing part, under which it finally dips. The bight of the turn under which the end now passes is dipped under its neighbour, and then alternately over and under successive turns to emerge on the opposite side of the knot. Finally the end is rove in the same way, but keeping on the opposite side of each turn to the bight.

These running Turk's heads can be made round the hand and formed into a spherical knot—at the end of a heaving line, for example.

Single Matthew Walker knot

This knot is used to prevent a rope, such as a rudder lanyard, from unreeving. It is a development of the wall knot, is neater and more decorative than the wall and crown, and is easily made.

Make a wall knot and then bring each strand up through the bight immediately on its right. Haul all the strands taut and form the knot (fig. 4–14). The strands may be either whipped together and the spare rope cut off, or, if the cordage is of natural fibre, twisted up to form the original rope.

FIG. 4–14. Single Matthew

FIG. 4–15. Double Matthew

Double Matthew Walker knot

Make a single Matthew Walker and then bring each strand up through the bight immediately on its right. Haul taut and finish off as required (fig. 4–15).

Stopper knot, or double wall

As this knot produces a more pronounced shoulder than any of the others (fig. 4–16), it forms a useful stopper on a rope to prevent anything passing beyond it. It is not so neat in appearance as some of the other, similar, knots because the ends of the strands protrude from the top of the knot; but it can be made on the bight as well as on the end of a rope and is often used in guest warps in place of the Double Diamond, described on page 98.

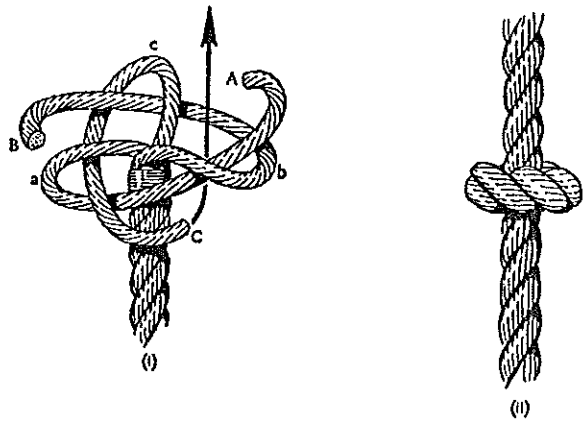


FIG. 4–16. Stopper knot or double wall

To make this knot, whip the rope at a distance from its end equal to at least four times the circumference of the rope, unlay the strands to the whipping, and form a wall knot (fig. 4–16(i)). Now pass A under B and C, and bring it up through *c* to the centre. Then pass B under C and A, and bring it up through *a* to the centre. Then pass C under A and B, and bring it up through *b* to the centre. Haul each strand taut at the top and in the centre of the knot, then whip all the strands together close to the knot and cut off the ends; or twist up the strands to form the original rope (fig. 4–16(ii)).

Six-parted crown and wall

This knot, although it appears more complicated, is made on exactly the same principle as a normal crown and wall. The six parts from a three-stranded rope are obtained by halving each strand, and relaying each part and whipping its end (fig. 4–17(i)). To make a six-parted crown, take A over B (fig. 4–17(ii)); take B round A, and then over C (fig. 4–17(iii)); take C round B, and then over D (fig. 4–17(iv)); then continue this with D, E and F; and, after taking F round E, pass F down through the bight *a* (fig. 4–17(iv)). Haul all the parts taut and make the six-parted wall underneath the crown as follows: take A under B (fig. 4–18(i)); take B round A, and pass it under C (fig. 4–18(ii)); take C

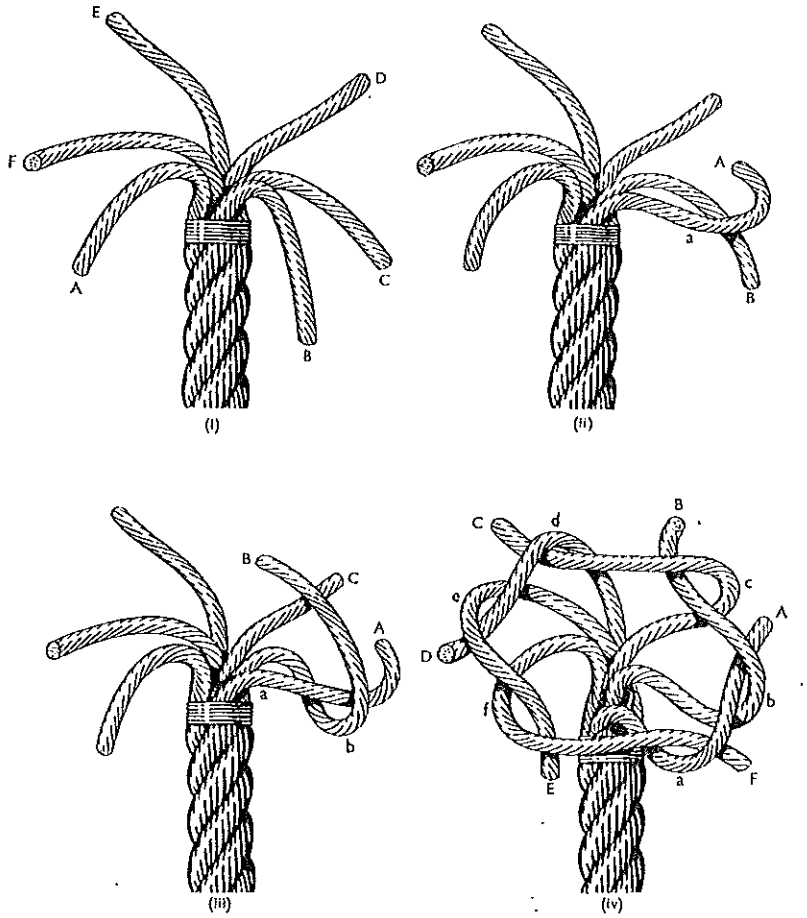


FIG. 4–17. Six-parted crown

round B, and pass it under D (fig. 4–18(iii)); then continue this to F; and, after taking F round E, pass F up through the bight *a* (fig. 4–18(iii)).

Single diamond knot

Both the single and double diamond knots are often made on the bight of a rope (such as a guest warp); the strands are then carefully unlaid, preserving their original lay, and laid up again when the knot is completed. To make a single diamond knot at the end of a rope, whip the rope at a distance from its end equal to four and a half times the circumference of the rope. Unlay to the whipping and hold the strands so as to form three loops placed equidistantly round the rope (fig. 4–19(i)). Then take A round outside B and up through *c;* take B round outside C and up through *a;* and take C round outside A and up through *b* (fig. 4–19(ii)). Haul taut all the strands and finish off by whipping the strands close to the knot and cutting off the ends, or laying up the strands

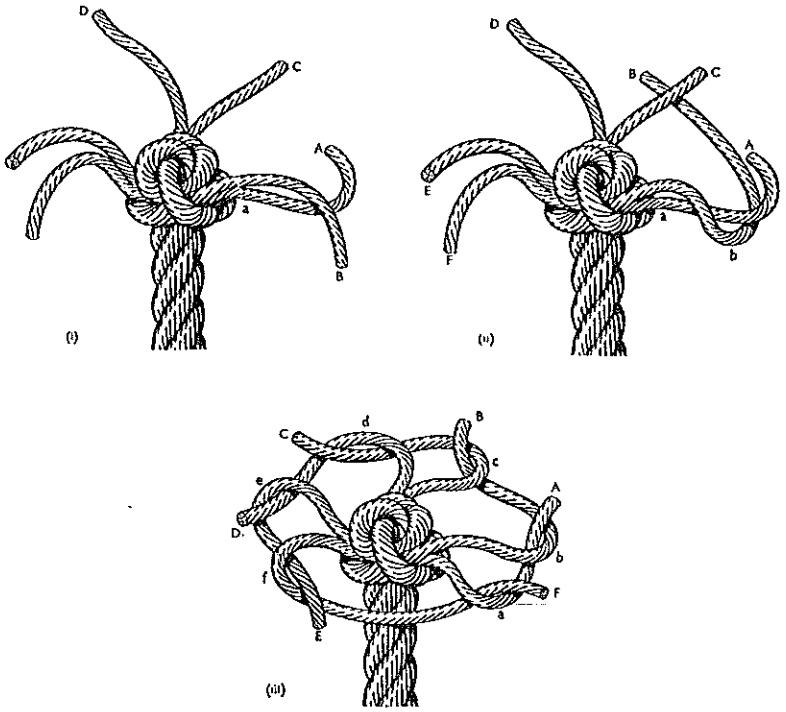
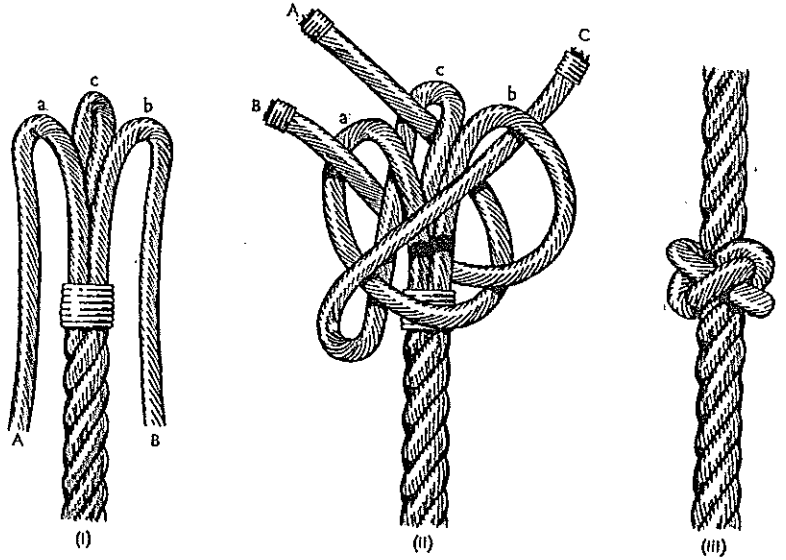


FIG. 4–18. Six-parted wall.



Double diamond knot

Whip the rope at a distance from its end equal to six times the circumference of the rope. Then make a single diamond and with each strand follow the lead of the single knot, bringing the ends out on top of the knot. The strands are then hauled taut and finished off as for a single diamond knot (fig. 4–20).

