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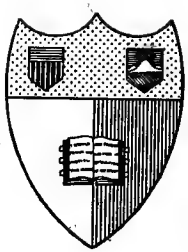

KNOTS, TIES AND SPLICES

FIG 1.

FIG.2.

FIG 3.

FIG.4.

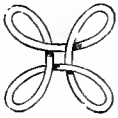

FIG 5.

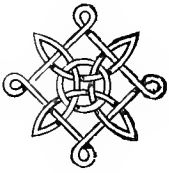

FIG 6

FIG 7.

FIG 8.

FIG 9.

FIG 10

Frontispiece

KNOTS

TIES AND SPLICES

A HANDBOOK

FOR

SEAFARERS, TRAVELLERS, & ALL WHO USE CORDAGE

WITH

HISTORICAL, HERALDIC, AND PRACTICAL NOTES

BY

J. TOM BURGESS

LONDON
GEORGE ROUTLEDGE AND SONS, LIMITED
BROADWAY, LUDGATE HILL, E.C.

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KNOTS, TIES, AND SPLICES.

I.

THE USES OF KNOTS.

KNOTS? What? Knots?

There are love knots, matrimonial knots, Gordian Knots. These are figurative.

There is the Stafford Knot, the Bouchier Knot, the Lacy Knot, the Henage Knot, the Dacre Knot, the Harrington Knot (which is not a knot at all), as well as the Wake Knot. These are heraldic.

There is the Monkey Knot, the Wind Knot, the Peruvian Knot, and conjurors' knots. These are fancy knots.

There are weavers' knots, builders' knots, sailors' knots, reef knots, fishermen's knots. These are real and useful knots.

But they are only twisted cord. *Cui bono?* What 's the use?

Let a few personal examples suffice.

Thirty years ago a lad was standing in a garden gazing at a surging mass of coloured silk, which heaved to and fro over the heads of a dense crowd. The wind

was blowing in fitful gusts, and heavy masses of vapour rolled overhead. The crowd had assembled to witness a balloon ascent. Cautious bystanders wished the exhibition to be postponed in consequence of the state of the weather; but the crowd roared, and the aëronaut took his seat in the car. The men who held the ropes were nearly pulled off the ground by the plunging balloon. At last, in sheer despair, the mad and struggling thing was released, and away it went. It rose above the surrounding buildings, but it was obvious to all that the wind was too strong, and that the life of the aërial navigator was in great danger. The boy could see him gesticulating to the various groups of people. He saw the grapnel thrown out. It dragged the ground. There was a pause for a moment in the progress of the balloon, but the bystanders merely gaped. Again the balloon came on towards the boy in the garden. At first he was paralysed, but his companion said, "Let us catch the ropes and twist them round a tree." The boy thought that such a scheme was not only wild in conception, but useless in practice. They waited for a few moments, until the grapnel again touched the ground, and tore up the surface of the adjoining pasture. The traveller above called to "secure the guide-ropes when the grapnel caught."

The boys were ready and excited, when the grapnel caught a stump in the hedge-bottom, and checked the mad career of the balloon which fluttered and struggled above them. They rushed forward, seized

a rope, and ran round the stump of a tree with it. They were about to do the same with another rope, when the grapnel gave way.

"Hold on, Jack," said the elder boy, "to this rope." And he took the other, and in a few seconds had secured it round the post of the gate. The ropes creaked—the tree was pulled like a young sapling. The intrepid and daring aëronaut came out of the car, held on by a rope for a moment, and dropped to the earth. The balloon, released of his weight, tore up the gate-post, snapped the cord which tied it to the tree, and bounded into the air.

"Well done, boys," said the late Mr. Graham, when he recovered his breath. "You did more than those fools dare," pointing to the crowd which now hurried up. "I owe my life to your knowing the power of a twisted rope, and having the ability to tie a simple knot."

That was my first lesson in the uses of knots and ties. My second led to a more profound knowledge of the art.

I was staying at Ennis, fishing in the Fergus, when the salmon ran, and occasionally visiting the lakes of Inchiquin, Ballyalla, or Drumconora for trout, when suddenly my rod snapped in the second joint. My cast-line was torn. I was in the most deplorable plight a young angler was ever in. There were fish in plenty, but my cherished rod was spoilt, and days must elapse ere it could be replaced.

"What could I do?" I asked, in a tone of chagrin.

"Take it to old Jack," said an old fisherman. And to "old Jack" I took it.

"Old Jack" was one of the kindest and most genial old tars I ever met with. His name was, I believe, McDonnell or O'Donnell, and his Christian name was Donagh, Donald, or Dermod, or some Gaelicized Bible name, which was supplanted by the universal Jack. Though he had lost an arm in the "untoward affair" at Navarino, he could "tie a fly" or make a rod with any man in Munster. He was equally the pet of the officers of the garrison and the boys of the town. To one he sold his excellent rods, and he mended the broken tackle of the other with equal gusto. He was very poor, yet he maintained an infirm sister and himself in respectability on a small pension and the produce of his rod and fly making. His well-balanced four-joint sixteen-feet salmon-rod was a beauty—the lower joint of ash, the two middle ones of hickory, and the top of greenhart. It made one's blood tingle to feel the pliant, well-balanced switch, and to know that the lordly salmon was almost within reach. The accident to my favourite rod introduced me at once to "old Jack," and initiated me in time into the further mysteries of "knots, ties, and splices." In the course of a few minutes he produced a small bottle of liquid glue, with which he anointed the broken rod, and "whipped" the splintered parts with fine waxed cord. He did it so readily that I wondered at the neatness, strength, and renewed symmetry of my "equal-to-new" rod. A few well-made knots

mended my line, and a new world opened up before me.

If any one asks the utility of knots, let the sailor answer. A little knowledge of them saved ten lives when the *Serrano* was wrecked; it enabled me to reach the *Gipsy* when she left her moorings with two boys on board; it lengthened and firmly united the bed-cords at a fire in Staple's Buildings, which enabled two people to escape from the upper-floor windows. At a hundred times and places the art—for it is an art—is useful. We know that Napoleon ennobled the inventor who could tie a knot in a piece of stretched string. Our ships are a mass of knots; and only last month a number of lives were lost in a Staffordshire colliery because the man who mended the rope did not know how to splice properly. The wonderful hero in "Foul Play" would have been much more wonderful if he could have knotted, knitted, netted, and spliced well; but the lady was the superior genius here, and had to make the nets.

Some little seafaring, some living in out-of-the-way places and travelling in lonely localities, have shown me the manifold uses of knots; and I acquired the knowledge of how to tie them sometimes from necessity, though I have not had the advantage of the boatswain's Saturday afternoon instruction with a marlinespike. I have gathered from various sources, as well as my own experience, these notes on "Knots, Ties, and Splicing," for there are but few who can tie a knot securely, though it is an operation that we

have to perform nearly every day of our lives. Not only seamen, but nearly every trade and every variety of labourer, has his or its special knot, which has been handed down from father to son, and from master to apprentice, for any number of years. It is an art, for if a tyro attempts to join two pieces of string together, in all probability it will be what is termed a false or a "granny" knot, or simply connect the two ends by an overhaul knot, which, if the easiest, is the clumsiest, and which Alpine travellers know is fatal to the strength of a rope. The sailor's, weaver's, or fisherman's knot would answer his purpose better.

II.

THE HISTORY AND PHILOSOPHY OF KNOTS.

THE history of knots is lost in the mist of antiquity. An ingenious essayist has told us that they are probably as "old as human fingers," and, doubtless, in Paradise the trailing flowers twisted themselves into wreaths amongst the spreading branches, as they formed a bower for mankind's first mother. Since that time they have become interwoven with man's life. Superstition has appropriated them, jugglers have used them, lovers have symbolized them, and good men have used them. They are a part of his occupation. Eve could not have begun her proverbial spinning in the days of general gentility without first tying a knot; and the first lady of the land ties a perfect knot every time she moves her tatting shuttle.

Knots were common in the time of Homer, for in the eighth book of the "Odyssey," Ulysses is represented securing the rich and costly robes, vases, gold, and other valuable presents of Alcinōüs and his queen by a cord of rope, fastened in a knot "closed with Circean art." This knot of Ulysses became a proverb, to express any unsolvable difficulty, ἄχοῦ Οδυσσέως δεσμὸς, and a proof of the esteem in which the ancients held

this art, so necessary in the absence of locks, may be adduced from the Gordian Knot; and, in fact, Homer describes the treasures and other valuable objects as being kept in the citadel, secured merely by a cord intricately knotted.

Probably we shall never know how the Gordian Knot was tied. Every young gentleman, however, knows the story of Gordius, the Phrygian husbandman, who was promoted to a kingdom by the oracle of Apollo, and how he hung up his plough-traces as a votive offering in the temple of Jupiter. He, however, tied one rope of these traces with so cunning a knot, that it was foretold that whoever unloosed it should be king of all Asia. We are told how baffling the knot was, and how Alexander the Great, when he found he could not untie it, cut it with his sword. There are some who would gladly follow the grim Macedonian's example, and cut the hymeneal knot which binds them to an unsympathetic or uncongenial partner.

The old sorcerers used knots, we are told, in their incantations. The witches of Lapland sold "wind knots" tied in a rope to their seafaring customers, who, when they wanted a particular wind, instead of whistling for it, untied the corresponding knot which had been tied by enchantment. Indeed, in all ages and in all climes knots, with their manifold uses and advantages, seem to have been used by necromancers as a means of mystification in furtherance of their magic arts. The Davenport Brothers were not the first

who showed their expertness with ropes and knots. Men had been tied with cords and put into sacks or boxes who emerged almost immediately free of all bonds; and there are scores of tricks published in conjuring books showing some interesting tricks with loops, slip-knots, false hitches, and other contrivances familiar to those who use cordage.

There is one part of the history of knots which has received but little attention, though it has not been overlooked in the many treatises on armoury which have been published from time to time; and these are known as —

III.

HERALDIC KNOTS.

THE knots used in heraldry are technically called "badges," and have been probably in use from a very early time, when heraldry, as we understand it, was a thing of the future. We find both in Celtic structures, and in those attributed to the Anglo-Saxons, many curious ornaments formed of interlaced cordage. We have given two small examples (pp. 38 and 101) which exemplify the method by which the twists and turns of a piece of rope were made into a geometric and not unpleasing ornament.

Of the heraldic knots that of Stafford is the simplest, and is used as the badge of the shire as well as of the noble house who first used it. It is an open, simple knot only (Fig. 1).

Probably the oldest is the WAKE KNOT, which is used also by the Ormonde family, and is known by their joint names. If this was the badge of Hereward the Wake, it is the most interesting of all the heraldic knots (Fig. 2).

The next in simplicity is the BOUCHIER KNOT (Fig. 3). It is formed of two open "granny" knots, and decorates the mantlings of a nobleman of the Bouchier family. In Westminster Abbey, on the tomb

of another Bouchier, it is several times repeated. It is sometimes shown as cordage, and at others as cord and beaded belt combined.

The elegant interlaced knot (Fig. 4) is supposed to represent a monogram. It is found embroidered in the robe of the effigy of Anne of Bohemia in Westminster Abbey.

The BOWEN KNOT (Fig. 5) is simply a cross formed by four loops with a circular rope, and may have been a rebus like

The LACY KNOT (Fig. 6), which is finely sculptured at Whalley Abbey, and simply means interlaced; and the same, judging from the motto, is

The HENAGE KNOT (Fig. 7), which bears the legend, "Fast, though untied."

The so-called knot of the Harringtons (Fig. 8) appears to be only a bit of fretwork from one of the charges.

The badge of the Dacres (Fig. 9) is formed by a cord entwining an escalop-shell and the ragged staff of Nevil, and is somewhat tastefully arranged. It is thought to indicate the descent from the Bouchiers or the union of their families, just as Edward, Lord Hastings (Fig. 10), entwines the sickle of the Hungerfords with the garb of the Peverells.

There are many foreign examples of this device. One of the family of Morvilliers shows the Pythagorean γ (so called because the philosopher made it the symbol of life), entwined with a hitch knot which is attached to a harrow, which thus forms a rebus on the

name of the French Chancellor at the time when Elizabeth ruled over England. Pope Leo X. had a twisted knot and a band round a yoke, and the House of Savoy took a "Figure of 8 Knot" for their device, with the motto "Stringe ma non constringe,"—it bends, but constrains not. As far back as 1252 an Order of the Knot was established at Naples. The badge, of silk, gold, and pearls, was tied in a knot upon the arm, and those who were invested with it made a vow to untie it at Jerusalem.

There is one other knot which, if not heraldic, is at least emblematic; and many a true lover is anxious for that knot, which, if once tied by the tongue, cannot be untied by the teeth. On the signet ring preserved in the birthplace at Stratford-on-Avon is engraved a true lover's knot entwining the letters W. S., and this is said to have belonged to Shakespeare (Fig. 11).

Fig. 11.

Quaint Sir Thomas Brown surmised that the true lover's knot had its origin in the Nodus Herculaneus, a very high and esteemed sacred knot of Hercules, resembling the snaky complication in the Caduceus or rod of Hermes. These ancient rods were probably only metaphorical. Ere, however, we conclude our

notices of these fanciful knots, let us point out that one of the forms of a crest wreath is that of a twisted "cat's paw" (Fig. 99).

If, however, we cannot trace distinctly the history of knots through all its various transformations, we can scientifically define it. "It is an endless physical line, which cannot be deformed into a circle. A physical line is flexible and unextensible, and cannot be cut, so that no lap of it can be drawn through another." It is altogether beside our purpose here to follow the theories of Listing, or the learned dissertations of Professor Tait (*Trans. Roy. Soc. Edinburgh*, 1876), for, though interesting in a mathematical sense, they are hardly simple enough for a "practical handbook."

IV.

CORDAGE IN GENERAL.

LOOKING at the subject simply as a practical one, we must first direct attention to the material generally used for the making of knots. Many boys have, doubtless, amused themselves by untwisting a piece of whipcord, which in reality is a miniature rope, and, in doing so, must have noticed the use which has been made of the original twist of the filaments of hemp or flax to bind the whole together into one continuous line. This is done by twisting the yarn in opposite directions, so that they bind together. If the strands (as a number of yarns are called) were twisted one way only, they would untwist themselves and part at the slightest strain; but advantage is taken of this tendency to untwist, and the result is that a hard, firm cord, bound together by the friction of its parts, is the result of laying strands together which have been twisted in opposite directions. According to the number of strands and variety of twists, the varieties of twine, cord, marline, ropes, hawsers, and cables are made. To join two ends of these together, you must use either a knot, a tie, or a splice.

