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ROPE AND ITS USES

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CONTENTS

ROPE AND ITS USES

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GENERAL INFORMATION

Kinds of Rope. At the present time rope is made chiefly from sisal or manila hemp. The former, which is the whiter and cheaper fiber, comes from Yucatan; the latter from the Philippine Islands, and receives its name from the chief port of shipment. Rope is also made of cotton and of wire. The latter finds little use on the farm while the cotton rope because of its softness is used about the house and also in making fancy halters for "show" stock or for young animals having tender skins.

A rope is composed of a certain number of "strands", the strand itself being made up of a number of single threads or yarns. Three strands laid or twisted together form a "hawser-laid" rope, and three such hawsers similarly laid make a "cable-laid" rope or a "cable". A "shroud-laid" rope usually consists of four strands laid around a central strand or core. The prepared fiber is twisted or spun to the right hand to form a yarn; the required number of yarns receive a left hand twist to make a strand; three strands twisted to the right make a hawser; and three hawsers twisted to the left form a cable. Thus the twist in each operation is in a different direction from that of the preceding one and this alteration of direction serves, to some extent, to keep the rope in its proper form.

Why Rope is Twisted. The primary object of twisting fibers together into a rope is to hold together the strands when a strain is applied. Twisting also compacts the fibers and prevents, to some extent, the penetration of moisture. The proper degree of twist in ropes is generally such that the rope is from three-fourts to two-thirds the length of yarn composing it. Hence when a weight is hung on the end of a rope there is a tendency for it to untwist and become longer. In thus untwisting the strands will loosen, the weight will revolve and

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the yarns in the strands will tighten until the strain upon them equals the strain upon the strands. In making rope the aim is to make the tension on the strands and on the yarns composing the strands equal. But since this is impossible it is always necessary to take out the "turns" in a new rope for the first two or three days that it is used. In case a new rope is inclined to be so "kinky" that it cannot be used the twist may be removed by tying it to a wagon and dragging it about on the ground.

Rope Data. The following table is based upon calculations for new manila rope without knots. In estimating the breaking strength of rope the following formula from Hunt and Miller has been used: Breaking strength equals 720 times the square of the circumference in inches. The safe load for any rope represents the greatest load that should be placed upon a single rope for its most economical wear. It will be seen in these tables that the safe load as given in the fifth column is about one-eighth the breaking load given in the sixth column.

The last column gives in inches the diameter of the pulley which will give the best results with a given sized rope. As

USEFUL FACTS ABOUT THREE-STRAND MANILA ROPE

Diameter (inches)	Circumference (inches)	Weight of 100 ft. of rope (lbs.)	Length of each lb. of rope (feet—inches)	Safe load (pounds)	Breaking load (pounds)	Diameter of pulley (inches)
3–16	9–16	2	50 0	35	230	1½
1–4	3–4	3	33 4	55	400	2
5–16	1	4	25 0	90	630	2½
3–8	1 1–9	5	20 0	130	900	3
7–16	1 1–4	6	16 8	175	1240	3½
1–2	1 1–2	7 2–3	13 0	230	1620	4
5–8	2	13 1–3	7 6	410	2880	5
3–4	2 1–4	16 1–3	6 1	520	3640	6
7–8	2 3–4	23 2–3	4 3	775	5440	7
1	1	28 1–3	3 6	925	6480	8
1 1–8	3 1–2	38	2 7	1260	8820	9
1 1–4	3 3–4	45	2 2	1445	10120	10
1 3–8	4 1–4	58	1 8	1855	13000	11
1 1–2	4 1–2	65	1 6	2085	14600	12
1 3–4	5 1–4	97	1 0	3070	21500	14
2	6	113	0 10	3600	25200	16
2 1–2	7 1–2	184	0 6.5	5630	39400	20
3	9	262	0 4.5	8100	56700	24

ropes pass over pulleys there is a constant bending and straightening. This causes the strands to chafe one another at the center. The larger the rope and the smaller the pulley the greater the wear. Hence to avoid serious wear on a hoisting rope it should be run over a pulley of a diameter not less than 8 times the diameter of the rope in inches. For example a ¾-inch hay rope requires a 6-inch pulley, a 1-inch rope an 8-inch pulley. Ropes used for transmitting power, as is required in the case of belts, should not be run over pulleys less than 40 times the diameter of the rope.

Weakening Effect of Knots. Knots, hitches and turns weaken the tensile strength of any kind of rope. When a load is applied to a straight rope the strain is evenly distributed on all the fibers but in the case of a knot or hitch the greatest strain occurs on the fibers on the outside of the bend with the result that they are overloaded and break. The strain is then thrown on the inside fibers with the result that the center rope soon gives way. The strength of rope decreases as the abruptness of the bend increases. It will be seen in the following table that when the strength of a straight rope is represented by 100 the same rope with a simple overhand knot has a strength of but 45. In the case of the timber hitch where the bend is less abrupt the relative strength is 65 and the eye-splice where the bend is still less abrupt, 90.

APPROXIMATE EFFICIENCY OF KNOTS, HITCHES AND SPLICES

	Straight rope	Eye-splice over an iron eye	Short splice	Timber hitch anchor band	Clove hitch, running bowline	Square knot, Weaver's knot	Overhand knot
Efficiency of the knot..	100	90	80	65	60	50	45

Care of Rope. The life of ordinary rope is materially increased when it can be kept in the dry. Ropes which have become wet should always be thoroughly dried out in the sun before they are coiled up, and hay ropes which are used inside of barns where they may absorb moisture from the drying hay should be removed when not in use. The alternate drying and wetting is very detrimental to the rope fiber.

Ropes are made with the twist of the strands to the right and hence when coiled into rolls should always be coiled in the same direction or "with the sun". When the rope is uncoiled the end first laid down should be drawn up through the center. Whenever the rope is unwound from the end last laid down there is always a tendency for it to twist. The same is true of binder twine and for this reason if it is unwrapped from the outside it will twist and snarl.

EXPLANATION OF TERMS RELATING TO CORDAGE

Yarn—Fibers twisted together.

Thread—Two or more small yarns twisted together.

String—The same as thread but a little larger yarns.

Strand—Two or more large yarns twisted together.

Cord—Several threads twisted together.

Rope—Several strands twisted together.

Hawser—A rope of three strands.

Shroud-Laid—A rope of four strands.

Cable—Three hawsers twisted together.

Yarns are laid up left-handed into strands.

Strands are laid up right-handed into rope.

Hawsers are laid up left-handed into a cable.

A rope is:

Laid—By twisting strands together.

Spliced—By joining to another rope by interweaving the strands.

Whipped—By winding a string around the end to prevent untwisting.

Served—When covered by winding a yarn continuously and tightly around it.

Parceled—By wrapping with canvas.

Seized—When two parts are bound together by a yarn, thread or string.

Payed—When painted, tarred or greased to resist wet.

Haul—To pull on a rope.

Taut—Drawn tight or strained.

Relaying Strands. The process of building up a rope from single strands is called laying a rope and the process of twisting together strands that have become untwisted, relaying. The most satisfactory method of relaying strands is that illustrated in fig. 1. The rope should be held firmly in the left hand and the thumb placed upon one of the strands as shown in the illustration. Strand no. 1 is then twisted tightly with

FIG. 1
RELAYING STRANDS

the right hand and pulled snugly into its place in the rope. Before loosening the hold upon the strand with the right hand, the thumb of the left is pressed upon this twisted strand at *x*. The next step is to grasp strand no. 2 with the right hand, twist it tightly, lay it in place above no. 1, and hold it with the thumb of the left hand just above the point *x* on no. 1. Strand no. 3 is treated in the same manner as nos. 1 and 2, and the process is continued until the desired length of rope is relayed. If the work is properly done the rope may assume its original condition.