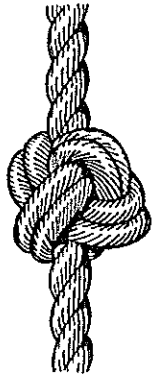


FIG. 4–20. Double diamond knot

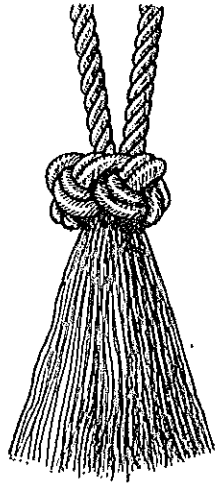
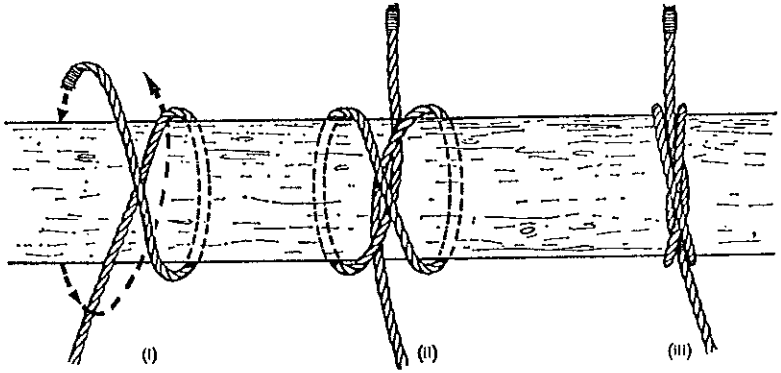


FIG. 4–21. Multi-parted double diamond knot

Multi-parted double diamond knot

There are numerous knots which can be made up from many strands, such as this knot. In fig. 4–21 it will be seen that two ropes can be joined together by knotting the six strands and then finishing off either by laying the strands up in their original lay, or by cutting off the ends a few inches from the top of the knot and unlaying the yarns so as to form a tassel. The six strands are placed together and stopped, and then a diamond knot is formed. Follow round each bight until the end of each strand is leading from the centre of the knot, then haul each part taut.



Constrictor knot

This is a variation of the clove hitch, and is used when a firm grip is required, such as when holding a thimble in place prior to splicing a hawser eye. It is the most secure of all binding knots.

Take a round turn, follow the arrow in fig. 4–22(i) and haul taut.

GENERAL ADVANCED WORK IN CORDAGE

Nettle or fox

This consists of two yarns, or one yarn split in two, laid up together left-handed between the finger and thumb, as follows: The yarns are held between the finger and thumb of the left hand and pointing to the right; the nearer one is given a right-handed twist with the finger and thumb of the right hand, and laid left-handed across the other; the cross is held with the thumb of the left hand.

This is continued until the required length of nettle is completed, when an overhand knot is made to prevent its unlaying. The uses of the nettle are described below.

To point a rope

Whip the rope at a distance from its end equal to twice the circumference of the rope plus 6 to 8 inches, and unlay the strands to the whipping. Select a number of outside yarns from each strand and make them up into an even number of nettles, making each nettle from one yarn split into two. When completed, stop the nettles back along the standing part of the rope. Then unlay

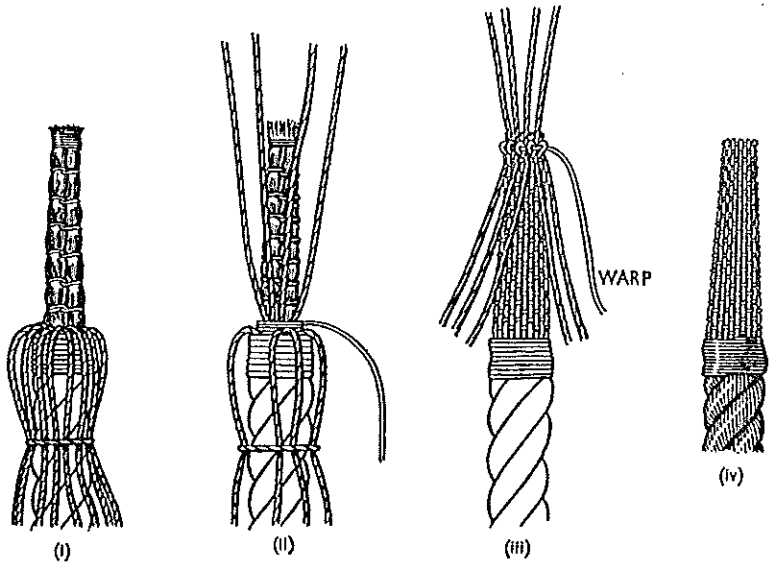


FIG. 4–22. Pointing a rope

the remaining strands and marl them down, cutting out a few centre yarns after each couple of turns of the marling so as to form a tapering heart on which to work the point (fig. 4–23(i)).

Unstop and divide the nettles, taking every other nettle down and back along the rope, and the remainder up and along the tapered heart; the former will now be called the 'lower' nettles and the latter the 'upper' nettles. Hitch a piece of twine (called the 'warp') with a couple of turns round the point where the nettles separate and as close as possible to the lower nettles, leaving the end of the warp free to pass again (fig. 4–23(ii)). Now bring the upper nettles down and the lower nettles up, and again pass the warp. Repeat this process until the pointing is of sufficient length (one and a half times the circumference of the rope), and then finish off as follows: Make a bight at the end of the point with each of the then lower nettles, so that the end of each bight lies back along the pointing, and pass the warp through these bights, binding the ends against the heart with a marling hitch (fig. 4–23(iii)); twist the top of each bight so as to form a figure of eight, and pass several hitches with the warp through these upper loops; then haul each loop taut with a small spike; then haul taut all ends and cut them off.

Cut off the upper nettles, the end of the warp, and the end of the heart protruding from the point (fig. 4–23(iv)). It will be found that a neater job will result if the nettles and the warp are well rubbed with beeswax.

Coverings

Grafting. This consists of nettles worked as in pointing, but it is used to cover the whole or any part of a rope instead of the end only. (Pointing, incidentally, can be regarded as a special kind of grafting.)

Grafting is often used to make an ornamental finish to an eye splice, as follows: Tuck the strands once; select sufficient inner yarns and with them worm the rope; then make up the remainder into nettles and proceed as in pointing. This grafting should extend for one and a half times the circumference of the rope.

Coachwhipping (fig. 4–24). This is used as an ornamental covering for boat-hooks, stanchions, bellropes, telescopes and similar fittings. It can be made up, with an even number of parts, from line, nettles, or alternate strips of blue jean and white duck, or any other suitable decorative material. The nettles are first secured by one end equidistantly round the fitting to be whipped (fig. 4–24(i)); in the following description of how this whipping is made the nettles have been numbered from 1 to 10.

There are different methods of making coachwhipping, and, according to the material used, it may be convenient to work either upwards or downwards or in any direction. In this particular example it has been decided to work upwards and to make the first cross to the right, but the instructions given below can easily be modified to apply to working the nettles downwards or otherwise. First, cross each odd-numbered nettle over the even-numbered nettle on its right, and hold or stop it up. Allow the even-numbered nettles to hang down-

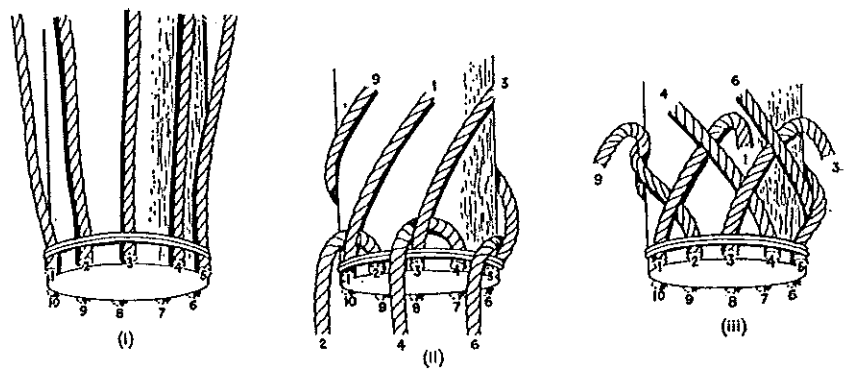


FIG. 4–24. Coachwhipping

its left. Hold or stop up the even-numbered nettles, and allow the odd-numbered nettles to fall downwards (fig. 4–24(iii)). Continue the first and second stages until the desired portion has been covered.

It will help if, on completion of each round, a stop of twine is passed round the upper nettles close to the cross. These stops are cut off when the work is finished. The extreme ends of the coachwhipping can be finished off tidily by covering them with a Turk's head.

Half-hitching (fig. 4–25). This is used extensively on the bow fenders of tugs. Splice an eye in a length of line and pass the end through this eye so as to form a ring round one end of the fender. Pass the end up through this ring and pull it down through its own bight, forming a half-hitch; repeat this operation to surround the ring with a complete row of such hitches, taking care to work round in the direction in which the crown of the spliced eye is pointing (fig. 4–25(i)). Then form a second row, making a half-hitch in each bight of the first

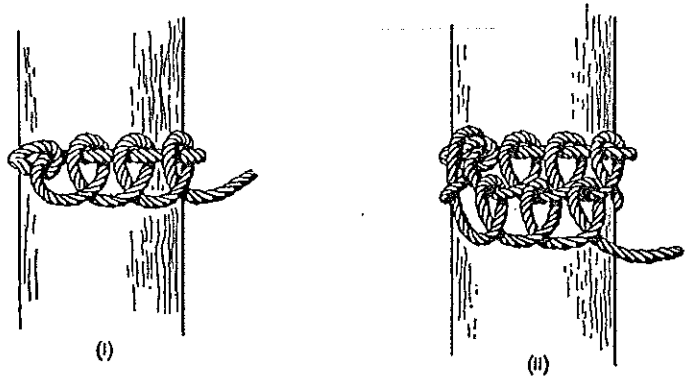


FIG. 4–25. Half-hitching

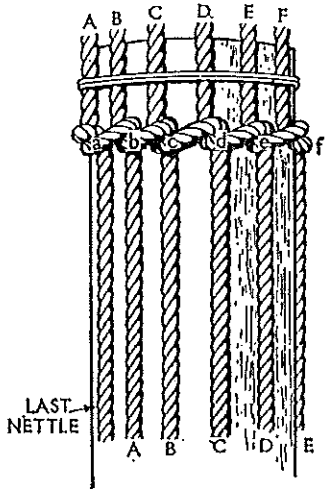


FIG. 4–26. Continuous walling

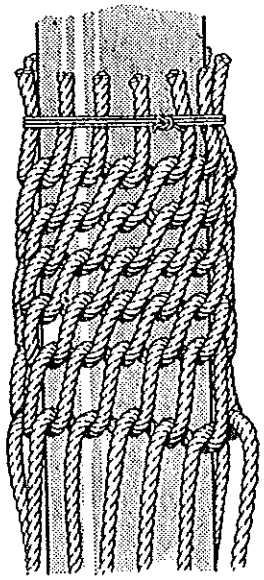


FIG. 4–27. Continuous crowning

(fig. 4–25(ii)), and then a third row and as many more as required. As the girth of the fender increases the number of hitches is increased by making two in one bight as often as necessary; as the girth decreases the number of hitches can be decreased by missing a bight periodically. It is finished off by passing the rope through each bight to form a clove hitch and then hauling taut.