Knots, however, are as various as the material knotted. The coarse fibres, thongs of hide, or twisted

intestines of savage nations, have given place to cordage of various sizes, thicknesses, and material. Advantage is taken of the natural curve and tendency of vegetable fibre to secure the greatest firmness, strength, and consequent security. The most rigorous tests are applied to know the exact strain different substances will bear; but whatever the substance, the principle of manufacture remains the same. The process has been modified as machinery has been brought into use, in order to produce a flexible and tenacious cord which shall retain the collective strength of every fibre of the material of which it is composed. Of these materials hemp is the most common, and, of all kinds of hemp, that of Manilla is the most serviceable, and generally preferred.

In studying the nature and uses of knots, particularly those which come under the designation of splices, some knowledge of the mode, and of the principles on which ropes are made, is essentially necessary. The simplest and most effectual mode of obtaining the united strength of the fibres composing the rope would be to lay them side by side, and fasten them together at each end, as in the Sevagee (Fig. 98). This plan, even if the fibres of hemp were of the necessary length, would be open to many objections; hence it was necessary to devise some plan which would give unlimited length to the rope, and at the same time preserve its torsion and portability. This has been achieved by the compression and twisting of the fibres in different directions, until they produce

a compact, hard, and strong rope, neither breaking the fibres on the one hand, nor leaving them so loose as to be easily drawn out from the mass on the other, —either extreme would be equally fatal in its results, and injurious to the stability of the rope. This happy medium is achieved by the modern process of rope-making, whether by hand or machinery.

At first the fibres of hemp are loosely twisted together, and form what is technically known as *yarn.* When two or three yarns are twisted together they form a *strand,* three strands form a *rope,* and three ropes a *cable.* It will be borne in mind that each portion of the cable is twisted in an opposite direction to the cable itself, so that advantage may be taken of the tendency to untwist to counteract the like tendency in other portions of the cable. This will be better understood by a reference to the accompanying diagram of a cable.

Thus A shows the fibres of which a *yarn* is composed; B, the yarns comprising a *strand*; C shows the strands forming a *rope* D, which together form the *cable* E. These are, in their turn, subjected to a variety of processes in order to insure their bearing an equal strain prior to their being combined into a cable. As a broad general rule it should be borne in mind that the loss of bearing power by twisting is almost one-third, but the tighter twisted ropes gain in durability what they lose in power. A twist of four-fifths of the length of the component yarns gives one-third more bearing power than if twisted to two thirds of

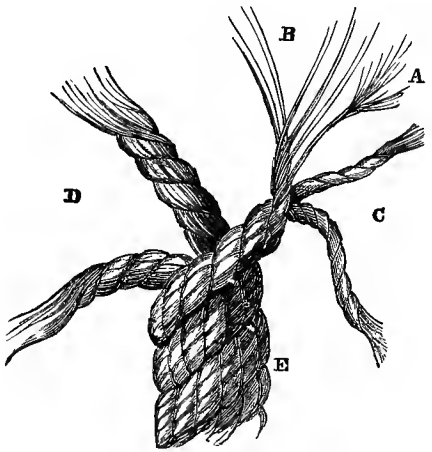


Fig. 12.—Analysis of Cable.

the length, which is the ordinary twist of ropes in use. The larger cables have even a greater twist than this. The various descriptions of line and rope, with their weights and lengths, are as follows :—

Kinds.	Length.	Weight.
Reefing-twine	24 skeins ...	8 to 9 lbs.
Sewing-twine	24 „ ...	8 to 9 „
Marline	12 „ ...	4 „
Log-lines	25 fathoms ...	1 to 3 „
Samson-lines	30 „ ...	¾ „
„	„ „ ...	1 „
„	„ „ ...	1¼ „
„	„ „ ...	1½ „
Fishing-lines	25 „ ...	¼ „
„	„ „ ...	½ „

Kinds.	Length.	Weight.
Fishing-lines	25 fathoms ...	¾ lbs.
„	„ „ ...	1 „
Hambro'-lines (6 threads)	23 „ ...	1½ „
„ (9 „)	„ „ ...	2¼ „
„ (12 „)	„ „ ...	3 „
Hand lead-lines	20 „ ...	4 „
Deep-sea-lines	120 „ ...	28 „
„	„ „ ...	32 „
„	„ „ ...	34 „
„	„ „ ...	36 „

This is from the computation of Mr. Chapman, the master ropemaker of Deptford Dockyard. In further explanation of the terms used, it should be borne in mind that—

A *yarn* is several fibres of hemp twisted together.

Twine, or *small cord*, is two twisted yarns.

Marline is three twisted yarns.

A *hawser* is a rope formed of three strands, containing from fifteen to twenty-five yarns in each strand.

A *cable* is a large hand-twisted rope, made from three or four smaller ropes twisted round a common axis.

Laying a rope is the twisting of the strands in a hawser-laid or shroud-laid rope, and of the component ropes in a cable.

Serving a rope is to cover it with smaller cord or spun yarn, to preserve it from rolling and from friction. To facilitate the operation the yarn is passed two or three times round the rope, and tightened by a species

of mallet with a concave groove on the side opposite to the handle, called a serving mallet. This enables the yarn to be twisted tightly and evenly round the rope, in the same manner as the silver wire is twisted round the fourth, or silver, string of a violin (Fig. 13).

Parcelling a rope (Fig. 14) is wrapping narrow strips of canvas about it, well tarred, in order to secure it from being injured by rain-water lodging between the parts of the service when worn. The parcelling is put on with the lay of the rope, with the edges overlapping.

Worming a rope (Fig. 15) is filling up the divisions between the strands, to give it

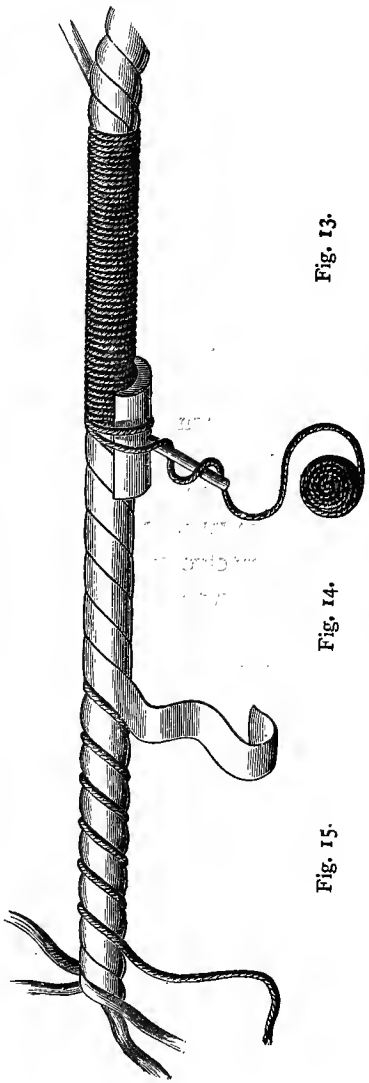


Fig. 13.

Fig. 14.

Fig. 15.

a round and full appearance prior to parcelling or serving.

A knowledge of the strength of ropes, and of their breaking weight, is essential in all operations where ropes are required. We are indebted to the Alpine Club for some valuable experiments on the strength of ropes used in Alpine excursions. In the course of these experiments the weakness of plaited ropes was demonstrated with startling effect. Indeed, the value of a plaited rope does not lie in its power to bear heavy weights or sudden jerks, but in its wearing properties when exposed to constant friction, as in sash and clock-lines. The committee of the Alpine Club found, in the course of nearly a hundred experiments with various kinds of rope, only four bore the strain of twelve stone falling five feet, and all these four ropes were made by Messrs. Buckingham and Sons, of 33 Broad Street, Bloomsbury. In the further experiments one of these ropes failed. Of the three ropes which remained, they were so nearly equal that it was difficult to say which was to be preferred.

"Each of these three ropes" (we quote from the report) "will bear twelve stone falling ten feet, and fourteen stone falling eight feet; and it may be useful to say that the strain upon a rope loaded with a weight of fourteen stone, and suddenly checked after a fall of eight feet, is nearly equal to that which is caused by a dead weight of two tons. None of these ropes, however, will bear a weight of fourteen stone falling ten feet; and the result of our experiments is

that no rope can be made, whether of hemp, flax, or silk, which is strong enough to bear that strain, and yet light enough to be portable. We believe that these ropes, which weigh about three-quarters of an ounce to the foot, are the heaviest which can be conveniently carried about in the Alps. We append a statement of the respective merits of the three kinds, all of which were made by Messrs. Buckingham expressly for the Club, and marked by a *red worsted thread* twisted in the strands :—

No. 1. MANILLA HEMP.—Weight of 20 yards, 48 ounces.

Advantages.—Is softer and more pliable than 2. Is more elastic than 2 and 3. When wet, is far more pleasant to handle than 2 or 3.

Disadvantages.—Has a tendency to wear and fray at a knot.

No. 2. ITALIAN HEMP.—Weight of 20 yards, 43 ounces.

Advantages.—Is less bulky than 1 and 3. Is harder, and will probably wear best, being least likely to cut against rocks.

Disadvantages.—Is much more stiff and difficult to untie than 1 and 3. When wet, is very disagreeable to handle, and is apt to kink.

No. 3. FLAX.—Weight of 20 yards, 44 ounces.

Advantages.—When dry is soft, more pliable, and easier to handle than 1 and 2, and will probably wear better than 1.

Disadvantages.—When wet, becomes decidedly

somewhat weaker, and is nearly as disagreeable to handle as 2.

It should be borne in mind that a knot weakens a rope at any time, and particularly if ill constructed: with a falling weight a knot like Fig. 67, or a loop like Fig. 31, is especially to be avoided.

The best knots recommended by the Alpine Committee are Fig. 68 to join two ropes, Fig. 29 and Fig. 33 for loops. These are all the knots required on an Alpine excursion.

A good formula for calculating the strength of ropes is given by Robison:—Multiply the circumference of the rope in inches by itself, and the fifth part of the product will express the number of tons the rope will carry. For example, if the rope be 6 inches in circumference, $6 \times 6 = 36$, the fifth of which is $7\frac{1}{5}$—the number of tons which such rope will sustain.

The following simple rules for calculating the weight of cordage of all kinds will be found serviceable. To find the weight of a hawser, or shroud-laid rope, multiply the circumference in inches by itself, and multiply the product by the length of the rope in fathoms, and divide by 420, the product will be the weight in hundredweights. Example: To find the weight of a six-inch hawser-laid rope 120 fathoms long; $6 \times 6 = 36 \times 120 = 4,320$, which, divided by 420, gives the weight of the rope, 10 cwt. 1 qr. 4 lbs.

Again: To find the weight of cable-laid cordage, multiply its circumference in inches by itself, and divide by 4. The product will be the weight, in hun-

dredweights, of a cable 120 fathoms long, from which the weight of any other length may be readily deduced. Example: Required the weight of a 12-inch cable 120 fathoms long; $12 \times 12 = 144$, divide by 4, and the product, 36, is the weight in hundredweights.

Cotton, silk, and cocoa-nut fibre are sometimes used for cordage; indeed, the latter has many advantages, one of the greatest of which is its lightness and resistance to the influence of water. Iron is now commonly used for standing rigging of ships, and wire ropes have a deserved reputation. Knots, however, do not pertain to iron in any shape, unless an iron nodule form the necessary and inevitable exception.

V.

SIMPLE KNOTS AND LOOPS.

LET us begin at the beginning. A plain rope is before us. We should remember that a rope, to hold tight when tied tight, should always be well stretched. The power of tension in a rope is considerable, and to those who are in the habit of packing goods, or even trunks, this power of giving way is sometimes a source of considerable annoyance, often aggravated by ill-tied knots slipping or becoming loose. In the nautical world, cordage and cables are always stretched and their strength tested before being used, in order to guard against any possible danger from this cause.

Fig. 16. Fig. 17. Fig. 18.

Taking the plain cord, it may be remarked that all knots are begun by either "loops" or "hitches;" and these may be single or double as required.

Thus, Fig. 16 is a SIMPLE HITCH, Fig. 17 an UNDERHAND LOOP, and Fig. 18 an OVERHAND LOOP. If we pass the loose end through either an overhand

or underhand loop, we have the simplest of all knots, as shown in Fig. 19, which when drawn taut has the appearance of Fig. 20. The perfect knot is known as the "FIGURE OF 8 KNOT" (Fig. 21), is formed by an underhand and overhand loop overlapping each other, and the loose end passed through the loop. When tight, as shown in Fig. 22, it bears a close resemblance to the Arabic numeral 8; hence its familiar name.

Fig. 19. Fig. 20. Fig. 21. Fig 22.

What may be called compound simple knots are known by the name of Double, Treble, Four-fold, or Six-fold Knots. They are in constant use when it is necessary to shorten a rope a few inches, or to increase

Fig. 23. Fig. 24. Fig. 25. Fig. 26.

the size or strength of a holding knot to prevent it passing through an eye or a block. These knots are made by passing the end of a rope twice, thrice, or as many times as may be necessary, through a loop (as shown in the simple knot) previously to "nipping," or drawing it taut by pulling both ends. Fig. 23 shows a double knot loosely formed, Fig. 24 when "nipped,"

Fig. 25 a treble knot nipped, and Fig. 26 its open formation. In Fig. 27 we have a five-fold knot, shown open, and in Fig. 28 its appearance when nipped. The Five and Six-fold Knot forms a coil of handsome close folds, and is very useful to travellers who do not wish to cut the precious cords of their baggage when on a journey, and to whom long loose ends are a special abomination. In the following section some "shortenings" which are more easily undone are explained; but for short lengths, a couple or more of six-fold knots are useful and handy.

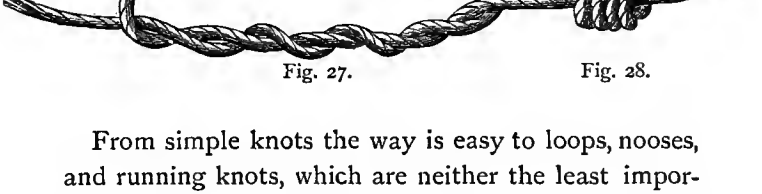


Fig. 27. Fig. 28.

From simple knots the way is easy to loops, nooses, and running knots, which are neither the least important nor the least useful of the knots. To this class belongs the "Tomfool Knot," which proved a puzzle knot for the Davenport spirits, and also the Tyburn Noose, which has ended many a troubled life. The simple Running Knot is made by passing a hitch instead of the end of the rope when making a simple knot (see Fig. 29). The variations of this knot are very numerous. A succession or chain of these running knots form the single plait or chain shortening, to which we shall have again occasion to refer. When the loose end A

is knotted with a simple perfect or double knot, it forms one of the most useful and easily made loops, though its power of holding is not so great as either Figs. 31, 32, or 33. When there is sufficient length of rope to permit its being let down double, it forms a

Fig. 29. Fig. 31.

