

THE mode of forming ropes and cables is shown in Fig. 1. A number of fibers, *a*, are spun right-handed (with the sun, or from left to right) into the *yarn*, *b*. A number of yarns, varying according to the size and quality of the strand required (ropes made of small fine yarn are the strongest and best), are then twisted, *left-handed*, into the *strand*, *c*. Three strands laid together, *right-*

handed, form the *rope*, *d*. (At *e* is the vacant space caused by the strand *c* being "unlaid" to show its structure.) This three-strand right-handed rope is the rope used for general purposes and for the "running rigging" of ships. For "standing rigging"—shrouds and stays—it is customary to use right-handed rope composed of four strands laid round a fifth smaller strand, called the *heart*, which passes straight up the middle. Left-handed rope is sometimes met with, but not often. Ropes are built up in this way for the sake of getting the twist right and left alternately, which is the only way of preventing them from untwisting under strain. Without the twist the fibers would fall to pieces.

Three ropes like *d*, laid together left-handed, form the *cable*, *f*, the largest kind of rope. All left-handed rope is called *cable-laid*; but, strictly speak-

ing, only nine-stranded rope like *f* should be so called. Formerly, ordinary right-handed rope was called *hawser-laid*, but that term is obsolete or has come to mean the same as "cable-laid."

There are many kinds of cord, such as window-sash lines, &c., which are not "laid," but "plaited," and are therefore in no sense *rope*. These cannot be spliced or made into the more complicated knots. Miniature rope, called *humber-line*, is about the smallest genuine laid rope, and is good for practicing knots upon. The smallest rope so called by sailors is inch-rope, *i. e.*, 1 in. in circumference. not

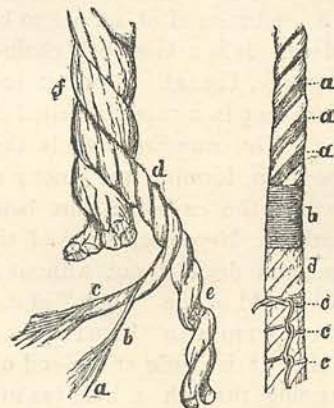


FIG. 1.

FIG. 2.

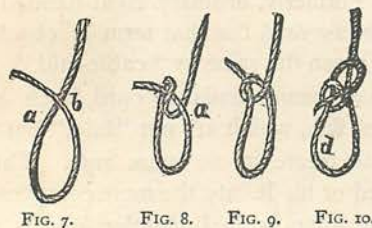
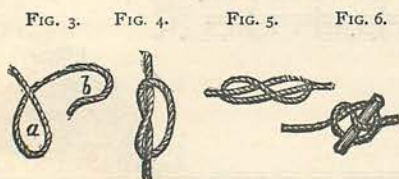
diameter. Rope exposed to the wet should be made of yarns soaked in tar. This makes the neatest knots and splices, the fibers sticking together better, but it makes the fingers in a sad mess. Untarred rope is nearly as good for practicing on.

String is composed of two or three yarns laid either way.

Spun-yarn is a kind of soft string, made by twisting, right-handed, two or three yarns from old rope.

Worming is filling up the channels between the strands of a rope, either to improve its appearance or to fit it for serving or parcelling (*a*, Fig. 2).

Parcelling is covering the rope with strips of old canvas soaked in tar to keep out the wet. Follow the "lay" of the strands from left to right (*d*, Fig. 2), then cover over or *serve* the parcelling with



spun-yarn (*b*, Fig. 2), going against the lay, or from right to left. "Service" is also put on without parcelling, over a plain rope or over worming.

Marling is used instead of service to keep parcelling in its place. It is a kind of "chain-stitch" as known to ladies (*c*, Fig. 2). Work it towards you.

Any bend or loop in a rope is called a *bight*, as *a* or *b* in Fig. 3. The *standing part* is that which is not bent about in forming the knot; the base, in fact, upon which the *end*—the part being manipulated—is worked. If you seize one of the bends of a coil of rope, and draw it out without finding the ends, you have hold of the "bight" of it.

The plain **OVERHAND KNOT** (Fig. 4) is the simplest of all. It is made at the end of a rope, to prevent it passing through a hole (as in sewing) or to prevent the strands from separating too far.