Whipping. Binding the end of a rope with twine so that it will not unravel is called whipping. Ropes that are to be passed through pulley blocks, halter ropes and the ends of strands used in making splices are usually finished in this way.

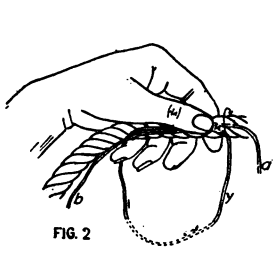


FIG. 2

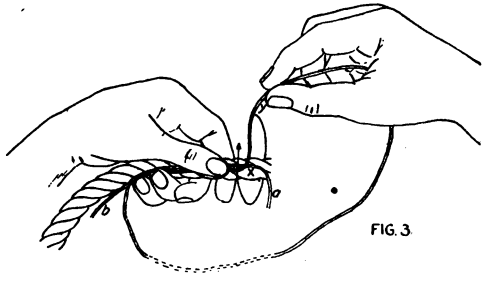


FIG. 3

THE BEGINNING OF THE "WHIPPING"

Secure a piece of string about three feet long and place it on the rope allowing the end *a* to hang loosely over the end of the rope about two inches. Now make a loop by passing the other end of the string *b* down the rope and allowing a loose end of about two inches. Grasp the rope with the left hand in such a manner that the thumb can be placed on both strings as at *x* in fig. 2. Then with the right hand, grasp the loop of the string at *y* and wrap it down the rope over itself and the other strand (fig. 3). Continue the wrapping as far as desired (one-half inch or more) then draw up the loops and tighten

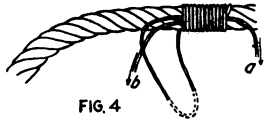


FIG. 4


FIG. 5

THE FINISHED WHIPPING

the tie by pulling on the ends *a* and *b* (fig. 4). If the string is wrapped firmly and closely, when complete it should appear as in fig. 5.

KNOTS

Overhand Knot. The overhand knot is the simplest knot made. It is very important, however, since it forms a part of many other knots. It is made by simply making a loop in the rope and passing one end as *a* through the loop, thus forming the right-hand knot as shown in fig. 6. If the loop at *x* is made to pass behind *b*, the end *a* will pass through the loop from this side and will form the left-hand knot. The overhand knot is used principally in connection with other knots and in making hitches and splices. Used alone, it will draw tight.

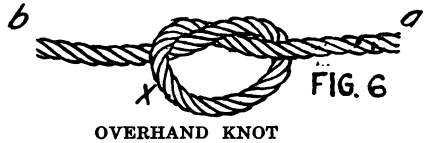


FIG. 6

OVERHAND KNOT


FIG. 7

BINDER KNOT

Binder Knot. This is the simplest method of joining two ropes and is the knot tied by all automatic binding attachments on grain harvesting machines. The knot is made by placing the two rope ends side by side and tying an overhand knot. It will not slip but when tightly drawn is difficult to untie (fig. 7.)

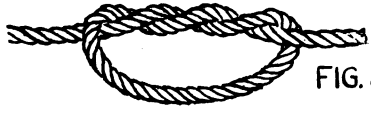


FIG. 8

Blood Knot. If, in making the overhand knot, the end of the rope is passed through the loop, two, three or four times (fig. 8.) before pulling it taut, the double, treble or fourfold knot is obtained (fig. 9). This is a larger knot than the overhand and is often used on thongs or whips being termed the blood knot.


FIG. 9

BLOOD KNOT

Square or Reef Knot. The commonest knot for joining the ends of two ropes, and probably the knot that is most often made, is the sailor's true knot or reef knot. In making it care should be taken not to make a granny knot. (See description of granny, fig. 12.)

First tie the right-hand form of the overhand knot (fig. 10) then across the strands (*a* in front of *b*) and tie the left-hand overhand knot. Notice that the ropes leave the loops together (fig. 11). The square knot can be easily and quickly tied, it is easily untied and is secure and reliable except when made with ropes of different sizes. The ease with which the knot can be tied and untied makes it very useful in reefing sails, and its smoothness and secure character makes it of use to the farmer in fastening the ends of binder twine when threading the binder.

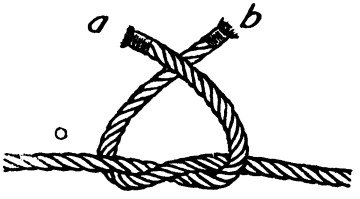


FIG. 10

FIG. 11

SQUARE KNOT

Granny or Lubber's Knot. This knot is often improperly used for the square knot and is of little value because it slips easily. The first step in making the knot is similar to that in making the square knot (fig. 10) but in completing it, the strand *a* passes behind the strand *b* before it is passed through the loop. Notice in fig. 12 that the ropes are on opposite sides of the loop. When the knot is drawn out of its correct form it assumes the shape of a hitch as shown in fig. 13. This kind of hitch slips easily and explains why it cannot be safely used.

FIG. 12

FIG. 13

FIG. 14

GRANNY KNOT
HITCH FROM GRANNY KNOT
GRANNY KNOT, ENDS WHIPPED

Granny Knot With the Ends Whipped. The granny knot is often used in tying large ropes together. In this case, however, the ends should be whipped to the standing part with strong twine (fig. 14). This prevents the knot from untying as well as from drawing tight.

Surgeon's Knot. The surgeon's knot is a modified form of the square knot. But instead of making but one twist as in fig. 10 the left end *b* is wrapped twice about the other rope (fig. 15). The string or rope is then pulled up tight and the wraps are jammed closely together by swinging the hands until the wrists cross while still pulling. This holds the knot securely until the second part can be tied. As the name implies the surgeon's knot is used in surgical operations.

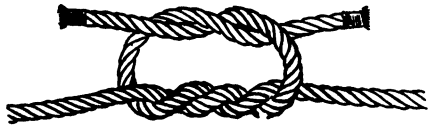


FIG. 15
SURGEON'S KNOT

Weaver's Knot or Sheet Bend. This knot is easily made, is easily untied and never draws tight. Place the two ends of the rope together, the right *a* under the left *b* (fig. 16). Hold the two in place with the left hand, and with the right hand holding the rope at *x* pass it around the end *a*, as shown in fig. 17. Release the right rope at *x* (fig. 17) and with the right hand, pass the end *b* through the loop as shown in fig. 18. The knot is completed by pulling on the ropes as indicated in fig. 19. By inserting a wooden stick or "toggle" into the knot, as shown in fig. 19, it may be more easily untied.