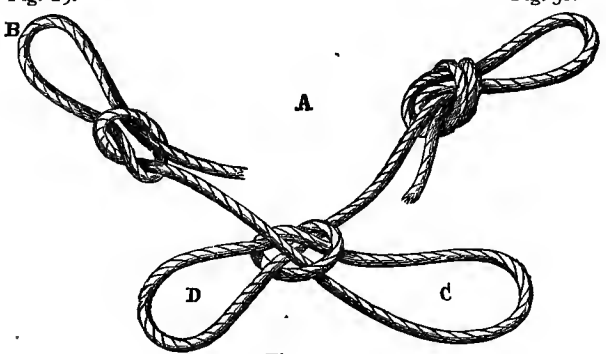


Fig. 30.

good loop for lifting inanimate objects, as the hitch may be lengthened and then drawn taut, though Fig. 34 is more commonly used for this purpose, as the pressure and weight of the object tends to tighten the grasp of the knot. The best knot for this purpose is the "RUNNING BOWLINE" (Fig. 40). If the end A is passed backwards through the loop B, it forms an excellent shortening knot, but is not adapted to bear a hard strain.

In its double shape, the running loop under the name of the "TOMFOOL KNOT" (Fig. 30), has achieved greater renown than perhaps any knot of modern times. The Liverpool gentlemen who introduced it

to the Davenport Brothers have been often asked for instruction how to tie it. It is a double loop through a simple knot. It is made in the beginning like the running knot (29), after which the firm end is passed through the open simple knot, so as to form a double loop or bow. Thus, if the wrists or hands are placed within the open loops D C, and the latter drawn tight, and the loose ends tied firm round the centre, a pair of handcuffs is produced which the skill of the Davenports could not untie. The firmness and security of the knot depends, however, on the rope being well stretched, otherwise a person with small hands would not have much difficulty in releasing himself from this or any other knot made on a rope.

The common LOOP KNOT (Fig. 31) is tied similar to the open HAND KNOT (Figs. 62 and 63), and forms the ordinary useful loop of every-day life. A more ornamental and even stronger loop, which is well adapted for large cordage, is made by the figure 8 knot (Fig. 32).

This loop, like Fig. 31, when once made and has been subjected to a lengthened strain, is very difficult to untie. In this case there is nothing better than a running knot with a check knot, E (Fig. 33), which is a modification of the fisherman's knot, and will be found eminently serviceable. In this knot, the simple knot E is tied over the running line, as shown. After use it may be easily drawn apart, the loop slipped, and the knot untied in a comparatively brief space of time. This is a very suspicious knot in all conjuring per-

formances, as it can be easily unloosed by a slight effort of the ankle or wrist; when the loop is carried round a chair it may be slackened or tightened in an instant.

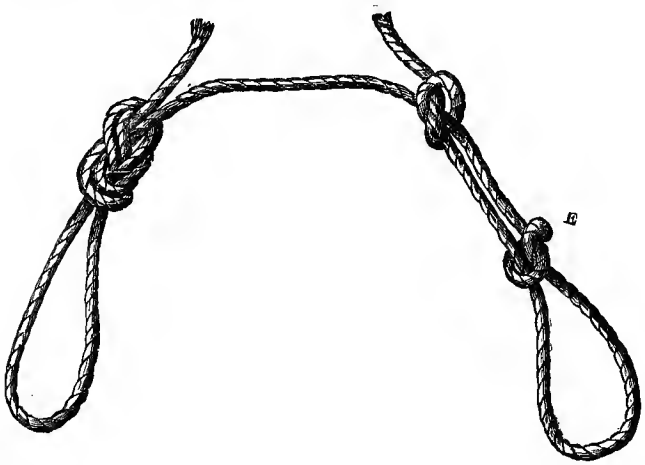


Fig. 32.

Fig. 33.

There are but few knots which will not give way in a new rope sufficient for a man to release his hands, and then the rest is easy. Speaking as a rule, the more rope, the easier the release. When two persons are confined together, the chances are largely increased in favour of the exhibitors, for if one can struggle a hand through the embarrassing cords he could release himself and help his fellow. The experiments of Messrs. Maskelyne and Cooke prove that the knots can be tied and untied irrespective of either extraneous or spiritual agency, for the knots were sealed

with wax, yet the hands were released and rebound again in the course of a few seconds.

One of the most common and useful of running knots used in commerce, and only applicable to small cords, is the RUNNING NOOSE (Fig. 34). A simple

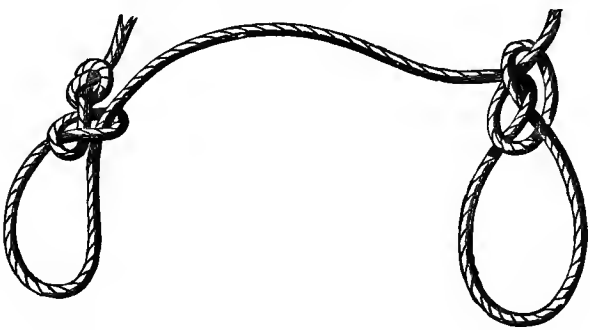


Fig. 34.

Fig. 35.

knot is made on the end of the cord, which is then simply knotted round. The running noose known as the CROSSED RUNNING KNOT (Fig. 35), is a useful knot in packing heavy goods, as well as a useful anchor fastening. Many visitors to a seaport have watched the tars at work on the outside of their vessels, suspended by a rope whilst they sat comfortably in a BOWLINE KNOT (Fig. 36). This knot is formed by passing the loose end through the lower loop of a figure 8 knot, and "seizing" or tying the end with small cord or marline.

This can hardly be called the true "bowline" knot, which is shown at Fig. 39. This is called a STANDING

Fig. 36.

Fig. 37.

Fig. 38.

Fig. 39.

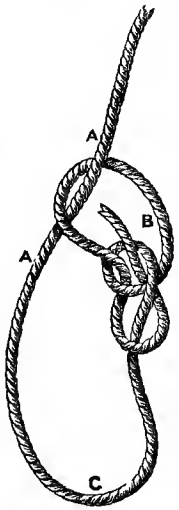


Fig. 40.

Fig. 41.

BOWLINE KNOT in contradistinction to Fig. 40, which is called a "running" bowline knot, and forms a noose

to put over anything. Here the loop or eye at B runs upon the standing part of the rope A A, forming another loop at C. A bowline knot on a bight of a rope seems a very difficult matter, but it is not so in reality. It is shown in Fig. 41, and is easily made; its great use is in lowering a man from a height, such as the rigging of a vessel, or, in case of fire, from a window. Fig. 42 is not calculated to bear the same strain, and is principally used to make fast the sheets of small boat sails. It is known as the "Midshipman's Hitch," and its construction is obvious. Figs. 37 and 38 represent two slip clinches, or open running knots, "seized" instead of tied. Fig. 38 is used to clinch a sailor's knot. These knots and loops are closely connected with the hitches and bends in shape.

Fig. 42.

VI.

SHORTENINGS.

THE most handsome knots of any practical value, and which approach nearest to the fancy knots of history, are Shortening Knots—knots that hold the surplus cord tight and firm without any loose ends. The most simple shortening for all descriptions of small cords is that known to boys as the Single Plait, but which seamen know as the Chain Knot. It is so easily made as to be popular with most young people. The first movement is to make the running loop (Fig. 29), then to draw the loose end through the loop as shown in Fig. 43, and repeat the movement until the requisite length of cord has been taken up and shortened; the end may then be secured by passing a belaying pin or a piece of wood through the loop (see Fig. 43), or by bringing the end of the rope through the last loop, as shown in Fig. 44.

The Twist Knot is by no means so generally known, though it is a very useful shortening, and admirably adapted for other purposes. Dissected, it is an ordinary "three plait," though formed of one piece. It is more useful than when formed of three separate pieces of string, for the ends are fastened and it cannot come undone. The mode of commencing this knot is

Fig. 43.

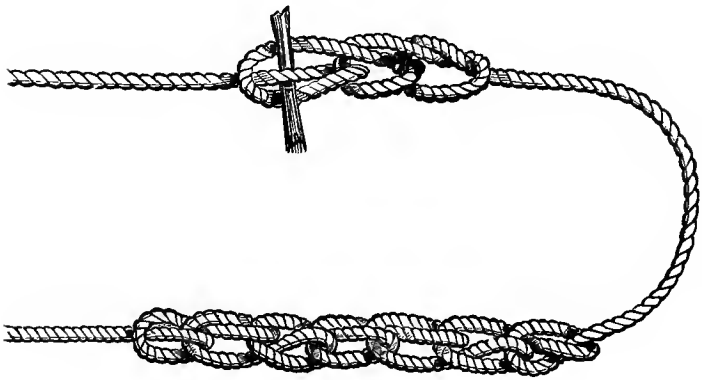


Fig. 44.

shown in Fig. 45. The double loop is held in the left hand; the side A is then brought over to B, with a half-turn B is crossed over to A, and the process of an ordinary three plait is continued until the end of the loop is reached, when the loose end is passed through the bight and the knot is fastened and completed as shown in Fig. 46. If well done, it forms a hard, tight, and compact long knot.

Closely allied to these knots is the Double Chain Knot (Fig. 47), which is really a pretty form of open knot, easily made, if the first loop is made secure by a twist in the rope, as shown in the diagram, and then pass the loose end through the preceding loop right and left until the knot is finished. This knot admits of any length of rope being used, whilst the majority of the other shortenings are only applicable to limited lengths.

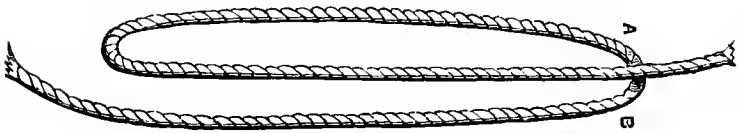


Fig. 45.

Fig. 46.

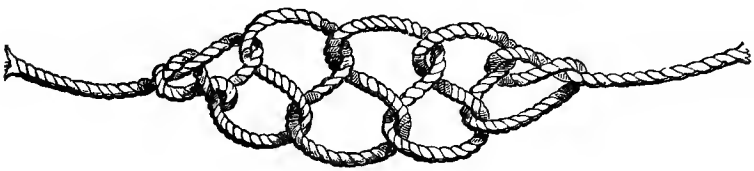


Fig. 47.

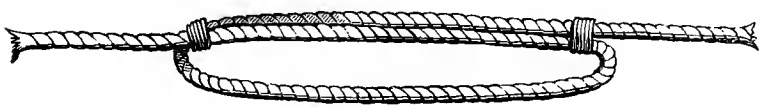


Fig. 48.

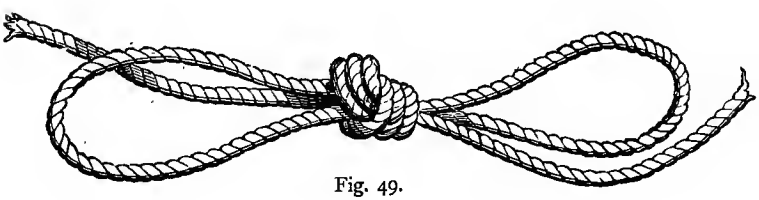


Fig. 49.

The Simple Loop or Bend Shortening (Fig. 48) is a plain, useful expedient for stout rope, and has the merit of not injuring the rope by any unnecessary strain, or crossing the fibres of the hemp. Its construction is evident.

In Fig. 49 we have a quickly made shortening, generally known as the Knot Shortening. It is simply an ordinary knot in the middle of a rope in which a double bend has previously been made. It is not adapted to stand a heavy strain, but from its security must be of vast use to travellers in cases where the strain is not direct on the knot, which is the case in the lashing of waggons and in the tying of packages; this, unlike Fig. 48, can only be made when both ends of the rope are free. For thick ropes it is not adapted.

When both ends of the rope are fast, the "SHEEP-SHANK," or, as it is sometimes called, the "DOGSHANK" shortening is used. The best and most secure form is that shown by Fig. 50. A simple running knot (Fig. 29) is first made in the rope; a bend is pushed through the running loop, which is then drawn taut; the other end of the bend is fastened in a similar manner, and forms, when complete, Fig. 50.

A much more simple "dogshank" is that shown in Fig. 51. In this a simple loop is made in the rope, and the hitch or bend placed through it. It is easily made, but is hardly to be depended on without being tied or seized as Fig. 48. If there is time to do this, it forms a safe and excellent shortening.

In Figs. 52, 53, and 54 are shown three loop shor-

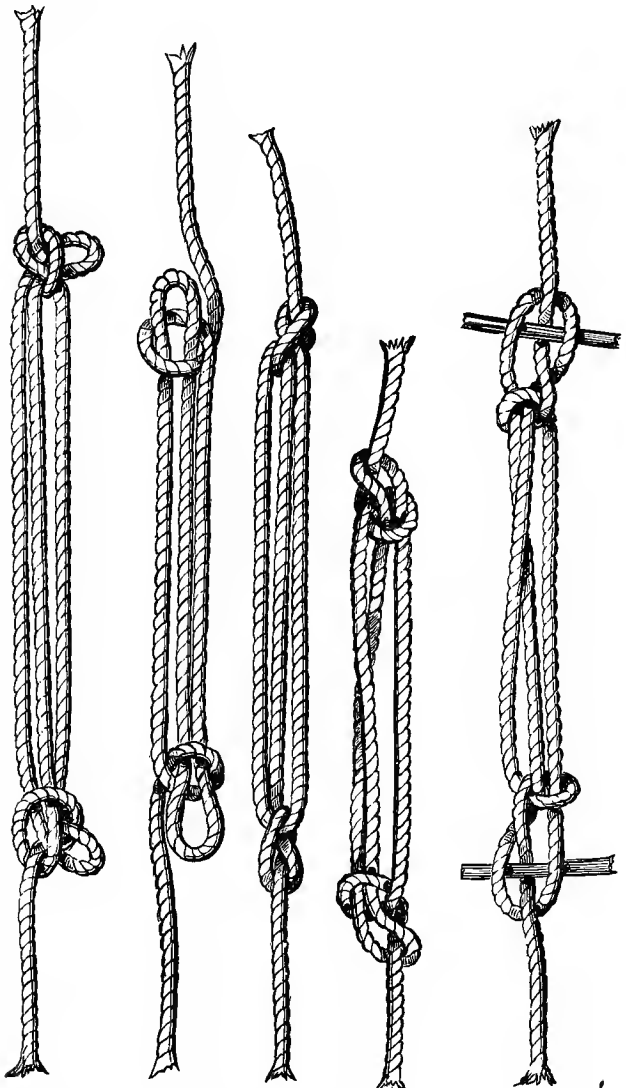
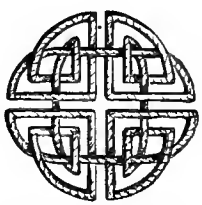


Fig. 50. Fig. 51. Fig. 52. Fig. 53. Fig. 54.

tenings, which can only be made when one end of the rope is free. To make Fig. 52 we ought to form a simple knot, and whilst open pass the loose end of the rope through the loop, and the shortening can then be made of the desired length, and fastened at the end of the hitch by a similar simple knot. Fig. 53 is an improvement, inasmuch as the strain is more equally borne by the various parts of the rope. It is formed by placing the rope in the position of Fig. 45, then turning the loose end first round the upper end of the hitch, and then the lower, and fasten by bringing the end through the loop which remains. The advantage of Fig. 54 consists in the fact that it can be loosened at will, by taking out the marlinespike or wood pin.