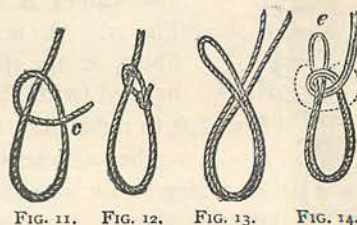
The **FIGURE OF EIGHT KNOT** (Fig. 5) is better than the overhand, as it does not "jam" under strain and is easy to undo.

The **BOAT KNOT** or **MARLINGSPIKE HITCH** (Fig. 6) is simply an overhand knot with the end held by

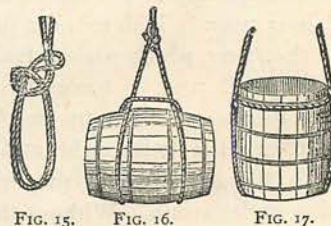
a piece of wood instead of being taken through the bight. On withdrawing this the knot falls to pieces.

The **BOWLINE** is the best of all knots. It forms a loop which neither jams nor slips, and is easy to undo. Two ropes may be joined by a bowline at the end of each. It may be thrown over or made fast round a post, it forms a sling for a cask, and fifty other things. Having formed a bight as in Fig. 7, hold the crossing *b* in the right finger and thumb; with the left hand take the bight at *a*, and draw it over the end as in Fig. 8: being twisted by this operation, it tends to take the shape shown in Fig. 9; let it do so, but still keep the crossing in order between the finger and thumb; now draw out the end a little, and work it in as in Fig. 10; adjust the loop to the size required, and pull it tight.

A **RUNNING BOWLINE** is begun as in Fig. 11, taking *c* as the crossing and *d* as the bight described above. Fig. 12 shows it finished,—the best slip-knot known, free from any risk of jamming.



One merit of the bowline is that it can be made on a rope with one end fixed and out of reach; but it can even be made in the middle of a rope when there is no time to look for the ends. This is a *bowline on a bight*. When a sailor hears the cry, "Man overboard!" he seizes a bight in the first coil of rope he meets with, forms a bowline on it, and throws it to the drowning man in less time than it takes to describe it, because he is not detained



looking for the end. Figs. 13 and 14, corresponding to 7 and 9, show that it is commenced as a common bowline, only with a double instead of a single

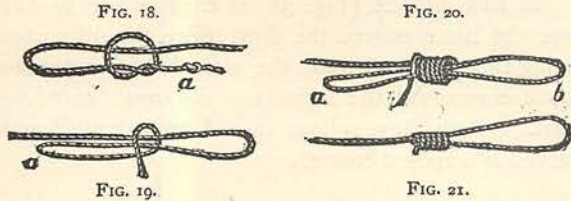
rope ; but instead of treating the looped end, *c*, like the end in Fig. 10, open it out and pass it round or behind the whole thing (see the dotted lines); then draw tight again, as in Fig. 15.

A **BOWLINE WITH FOUR BIGHTS** is made with *two* double ropes. It has four large loops, instead of the two in Fig. 15, and may be used, for instance, to support the different parts of a man's body while being drawn out of the water insensible.

Figs. 16 and 17 show two ways of slinging a cask, &c., in the loop of a single bowline. In Fig. 17 the rope must be arranged before the bowline is made.

Fig. 18 is a simple running knot, but inferior to the bowline. It is often used for tying up parcels, when an overhand knot at *a* is made to prevent the end slipping through.

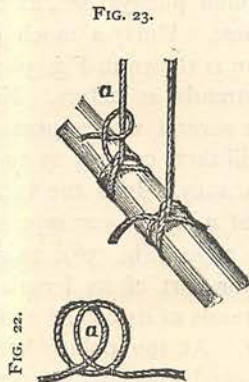
The **HANGMAN'S KNOT** is useful for the same



and other purposes and does not jam so much, besides being more ornamental. Form bights as in Fig. 19; work the end round and round, as many times as you like, towards the loop *a*, Fig. 20; pass it through *a*; pull *b* so as to nip the end tightly in *a* (Fig. 21). When made with care this is a pretty knot.