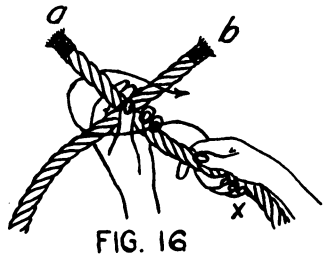


FIG. 16

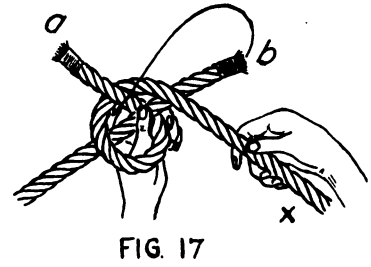


FIG. 17

FIG. 18

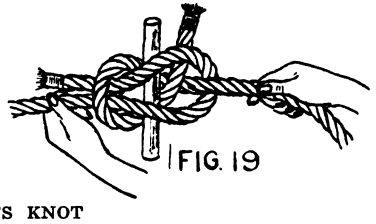


FIG. 19

WEAVER'S KNOT

Figure 8 Knot. This knot is made by making a loop in the rope by passing the end *a* over the standing part *b* at *x* as shown in fig. 20. The end *a* is then passed beneath the standing part *b* and is brought back through the loop *y*. It is drawn taut by pulling on the standing part (fig. 21). The knot is used on the ends of ropes to prevent them from slipping through a pulley or hole.

FIG. 20


FIG. 21
FIGURE "8" KNOT


FIG. 22
FLEMISH KNOT

Flemish Knot. Ropes are often tied together by laying the two ends side by side and making the Flemish knot. (Fig. 22.) This knot is made in the same manner as the figure eight (figs. 20 and 21).

Stevedore Knot. The stevedore knot like the figure eight, is used to prevent ropes from pulling through pulleys or holes. It is made in the same manner as the figure eight but instead of making one turn around the standing part *b*, three turns are made as shown in fig. 23. The end is then passed back through the loop as shown by the direction of the arrow in fig. 23. The standing part of the rope *b* is then drawn until the loop *x* is taut (fig. 24).

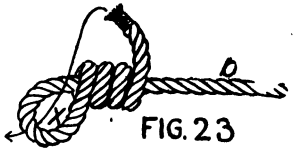


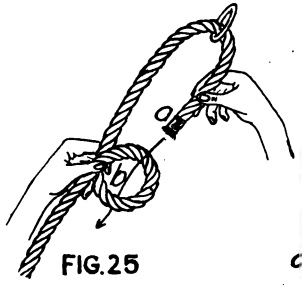
FIG. 23


FIG. 24
STEVEDORE KNOT

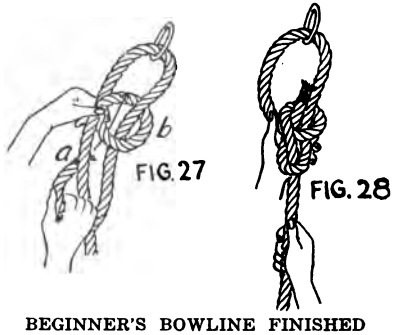
Bowline Knot. The bowline is without question the most useful and most important of the different knots. It is easily tied, will not slip nor draw tight and may be easily untied. It is used in fastening animals, in the hay field or stacking outfits, in tying hay ropes, and in fact in any place where a permanent knot that is easily untied is wanted. Sailors use it in mooring their ships; hence the name bowline, from the line fastened to the bow of the vessel.

(1) *Bowline—Beginner's Method.* The knot is made by passing the end of the rope as *a* through a ring or around a post.

A loop or half hitch is then made in the standing part of the rope about two feet from the end *a* (fig. 25). The end *a* is then brought through the loop *b* from the upper side as shown in fig. 26. next, the end *a* is passed over the standing part of the rope at *c*, as in fig. 27, and is then passed back through the loop *b*. Fig. 28 shows the completed knot drawn taut.

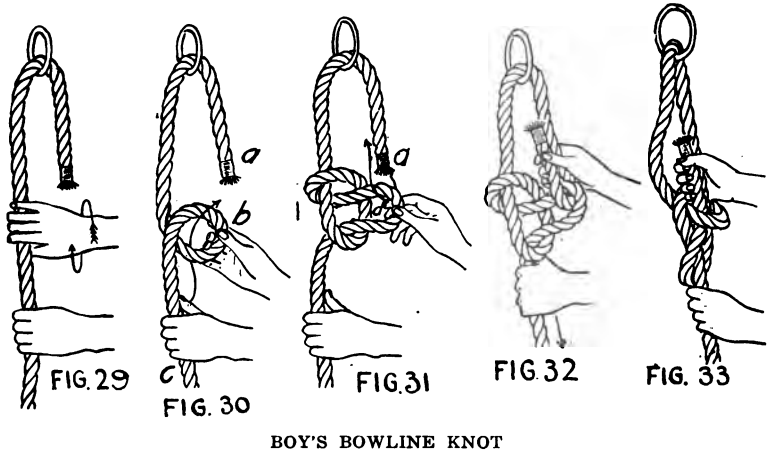


BEGINNER'S BOWLINE KNOT



BEGINNER'S BOWLINE FINISHED

(2) *Bowline — Boy's Method.* Placing the rope through a ring or around the object to which it is to be tied, lay both hands, palms down, on the standing part of the rope as in fig. 29. With a twist of the right hand make a loop



BOY'S BOWLINE KNOT

or half hitch *b* as shown in fig. 30. Now with the left hand, pull the standing part of the rope *c* through the half hitch *b* making a loose slip knot (fig. 31). Bring the end *a* through the loop of the slip knot *d* and fold it back upon itself, holding it firmly with the right hand as in fig. 32. With the left hand on the standing part of the rope, give a quick jerk in the direction indicated by the arrow and the knot is completed (fig. 33).

(3) *Bowline—Overhand Method.* With the right hand on the end of the rope and the left on the bight in the position as shown in fig. 34, make a loop by bringing the left hand around the end of the rope as indicated by the direction of the arrow in fig. 34 and shown in fig. 35. Now, with the left hand hold the loop in place. Grasping the end of the rope *a* with the right hand bring it around beneath the standing part (*b* fig. 36) and back through the loop *c* as in fig. 37. This is the quickest and easiest method of making the bowline knot.

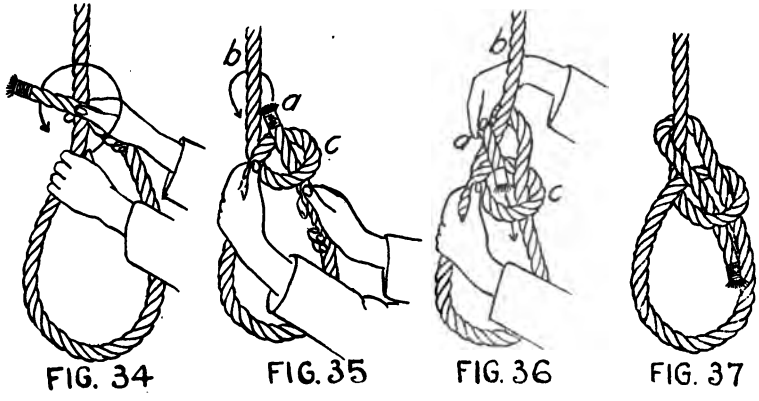
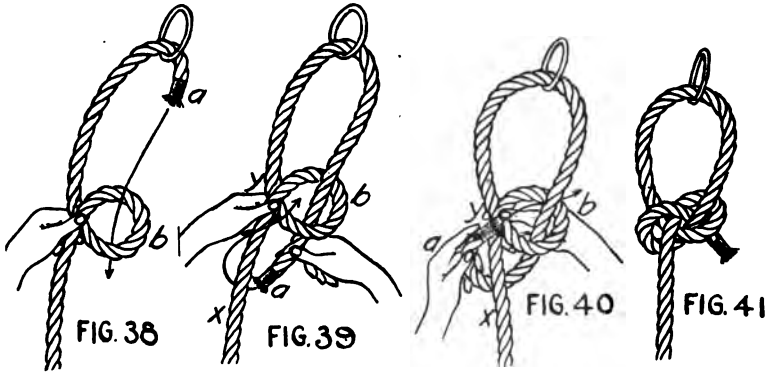