AN ORNAMENTAL SHORTENING FROM THE CROSS OF TERMONFECHIN.

VII.

KNOTS FOR UNITING ROPES.

THE knots most common—those in use in everyday life are those which are used in uniting two separated ends of ropes—are not those used as stoppers or "shortenings" on a single line, but are used for uniting the ends of two separate pieces of rope.

Fig. 55. Fig. 56. Fig. 57

When two simple loops or hitches (Fig. 16) are crossed together (Fig. 55), they form the commencement of the famous Sailor's Knot, a variation of the REEF KNOT (Fig. 57), which is loosely formed in Fig. 56. In this knot the two ends lie close together, and when the ropes are of equal thickness it forms one of the simplest and best knots for uniting two pieces of rope or cord, and can be easily untied; and hence its use as a reef knot. If, however, the cords be of unequal thicknesses, the knot will slip and form a loop as in Fig. 58, and part company. If the ends are not laid

parallel to the rope, as in Fig. 59, it becomes the FALSE or GRANNY KNOT. On a comparison of Figs. 60 and 57, where the two knots are shown drawn taut, the difference in neatness and compactness will be at once apparent. The reef knot may be made either under hand or overhand, as may be most convenient. If it is necessary to use ropes of different thicknesses, then the ends of the sailor's knot must be wrapped or tied to the cord, as shown in Fig. 61, which shows a very useful and neat method of joining two ropes, if time is not an object. On the other hand, the "OPEN-HAND" KNOT is one of the quickest made; it has also the recommendation of never slipping or untying — it remains firm; but if a great strain is put on the rope, it is more apt to break at the knot than many of the other knots. Besides, it is thick, heavy, and clumsy, whether tied to the right or left. Fig. 62 shows its open formation from the front, and Fig. 63 its back view when drawn taut.

For small cord or twine the WEAVER'S KNOT is perhaps the best; for thread it is incomparably the best knot, and easiest made. The two ends are taken and crossed, as Fig. 64, and both cords are held between the thumb and forefinger of the left hand. The right end (A) is then looped back over the left end and brought under the thumb, where it is held fast, while the right-hand end (B) is slipped through the loop at C; the knot (Fig. 66) is then formed by tightening the right-hand cord. If cord thicker than thread is used, the end B must be held between the thumb and finger

of the left hand whilst the knot is being drawn taut, as in Fig. 67.

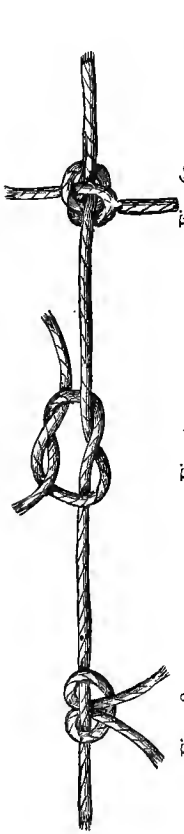


Fig. 58.

Fig. 59.

Fig. 60.

Fig. 61.

Fig. 62.

Fig. 63.

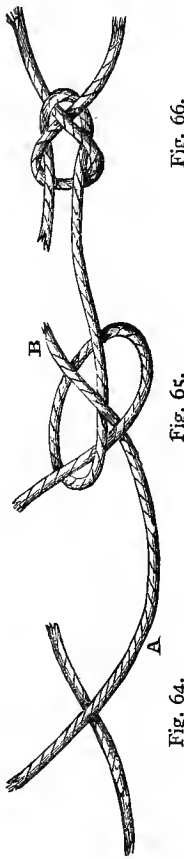


Fig. 64.

Fig. 65.

Fig. 66.

The "FISHERMAN'S," or, as it is sometimes called, the "ENGLISHMAN'S" KNOT, is of quite another cha-

racter. It is formed of two simple knots (see Fig. 70) slipped over each cord, as in Fig. 68. When drawn taut its front appearance is shown at Fig. 69. It is a very useful knot. To anglers it is invaluable, as it may be separated by taking hold of the ends A, B, so as to admit a third line between them as a "dropper," in fly-fishing. In joining gut-lines the same knot, left a little apart and the intermediate opening wrapped or whipped with silk, forms one of the strongest and most reliable fastenings known. Mr. Cholmondeley Pennell, who subjected this knot to a series of experiments, found that the line snapped sooner at any other part than at this knot. It is also very useful to join ropes for temporary purposes only, as it is firm and may be easily untied.

The "ORDINARY" KNOT or TIE, for uniting large ropes, is shown in Fig. 71. It has all the advantages of the open-hand knot, with the additional recommendations that it is easy to make, very strong, and does not strain the fibres of the rope. It is formed by first making a simple knot (Fig. 70), and then interlacing the other cord in the manner shown at Fig. 71. When drawn taut it has the appearance of Fig. 72. However great the strain, it does not injure the rope, which keeps also in a straight line, which it will not do with the open-hand knot, Figs. 62 and 63. If the ends are whipped with twine, as shown in Fig. 61, it is really a neat and handsome as well as a useful knot.

Another knot, which may be termed a Shortening Tie, is shown at Fig. 74. It is a handsome knot, and

is used when there is too much rope, and where it is necessary to use a large knot for the purpose of pre-

Fig. 67.

Fig. 68.

Fig. 69.

Fig. 70.

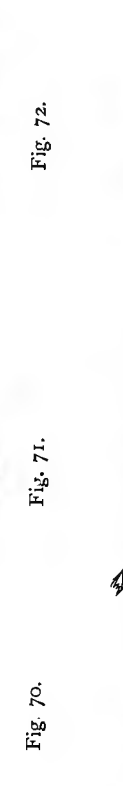


Fig. 71.

Fig. 72.

Fig. 73.

Fig. 74.

Fig. 75.

venting its running too far through an eye, ring, or loop. It is formed by making the figure of 8 knot at the end of a rope (Fig. 73), which is a double knot

and then interlacing the other rope through it, as in Fig. 26. When drawn taut it has the appearance of Fig. 75.

It is sometimes necessary to join hawsers, as well as ropes, for some temporary or permanent purpose, and for this some special contrivances have to be made. The simple HAWSER BEND (Fig. 76) is so easy

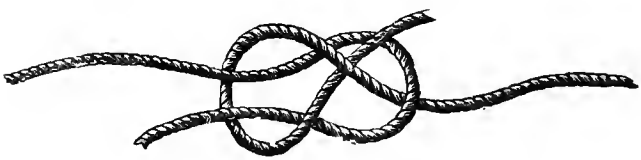


Fig. 76.

as to be constantly adopted when only a temporary purpose has to be served. It is a simple hitch within a loop. The GARRICK BEND is stronger and more reliable (Fig. 76*). What is known as the BOWLINE

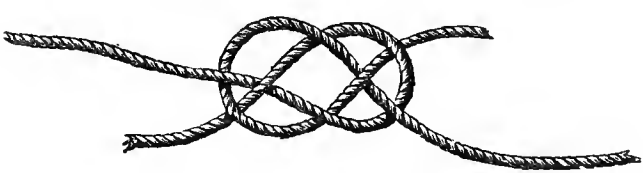


Fig. 76.*

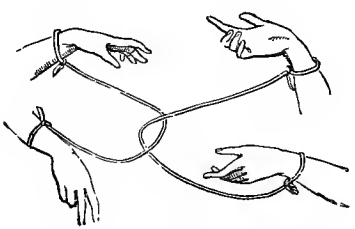
BEND (Fig. 77) is perhaps the strongest of all the knotted hawser bends. It is formed of two BOWLINE KNOTS, one crossing the loop of the other. The diagram gives a good idea of this bend.

Fig. 77.

The HALF-HITCH and SEIZING BEND (Fig. 77*) takes more time, and is used on hawsers which require to be joined for a long period; its formation is evident.

Fig. 77*.

These are all the knots, properly so called, used for the purpose of uniting two pieces of rope which have simple ends. The knots are very different when one rope has a temporary or permanent loop; some of these are elsewhere given.



A KNOT TRICK.

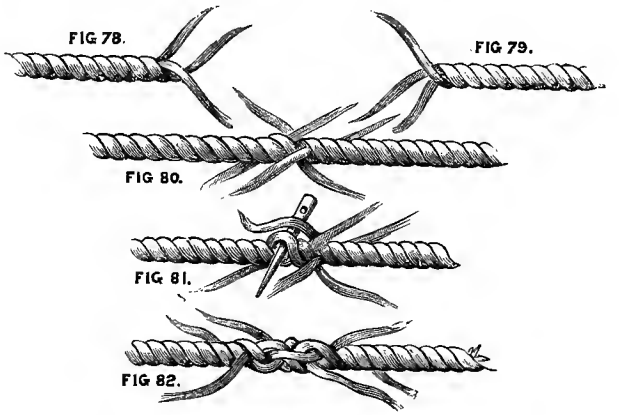
VIII.

SPLICES.

HAWSERS, cables, and even ropes sometimes require uniting in such a manner that there should be no obvious difference in their diameter, and no substantial weakening of their strength.* This can only be accomplished by means of "Splicing,"—that is, putting the ends of ropes together by opening the strands and placing them into one another; or, if equal diameter is not essential, by putting the strands of the end of a rope between those of a bight.

A SHORT SPLICE (Fig. 82) is not difficult, and is only used where there is not much strength required, and time does not permit of making the long splice, which is far the best. Open the ends for a short distance (Figs. 78, 79), and place them together as shown in the diagram (Fig. 80); grease the ends of the strand well, and lay them one within the other, drawing them as hard as possible to each other. Hold the end of one rope and the three strands which come from the opposite rope fast in the left hand, or, if the rope be large, stop them down to it with rope yarn; then with a marlinespike (Fig. 81) open the strand, and

* A splice weakens a rope about one eighth.



push down the middle strand of the other end, and by raising alternate strands on both ends, and working in the strands as shown, it assumes the appearance of Fig. 82. It must not be forgotten that the first strand must be passed over the strand which is first next to it, and through *under* the second, and out between the second and third next to it. In the subsequent operation, the strands must be passed *over* the third from it, and under the fourth and through. Only one-half the strand need be passed the second time, and the other cut off to taper the splice.

To know how to make a LONG SPLICE is most useful in every condition of life in which cordage is used, as a long-spliced rope will reeve and run through any block, just the same as a new rope, and comparatively as strong. You unlay the ends of two ropes to a distance three or four times the length used in a

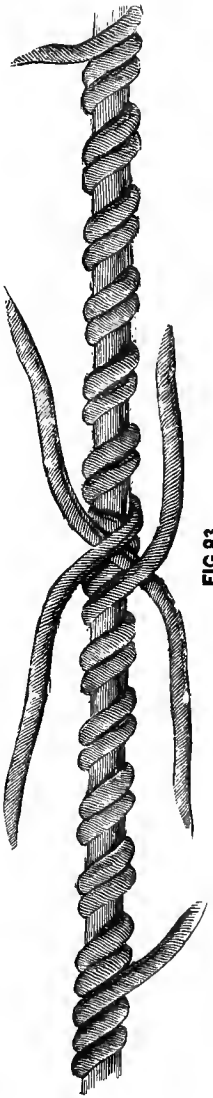


FIG 83.

short splice, and splice them within one another in the same manner. Unlay one strand for a considerable distance, and fill up the interval which it leaves with the opposite strand from the other rope, and twist the ends of these two ropes together. Then do the same with two more strands. The two remaining strands are twisted together in the place where they first crossed. The general appearance of the splice is shown in Fig. 83. The ends *in progress*, which are here shown short, are cut and passed through as in the short splice. Before cutting, the rope should be got well on the stretch.

A chafed strand is not only unsightly but weakens a rope, whilst the two remaining strands may be perfectly sound. It is sometimes desirable to put a new strand in, and this is done by cutting off the chafed strand for some distance, and then taking a strand from a new rope and laying it into the score in which the damaged one lay before.

Lay it up just as in a long splice, cut half, and stick the half-strands, and the repair is accomplished. When the splice is left thicker than the ordinary rope, it is termed a Pudding Splice, and is used on emergencies.

A CUT SPLICE (Fig. 84) is frequently useful to make a loop in a rope. To form it the rope is cut in

Fig 84.

Fig. 85

two, and the ends are unlaid as for a short splice. Place the ends of each rope against the standing part of the other, forming an oblong eye of the size you wish (as in Fig. 84), then pass the ends through the strands of the standing parts in the same manner as in the short splice, and the operation is complete.

An EYE SPLICE (Fig. 85) is used by seafarers to splice round a block, deadeye, or thimble, and is formed by unlaying the end of a rope for a short

distance, and laying three strands upon the standing part, so as to form an eye. Put one end in the strand next to it in the same manner as the short splice, put the next end over that strand and through the second, and put the remaining end through the third strand on the other side of the rope; taper them, divide the strands, and put them in again.

Fig. 86.

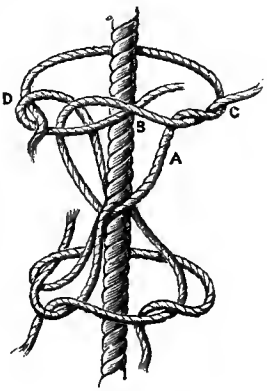


Fig. 87.

A SHROUD KNOT (Fig. 86) is another method of joining two ropes. You open up the ends of the ropes, as in a short splice, and place the strands one within the other; then single "wall" the strands of one rope (see Figs. 172, 174) round the standing part of the other against the lay; taper the ends off, and serve over.