A rope may be secured to a post or spar by a bowline, as to the cask in Fig. 16, or by

The **CLOVE HITCH** or **BUILDER'S KNOT**, Figs. 22



and 23, which holds very tight, especially if the end is "seized" or "stoppered" down with spun-yarn,

or secured to the standing part by a "half-hitch," as at *a* in the latter figure. You can form this knot either by twisting the end of the rope round the post, in the manner shown in Fig. 23, or by forming a double loop as in Fig. 22, and passing the post or spar through the opening *a*, and then drawing tight. In either case the result is the same.

The **TIMBER HITCH** (Fig. 24) holds tight while the strain is on, but not otherwise. It is useful in a hurry, and easily made.

The **ROLLING HITCH** (Fig. 25) holds so securely that a weight may be suspended by it from a perpendicular pole, or the pole may be slung by it in the same position. At *a* it is shown drawn tight. In Fig. 26 an extra turn is taken, which adds to the

FIG. 24.

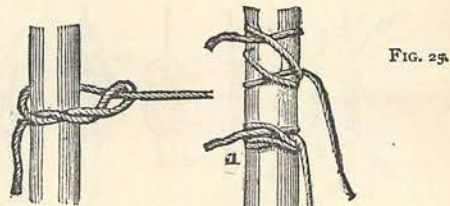


FIG. 25.

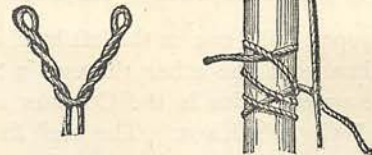


FIG. 26.

FIG. 27.

strength. There is also another more complicated form of the rolling hitch.

In all these figures the knot is drawn loose to show the structure.

The **CAT'S-PAW** (Fig. 27) is used for hitching the bight or any part of a rope to a hook, &c. Form two bights, twist them in opposite directions, and pass the hook through the loops. A weight may now be hung to either part of the rope. There are several cat's paws, but this is the commonest.

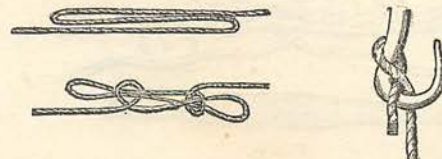


FIG. 28.

FIG. 29.

The **SHEEPSHANK** or **DOGSHANK** (Fig. 28) explains itself. It is used for shortening ropes when

it is undesirable to cut them to the length required. It comes apart again when the strain is removed.

A BLACKWALL HITCH (Fig. 29), simple as it is, is a safe way of hanging a weight from a hook. The greater the weight the tighter the end is jammed against the hook, though there is no knot in it.

The neatest join for two ropes is the REEF KNOT, or RIGHT or TRUE knot. Twist the ends as in Fig. 30, then make an overhand knot as in Fig. 31. If the latter is twisted in the right direction, the ends will lie close as in Fig. 32; if not, they will stick out sideways. When this happens the knot is useless, and is called a "granny knot," or false knot. Neat as the true reef knot is, it is only suited for small ropes with no great strain on them: under much strain it jams and is difficult to undo. To

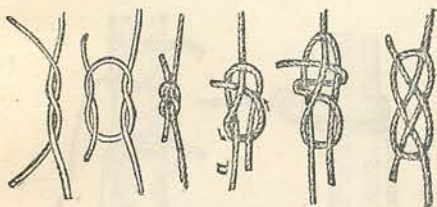


FIG. 30. FIG. 31. FIG. 32. FIG. 33. FIG. 34. FIG. 35.

join large ropes, hold one in the left hand as at *a* in Fig. 33; then work the other through in the direction of the arrow. This is the COMMON or SHEET BEND, or WEAVER'S KNOT. The reef knot is that used to join the ends of each pair of "reef points" in reefing a sail. Of course joining the two ends of a rope together is the same as joining two separate ropes. The weaver's knot is easy to undo, especially if made as in Fig. 34.

Fig. 35 is a CARRICK BEND, for joining two cables for towing ships, &c.; but a bowline bend is more general.