FIG. 34 FIG. 35 FIG. 36 FIG. 37

OVERHAND BOWLINE KNOT

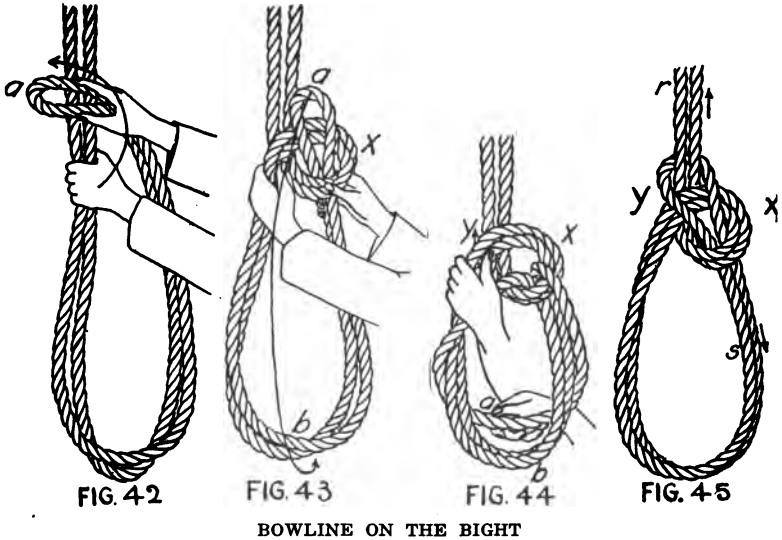
Teamster's Hitch. The teamster's hitch is a modified form of the bowline and is given here because it is often misused for that knot. Unlike the bowline it draws tight and is difficult to untie. Fasten the rope to the object to which it is to be tied. Then make a loop or half hitch in the rope (fig. 38) and bring the end *a* through the loop from the upper side (fig. 39) as in starting the bowline. But instead of bringing the end over the standing part of the rope at *x*, as in the case of the bowline, it is passed under the rope *x*. In other words it is passed around the loop where the ropes cross as at *y* in fig. 40. The end *a* is then passed down through the loop *b* as

indicated by the arrow in fig. 40. The completed knot is shown in fig. 41.



TEAMSTER'S HITCH

Bowline on the Bight. This knot is made in the middle of a long rope or at the end of a rope when it has been doubled. The steps in beginning it are the same as those used in making the bowline (see description of bowline, overhand method figs. 34 to 37) except that a double rope is used. Fig. 42 shows the first step. A loop is then made about the end *a* with the left hand as shown in fig. 43. The end *a* should now be pulled



BOWLINE ON THE BIGHT

through the loop x far enough so that it may be drawn downward as indicated by the arrow. The loop a is now slipped over the large loose loop b as indicated in fig. 43, and then carefully moved back (fig. 44) until it is in position of a in fig. 45. In tying the knot care should be taken to prevent the half hitch or loop x from losing its form. This can be done by holding the ropes together where they cross at y. To tighten the knot pull carefully on the ropes at r and s in the direction of the arrows (fig. 45). The bowline on the bight while not as important as many other knots is especially useful in throwing horses and cattle. It is safe because it will not slip nor draw tight and is easily untied. Its use is further described under "tackles for throwing horses and cattle".

Spanish Bowline. This knot may be made in the middle of a long rope or in a loop at the end of the rope. It forms two single loops that will hold without slipping when used either separately or together. The knot is easily untied.

Form a bight in the rope (fig. 46) and

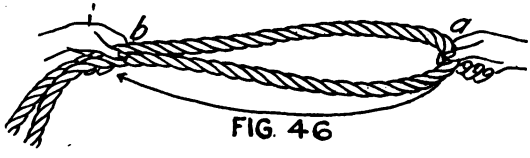


FIG. 46

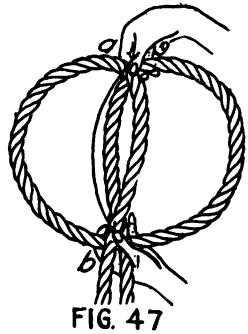


FIG. 47

FIG. 48

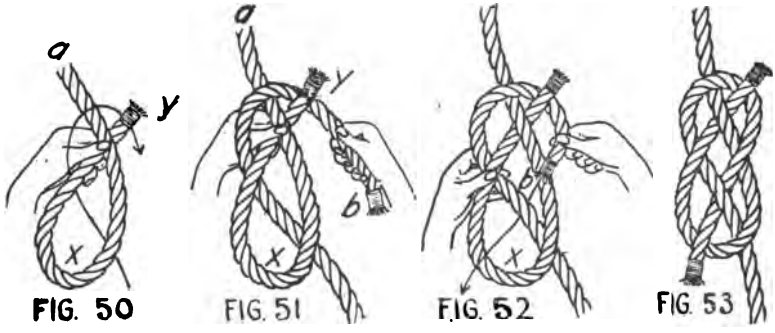

FIG. 49

SPANISH BOWLINE KNOT

with the right hand, fold it under the ropes as at b, thus forming two loops (fig. 47). Cross the two loops of the bight as shown in fig. 47 and with the right hand grasping the crossing a, fold these loops over on the part b forming four smaller loops as shown in fig. 48. Holding the loops thus formed with the left hand, pass the loops c and d through the

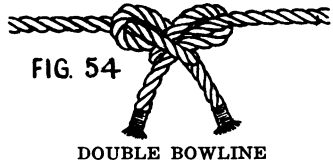
smaller loops x and y, each on its respective side as indicated by the arrows. Pull the loops through and the knot is finished (fig. 49). The knot is easily made if care is taken not to let the loops slip or lose their form.

Carrick Bend. For tying ropes together no better knot can be used than the carrick bend as it is quickly and easily tied. It is secure and does not draw tight. The carrick bend is often used as a fancy knot in braids or bands. In making the knot lay the end of the rope y under the standing part a



CARRICK BEND

to form a loop as shown in fig. 50; pass the other end of the rope b under the loop x, over the standing part at a and under the end y as shown in fig. 51. Holding the ropes firmly in position push the loop b through the loop x as shown in fig. 52, making a slight loop. Then pass the end of the same rope b between the raised loop of b and the loop x as indicated by the arrow in fig. 52 and illustrated in fig. 53. If the standing parts of the rope are pulled a modified form of the knot will be the result (fig. 54). This form of the carrick bend is sometimes called the double bowline.



DOUBLE BOWLINE

Harness Knot. This knot is used by seamen in making knots in a towline because it can be easily tied and untied and does not seriously weaken the rope. It is made by first making a simple slip knot, drawing the loop through only a short distance as illustrated in fig. 55. The lower part of the loop x is

then passed between the bight and the side of the loop as indicated by the arrow in fig. 55 and shown in fig. 56. In drawing up the knot it is necessary to hold it firmly against some object

FIG. 55

FIG. 56


FIG. 57

HARNESS KNOT

and pull on the part of the loop *y* in the direction indicated by the arrow. Fig. 57 shows the knot completed.