The best method of making a FRENCH SHROUD KNOT (Fig. 89), which is neater, may be thus described:—The strands are placed as in a short splice; they

are placed closely, as in Fig. 87. Make a loop of the strand A; pass the end of strand B through the bight of A, as C; make a loop of strand D, and pass the end of strand A through it, as at D; then pass the end of strand D through the bight of strand B, and one side is complete. Care should be taken that all the ends should be passed through the loops or bights, for this is "walling." Follow the same plan with the three strands on the other side, and then draw all ends taut, when the knot will be shown as in Fig. 88. The ends of the strands must then be tapered on each side, marled, and served over, and when complete will look as Fig. 89.

Fig. 88.

Fig. 89.

IX.

OTHER MODES OF UNITING ROPE.

OCCASIONS constantly occur both on sea and land, in fair weather and foul, to unite ropes on the bight, or that are fitted with eyes or other loops. In Fig. 90 we show the simplest of all these knots, a running knot fastened in the eye of a rope. There are many

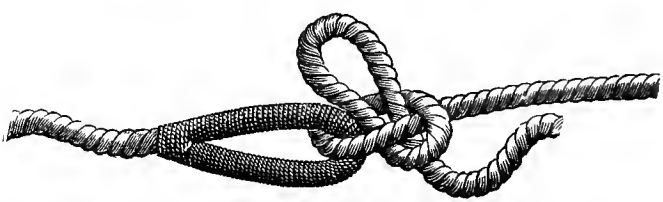


Fig. 90.

other modes of fastening a simple end to a ring, loop, or eye, and these will be found fully illustrated in Section XI, devoted to moorings and anchor fastenings.

The WEDDING KNOT (Fig. 91), or "Rose Lashing," is one to join two rope-ends, both having eyes. The lashing is passed successively through both eyes, and then tied in the centre.

Fig. 91.

Fig. 92.

Fig. 93.

Fig. 94.

Fig. 92 is a joint by a spherical shell, each loop being made as in figures, and surrounding the ball of wood technically called a shell.

The DEADEYE LASHING (Fig. 93) is one of frequent use in various forms on board full-rigged ships; it admits of easy adjustment to the strain of the ropes. The ram blocks are fastened in the eyes, which are here made by simple lashings, and tightened by the lanyards (A A), which pass through holes in the deadeye, so as to tighten or slacken the rope at will. The ends of the lanyard are fastened to the main rope. These deadeyes are frequently seen fastened to the point wherever it is necessary to strain the cordage.

In Fig. 94 are shown three methods of joining cordage—A is what is termed a BELAYING-PIN SPLICE. The belaying-pin, which is here shown stopped on the end of the rope, and served with yarn, is passed through the eye of the rope, and at the other end a loop is formed. Through this loop or bend a "button," secured to the rope (B) by a single knot, is passed, and the double junction is complete, and has the advantage of being separated in an instant.

Loops and eyes in ropes are in constant use for a variety of purposes. In the previous section, the mode of making an "eye" in the centre of a rope is shown (Fig. 84), as well as the "eye and splice" (Fig. 85). The latter, however, is not so strong or durable as

An ARTIFICIAL EYE (Fig. 95), which is made more in

the manner of a long splice. Take the end of a rope and unlay one strand; lay the two strands back to the standing part of the rope; pass the strand which has been unlaid over the end and in the intervals round the eye, until it returns down the standing part, and lies under the eye with the strands; then divide the strands, taper them down, and serve them over with spun yarn. This is the "eye," or loop, shown at Figs. 90, 91, 94, served over.

Fig. 95.

A FLEMISH EYE (Fig. 96) is thus formed:—The rope is at first whipped, and the strands unlaid to the

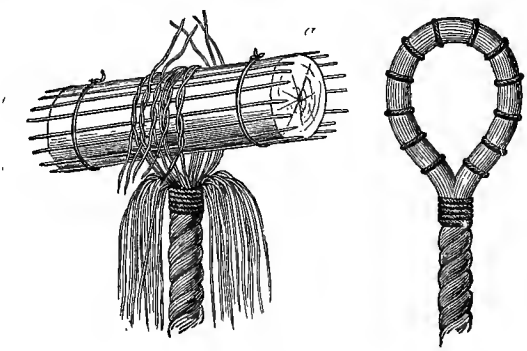


Fig. 96.

whipping and opened out, separating each rope yarn. Take a piece of wood the size of the intended eye (*a*) between, and along it lay three or more stops (*b b b b*);

hitch over the yarns, and tie with overhand knot (as *c*), crossing them somewhat; seize the ends, and worm them between the strands at the shoulder; then marl all down, parcel, and serve the ends.

The THROAT SEIZING (Fig. 97) is more rapidly made. The end is only partially opened, and lashed with yarn in the manner shown.

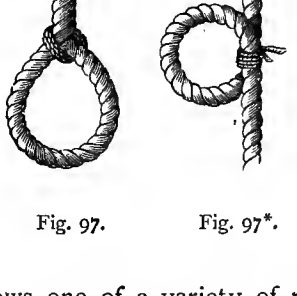


Fig. 97. Fig. 97*.

Fig. 97* shows one of a variety of rings now but seldom used, but still useful to pass other ropes through in the rigging, and occasionally on land. Another ring is formed by lashing the two ends of a short piece of rope to the side of a long one, giving the requisite loop.

A GROMMET (Fig. 98) is a spliced ring so useful that no boat or vessel should be without them. They are used to lengthen ropes, to play at quoits on board foreign ships and steamers. They are made to furnish handles to chests, and a variety of other purposes at sea; but are but little known on shore. It is formed

of a single strand of rope, which, after you have formed your ring of the size you may require, is laid, in its turns, twice round the ring in the crevices, following the lay until the ring is complete. Finish with an overhand knot (Fig. 55), divide the yarns, and stick them in, as in a long splice.

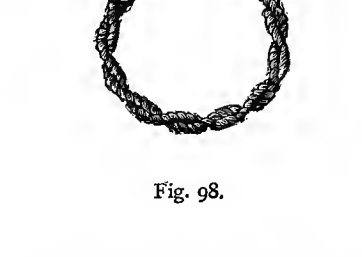


Fig. 98.

Fig. 99.

A SEVAGEE is a ring of rope yarns laid round and round a bight, and marled down in a similar manner to the "Flemish Eye." They are strong, exceedingly useful, and are used, like the grommet, for block-straps, and as straps to go round a spar, for a tackle to be hooked into for hoisting.

One of the readiest made of these loops, to be used for hoisting, is the CAT'S PAW (Fig. 99), where, by twisting the rope against the run, it forms a twist on either side, which is sufficiently strong to hold hooks or tackle to carry considerable weight.

X.

TIES.

TIES are the popular embodiment of knots in general. The old saying of "being tied to your mother's apron-string," has a broader meaning attached to it than the mere technical idea of a tie. Then ties are so various. There are home ties, ties of the affections. The cricketers tied when they were so equally matched that neither won. The young wooer wishes to be tied; and, to facilitate that desirable event, he puts a handsome tie about his neck; and the parson, when about to tie the nuptial knot, is very particular, too, about his spotless tie. The surgeons, also, use ties for arteries in amputation (Fig. 102), and for reducing dislocations (Fig. 104), for it holds firm, and does not tighten when pulled. Shopkeepers are adepts at tying, for they have to tie up innumerable parcels in the course of a year. Their idea of tying is really a combination of particular knots, though the final fastening is the only technical tie properly so called. The model tie of tradesmen is the

STATIONER'S KNOT (Fig. 100), which may be tied either right or left-handed. It always remains firm, and can be instantly untied by pulling the loose end. To tie it, a running loop or noose is tied at the end of the string, and it crosses the parcel in a vertical direction; the cord is then carried crossways round

the package, and fastened as seen in the sketch. The knot can be made by three movements of the fingers, so mechanically as to appear to be tied without an

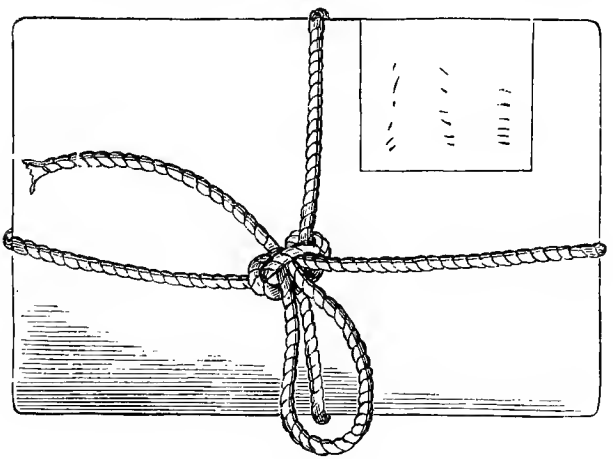


Fig. 100.

effort. This tie is only adapted for small cordage and parcels, but is one of the most useful of its class, and is inserted here for its general utility.

Ties vary in form according as the object to be fastened is loose, tall, or short. Thus the ties used to secure timber vary from the ties which secure a boat or a ship to a pier or a post (Section XI.), and these again vary from those which are useful to secure the rope round a mast, or pole, or tree.

The commencement of a simple knot round a tree, mast, or other solid substance, is shown at Fig. 101;

Fig. 101.

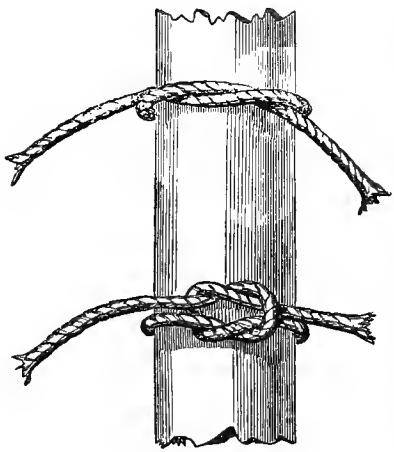


Fig 102.

the knot, which is in reality a reef knot, is shown finished at Fig. 102.

The TIMBER HITCH (Fig. 103) is one of a series of knots which depend for their firmness upon the friction of the parts. It is so firm, that the greater the strain the tighter it becomes. Closely allied to it is the CLOVE HITCH, or BUILDER'S KNOT (Fig. 104). This knot is used by builders to secure their scaffolding, and is in constant use on shipboard. The friction is sufficient to hold the rope firm on a perfectly smooth pole against a heavy lateral pressure.

Fig. 103.

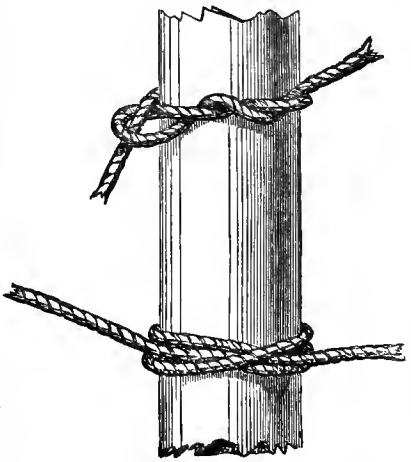
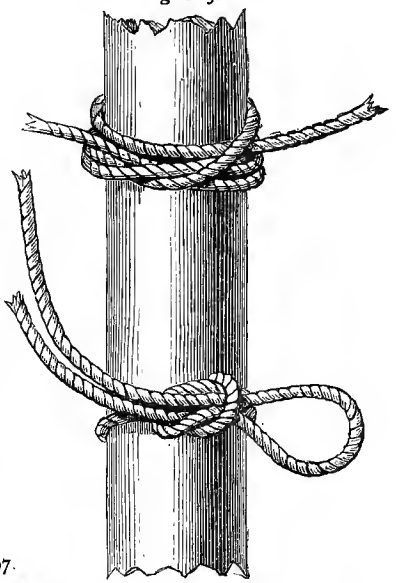


Fig 104.

Fig. 105.



The clove hitch is used by surgeons in cases of dislocation of the thumb, to assist the operation. When the ends are knotted, the builder's knot becomes the Gunner's Knot. The Double Builder's Knot is shown at Fig. 105. It is, however, but seldom used. The value of these knots is so great, that a little time spent in practising the loops necessary to use it instantaneously on a pier or post will be amply repaid in the course of a year.

Fig. 106.

Fig 107.

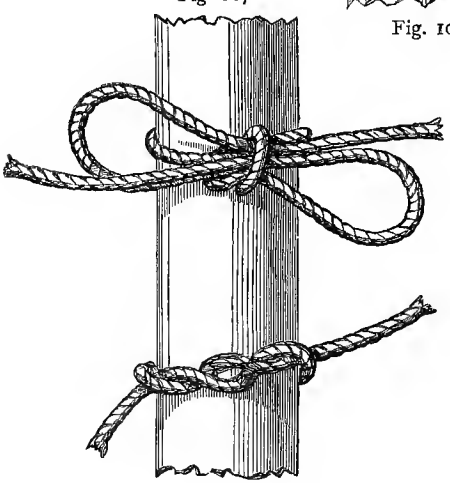


Fig. 108.

Fig 109.

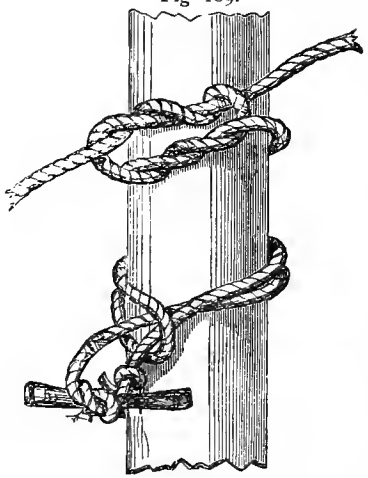


Fig 110

The DOUBLE BOW and SINGLE BOW KNOTS are the most common and most useful of all knots. They are both commenced as Fig. 101, and the single bow (Fig. 106) is made by doubling one of the loose ends when forming Fig. 102; it thus is easy to untie. Care must be taken in this, as in the double bow (Fig. 107) or rosette knot, to keep the simple knot taut until the knot is complete. The ends must lie straight, as in the reef knot, or otherwise it will become the false knot known as the "granny."

Fig. 111.