A permanent junction between two ropes should

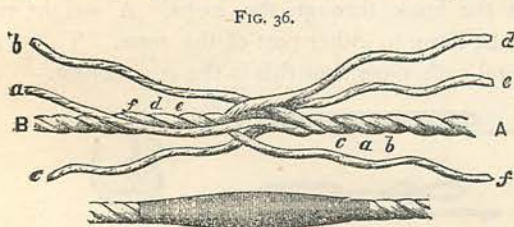


FIG. 37.

always be made by *splicing*. Fig. 36 shows the commencement of a

SHORT SPLICE.—Open out or unlay the strands,

and "crutch" or inter-lock the ends (tightly, not loosely as in the drawing); take any strand, *a*, pass it over the opposing strand next before it, *f*, and stick it in between that and the next, *e* (which must be lifted up by a pointed piece of wood or iron called a *marlingspike*). Pass it under *e* and up between *e* and *d*. Treat all six strands in a similar manner. If great strength is required, pass them all a second time. When the ends reappear, untwist each into yarns; cut out half of each yarn; twist up the yarns again; then pass the six *reduced* strands once more, and cut off the ends. This is to *taper the splice*, to make it more sightly (Fig. 37.) If the description seems obscure, try it as you read: the principle is to embed or burrow each strand of A into the substance of B and *vice versa*. Splicing large ropes is very hard work.

An EYE SPLICE (Fig. 38) is easily made by any one who has mastered the short splice, the difference being that you have only the strands of *one* rope to work in amongst the strands of its own "standing part." Both these splices should be parcelled and served if exposed to wet.

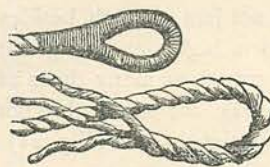


FIG. 38.

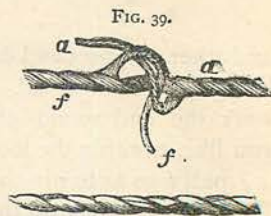


FIG. 40.

The LONG SPLICE is stronger and more elegant than the short splice, and must be used if the rope has to run through pulleys, &c., as it does not increase its thickness. Unlay a much greater length of each rope than is shown in Fig. 36; inter-lock or "crutch" the strands as before. Now untwist *a* still further—for several whole turns along its own rope A, which will then consist, so to speak, of two strands and a vacancy. Into the vacant space left by the removal of *a* lay the corresponding strand *f*, of the opposite rope (Fig. 36); twist *f* tighter as you lay it in A, for part of its length is now composed of two strands of its own, *b* and *c*, and one of its neighbor's, *f*. At the point where the untwisting of *a* ceases—and where, of course, the laying in of *f* ceases also—join *a* and *f*; cut off all but a few inches of each; untwist them, and cut off about one-fourth of the yarns from each. Tie the reduced

strands with an overhand knot (as in Fig. 39), which must be coaxed into the vacant place as neatly as possible; beyond the knot reduce *a* and *f* by another fourth; pass the end of *a* over *f* and the end of *f* over *a*, and each under the *two* next strands (Fig. 40): when you have well stretched the rope, cut off the ends where they appear. Sometimes the two are reduced by half before knotting; sometimes the extreme end is reduced to a fourth, and "stuck" once more. In the same way work one of *A*'s strands—say *b*—into the rope *B*, untwisting *d* to make room for it, and joining them like *a* and *f*. You will now have *e* and *c* to dispose of. Reduce them, and tie their ends together like the others, but at the original point of junction, without laying them into either rope: your three pair of strands will now be united at three different points in the rope, some distance apart, and there will be no material increase of thickness.

A GROMMET—(see engraving in the article on

Sailing)—is a rope ring made by unlaying one strand from a rope. Form a bight of the required size at one end, and work the loose end twice round it, following the natural crevices of the strand. You will now have a solid three-strand rope in the form of a ring, and a pair of ends to join. Join them by an overhand knot, first tapering them, and "stick" the ends just as in a long splice.

Sailors have many ornamental knots for finishing the ends of ropes, to prevent the strands from separating: amongst the others are the Matthew Walker, the Single Wall, the Single Wall Crowned, the Double Wall, the Double Wall Double Crowned, the Single Diamond, the Double Diamond, the Stopper Knot, and others, which space does not admit of our describing. All the knots and splices in common use we have given, and the reader may be sure that few pieces of stray information repay the trouble of learning—and practicing—better than a knowledge of the Art of Cordage.