Farmer's Loop. The farmer's loop can be tied in the middle of a rope when both ends are fastened. It is easily tied and easily loosened. Make two turns in the rope and hold it in position as indicated in fig. 58. Pass the loop *a* under the loop *b* and up between *b* and *c*, as shown in fig. 59. Next pass the loop *c* under the loop *a* as indicated in fig. 59 and shown in fig. 60. Now pass the loop *b* under the loop *c* and up between

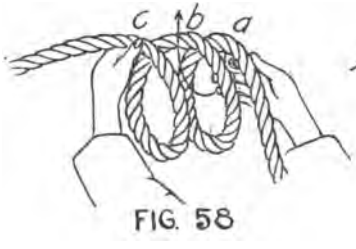


FIG. 58

FIG. 59

FIG. 60

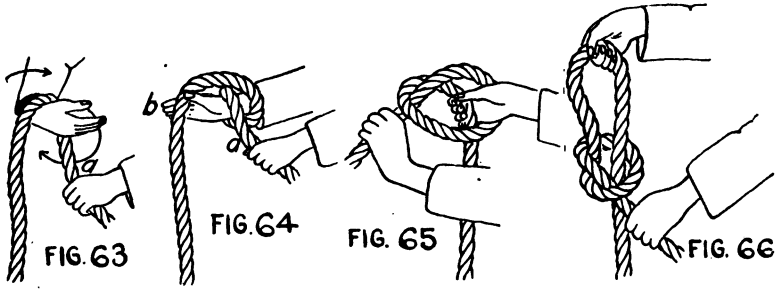
FIG. 61


FIG. 62

FARMER'S LOOP

a and *c*, as indicated in fig. 60 and as shown in fig. 61. Tighten the knot and it is complete (fig. 62).

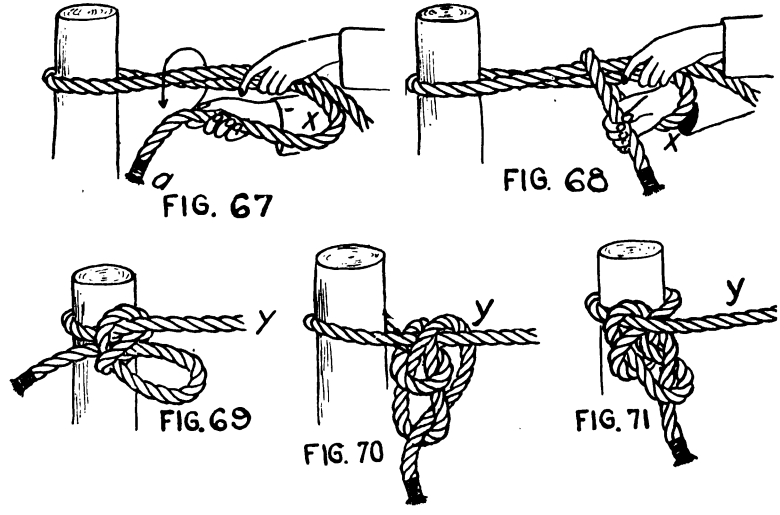
Slip Knot. The slip knot is one of the common knots. It can be easily and quickly made by catching the bight of the rope with the right hand, as in fig. 63, and then by giving the



SLIP KNOT

hand a turn in the direction indicated by the arrow in such a manner as to catch the end *a* over the wrist as in fig. 64. Grasp the bight of the rope at *b* fig. 64, and pull it through the loop as in fig. 65. Fig. 66 shows the completed knot.

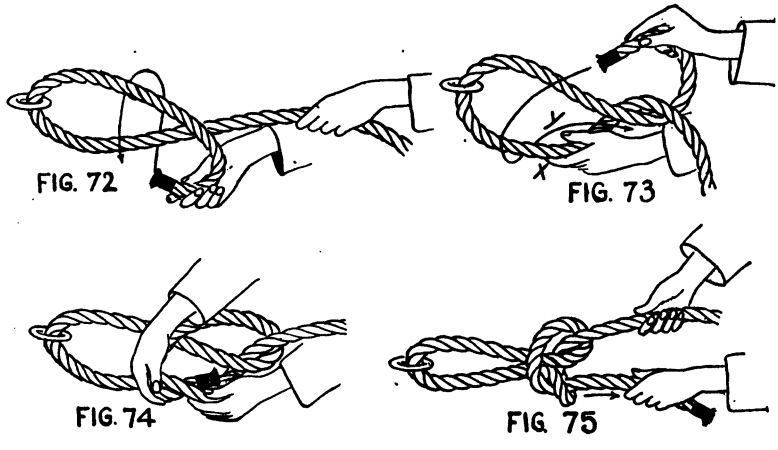
Manger Knot. The manger knot, as the name implies, is most commonly used in tying halter ropes to a ring or post. It is easily made, is secure when properly tied and can be loosened



MANGER KNOT

by a simple jerk of the hand. To make the knot, pass the rope around the post so that the short end will be in the right hand. Grasp both ropes with the left hand (fig. 67) and with the right throw the short end *a* across both ropes in front of the left hand as indicated by the direction of the arrow (fig. 67). Now with the right hand reach through the loop or bight *x* thus formed (fig. 68) and pull the rope through, tightening it and forming another loop (fig. 69). The end of the rope is now thrown over the standing part and passed through the loop as shown in fig. 70. The knot is sometimes incorrectly made by passing the end through the loop (fig. 71) without first passing it around the standing part of the rope *y*. In this case when the loop is drawn down tightly there is difficulty in untying the knot. There is also a right and wrong way in tying the knot when making a hitch to a smooth post. Fig. 70 shows the knot in the correct position to the right of the post. In this position the pull will come on the knot causing the loop around the post to tighten. Fig. 71 shows the wrong position. The pull in this case coming on the tie rope opens the loop around the post and allows the hitch to slip down.

Halter Tie. The halter tie is often used in fastening animals. It is sometimes used instead of the bowline but unlike the bowline draws tight and if not carefully made it often slips. With the left hand on the standing part of the rope and the right hand holding the end, bring the short end down across the standing part of the rope as in fig. 72. Passing the end around the rope as indicated by the direction of the arrow



HALTER TIE

(fig. 72) with the left hand grasp the standing part of the rope at x as shown in fig. 73. Now pass the end beneath both ropes, as indicated by the direction of the arrow in fig. 73 and through the loop y formed by the left hand (fig. 74). In tightening the knot, draw on the short end first (fig. 75) or it may be pulled out of shape and two half hitches formed.

Emergency Knot. The emergency knot is used for the same purpose as the bowline. It can be tied any place in a long rope without the necessity of drawing the end through the knot to be tied. When firmly drawn the knot is difficult to untie.

In beginning the knot the rope is held with the palms of the hands up, the ends upon which the pull is to come in the right hands (fig. 76). Throw two loops in the rope with each hand as shown in fig. 77 by turning the hands in the direction of the

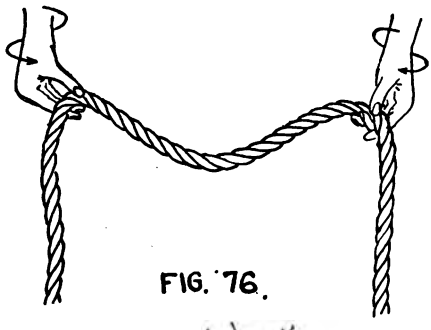


FIG. 76.