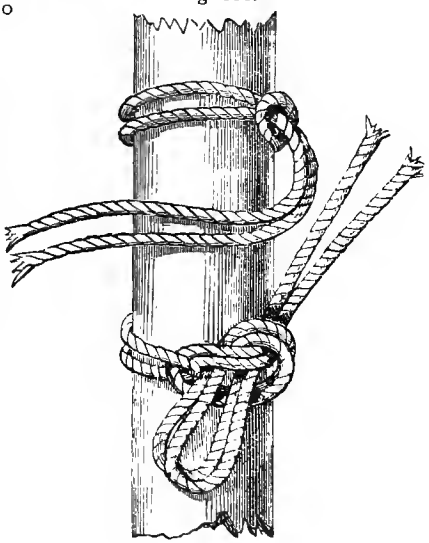


Fig 112.

which should always be avoided. In small cords, where considerable tightness is required, a twist knot may be used, either in connection with the bow knots, or, as in larger cordage, in a Double-twist Knot (Fig. 109). The commencement is shown at Fig. 108. In

Fig. 113.

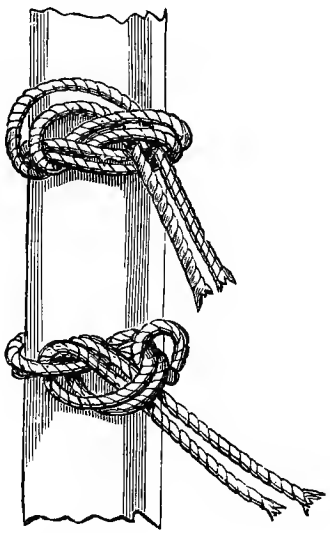


Fig. 114.

small cords this knot may be finished as in the common knot (Fig. 102) when extra tautness is required, and no assistance is near to hold the first knot until the second is completed. (The diagrams are purposely drawn loose, so that their construction may be more easily seen.)

The knot shown at Fig. 110 is one that can be

recommended to all who have to occupy tents or to travel much. It is a simple loop made by joining the two ends of the rope with a fisherman's knot (Fig. 68). This admits a short cross-bar or wooden pin, and it will enable the traveller to suspend clothes, or any articles, round a tent-pole. The cord may also be used for a "toggle" when two pieces of wood have to be joined together.

A common form of running knot, with two ends, is shown in Fig. 111. It is used when it is inconvenient to divide the rope. Unless the ends are at liberty, it could not be used round a mast; but it can be easily slipped round a pier. It is frequently checked by a bow, as at Fig. 112, or by the FLEMISH KNOT (Fig. 113), or the CHECK KNOT (Fig. 114). The two last knots cannot be tied unless the ends are loose; and they cannot be untied without assistance from a marlinespike or some similar contrivance.

XI.

MOORINGS, RING KNOTS, AND FASTENINGS.

THERE is a popular fallacy about sailors' knots. A reef knot is a true sailor's knot. We know how deftly Jack, when ashore, ties his black silk neckerchief with a running hitch; but this is but half a sailor's knot. What is called a true sailor's knot has two or more hitches, which may be reversed. In Figs. 115 and 116 we have two varieties of sailors' knots, showing one line straight whilst the end is simply twisted round in two hitches. These are good mooring knots for the painter of a wherry or other small boat.

An excellent temporary fastening of the end of a rope, and one that can be cast off in a moment, is shown at Fig. 117; and in this respect it is the reverse of the more permanent stoppered loop at Fig. 118. For rapidity of unmooring, Fig. 119 has by far the advantage. It is a simple boat knot, with only one turn in the ring; the loose end is left longer than shown in the engraving. This boat knot sometimes catches the ring, and sailors prefer

The LARK BOAT KNOT (Fig. 120), which is fastened by a wooden pin. This knot admits of the instant release of the boat.

Fig. 115.

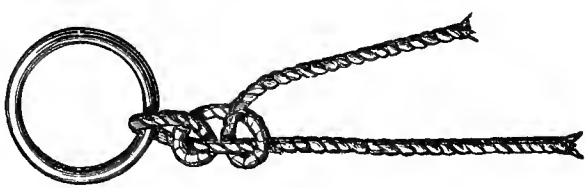


Fig. 116.

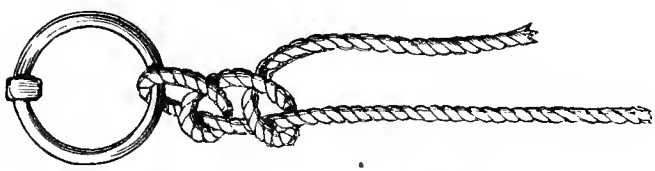


Fig. 117.

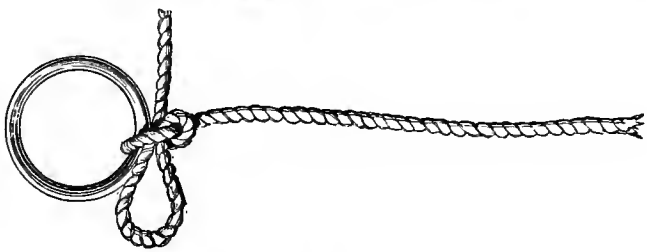


Fig. 118.

Fig. 119.

Fig. 120.

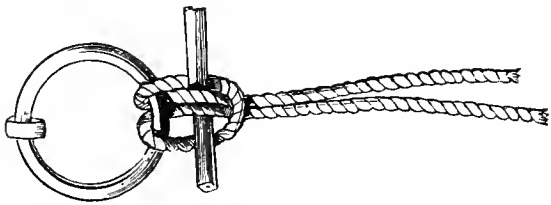


Fig. 126.

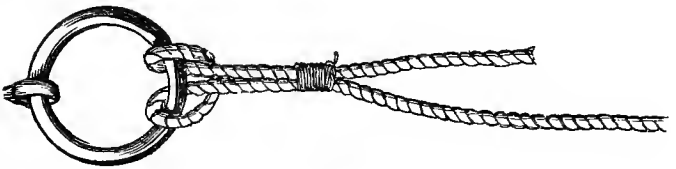


Fig. 125.

Fig. 124.

Fig. 123.

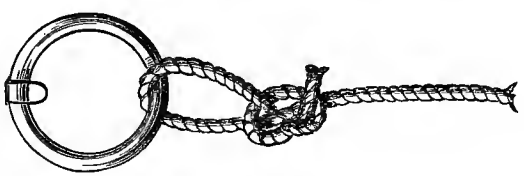


Fig. 122.

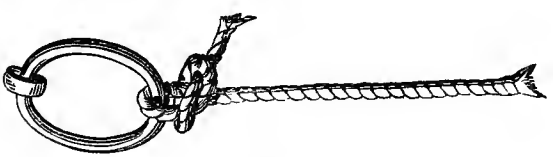
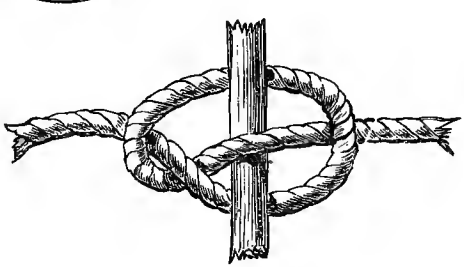


Fig. 121.



Another simple but useful knot for securing any object on a sudden emergency is the boat knot shown at Fig. 121, which is an incipient running knot, so to speak. Instead of the line running through the loop, a small piece of wood or other object is passed between it and the loop, and is so held fast.

Simple and crossed running knots are shown at Figs. 122 and 123. The simple running fastening (Fig. 122) is not so secure, but chafes less than the crossed running knot (Fig. 123). Even this gives place to the more elaborate

CAPSTAN KNOT (Fig. 124), which is a species of figure of 8 fastening.

The LARK'S HEAD KNOTS are far more secure, and are more generally used for anchor fastenings. Fig. 125 shows the ordinary form of this useful knot. Fig. 126 is the same form of knot stoppered, and Fig. 127 when it is simply crossed. The double-looped lark's head is shown at Fig. 128, and the treble lark's head at Fig. 129. The tying of these knots is sufficiently obvious, and their variety would seem to meet Captain Galton's suggestion in his "Art of Travel," that they admit of sufficient variety to form a constant guard against the pilfering of the rations and luggage waggons when on a journey (see Section XVI.) The various forms of ring knots are still further extended by the

BACKHANDED SAILOR'S KNOTS, shown at Figs. 130 and 131.

SLIP KNOTS, stoppered, are shown by Figs. 132, 133.

Fig. 132.

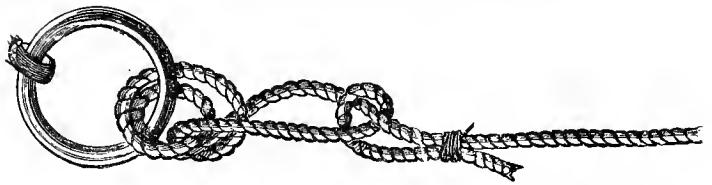


Fig. 131.

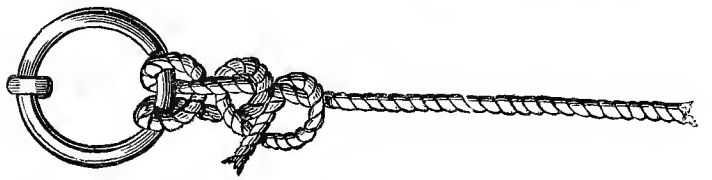


Fig. 130.

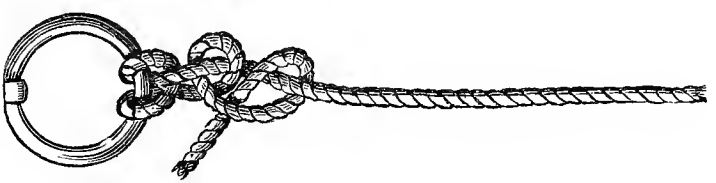


Fig. 129.

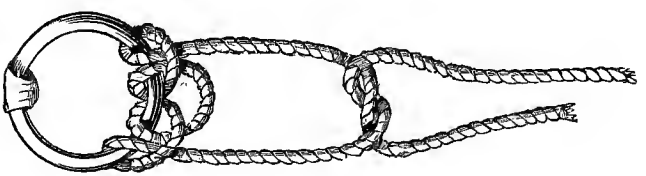


Fig. 128.

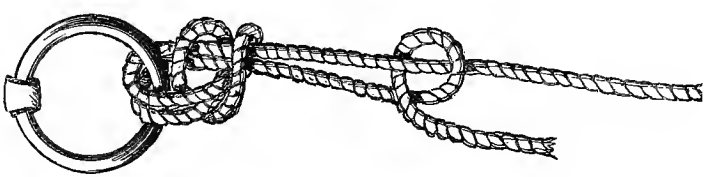


Fig. 127.

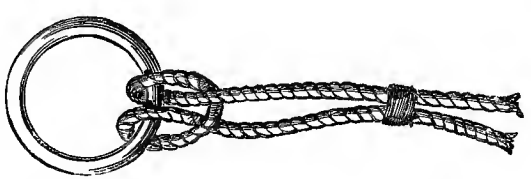


Fig. 133.

Fig. 134

Fig. 134 shows Fig. 135 secured by a slip clinch. This part of the subject may be appropriately concluded by a check knot, connecting two rings together. It is called by gunners a Delay Knot, and it is one of those knots which are ornamental as well as useful.

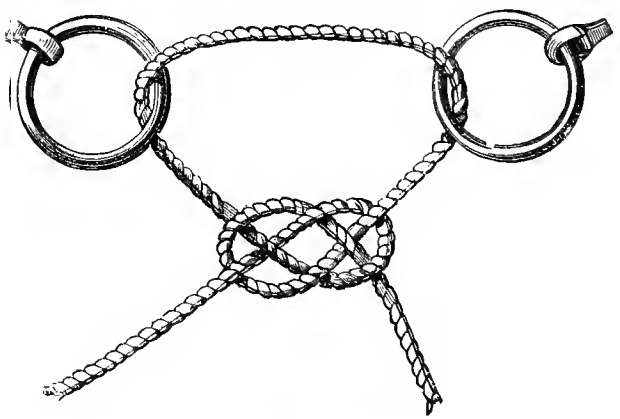


Fig. 135.

XII.

HITCHES AND BENDS.

IN the foregoing chapters a great number of hitches have been shown in connection with the various knots and fastenings. Those included in this chapter are of the greatest practical value in the every-day life of the builder, timber hauler, and warehouseman, as well as to those engaged in the docks and seafaring life.

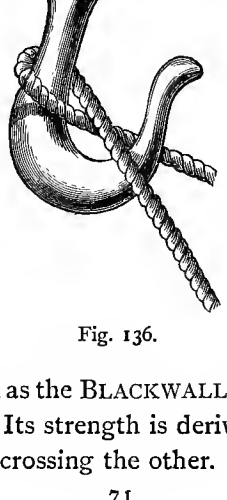


Fig. 136.

What is known as the BLACKWALL HITCH (Fig. 136) is the simplest. Its strength is derived from the friction of one rope crossing the other.

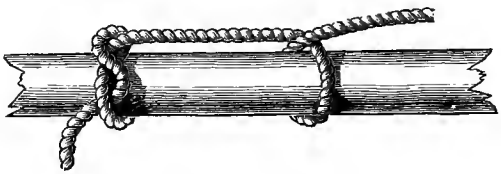


Fig. 137.

The TIMBER HITCH (Fig. 137) is used for towing or hauling timber. It consists of the simple timber hitch (Fig. 103), with an additional hitch higher up to give additional purchase to the rope.

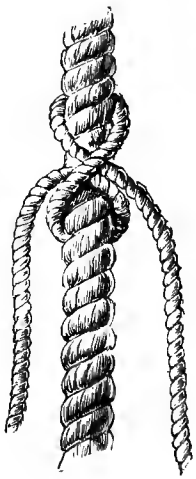


Fig. 138.

The CLOVE HITCH, so universal, is also used for the purpose of hauling in heavy cables or chains by two or more men (Fig. 138).

The CHAIN HITCH (Fig. 139) is another and more powerful method of attaching a small rope to aid in

Fig. 139.

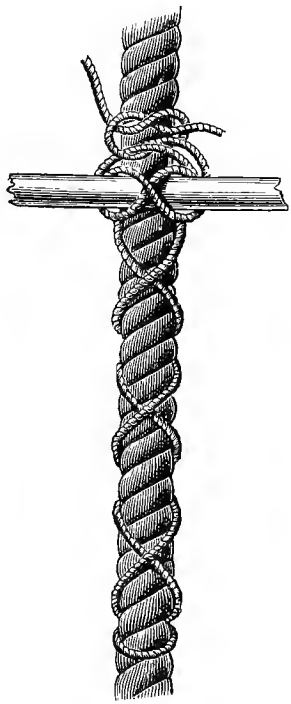


Fig. 140.

pulling in a larger, or of hauling a vessel by a warp to the shore. When it is necessary to use a lever as a handspike, the fastening 140 is used. It is obvious that occasions will arise when room cannot be found

for the ordinary hauling; then this mode of fastening is necessary.