Continuous walling (fig. 4–26). This is used as an alternative covering for a fender, or for decorating stanchions and other fittings. It uses less material than half-hitching. It is made from a number of nettles, or of lengths of suitable line or rope, each secured by one end to the fitting to be covered so that they are spaced round it equidistantly. The fitting—a fender, for example—is secured so that the nettles hang downwards, and it is then covered with a series of wall knots, each being made from the nettles as already described for a six-parted wall, i.e.: Pass A over B; then bring B up and over so as to enclose A, and place it over C; then bring C up and over so as to enclose B, and place it over D; then continue in this manner until the last nettle has been passed down through *a;* then haul the whole row taut and repeat the operation as often as necessary.

If the fitting to be covered is not of even diameter it is usual to begin continuous walling at the largest girth and then to decrease by discarding nettles as necessary. It can be finished off tidily by covering each end with a Turk's head.

Continuous crowning (fig. 4–27). This can be used to cover a rope, stanchion or similar fitting. It is made in the same manner as already described for a six-parted crown, and is prepared for working in the same way as that described for continuous walling. It may be found easier to work the crowns upwards, instead of downwards as in continuous walling.

Ringbolt hitching (fig. 4–28). This is used to cover curved fittings and is

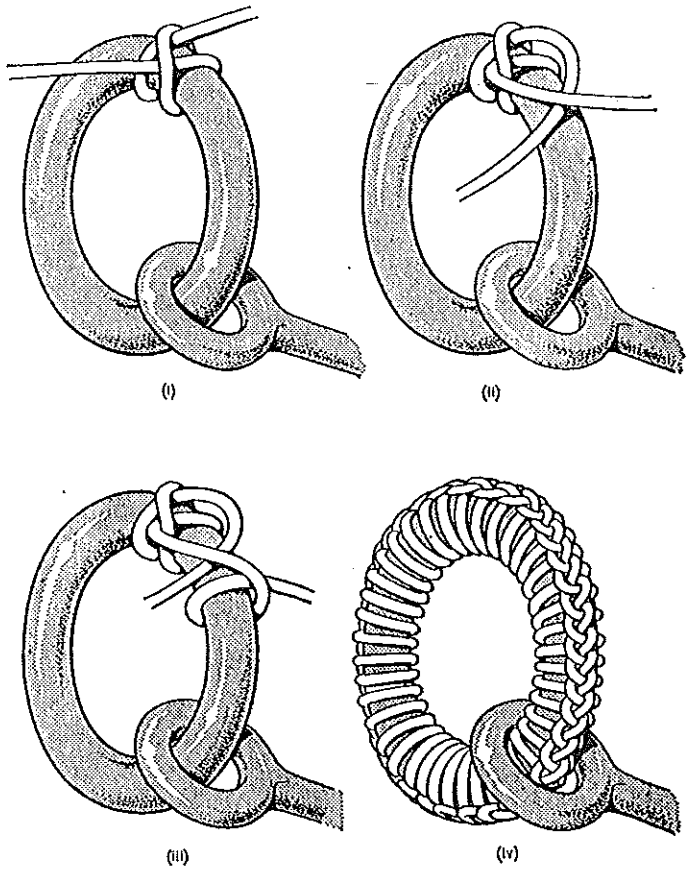


FIG. 4–28. Ringbolt hitching

of line and make a clove hitch round the eye (fig. 4–28(i)). (2) Cross the right part under the left and take it clear (fig. 4–28(ii)). (3) Make a half-hitch with the new right part (fig. 4–28(iii)). Repeat (2) and (3) as often as necessary to cover the eye, and finish off with an overhand knot so as to complete a reef knot.

Cockscombing (fig. 4–29). This is also used to cover an eye or a ring. It can be made using one, three or any odd number of parts. The description given below is for three parts.

Seize the ends of the three parts to the fitting, allowing two parts to hang on the right and one part on the left (fig. 4–29(i)). Take the part on the extreme right and make a half-hitch round the fitting, with the end coming out to the left and on top of the fitting. Next, take the original left-hand part and make a half-hitch to the right, with the end coming out to the right and on top of the fitting (fig. 4–29(ii)). Then take the part which has not been used and make a half-hitch round the fitting to the left, with the end coming out to the left and

last turns of the mesh are passed round the bottom side of the jackstay in the same way as the turns were passed round the top and sides, and the mesh is finished off at the bottom left-hand corner with a clove hitch and an eye splice.

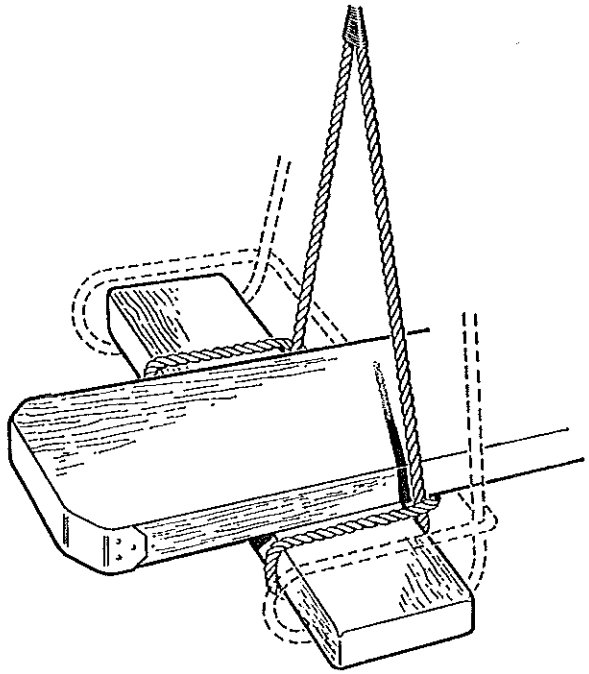


FIG. 4–31. Securing a lanyard to the end of a plank stage

Rigging a plank stage

Plank stages, suspended by rope lanyards at each end, are used to support men when working over the ship's side, or on superstructures and funnels. The lanyards are secured to a small crosspiece of wood, called a *horn*, at each end of the stage; these project from the stage and so keep it a convenient distance from the fleet to be worked.

A long soft eye is either spliced or made with a bowline in one end of each lanyard and then placed under the end of the stage, with a half-hitch taken round each horn (fig. 4–31). The lanyard is then either passed round a cleat or similar fitting near the gunwale above, through the eye of a lizard rigged for the purpose, or, in larger ships, through blocks or chain gantlines secured to eyeplates or to the top of funnels; and the end is then brought down and belayed round the horns of the stage, thus enabling those working on the stage to lower themselves to the position required. *The lanyard should never be rove round a guardrail.*

When a lizard is used its tail is belayed round a secure fitting on the deck above the stage so that the eye hangs clear of all obstructions, giving a clear lead for the lanyard and avoiding chafe.

When chain gantlines are provided for rigging stages on a funnel they are unrigged when not in use, because they are noisy at sea and damage the paintwork. It should be possible to rig stages without having to let fires in the boilers die out, and, if other means of reeving the first gantline are not available it will be necessary to keep one permanently rove with a small wire rope. Once the first gantline has been rove the remainder present no difficulty, each being rigged from a bosun's chair sent up on its neighbour.

Rigging a bosun's chair (figs. 4–32 and 4–33)

It is the normal practice in the Royal Navy to tend a man from the deck when he is aloft in a bosun's chair. The gantline must be tended by an experienced seaman and be properly belayed to a secure fitting. However, on some occasions it may be necessary for the man himself to control his own positioning of the chair; and then the methods described below should be adopted. On no account should an inexperienced seaman be sent aloft untended.

A bosun's chair is a piece of wood about 18 inches long, 5 inches wide, and 1 inch thick, having two holes at each end through which two strops are rove and spliced underneath. A thimble is then seized into the bights of both strops and

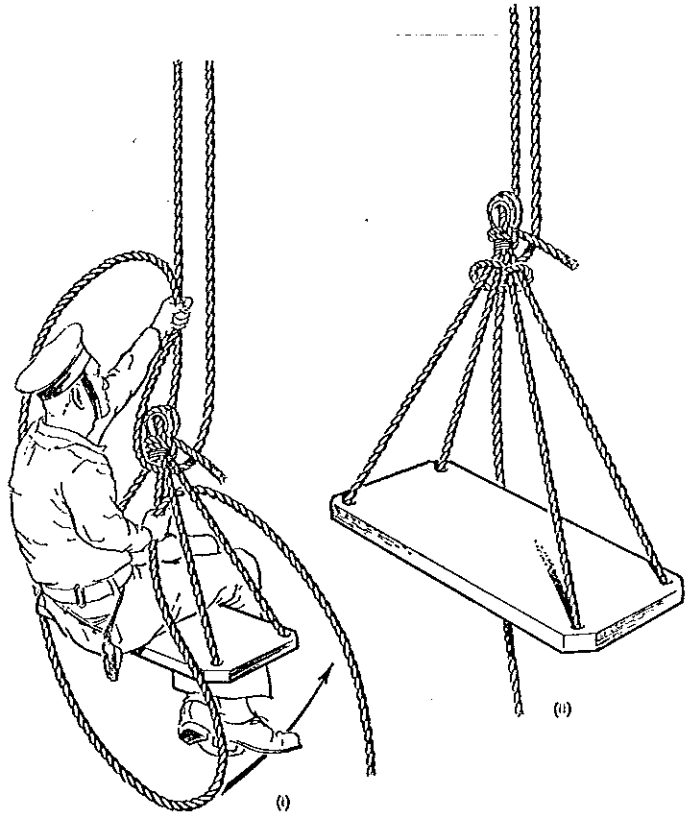


FIG. 4–32. Lowering hitch used with bosun's chair on a gantline

Wireless Lead In.—An arrangement fitted to the deck to lead the wireless aerial through to the wireless room.

Wireless Room.—Room containing the wireless instruments. It is usually situated as high up as possible, in some place convenient for the wireless "Lead In".