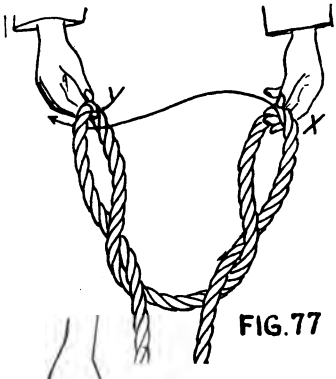


FIG. 77

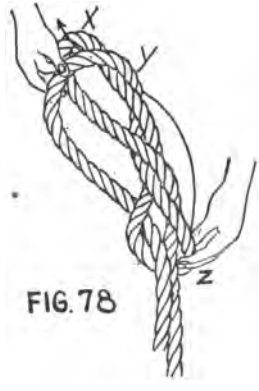


FIG. 78

FIG. 79

EMERGENCY KNOT

arrows as indicated in fig. 76. Now pass the loop x held in the left hand, through the loop y in the right hand so that it extends beyond the loop y about two inches as shown in fig. 78. Holding the loops x and y with the right hand (fig. 78), grasp the loop z with the left hand and in turn, pass it through the loop x held in the right hand as shown by the direction of the arrow in fig. 78. The knot is completed by pulling on the loop last formed and the standing part of the rope (fig. 79).

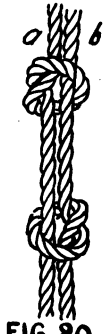


FIG. 80

FISHERMAN'S KNOT

Fisherman's Knot. The fisherman's knot derives its name from the fact that it is commonly used for joining silkworm gut on fishing tackles. In making it the strands are laid together, and an overhand knot (fig. 80) is made with one end a around the other strand b. The strands are then turned end for end and another overhand knot made with the other end b around the first strand a. See overhand knot (fig. 6).

Fisherman's Eye Knot. This knot may be made by the method just described or by another method somewhat more complicated but much quicker when learned. Make a bight in the rope (fig. 81). Then grasping the bight with the right hand at x lay it over on the two strands at y thus forming two loops (fig. 82). Now cross the loops as in fig. 83 and with the right hand draw the strand x down between the two ropes y and up through the loop a as indicated by the arrow in fig. 83. Fig. 84 shows the knot completed.

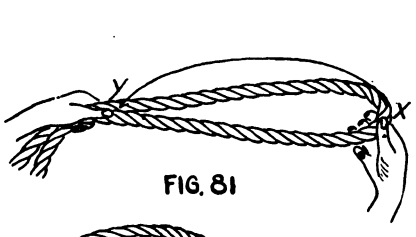


FIG. 81

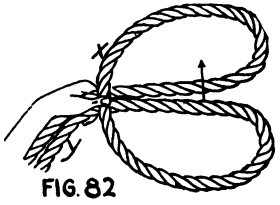


FIG. 82

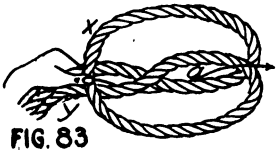


FIG. 83

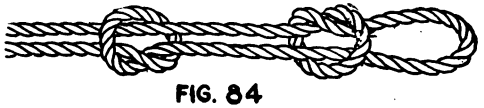
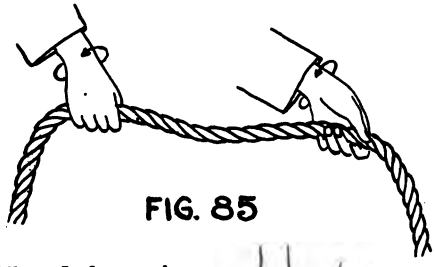


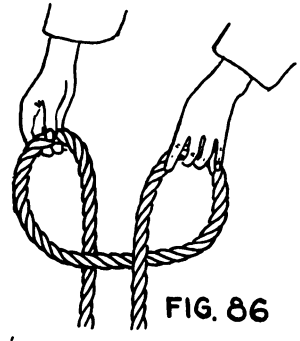
FIG. 84

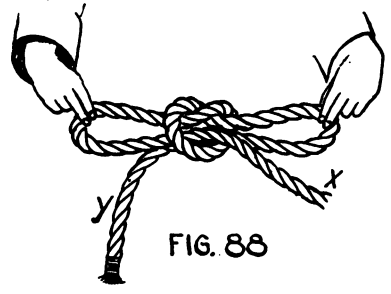
FISHERMAN'S EYE KNOT

Tom Fool's Knot. The tom fool's knot, or double bow as it is sometimes called, is a trick knot and yet at the same time it is very useful. It is commonly used in ringing hogs, one of the loops being placed around the upper jaw. It is tightened on the jaw by pulling the standing part of the rope x and untied by pulling the end of y (fig. 88).

To tie the knot hold the rope with the palm of the left hand up and the palm of the right hand down (fig. 85). Now turn both hands toward the right as indicated by the arrows in fig. 85 and shown in fig. 86, so that the palms will face each other. Holding the hands firmly in that position, bring the two loops together as shown in fig. 87 so that they may be drawn through from opposite sides in the direction of the arrows.







TOM FOOL'S KNOT

Releasing the hold upon the rope at x with the left hand, reach through the loop formed by x and grasp the rope y; and releasing the strand y with the right hand reach through the second loop formed by y and grasp the rope x, then pull the ropes through in opposite directions forming a double loop. Fig. 88 shows the comleted knot.

Lineman's Rider—End Method. Linemen and especially telephone men often use a knot which they term the lineman's rider. It is absolutely secure and will hold from any point upon which it may be drawn.

Doubling the rope as shown in fig. 89 fold it back upon itself as indicated by the arrow, so as to form two loops (fig. 90). Now holding these loops in the left hand, with the right bring the end *a* under the bight *x* and back through the loop *y* from the upper side, as indicated by the arrows in fig. 90

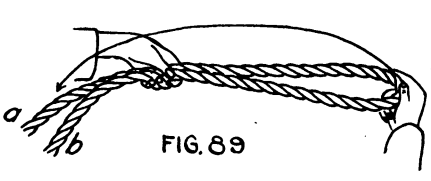


FIG. 89

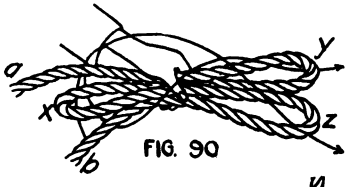


FIG. 90

and shown in fig. 91. The other end *b*, is next passed under the bight *x* in the opposite direction and back through the loop *z* in the same manner as described for *a*. Tighten the knot by drawing on the bight *x* and the two ends *a* and *b*. The completed knot is shown in fig. 92.

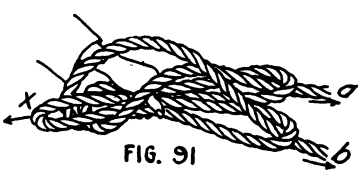


FIG. 91

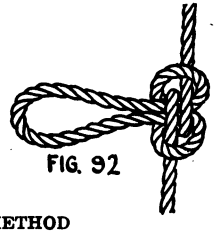


FIG. 92

LINEMAN'S RIDER—END METHOD

Lineman's Rider—Loop Method. Holding the doubled rope in the left hand, grasp the bight or loop with the right, and twist it one full turn thus forming the loop *x* as shown in fig. 93. Now with the right hand, grasp the loop at the crossing (fig. 94). Then with the left hand draw the loop *x* between the two ropes at *y* as indicated by the arrow in fig. 94 and shown in fig. 95. Pass the loop *x* through the loop *z* as indicated by the arrow in fig. 95, and tighten the knot by drawing on the loop *x* and the two ends (fig. 96).