The ROLLING HITCH (Fig. 141) is used principally for attaching a rope to an upright stay, spar, or scaffold-pole. It is a modification of the builder's double knot (Fig. 105).

Fig. 141.

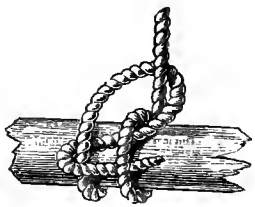


Fig. 142.

The MAGNUS HITCH (Fig. 143) shows one of the numerous hitches for holding spars, and the STUDDING SAIL BEND (Fig. 142) another. Frequently another hitch is taken round the spar for greater security. When it is necessary to hold another tackle by the same rope to a spar, the ROBAND HITCH (Fig. 144) is useful. The end is secured on the other side, as in Fig. 142.

Amongst the most useful methods of using cordage, that of Slings is the most general. Millers, sailors,

and stevedores are well acquainted with their use. A simple sling is merely an extension of a sevagee,

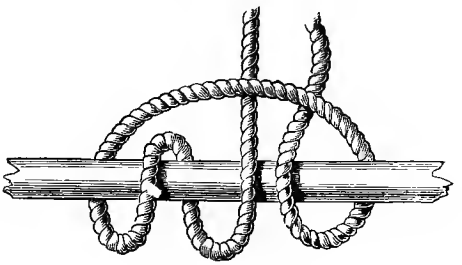


Fig. 143.

described on page 57, or it is an endless piece of rope, which is quickly passed round a cask, sack, or box

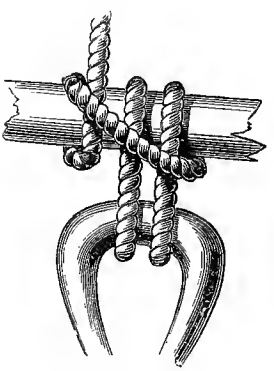


Fig. 144.

Fig. 145.

(Fig. 145) and hoisted aloft, or let down into the hold or waggon. The hook is slipped from one loop to the other, and the rising tackle carries the sling with it.

Fig. 146 shows another mode of slinging casks with a piece of rope, with the head closed. A running

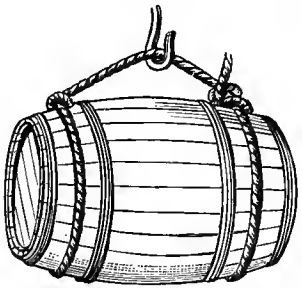


Fig. 146.

noose is placed round one end, and the rope is passed along the top of the cask, and then slipped round the

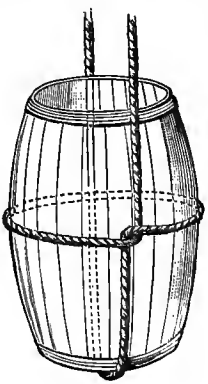


Fig. 147.

other end of the cask and fastened with reverse hitches, as shown in Fig. 116. This is not so rapid, but is used when a sling is not at hand. When the

head of the cask is open, it is slung as in Fig. 147—a ready mode of raising an injured man from a well or mine when other appliances are not at hand. The bight of the rope, or "whip," is fastened best by a bowline knot, and frequently another hitch is put round the cask nearer the head.

Sometimes it is necessary to put a stopper on a rope to prevent another slipping, or for other purposes. This is best accomplished by

Fig. 148.

Fig. 149.

Fig. 150.

A TURK'S HEAD KNOT, which is worked upon a rope with a piece of small line (Figs. 148, 149, 150). Take a clove hitch slack with the rope, with the line round the rope; then take one of the bights formed by the clove hitch and put it over the other, pass the end under, and up, and through the bight which is underneath; then cross the bights again, and put the end round again, under, and up through the bight which is underneath. After this follow the lead, and it will make a turban of three parts to each cross.

XIII.

FASTENINGS.

NOTHING is so astonishing to the eyes of a landsman on his first voyage as the facility with which the large steamer is warped out of dock from amidst a crowd of other vessels, and the ease with which it is

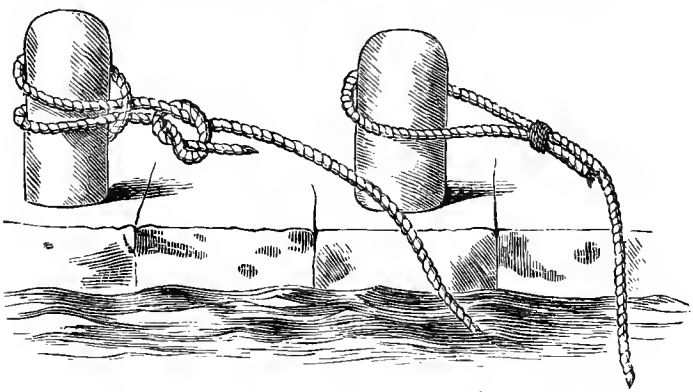


Fig. 154. Fig. 151.

moved to the pier by the simple twisting of the cable round a post or the huge cleats which are fastened into the sides of the vessels or on the pier-head.

The simple stoppered loop (Fig. 151) is familiar to all, and when the end of the rope can be constantly used no other fastening is required. It happens fre-

quently that either the end of the rope is not stoppered or the middle of the rope must be used, then the

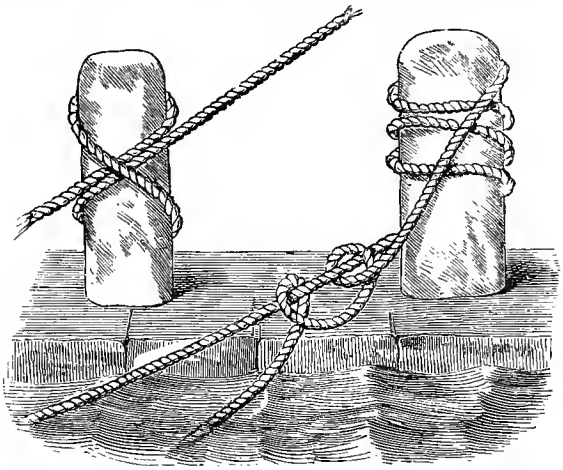


Fig. 152. Fig. 155.

WATERMAN'S KNOT (Fig. 152) may be used. This is similar to the clove hitch, and it can be made in a moment by placing two loops on the rope, as shown in Fig. 153.

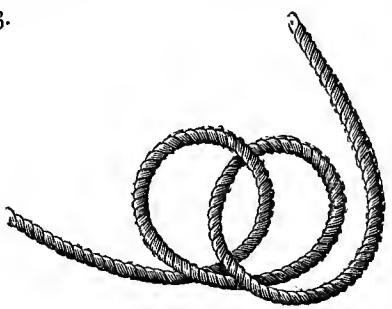


Fig. 153

A lark's head can be easily made over a post when there is a running noose or knot, as at Fig. 154.

The bend at Fig. 155 is an example of the holding power of a twisted rope, which is mentioned in connection with the stopping of the balloon in the introduction to these sections.

The CHAIN FASTENING (Fig. 156) is of a more

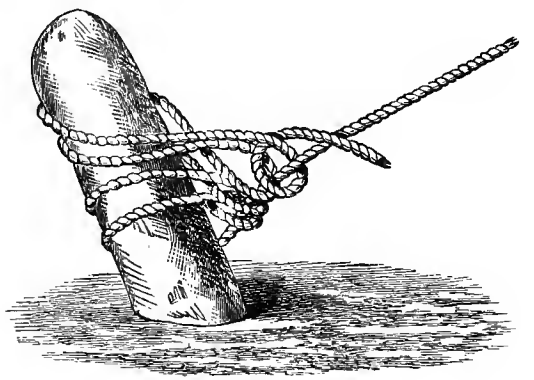


Fig. 156.

permanent character, and is used when the vessel is likely to remain some time. It is also useful in agricultural work when the end of the rope would be in the way of the waggon, machinery, or men.

Occasionally square moorings or sheaves are used for the mooring of vessels. In these cases the fastenings vary.

Fig. 157 is a double chain fastening to sheaves.

In Fig. 158 is a loop fastening to sheaves, which may be tied or untied without untying the loop itself.

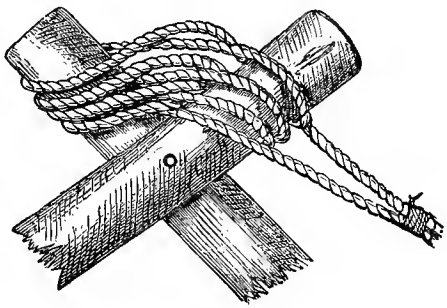


Fig 157.

This knot holds itself. It is made by passing the loops A, B, C, D, E, as shown, and then placing the

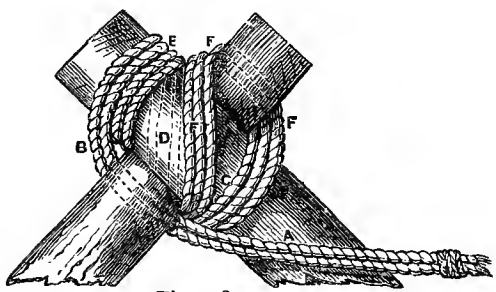


Fig. 158.

loop F over the head of the right-hand post of the sheaves. When slackened, the loop of the cable F will again slip over the head of the post, and the turns are then reversed. There is a more simple fastening by wrapping the cable round the angle of the sheaves.

In Figs. 159 and 160 there are two examples of a

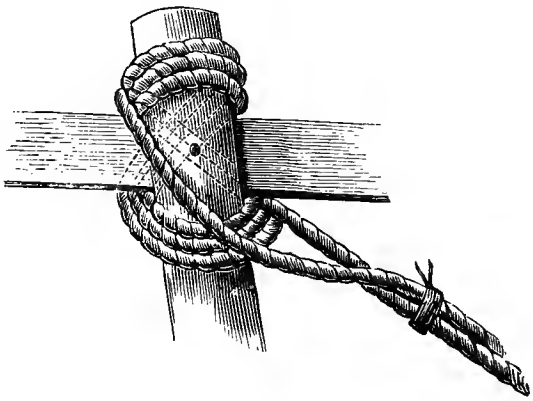


Fig 159.

crossed and square fastening, which sufficiently ex-

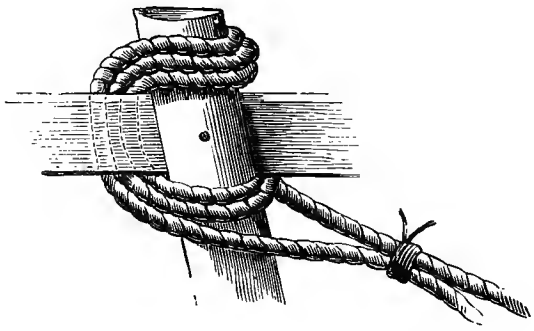


Fig. 160.

plain themselves. The ends are secured by being stoppered to the cable.

The ends of small ropes are secured round a belaying-pin, as in Fig. 161, or on a cleat (Fig. 162), the crossing several times repeated.

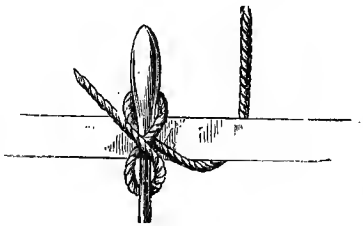


Fig. 161.

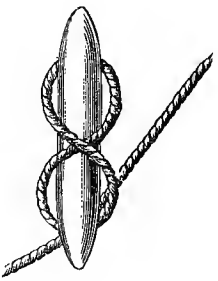


Fig. 162.

The holding together of ropes or hawsers by bands, ligatures, or ties, has been before alluded to. What is termed the NECKLACE TIE (Fig. 163) is an example

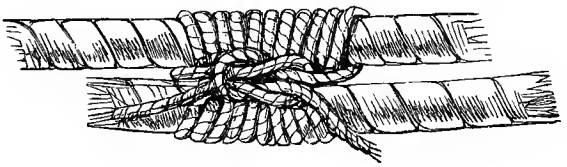


Fig. 163.

where the ends of the yarn are secured by a reef knot, after being passed over the band. It is a safe knot, and the greater the strain the tighter the knot becomes.

A useful band is shown at Fig. 164. The second end (B) is drawn through by a turn—a very useful method of securing the ligature of a fractured fishing-rod. Perhaps a better plan, but not always practi-

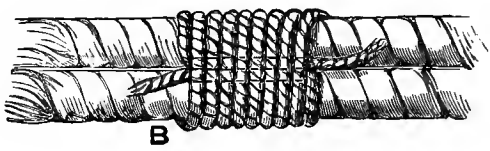


Fig. 164.

cable, is to lay the first end with a simple loop the length of the band, then tightly wrap the cord or string over the space necessary, and then the loose end may be threaded through the loop left by the

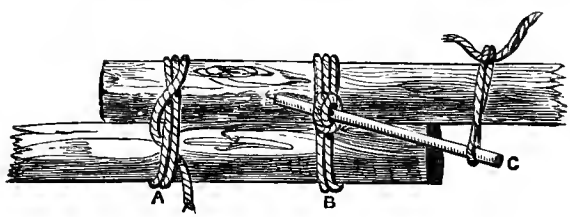


Fig. 165.

turn, and drawn inwards. This forms a very neat band, and it is easily made.

These bands, or ligatures, vary with the mode of fastening the ends. Sometimes the two ends are

fastened by a reef knot on the surface, and at others the ends are hitched through each other and drawn back, and not left straight as in Fig. 164.

The PORTUGUESE KNOT, used as a lashing for sheave legs. This knot is first a plain band round the legs when placed close together; the legs are then opened, and the ends secured between them, as shown in Fig. 163.

PACKING KNOTS are used for binding timbers together. In Fig. 165, the knot is shown commenced at A, and B the knot complete. It is tightened by means of a packing-stick, C, which is twisted under the knot, and then twined round and secured as shown. A quicker plan is two toggles, similar to the one shown in Fig. 166, and after twisting the sticks round, tie the two ends of the sticks together.

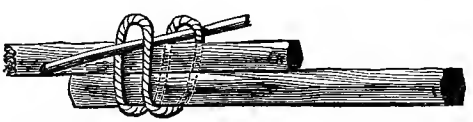


Fig. 166.

XIV.

THE ENDS OF ROPES.