Wire Reels.—Mooring wires when not in use are wound on wire reels fixed to the deck in the most convenient position.

CHAPTER III.

MANUAL SEAMANSHIP.

Rope Making Materials. Splices, Knots, Bends and Hitches. Wire Rope—its Manipulation, Splicing, Worming, Parcelling and Serving. Grades of Canvas, Sewing. Boatswain's Chair. Moorings. Sailorising Jobs.

ROPE MAKING MATERIALS.

Rope.—It is known that ropes were used in China at a very remote period, and that the Egyptians made them from papyrus and palm fibres, as well as hides, but there is no record of who first conceived the idea of making rope.

At the present day ropes are made from either vegetable fibre or metallic wires. The principal fibres used are as under.

Manila.—Abaca is the fibre which is usually referred to as manila, but it is more commonly known by the name of the port in the Philippines from which it is exported, and where it grows almost exclusively.

Being strong and durable it makes excellent rope, and, as it does not rot it is never tarred. It does, however, swell considerably when wet, so is not altogether suitable for running rigging. It stretches 20 per cent. to 30 per cent.

Hemp.—Although hemp was once imported from European countries in large quantities, and used almost exclusively in the manufacture of rope, it is now almost completely superseded by manila, with the result that hemp is now only found in boltrope, and a few of the smaller classes of lines, most of which are of the tarred variety. It does not swell when wet, and for this reason makes good running rigging.

Coir.—A fibre which is not so durable as hemp. It comes from the coco-nut palm and will soon rot if stowed away wet.

Although about one-third lighter it is only one-quarter the strength of hemp rope, and as it floats very lightly on the water it is very useful as a warp. It is usually employed for all purposes where a rope with a good "spring" is required, such as in a towing spring. About 25-30 fathoms is attached to a towing wire to act as a "spring". It stretches from 40 per cent. to 50 per cent.

Coir rope is sometimes referred to as "bass" or "grass rope".

Cotton.—Rope composed of cotton fibre is mostly found on yachts, and is used to a greater extent in America than elsewhere.

Sisal.—A material which comes from the fibre of aloe leaves. It is very white and almost as strong as hemp and stands sea water well.

Formation of Rope.—The formation of all rope depends on "twist". Fibre is twisted up into yarns which are then twisted up into strands. These in turn are laid up or twisted up to form the complete rope. Friction, and the inclination of each strand to unlay holds the other in place.

Yarns.—These are composed of threads of fibre well and evenly spun into what is known as a standard 24 thread yarn. The size of this yarn is such that if 24 such yarns are formed into a strand and three such strands are laid up to form a rope, the rope will measure three inches in circumference.

Strands.—The number of yarns in a strand depends on the size of the rope, and each strand is composed of yarns laid up right-handed in the case of a left-handed rope, and left-handed for a right-handed rope.

Ropes may be composed of either three or four strands, but three is the most common in use, probably because they are considered to be one-fifth stronger than four strand.

Lay of the Rope.—All ropes come under one of two different headings. They are either *right-hand lay* or *left-hand lay*, according to the direction in which they are finally "laid up" or "twisted up". With the former the strands run from left to right, and with the latter from right to left. Practically all ropes are *right hand laid.*

If a rope is "twisted up" very tight and hard it is said to have a *hard, firm or short lay.* One effect of this is that pliability and breaking strain are reduced, but the rope is not so liable to absorb water and lose its shape.

On the other hand, a rope which is loosely "twisted up" or "laid up" is said to be of *soft* or *long lay.* This has the effect of increasing the pliability and breaking strain, but soft laid rope is more liable to absorb water and lose its shape.

When a rope has only sufficient "twist" to combine pliability, strength and ability to withstand hard working conditions, it is said to be of *standard* or *plain lay*, and this is the most common form in use.

Types of Rope.—Strands and completed ropes are combined in various ways to suit special purposes, as under:—

Hawser Laid Rope.—This is the commonest form of lay. It is the ordinary 3 strand rope laid up right-handed, which is used for practically all purposes.

Shroud Laid Ropes.—Four strand rope laid up right-handed around a central "heart".

Cable Laid Rope.—A left-handed rope, the difference in which is very noticeable. Each of the three strands is a complete rope in itself, consisting of three strands laid up right-handed; it would therefore be more correct to call it 9 stranded. The sizes range from about 5 inches to 18 inches.

Cable laid ropes are principally employed as towing "springs". For this purpose they are spliced to a length of wire, but it is essential that the lay of the wire and that of the rope is the same. As the lay of a wire is usually right hand, cable laid ropes intended for this purpose are always made with a right hand lay.

Water Laid Rope.—Same as cable laid.

Warp Lay.—The only difference between this type and the cable laid rope (three 3-strand ropes laid up together) is that the first and final lays are very hard. Sometimes 4-strand warps (containing 12 strands) are supplied, and for special types of work a 5-strand warp (containing 15 strands) is sometimes used.

Unkinkable Lay.—This type of rope is specially made for lifeboat falls. Individual yarns are spun with the same "twist" as the strands themselves, instead of the opposite way, as in the case of ordinary ropes. This is done to eliminate the tendency of ordinary ropes to kink when working in multiple blocks.

Preserving Ropes.—Ropes which may be constantly immersed in water are often "tanned", or "barked" by the application of "cutch", to preserve them. Archangel tar and coal tar are also used for the same purpose, but this reduces the breaking strain by about 10/15 per cent. in the case of hard fibre rope, and about 30/40 per cent. in the case of soft fibre ropes. It also stiffens the rope and makes it heavier.

Another method is to treat the fibre to a waterproof dressing to prevent moisture reaching the heart of the rope.

During manufacture a small proportion of lubricant is added to soften and lubricate the fibres. All ropes are "oil spun" in this way, except those which are made for some special purpose where oil is likely to cause a stain. Ropes without oil are said to be Dry Spun.

Rope in General Use.—Manila rope is normally used in ships but during the late war when supplies were cut off, Sisal rope was extensively used, and being an Empire product is still likely to remain.

Small Stuff.—Apart from the heavy ropes found on all vessels, there are a number of light lines and "cordage" more generally known as "small stuff". They are as follows:—

Boltrope.—A good quality 3-strand right-handed hemp rope used for sewing to the edges of sails for the purpose of strengthening them. Boltrope is made in sizes ranging from ½ inch to 6 inches.

It is soft laid and well stretched before being made into coils, so as to render it soft and pliable.

Only the small sizes of boltrope are ever found on board the average steamer—hence the reason for including it among "small stuff".

Point Line.—Small size three strand manila rope, ranging from about 1 inch-1¾ inch circumference. Sizes are always designated by the number of "threads" of which 15, 18 and 21 are the popular numbers, the corresponding circumferences being 1⅜ inch, 1½ inch and 1⅝ inch.

"Ratline Stuff".—A 3-stranded tarred soft hemp rope supplied in coils of 120 fathoms. It belongs to a range of tarred ropes known as "tarred cordage", which ranges from 1 inch to 6 inches. From 1 inch to 1¾ inches is generally known as "ratline" and is measured as in the case of pointline by the number of threads or yarns it contains. Being 3 stranded it goes up by multiples of 3 from 9 threads (1 inch) up to 24 threads (1¾ inch). Amongst other things it is always used for "Heaving lines".

Loglines.—Plaited hemp lines made specially for towing through the water in connection with the Log. It may be "dressed" or "undressed", and is usually supplied in 40, 50, 65 and 70 fathom coils. Seven sizes are manufactured as follows:—$\frac{2}{16}$ in., $\frac{2}{32}$ in., $\frac{3}{16}$ in., $1\frac{2}{32}$ ins., $1\frac{4}{32}$ ins., $1\frac{6}{32}$ ins., and $1\frac{8}{32}$ ins. The lighter types are often used as flag halliards.

Flag Halliards.—Dressed hemp 3-strand line supplied in 30 fathom coils or hanks. There are three sizes—6, 9 and 12 thread (¾ inch, ⅞ inch, and 1 inch circumference). Because they are less liable to get full of "turns", plaited hemp lines are often used as flag halliards.

Hand Leadlines.—These are 3 stranded dressed hemp lines of 1⅛ inch circumference and are water or cable laid being supplied in 30 fathom coils.

Deep Sea Leadlines.—Dressed hemp lines of 1½ inch circumference containing 3 strands water or cable laid and supplied in 120 fathom coils.

"Boat Lacing".—High grade dressed hemp lines with 3 strands supplied in 30-fathom hanks. It is used principally as a lacing for boat covers and awnings. Size is determined by weight, which ranges from 4 ozs. to 4 lbs. per 30-fathom hank. Fourteen sizes are manufactured.

Hambro'-line.—Three yarn or three stranded right handed tarred soft hemp made in two sizes 3 or 6 thread. It is usually supplied in 30 fathom hanks.

Houseline.—Three yarn tarred hemp laid up left-handed.

Marline.—Two yarn tarred hemp laid up left-handed and is usually supplied in 1 lb. hanks.

Spunyarn.—2, 3 or 4 yarns twisted together and soaked in

Stockholm tar. It is used principally for "serving" rope, and is supplied in the following ranges:—

2 yarn in 3½ lb. balls, also in 14 or 56 lb coils.
3 yarn in 5¼ lb. balls, also in 14 or 56 lb. coils.
4 yarn in 7 lb. balls, also in 14 or 56 lb. coils.

Samson Lines.—Very light lines sold in 30-fathom hanks. They are similar in appearance to fishing lines, but are seldom seen in the Merchant Service.

Seaming Twine.—A 3 ply twine spun from the best flax, and made up in hanks of 1 lb., containing about 1800 yards.

Roping Twine.—This is also sold in 1 lb. hanks containing about 1800 yards, and is usually 5 ply.

Machine Twine.—Is made up in balls or cops weighing 1 lb., and is usually chemicalled to resist rot and mildew. It is prepared from a high grade flax and may be either 2 or 3 ply. A ball or cop contains about 2000 yards of twine.

Strength of Rope.—To find the strength of hemp or manila, square the circumference of the rope and divide by three. This will give the breaking strain in tons. For the proof strain divide by four, and for the working strain divide by six. For example, take a 3 inch rope; this would give us 3 tons breaking strain 2¼ tons proof strain, and 1½ tons working strain.

Lifting Power of Tackle.—If the weight that a single part of rope is capable of suspending is multiplied by the number of parts at the movable block, it will give the lifting power of a tackle but one-fourth must be subtracted to allow for frictional resistance.