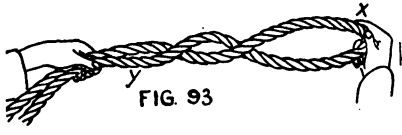


FIG. 93

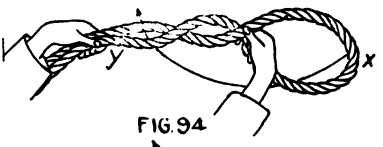


FIG. 94

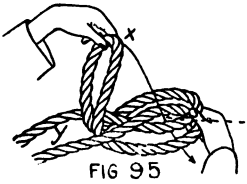


FIG 95

LINEMAN'S RIDER

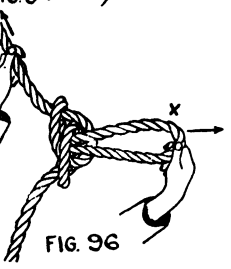
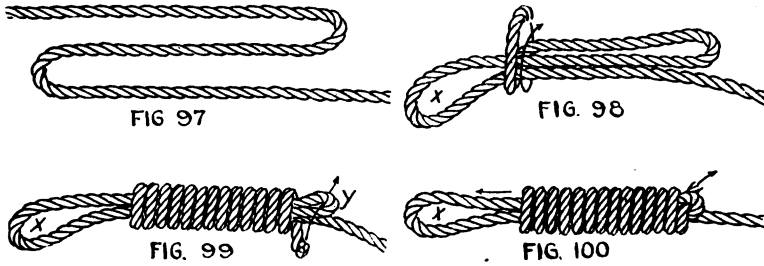


FIG. 96

LOOP METHOD

Hangman's Noose. The hangman's noose is made by making a double loop in the rope as indicated in fig. 97. The end is then wound back (fig. 98) thirteen rounds over the loop and



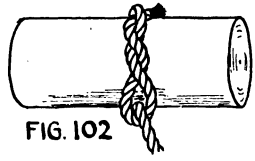
HANGMAN'S NOOSE

the standing part (fig. 99). The knot is completed by passing the end through the loop y as shown in fig. 99, and drawing on one side of the noose x as indicated by the arrow in fig. 100.

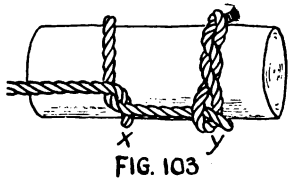
HITCHES

Half Hitch. For temporarily fastening ropes when there is a steady pull the half hitch is often used. Its chief use, however, is in connection with other knots or hitches. The half hitch is made by passing the end of the rope around the standing part and pinching it between the rope and the object to which it is attached (fig. 101).

Timber Hitch. The timber hitch is much more secure than the half hitch and is often used by carpenters, foresters and lumbermen in moving logs or timbers. It is, in part, a repetition of the half hitch since the end, instead of being simply tucked under the rope is wrapped about it once or more (fig. 102).



Timber Hitch and Half Hitch. As the name implies this hitch is a combination of the timber hitch and the half hitch. The two when thus used together make a more secure hitch than either alone and are especially



HALF AND TIMBER HITCHES

useful in lifting timbers, long pipes, pumps, or other long objects where a nearly straight end pull is desired. When the loops cannot be passed over the end of the object the half hitch x should be made first. The end is then passed back to form the timber hitch y (fig. 103).

Magnus Hitch. The magnus hitch is useful in securing a rope to a spar as there is but little tendency for it to slip endwise. Pass the end of the rope around the spar in front of the standing part x, around the spar again on the other side of the standing part and then through the bight y last formed (fig. 104).

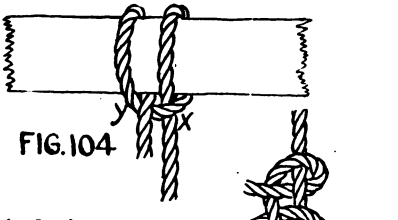


FIG. 104

Rolling Hitch. A rolling hitch is made by wrapping the rope three times around the object to which it is to be fastened and then making two half hitches around the standing part. The hitch may then be hauled taut. It is very easily and quickly made and is secure (fig. 105).

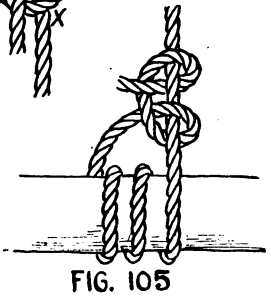


FIG. 105
MAGNUS AND ROLLING HITCHES

Topsail Halliard Bend. Fig. 106 shows the topsail halliard bend completed but not drawn taut. Three turns are first made around the object to which the rope is to be fastened; it is then brought back around the standing part, through beneath the three wraps, back again over the last two wraps and under the first.

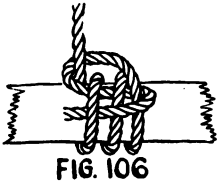


FIG. 106


FIG. 107


FIG. 108
TOPSAIL HALLIARD
FISHERMAN'S BEND
ROUND TURN AND
HALF HITCH

Fisherman's Bend. The fisherman's bend is used for permanently fastening the end of a rope to a ring or hook and is frequently used in fastening boats, hammocks, anchors, etc. The hitch consists of two turns around the ring and a half hitch completely around the standing part and the two turns (fig. 107). The end of the rope may be spliced into the standing part or it may be simply whipped to the latter as in the illustration. The object of

having the rope through the ring twice is to give it greater wearing surface.

Round Turn and Half Hitch. The round turn and half hitch has the same use as the fisherman's bend and is similar to it with the exception that the half hitch is made only around the standing part of the rope (fig. 108).

Clove Hitch. The clove hitch is the most used of any of the hitches, being the simplest, the most convenient and the most secure method of fastening tent ropes, guy ropes or other temporary stay ropes. It may be formed either in the end or in the middle of the rope without access to the ends and it will be secure with either end of the rope used as the standing part.

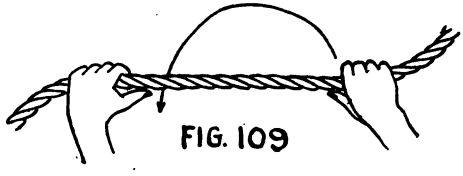


FIG. 109

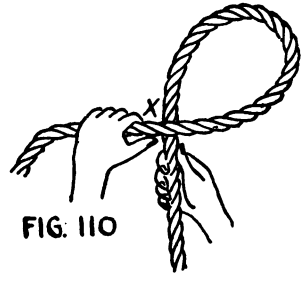


FIG. 110

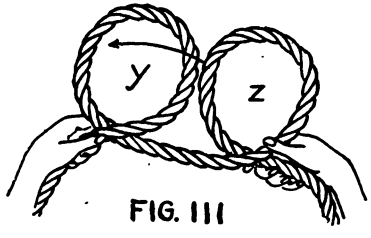


FIG. 111

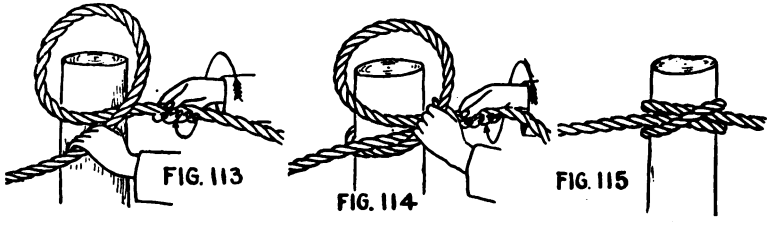

FIG. 112

BEGINNER'S CLOVE HITCH

1. *Clove Hitch—Beginner's Method.* To make the hitch by this method the rope is held in both hands as shown in fig. 109. The right hand is then made to describe a curve, as illustrated by the arrow, (fig. 109) passing under the rope at *x* fig. 110. Hold the half hitch in the left hand as shown in fig. 111 and throw the second loop in the same manner as the first (fig. 111). Slide the loop last formed *z* over the first *y* as indicated by the arrow in fig. 111 and shown in fig. 112.