If ropes, hawsers, or cables are left with their ends unguarded, they are sure to become untwisted or otherwise unmanageable. The same is true, in a lesser degree, of lanyards and smaller ropes. These can easily be secured with a fine whipping, and the smaller yarns and threads by a single overhand or other knot. The ends of ropes at sea are variously treated; in some instances they are finely tapered to a point, to pass easily through a block or ring.

The usual method of pointing a rope is first to stop it with a whipping (see Fig. 167), and then unlay the end of it. Take out as many yarns as are necessary, and twist each yarn in two. Take two parts of different yarns, and twist them tight into "nettles"*—three or four yarns twisted together—if the rope is not very small. The rest of the yarns may be combed down with a knife, and the rest put back upon the rope. Pass three turns of twine like a timber hitch taut

* A "nettle" is made of two or three yarns laid up with the finger and thumb, keeping the lay on the yarn, and is left-handed stuff.

round the part where the nettles separate, and hitch the twine, which is called the warp. Lay the nettles backwards and forwards each time. The ends may be whipped and snaked with twine, or the nettles hitched over the warp and hauled tight. The upper seizing

Fig. 167.

Fig. 168.

must be snaked. A piece of stick is put in if the upper part is too weak for pointing, and frequently the end is terminated by a small eye, as in Fig. 168, called an eye splice.

SNAKING A SEIZING is done by taking the end

under and over the outer turns of the seizing alternately, passing over the whole. The whole may be whipped also with small twine.

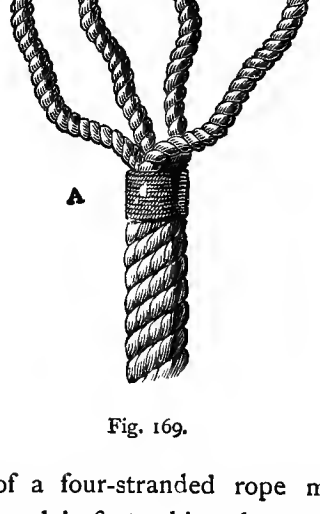


Fig. 169.

The ends of a four-stranded rope may be thus secured. The end is first whipped as at A, Fig. 169, and the four strands are opened out. They are then brought down over the end in loops, and the strands tied together (Fig. 170); or they may be simply brought down as in Fig. 171, and bound to the cable with twine.

A three-stranded cable may be finished by the SIMPLE WALL KNOT (Fig. 172), which shows the interlacing of the strands one within the other. When these are drawn taut the knot is finished. When a

single wall is "crowned," as it is termed, one end is laid over the top of the knot; the second end is laid

Fig. 170.

Fig. 171.

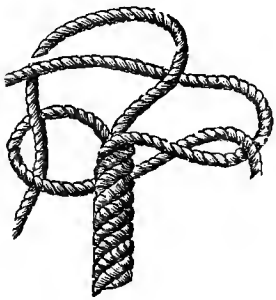


Fig. 172.

over the first, the third over the second and through the bight of the first (Fig. 173).

Fig. 173.

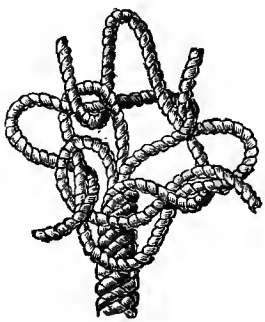


Fig. 174.

A DOUBLE WALL KNOT (Fig. 174) is formed by making the single wall first, and not hauling it taut.

Then take one end and bring it underneath the part of the first walling next to it, and push it up through the same bight (Fig. 174). Do the same with the other strands, pushing them up through two bights. If made thus it will have a double wall and a single crown.

Fig. 175.

Fig. 176.

Fig. 177.

A double wall double crowned is Fig. 174 continued. The strands are laid by the sides of those of the single crown, pushing them through the same bight in the single crown and down through the double walling, and the knot is completed (Fig. 175). Fig. 176 shows one method of finishing a single wall by cutting off the strands and tying them with twine; and the double crowned wall knot may by finished by a LARK'S NEST (Fig. 177), by interlacing the loose strands one within another by a requisite number of turns over the padding. This forms a knot at the end of the rope.

The knot known as the MATTHEW WALKER is formed as at Fig. 178. The whipping is first put on; the strands are opened; one strand is taken round

Fig. 178.

Fig. 179.

the rope and through its own bight, then the next strand underneath through the bight of the first and through its own bight, and the third strand underneath. When taut it has the appearance of Fig. 179.

XV.

KNOTS AND THEIR APPLICATION.

In Section I. we sketched some of the various uses to which a knowledge of knots may be put in every-day life. It is not every one that goes to sea, or lives even upon the sea-shore, but there are many who travel, many who live in "out-of-the-world" localities where artizans are scarce, but where rope or

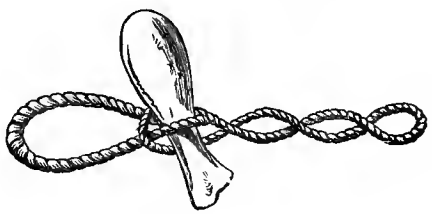


Fig. 180.

twine, or some substitute for it, may be found. In civilized life, as in primitive regions, a piece of string or rope is a carpenter's chest of tools, a saddler's shop, a ladder, straps, buckles, and half a hundred other things besides, which are not dreamt of in the philosophy of common men. Who has not seen a poor fellow wearying along with his pack slung over a stick, or in his hands, when a couple of slings shown

in Fig. 145 would enable him, if he shortened it to the proper length, to put his arms through the loops and carry it as a knapsack, easily and without unnecessary fatigue? If a buckle is wanted, what is more easy than to make a two-grommet, or rings of

Fig. 181.

rope, as in Fig. 180? and by inserting a piece of wood between them an extempore buckle is produced. In the same manner a swivel is frequently wanted in the country. The blacksmith may be away from home, or we may be far away from such an individual, with

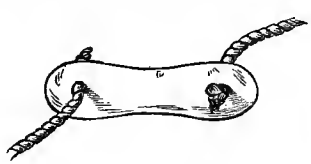


Fig. 182.

a chance of being benighted. A lucky thought strikes the "knot-tyer," and by the aid of a little bit of wood he produces the swivel (Fig. 181), strong and useful, if not ornamental. Another mode of producing a useful swivel, in a rough and ready manner, is shown at Fig. 182.

These simple contrivances, which have been culled from books of travels, will show how much a knowledge of the uses to which ropes may be put and knots tied is useful to mankind. An Alpine climber, or a puffin gatherer on the northern cliffs, without a knowledge of a bowline knot would be a lost man ; and, if lost, the bowline in a bight would enable him to seat himself, if alive, and be lifted up by strong hands

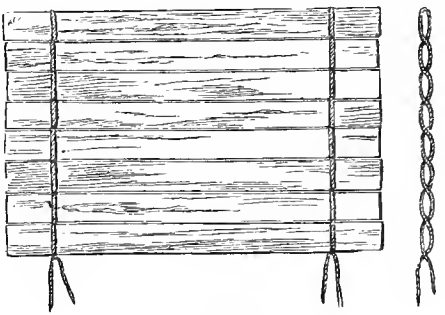


Fig. 183.

above ; or, if dead, the running bowline, or some of the running loops before described, would enable his friends to raise his body. The modes in which ropes are made to bind bamboos together in the East is suggestive of what might be done nearer home. There is a hitch which Captain Galton, in his "Art of Travel," calls the MALAY HITCH, for want of a better term. He shows how easily by it, when planks or boards are at hand, a shelter can be made without nails or injuring the boards, and so quickly that a party could

be housed in a few minutes. Yet by a glance at Fig. 183 it will be seen how simply it may be done: the cord is only twisted once as each board is inserted between them, and they are held together sufficiently tight for any temporary purpose.

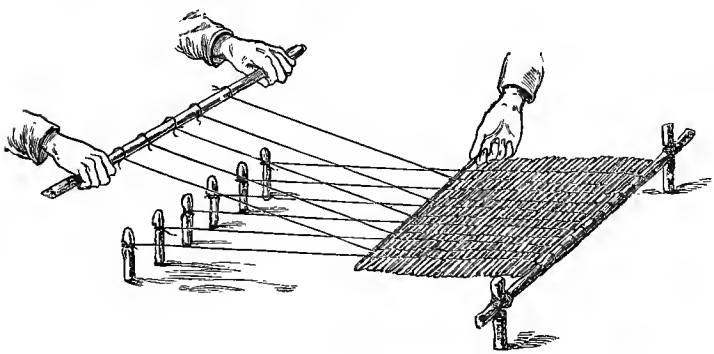


Fig. 184.

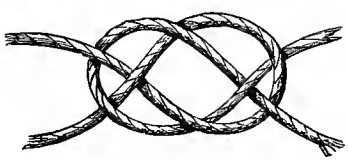
Take, again, the rude weaving apparatus shown in Fig. 184. A knowledge of such a mode of weaving was common in every farmhouse half a century ago. Yet in wet summers at home, now that coir twine is cheap and plentiful, it might be used with advantage on many a farm. The mode of its construction and use is thus given :—

Take two pegs, A and B, about 15 or 18 inches long, and drive them into the ground so as to be firm, and standing about a foot out of it. Then take a stick or piece of wood and lash it across the upright stakes at A B. A row of pegs at C may now be driven into the

ground parallel to A B, at equal distances apart—the distance should not exceed 6 inches. Two sets of strings are then tied to the stake A B. One set is tied to the stick or staff D E, and the others have their loose ends placed into clefts or notches on the pegs, at C. If there are a dozen strings, then the odd numbers, 1, 3, 5, 7, 9, 11, must be attached to the staff D E; and the even numbers, 2, 4, 6, 8, 10, 12, to the cross staff A B. By alternately raising and depressing D E, and placing a handful of straw or rushes between the strings at each movement, and making them lie close by pulling them with a stick, a good mat is made by this rough and simple mode of weaving, easily and rapidly, and when it has served its purpose, the string, if necessary, may be recovered. The mats may be trimmed and joined together, if thick and clumsy, by what is known as the cobbler's stitch, or by tying the string ends together.

The art of plaiting, or, as it is called at sea, "sennit" making, should be cultivated. In the section on Shortenings, we have given some illustrations of plaiting on one cord. The loose and tight drummer's plait is given; and in Captain Alston's "Seamanship," the necessity of cultivating the making of straw sennit, or straw plait, is inculcated, in consequence of the variety of purposes to which the art may be put, from the making of hats to the making of baskets. These are only a few of the many uses to which this knowledge

may be put in every-day life. The examples might be multiplied *ad infinitum*. Still, the uses of common things are too apt to be forgotten or overlooked in these busy days. Those curious in the many uses found for knots will be interested in the next section.



AN HERALDIC KNOT.

XVI.

AN ALPHABET OF KNOTS.

THERE is scarcely a traveller or explorer who has not felt the want of some simple and ready means of communicating a message apart from the usual pen and ink. Many persons have suggested a series of knots for this purpose, apparently in ignorance that such a scheme of knot writing was introduced for the use of the blind many years ago, by a teacher named David Macheath, of the Edinburgh Blind Asylum, and a scholar named Robert Mylne. They describe their "string alphabet," as they term it, thus:—The string alphabet is formed by so knotting a cord that the protuberances made upon it may be qualified by their shape, size, and situation for signifying the elements of language. The letters of this alphabet are distributed into seven classes, which are distinguished by certain knots or other marks. Each class comprehends four letters, except the last, which comprehends but two. The first, or A class, is distinguished by a large round or treble knot (Fig. 185). The second, or E class, by a knot projecting from the line; the third, or I class, by the series of links known

as the "drummer's plait." The fourth, or M class, by a simple noose; the fifth, or Q class, by a noose with

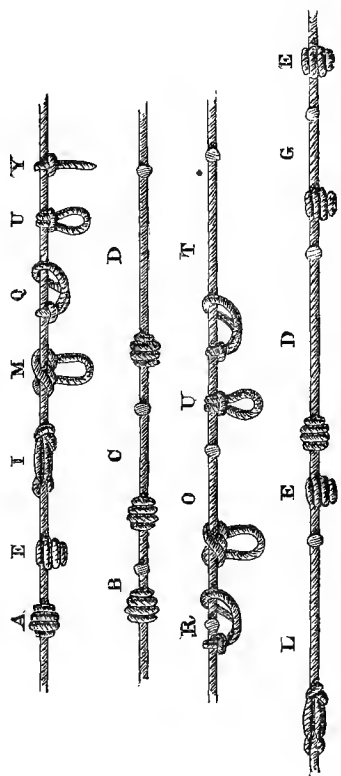


Fig 185.

a line drawn through it; the sixth, or U class, by a noose with a net knot cast on it; and the seventh, or Y class, by a twined noose.

The first letter of each class is distinguished by the simple characteristic of its respective class, the second by the characteristic and a common knot close to it, the third by the characteristic and a common knot half an inch from it, and the fourth by the characteristic and a common knot an inch from it. Thus A is simply a large round knot; B is a large round knot with a common knot close to it; C is a large round knot with a common knot half an inch from it; and D is a large round knot with a common knot an inch from it; and so on. The knotted string is wound round a vertical frame, which revolves and passes from the reader as he proceeds.

Of the general character of the string alphabet the inventors say:—"It must readily occur to every one that the employment of an alphabet composed in the manner which has been explained will ever be necessarily tedious; but it should be borne in mind that there is no supposable system of tangible figures significant of thought that is not more or less liable to the same objection. . . . There can scarcely be any system of tangible signs which it would be less difficult either to learn or to remember, since a person of ordinary intellect may easily acquire a thorough knowledge of the string alphabet in an hour and retain it for ever. Yet the inventors can assure their readers that it is impossible for the pen or the press to convey ideas with greater precision. Besides the highly impor-

tant properties of simplicity and accuracy which their scheme unites, and in which it has not been surpassed, it possesses various minor, nor yet inconsiderable advantages, in which it is presumed it cannot be equalled by anything of its kind.

"For example, its tactile representations of articulate sounds are easily portable. The materials of which they are constructed may always be procured at a trifling expense, and the apparatus necessary for their construction is extremely simple. In addition to the letters of the alphabet, there have been contrived arithmetical figures, which it is hoped will be of great utility, as the remembrance of numbers is often found peculiarly difficult. Palpable commas, semicolons, &c., have likewise been provided, to be used when judged requisite."

These it has not been deemed necessary to give, in consequence of their uselessness in the only practical manner in which these knots might be of service—that of conveying a message in a strange country, where pens, ink, or pencil were not at hand.

PRINTED BY
WOODFALL AND KINDER, LONG ACRE
LONDON