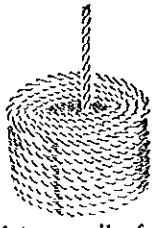
Relative Strength of Chain and Rope.—Using the diameter of a chain and the circumference of a rope, the proportional strength is reckoned to be 10 to 1.

Relative Strength of Hemp and Wire.—The following table shows the size wire which may be substituted for hemp rope.

Hemp Rope		*Wire Rope*	
3 inches	8 inches	1½ inches	3½ inches
4 „	9 „	1¾ „	4 „
5 „	10 „	2 „	4½ „
6 „	11 „	2½ „	5 „
7 „		3 „	

FIG. 1.—Opening a Coil (from outside).

FIG. 2.—Opening a Coil (from inside).



Opening a Coil.—Very often the label attached to a coil of rope contains instructions as to how it should be opened up, but if not, proceed as follows:—Figs. 1 2.

(*a*) *Ropes with a Right Hand Lay.*—Strip bagging, find outside end and lay coil on whichever side will permit the end to come away left-handed (anti-clockwise.)

Another method is to leave the bagging intact, and lay the coil so that the inside end will come away left-handed, taking it up through the centre, from the bottom of the coil, if necessary.

(*b*) *Ropes with a Left Hand Lay.*—Either the inside or outside end may be used, but the rope must come away from the coil right-handed (with the hands of the clock).

Coiling Rope.—Ropes laid up right-handed must be coiled down in a clockwise direction, and left-handed ropes in an anti-clockwise direction.

To Thoroughfoot a Rope.—If, through a mistake or any other cause, a rope has been taken off a coil right-handed (with the hands of the clock), it will require to be thoroughfooted. That is, it must be coiled down left-handed, the end passed through the centre, pulled through underneath, and coiled down again. Repeat the operation two or three times, and it will remove the kinks resulting from opening the coil the wrong way.

Stretching Rope.—Very often a rope requires stretching before it can be used in making or reeving off new gear. A half-hearted stretch by hand or steam winch may be good enough in some cases, but in others, a more effective process requiring time will be necessary.

A good method is to make one end fast in some convenient place and heave on the other end with a tackle at frequent intervals. When the rope sags, the slack can be taken in on the tackle, and, if left lying all day and all night, it will be ready for use on the following morning.

SPLICING.

Rope Eye Splice.—Unlay enough end to make about 3 tucks (one turn for each tuck to be made), then form an eye with the ends on top. That is, the three ends must be running diagonally across the rope from left to right, on top. Fig. 3.

Take the middle end and tuck it underneath the nearest strand of the standing part, towards the left. Pick up the next end of the left, pass it over the strand with the middle end under it, and tuck underneath the next one to the left. The third end is the most awkward. It has to be led over to the right across the third strand, and tucked underneath it from right to left. If all this has been done correctly, there should be an end coming out between each of the strands. Should two ends come out between the same strands the splice is wrong. For the next round of tucks each end is led over one strand and under the next, towards the left.

As a general rule, two full rounds of tucks are considered sufficient for ordinary purposes, and three when the rope has to bear any strain.

For neatness, a splice may be tapered by adding an extra round of tucks with halved strands. These should be cut on the underneath side, so that the short or cut ends are hidden.

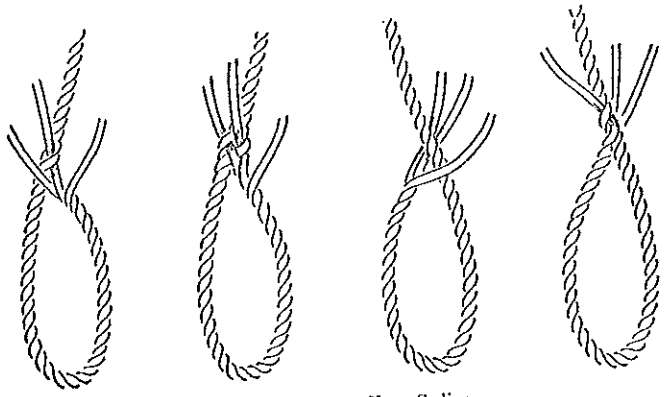


Fig. 3.—Rope Eye Splice.

Dogging the Ends.—After putting an eye splice in a mooring rope, the usual practice is to "dog the ends" before cutting them off. Each strand is halved and unlaid, then each pair of adjoining halves are whipped together. Fig. 4.

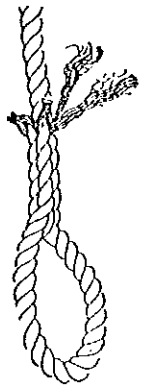


Fig. 4.—"Dogging the Ends.'

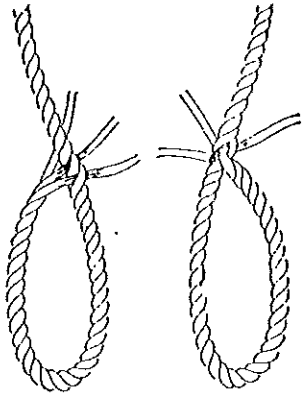


Fig. 5.—Sailmaker's Eye Splice.

Pick any pair, then if the ends are long enough, choose a good yarn from each half strand at the point where they nearly touch. Pass these yarns around the two halved strands in opposite directions and make an overhand knot each time they meet.

Continue doing this until a good whipping has been passed, then finish off with a reef knot.

If the yarns belonging to the strands are not long enough, any long yarn can be used.

Sailmakers Eye Splice.—This is a very simple splice which is used by sailmakers because it looks neater on roping sewed to canvas. It is never used on any rope which has to bear a strain, as it is likely to "draw".

With the ends in the same position as in the foregoing splice, they are each tucked through the nearest strand towards the right.

The second round of tucks is made in exactly the same way, and for neatness are always tapered.

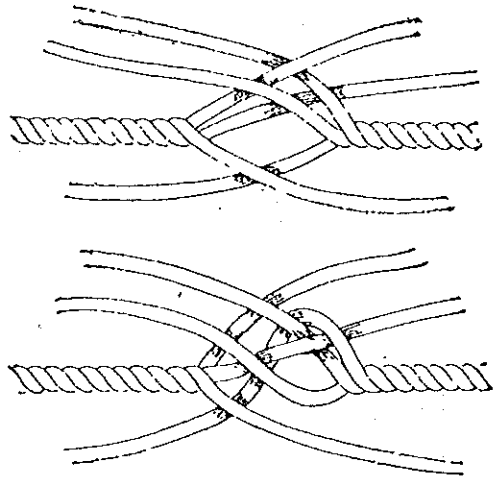


Fig. 6.—Short Splice.

As an eye of this sort bears no great strain, one full, and one or two halved rounds of tucks are usually sufficient. Fig. 5.

German Eye Splice.—Place ends in the same manner as for an ordinary eye splice, then tuck the middle end through nearest strand towards the right. Next, tuck the right hand end under the same strand, but towards the left. This means that the first two ends are crossed under the same strand. The third end is tucked under the remaining strand, towards left, in the ordinary way.

Succeeding tucks are put in over one and under one in the usual way.

Short Splice.—The general rule for a short splice is to unlay one turn on each end for each tuck to be made, but it is as well for the novice to make it one extra and be on the safe side.

Place the two unlaid ropes together, so that the ends on the right hand side lay in between the ends on the left.

With a large sized rope a firm seizing may be passed around the exact meeting place of the two ropes, but with lighter ones it is just held firmly in the hand while the tucks are made. When tucking, each end is simply passed over one and under one, and and about two tucks each way is the usual number made.

A loose splice is of little use, therefore all ends must be pulled as tight as possible.

An easy method (not always permitted) of holding the two ropes together is to form an overhand knot with each pair of ends which come together from opposite sides, taking care that the ends follow the lay of the rope and not across it. Take one in each hand and pass one over the other in the same way as the first part of a reef knot and pull tight. Do the same with the other two pairs, then begin the tucks. Fig. 6.

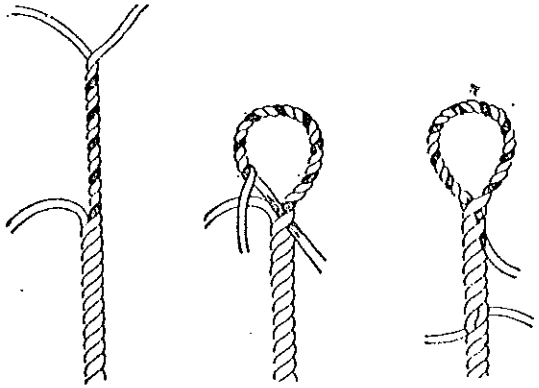


FIG. 7.—Chain Splice.

Chain Splice.—The rope tail spliced to a chain stopper is usually of such a size that it is too thick to pass through the link of the chain, in which case it must be chain spliced.

Unlay about 18 inch of one strand, pass the other two through the link and form an eye about 1½ inch long, leaving about 8 inches of end for splicing.

Separate these two ends. Take whichever will lie neatest and lay it up in the vacant score until it meets the first end which was unlaid. Finish off these two ends in the same way as for a long splice (overhand knot with the lay of the rope, and each end halved and tucked twice, over one and under one). The remaining strand is also tucked over one and under one. Fig. 7.

Long Splice.—In actual practice long splicing is very seldom resorted to. It is a wasteful method, and ropes requiring to be joined in this manner are usually replaced with new ones.

A good deal more end has to be unlaid for a long splice, but the actual amount is dependent upon the size of rope to be joined, the length which can be spared for the purpose, and the weight it has to bear when in use.

As a general rule, about three or four times the amount required for a short splice is unlaid, and the ends are placed together in exactly the same manner as for that method.

When this has been done proceed as follows:—

Pick out any two ends which cross one another from opposite sides, unlay one of them a good distance, and lay the opposite number in its place until only a few inches are left. Cut off surplus from unlaid end, and do exactly the same with a second pair, but work towards the opposite direction.

The third pair are left in their original position. Fig. 8.

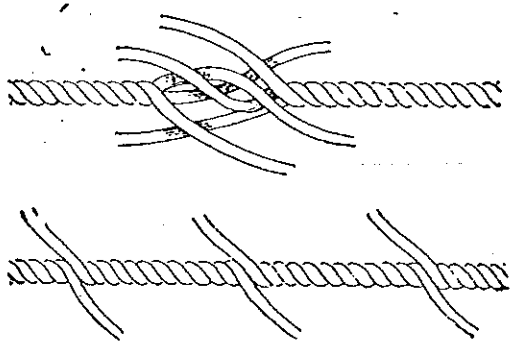


FIG. 8.—Long Splice.

This gives us three pairs of ends an equal distance apart, and to dispose of these an overhand knot is made with each pair, but the ends must follow the lay of the rope and not across it. After pulling tight, divide each strand in two, and tuck one half of all strands two or three times, over one and under one.

If possible, the rope should be well stretched before cutting the ends off close.

Some seamen also put a palm and needle whipping at each of the three points where the ends are knotted and tucked, to make sure they will not come adrift through wear and tear.

Splicing Four-Strand Rope.—When the eye is formed, place the ends so that two hang down on the right, and two stick up on the left. Tuck the first end on the extreme left through two strands, and the next through one, both to the left. This gives us two ends entering at the same place but emerging between different strands.

The two remaining strands are tucked in the same way as for a three-stranded rope. Follow on with over one and under one.

Another method is to take the second end from the right and tuck through two strands towards right. Next, tuck the first end through the same lay but under one strand.

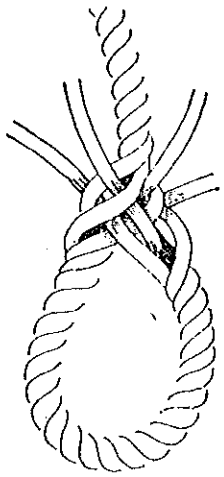


Fig. 9.—Splicing Four Strand Rope.

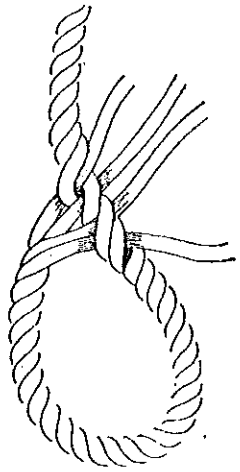


Fig. 10.—Splicing Four Strand Rope.

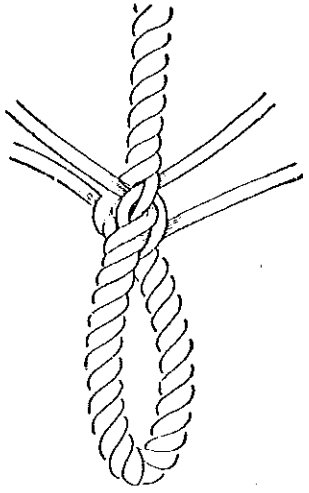


Fig. 11.—Splicing Four Strand Rope.

The remaining two ends are each tucked under one strand towards right. Figs. 9, 10, 11.

Splicing Three and Four-Stranded Rope Together.—Divide the end with four strands into three and splice together in the ordinary way.

Cut Splice.—This is often used for joining two wires, instead of making a short splice, but it is a very unsightly and lumpy join.

Unlay the two ends as for an eye splice, overlap the standing parts a few inches, and tuck all ends in the same manner as for an eye splice. Fig. 12.

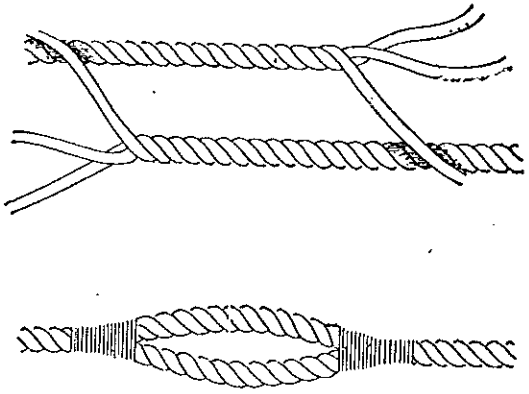


Fig. 12.—Cut Splice.

If desired, an eye can be formed by increasing the overlapping to any required distance.

Splicing Plaited Line.—To splice an eye or make a short splice with plaited line is a tedious business requiring patience, and is seldom done at sea.

The usual practice is to unlay the end some two or three inches, form the eye, lay the ends along the standing part and serve over tightly with strong twine.

KNOTS, BENDS, AND HITCHES.

Knots with Single End	*Knots with Own Strands*
Overhand Knot	Wall
Figure of Eight Knot	Crown
Simple Clinch	Double Wall
Bowline	Manrope Knot
Running Bowline	Stopper Knot
Half Hitch	Single Matthew Walker
Clove Hitch	Double Matthew Walker
Cow Hitch	Knots and Bends Uniting Ropes
Awning Hitch	Reef Knot

Knots with Single End	*Knots with Own Strands*
Rolling Hitch	Sheet Bend
Timber Hitch	Single Carrick Bend
Marline Spike Hitch	Double Carrick Bend
Blackwall Hitch	Common Whipping
Double Blackwall Hitch	Palm and Needle Whipping

See Figs. 13 to 37.

FIG. 13.—Overhand Knot.

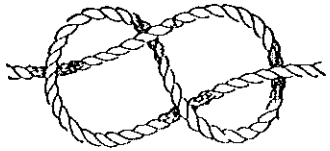


FIG. 14.—Figure-of-Eight Knot.

FIG. 15.—Bowline.

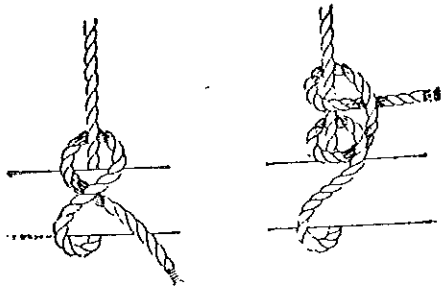


FIG. 16.—Half Hitches.

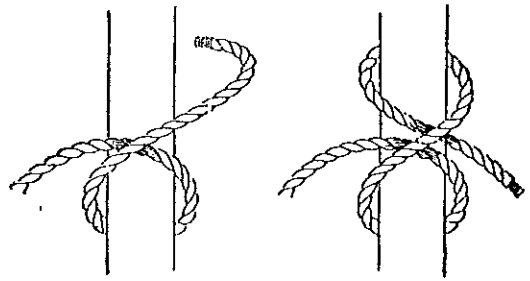


FIG. 17.—Clove Hitch.

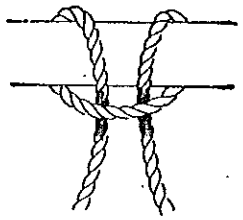


FIG. 18.—Cow Hitch.

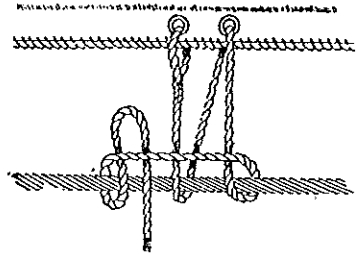


FIG. 19.—Awning Hitch.

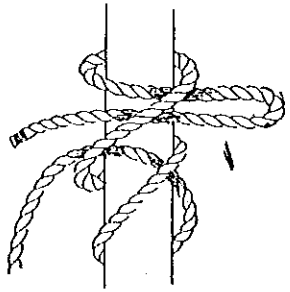


FIG. 20.—Rolling Hitch.

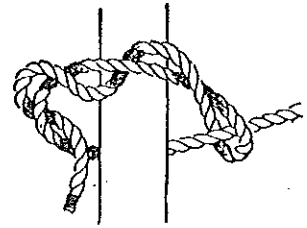


Fig. 21.—Timber Hitch.

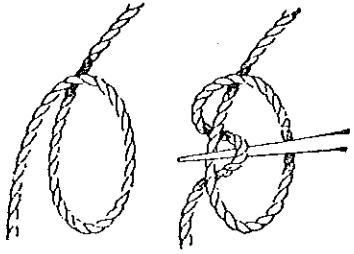


FIG. 22.—Marlinspike Hitch.

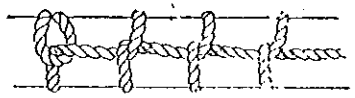


FIG. 23. Marline Hitch.

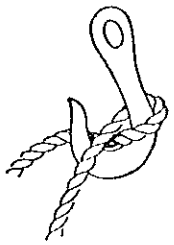


FIG. 24.—Blackwall Hitch.

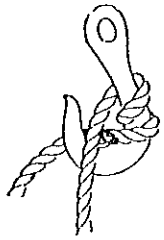


FIG. 25.—Double Blackwall Hitch

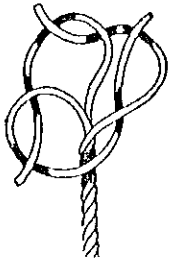


FIG. 26.—Wall.

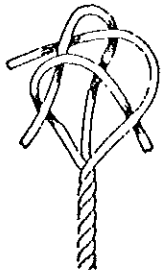


FIG. 27.—Crown.

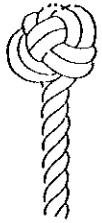


FIG. 28.—Manrope Knot.

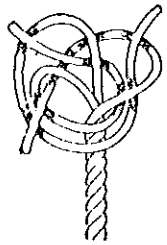


FIG. 29.—Single Matthew Walker.

FIG. 30.—Reef Knot.

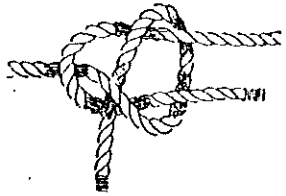


FIG. 31.—Sheet Bend.

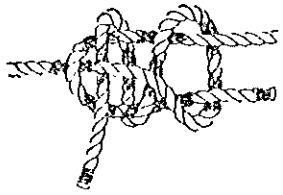


FIG. 32.—Double Sheet Bend

FIG. 33.—Single Carrick Bend.

FIG. 34.—Double Carrick Bend.

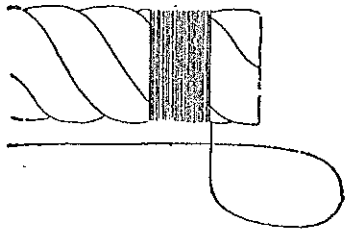


FIG. 35.—Common Whipping.

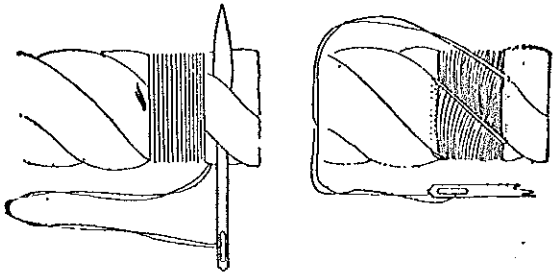


FIG. 36.—Palm and Needle Whipping.

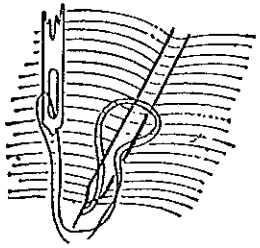


FIG. 37.—Finishing off End.

Heaving Line Knot.—Form a bight about 5 ft. from the end of the line. About 8 inches from the actual bend, start wrapping the spare end around both parts of the bight, working towards the bend itself, and make about 10 turns. Pass the remainder of the spare end through the small bight which is left, and pull tight on the standing part of the line. This leaves a good heavy knot which will carry the line well when throwing. Fig. 38.

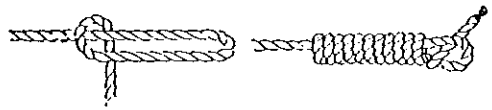


FIG. 38.—Heaving Line Knot.

Monkey's Fist.—This is a good heavy knot which is formed on the end of a heaving line to give carrying power to the end when throwing.

About 9 feet from the end, make three small coils of line over the hand, about 4 inches in diameter. Then make three more turns around or across the middle of the first three. Pass another three

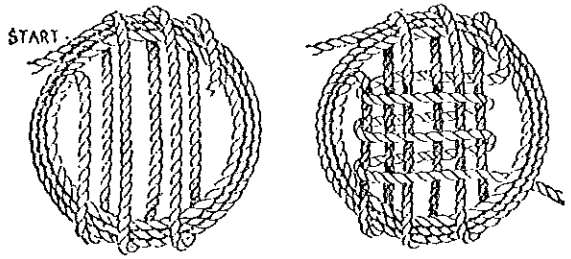


FIG. 39.—Monkey's Fist.

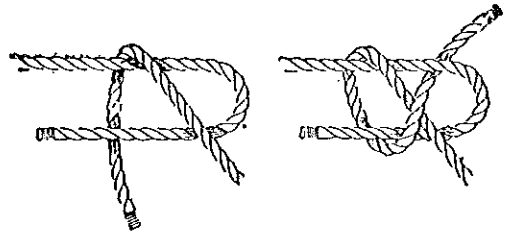


FIG. 40.—Joining Heaving Line Quickly.

turns around or across the second three, but inside both ends of the first three. If correct, the remaining end will come out alongside the standing part, and to this it is eventually spliced, when all parts are tightened up. Before tightening up, poke a piece of waste or oakum into the centre of the ball to act as a heart. Figs. 39, 40.

WIRE ROPE.

Wire Rope.—Prior to 1874, wire ropes were not sufficiently pliable for marine purposes, but the introduction of flexibility has now enormously increased their sphere of usefulness. At the present time wire ropes have superseded both hemp and manila for practically all purposes on board ship.

Flexibility was attained by increasing the number of wires used in the formation of the rope, and, as the purposes for which the rope is intended also determines the number of wires in its make-up, it will be found that ropes intended for different types of work are of different construction.

These types are many and varied, but the most popular rope for all marine purposes is the 6/19. That is to say, it has six strands with 19 wires in each strand.

Each wire is constructed so that the strands are laid around a hemp heart, and in some makes a heart will be found in each strand also.

Construction, Size and Use.—The following table will give an idea of the construction sizes and uses of the wire ropes likely to be met with on board ship.

	Construction	*Circ.*	*Names*
(1) For Standing Rigging Funnel Guys, Stays, etc.	6/6 and 6/7	¾″ to 5″	Non Flexible
(2) For Cargo Falls, Hawsers, Towlines, etc.	6/12 and 6/19	⅜″ to 5″	Ordinary Flexible
(3) For Cargo Falls, Hawsers, Towlines, etc.	6/24 and 6/27	½″ to 6″	Extra Flexible
(4) For Hawsers, Towlines, etc.	6/30 and 6/37	1″ to 7″	Special Extra Flexible
(5) For Hawsers, Towlines, etc.	6/61 and 6/91	4″ to 10″	Super Flexible

True-Lay Wire.—A new type of wire, the special feature of which is that the wires and strands, before laying up, are shaped to the spiral form which will be required in the finished rope.

This counteracts the tendency of all wires to "spring" apart when cut or unlaid.

Steel.—For all general purposes, the steel used in the manufacture of wire ranges from mild steel for non-flexible wires to hard drawn plough steel for the flexible type.

Breaking Strain of Flexible Wire.—To find the breaking strain square the circumference and multiply by 2.

region of a splice. Old bagging or burlap makes good parcelling; it should be cut in long strips about three inches wide and rolled up ready for use, in the same manner as a bandage. A thick coating of tallow is put on the wire, and the parcelling is laid on in the same manner as a soldier's puttee. To hold it in place a length of sail twine is hitched along the full length of the burlap. If another coating of tallow is now applied over the burlap, it will both help to assist the movement of the serving board and keep the weather out as well.

Don't forget to put the parcelling on with the "lay" of the rope.

Parcelling Stays.—The idea of parcelling is to keep water out of the wire. Therefore, when working on a stay it should be put on with the "lay", starting at the splice on each side and finishing off at the middle of the eye.

This overlaping keeps water out, and for the same reason, swifters, shrouds and stays are parcelled upwards.

Serving.—This is the finishing touch which makes all the difference between a neat job and an eyesore. After an eye has been spliced in a wire, the part where the ends have been cut short is parcelled and served. Not only does this keep the weather out, but it also protects the hands from the short sharp ends of the out strands.

Two or three stranded marline is invariably used for this job, and to bind it on the wire sufficiently tight a serving board is used. These are of two kinds—round and flat. The latter is the most popular type; it is grooved out on one side to take the shape of the wire.

Before starting, remember that serving must be put on against the "lay" of the rope, therefore, it would be started at the end of the splice and worked towards the eye itself.

The wire to be served should be hung up at a convenient height, and the person serving should stand with the eye of the wire on his right hand side. The person who is assisting by passing the ball of marline around the wire should stand on the opposite side. To begin, unlay the end of marline about half an inch or so, and put a few turns on by hand. The end will be under the first few turns, and being unlaid will not leave a bulge. The serving board should work away from the person serving, therefore, the grooved part is laid against the wire with the rounded part towards the body.

The marline is laid up the rounded side from the bottom, goes round the handle, back down the same side and is then led up to the handle again. When working, the marline runs through the fingers to regulate the strain put on the turns. The last four turns are made large enough to allow the ball of marline to pass through, so that when pulled tight again an ordinary whipping is formed. An overhand knot is sometimes worked down flush with the serving before cutting off.

Joining Serving.—When the marline is nearly finished—say about 3 or 4 feet from the end—lay end of new ball along the wire and serve over it for 3 or 4 inches. When old stuff is finally finished, pass remainder under new marline and carry on serving over the old end.

Wire Serving Board.—An ordinary type of serving board is of little use when seizing wire is employed. In fact, the practice is so uncommon that no special board is kept for the purpose and one usually has to be improvised.

Take a piece of hard wood about 15"×2"×1" and bore three holes, each ¼ inch in diameter, in the following order:—The first about 1 inch from the end, and the second about 2 inches. The third one should be spaced slightly more than the diameter of the article to be served.

CANVAS.

Canvas.—The word canvas is thought to be derived from *cannabis*, a Latin word for hemp, which would seem to indicate that in the early days of its history it was made from that material. The Egyptians and Phoenicians are also believed to have used canvas, and were probably the originators of this type of cloth.

Construction.—At the present time canvas is made from hemp, flax, cotton, tow and jute, or a mixture of these materials. British canvas is made from flax, but in America cotton is mostly used, and this gives rise to the term "American cotton canvas". Best quality British canvas is made with "all long flax". Bagging, tarpaulin and canvas, in the order named, form an ascending series of cloths as far as fineness is concerned.

The threads running lengthwise along the canvas are known as the "warp", while those running across the cloth are called the "weft". On account of the rough usage it gets, and the strong pressures it must stand, all flax canvas is made with a double warp.

The finished edge of the canvas is called the selvedge, and the coloured thread woven near it is used as a guide for the seam when sewing lengths of canvas together, and is known as the selvedge stripe.

On the outside of each bolt of canvas, the length to the nearest quarter of a yard will be found stencilled thereon. The width is 2 feet.

Waterproofing.—Most grades are proofed to prevent water percolating through the woven material, and two methods of doing this are in general use. In the first, the fibres are chemically impregnated, and in the second a wax proofing is superimposed on the material itself.

The former is probably the best, as the action of the sun and continual folding will destroy the efficiency of the proofing in the case of the wax surface type.

Grades and Uses.—Hundreds of different types and sizes of canvas are to be found on the market, but that in general use in the

Merchant Service is known as "Merchant Navy Canvas", and is supplied in 7 grades. Each grade is known by a number from 0-6, and each is used for a particular purpose, as under:—

No. 0 is a very stout canvas used principally for making canvas ash shoots.

No. 1 is used for awnings.

No. 2 is used for awnings, boat covers, winch covers, etc.

No. 3. is used for awnings, boat covers, winch covers, etc.

No. 4 is used for awnings, ventilator covers, screens, etc.

No. 5 Soft, cheap line used for anything, principally patching.

No. 6 Soft, cheap line used for anything, principally patching.

All above materials are 24 inches wide.

Sail Needles.—Sizes run from 6-16.

6-13 are roping needles.

14-14½ are seaming needles.

16 are duck needles.

Tarpaulin Canvas.—As a general rule tarpaulin canvas is rougher and coarser than ordinary canvas. It is well proofed to withstand water and is made from second grade flax. Although not of such good quality as ordinary canvas, yet some of the finest grades of tarpaulin are of better texture than the lower grades of canvas. It is manufactured in both green and white, in widths of 2 feet 6 inches and 3 feet.

Yacht Canvas.—Although the terms sailcloth and canvas are synonymous, it is really only yacht canvas or material for lifeboat sails which is spoken of as sailcloth. This is supplied in 12 ins, 15 ins and 18 ins. widths, but is seldom seen on merchant vessels, except as lifeboat sails.

Cotton Canvas.—Like other types of canvas, the cotton variety can be obtained in many grades and sizes. It is manufactured and used principally in America. As a general rule, it is harder to sew than flax canvas.

Duck.—This is a very light type of cotton canvas. It is manufactured in hundreds of different grades and sizes, and is only used in best class of work, when a more pleasing effect on the eye is required.

Canvas Work.—Apart from neat stitching, the most important point to watch in canvas work is measurement. By allowing the correct amount for shrinkage and stretching, even an amateur should turn out a creditable job. Sailmakers allow one inch to the foot for "stretch" when making awnings, but for boat covers or tarpaulins the same amount would be allowed for shrinkage.

For smaller articles, less than one inch to the foot is often advisable, but this is purely a matter of judgment, and depends on the article being made.

Another point to watch is the fact that the bottom cloth always creeps in or shortens when two cloths are being sewed together. If both were cut the same length, this shortening would probably

spoil the job; therefore, an allowance must be made to counteract this.

The overlapping of flat seams must also be taken into consideration, for there would be considerable loss in this respect on a big job such as an awning, and even with small articles the loss would be important.

Sewing Canvas.—Two different types of seams—round and flat—are used when sewing canvas. The type of work, as well as the purpose the material is intended for, will determine which one should be used.

Flat Seams.—Overlap two strips (cloths) of canvas as far as the coloured marking thread, and sew on both sides. This makes a double row of stitches and a very strong seam.

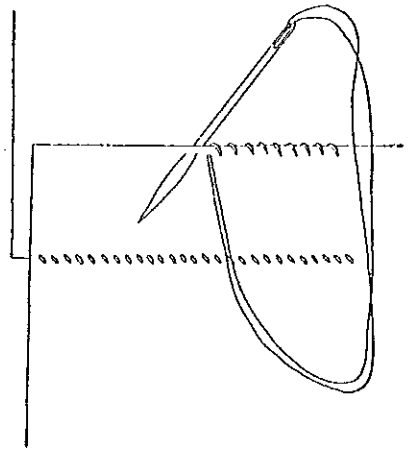


FIG. 42.—Flat Seam.

When sewing any article which will be exposed to the weather, the seams must be overlapped, so that they will not catch any wind or rain, in the same manner as slates on a roof.

Begin sewing on the right and work to the left. Fig. 42.

Round Seams.—This is the quickest method of joining two pieces of canvas. The stitches have to be made on what will eventually be the inside of the article, therefore, the parts are reversed before sewing together.

Turn down about half-an-inch of each edge, and rub it down with the handle of a knife (or anything hard), to form a sharp distinct fold.

Place the two parts of canvas together, side by side, vertically, with the short ends or folds turned away from one another.

Sew from left to right. When finished, open out the canvas and rub the seam down to flatten it out. Fig. 43.

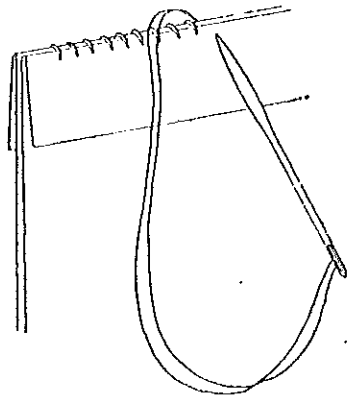


Fig. 43.—Round Seam.

Tabling.—Nearly all articles are finished off with a "turn in" or fold sewn along the edges. This is known as a "tabling". Fig. 44.

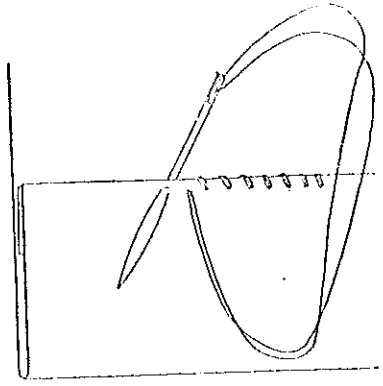


Fig. 44.—Tabling.

The double thickness of canvas gives a good strong edge, especially if eyelets are to be stamped in, or if roping is to be sewn on.

Stitches.—Very neat sewing requires about 5 or 6 stitches to the inch, but 4 is the commonest number in ordinary work. Anything less than that would give the appearance of "Homeward Bound Stitches" or "Dog's Teeth" (e.g. big, careless, hurried stitches).

Beeswax.—Before using twine for sewing it is usually rubbed down with beeswax or soap. This smoothes down the fibrous surface of the twine and helps to make a more watertight seam.

Unsmoothed or unwaxed twine will quickly wear through and break.

Alkali in soap is injurious to twine if used too freely. In fact, it should not be used unless absolutely necessary.

Starting the Stitches.—Among "old-timers" it is considered to be bad form to start sewing with a knot in the end of the twine.

The proper way, they say, is to leave a short end (about 1½ inch), tuck this in along the seam, then sew round it.

Joining Thread.—Various ways of joining thread after rethreading the needle are in general use, but the following method is as good as any.

Leave about 1½ inches of end to the canvas when cutting the needle adrift, then unpick the last half of the stitch. Begin sewing again by sticking the needle through the hole left by this unpicked stitch. If a short end is left on the new length of twine, we will now have two short ends coming together inside the seam. Twist these ends together, lay them just inside the seam and sew around them.

Another method is to proceed as before, knot the fresh twine, and continue sewing around the end from which the needle has been cut.

Eyelets.—Those used in canvas are of metal, and they are hammered in with a special punch.

Working an Eyelet Hole.—Make a small grommet and place it around the hole. Commence sewing at the point farthest from the person by sticking the needle down through the canvas and passing it up through the hole. Alternate stitches are carried well out from the hole and the grommet must be completely covered.

Repair Work.—A cut or tear in the canvas which is not worth patching is drawn together by "Herringboning" or "Cross Stitching".

Cross Stitching.—At the left hand end of the tear, stick the needle (with a knot in end of twine) up through far side of canvas, then stick through and down on the near side, and to the right, giving the twine a wide angle, then across to the far side and up through, also at a wide angle.

Lead the twine back across the first stitch, at an even angle, to form a neat X, then push the needle back at the same angle until it emerges again at the same place as the twine. Next, take another stitch to the right and carry on as before.

By reversing the procedure it is possible to work from right to left.

Herringboning.—Starting from the near side of the tear, and at the right hand end, make the first stitch up through the opposite side, at an angle to the left, then lead back to near side, pushing the needle down through and bringing it up on the right side of the

crossing stitch. Lead across to far side at an angle again, and so on, for the required distance. Fig. 45.

When covering rails, this system counteracts the tendency of an ordinary seam to spiral around the rail, through continually drawing to one side.

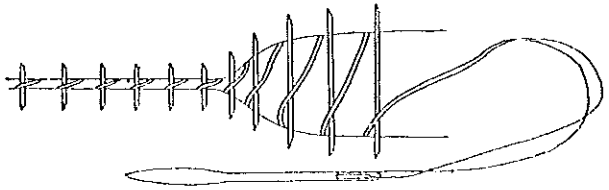


FIG. 45.—Herringboning.

Darning.—This is done in the same way as darning socks, but can only be used when the hole or tear is a very small one.

Roping.—Hold the roping on the far side of the canvas. Stick the needle through the canvas and through a strand, lead the twine down between the lays of the rope, then through the canvas again and through the next strand, working from left to right. Carry on

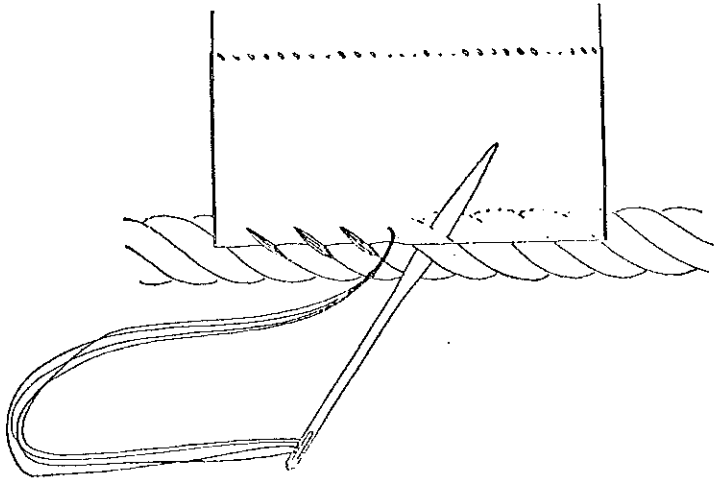


FIG. 46.—Roping.

in this manner, and to finish off an end of twine, stick the needle back once in the opposite direction from which it came, thus forming a short nip. Fig. 46.

Roping is invariably sewed to a tabling very seldom to a selvedge edge.

Lowering Hitch.—A bosun's chair and gantline is used in all work done aloft, and the gantline is always attached to the chair by means of a double sheet bend, with the end stopped securely to the standing part of the bridle. When painting topmasts or "Riding Stays," another man always attends the gantline and lowers the one who is painting, but when working on the lowermast, a sailor is expected to lower himself by means of a lowering hitch. This takes the form of a reef knot on the chair itself. It is formed as follows:—Fig. 47.

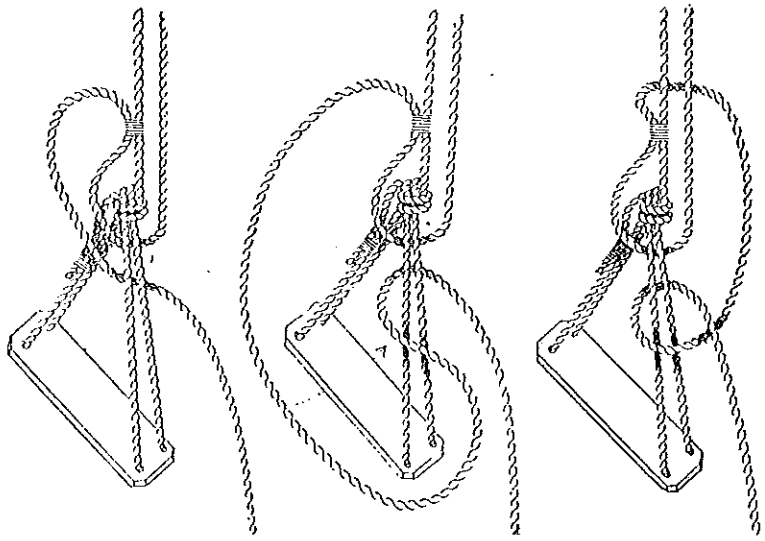


Fig 47.—Lowering Hitch.

When hoisted high enough, a wracking is passed around both parts of the gantline, and this holds the weight while the hitch is being made. When ready, a long bight of the hauling part is pulled through the strop of the chair towards the person, passed over the head, and allowed to drop behind to the feet, which are passed behind it. When the sides of this long bight have been brought to the front of the person, the slack on the hauling part is pulled tight, and this forms a reef knot on the strop of the chair itself. When ready to lower away, the wracking is cast off, some slack is pulled up, and the parts are made to render round, which they will do easily enough through the weight of the man in the chair.

Instead of using a wracking, most seamen simply pull a little slack through the strop and lead it up to the standing part, both parts of which they hold in one hand while forming the hitch with the other. This is a quick method, but it should not be attempted