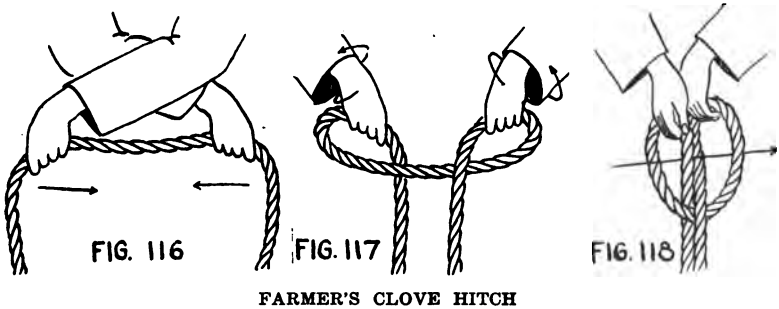
2. *Clove Hitch—Sailor's Method.* Oftentimes it is desirable to form a clove hitch where there is a pull on the rope. This can be done by sustaining the weight with the left hand as

in fig. 113, forming a loop with the right hand as illustrated in the beginner's method (figs. 109 and 110) and passing the loop over the top of the post. The end of the rope is then held in the left hand, and another loop made with the right hand, (fig. 114) is thrown over the post (fig. 115).



SAILOR'S CLOVE HITCH

3. *Clove Hitch—Farmer's Method.* This method of making the clove hitch is the most practicable and the one most commonly used. Crossing the arms, the left in front of the right, grasp the rope as indicated in fig. 116. Without twisting the rope, bring the hands to the position indicated in fig. 117. The hitch is completed by turning both hands to the right, as indicated by the arrows in fig. 117 and shown in fig. 118. Both loops may then be held in the right hand.



FARMER'S CLOVE HITCH

Scaffold Hitch. A very simple but satisfactory form for fastening scaffolds may be made by slightly modifying the clove hitch. Make a clove hitch of ample size so that when it is placed over the end of the scaffold the ends swing freely below it, as in fig. 119. The ropes are then tightened by being pulled in opposite directions to the end of the plank, as shown in fig. 120. Turn the plank over, draw the ropes up and fasten the short end to the standing part by a bowline knot (fig. 121). A scaf-

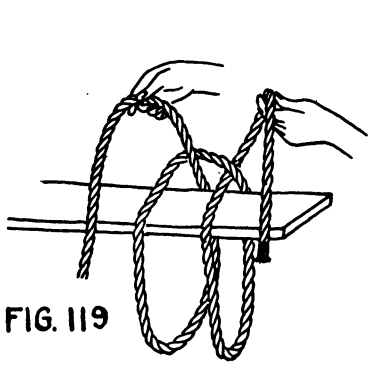


FIG. 119

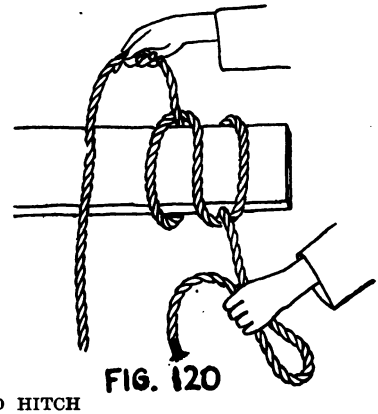


FIG. 120

SCAFFOLD HITCH

fold hitch is made on the other end of the plank and the scaf1 fold is ready for use.

Miller's Knot. This knot is the same as the clove hitch but it is made in a different manner. The knot (really a hitch) is used by farmers and millers in tying grain and flour sacks and is also used in fastening ropes to long beams when the end of the beam cannot be reached.

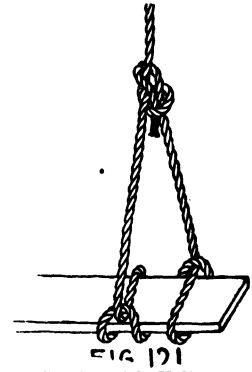


FIG. 121

SCAFFOLD HITCH

Hold the standing part of the rope in the left hand while with the right pass the free end around the beam so that the loop crosses the rope *y* held in the left hand (fig. 122). The free end in the right hand is brought over the loop at *x* and under the standing part at *y* as indicated by the arrow in fig. 122 and shown in fig. 123. When the strands are drawn the knot appears as in fig. 124.

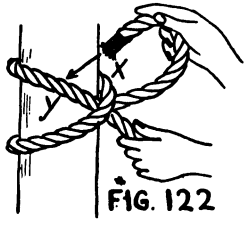


FIG. 122

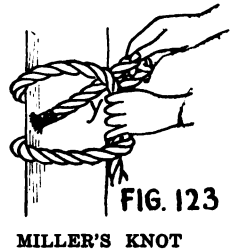
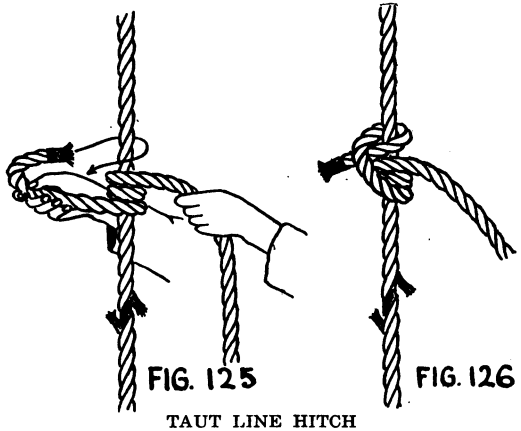


FIG. 123


FIG. 124

MILLER'S KNOT

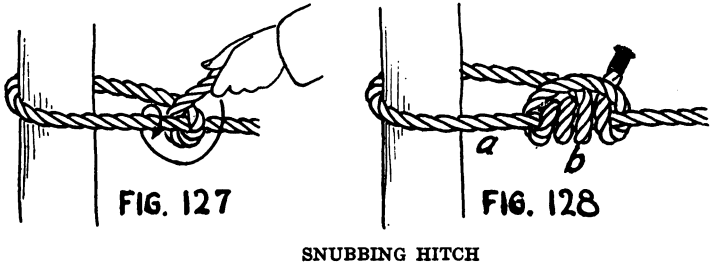
Taut Line Hitch. Very frequently in using ropes or cables there are occasions when it becomes necessary to attach one rope to another. For instance, when a strand in a rope breaks under the weight of a heavy load, it is often desirabled to relieve the tension at that point by fastening another rope above the break. Such a fastening can be made by using the taut line hitch.



TAUT LINE HITCH

Give the end of the rope two full turns about the taut rope, wrapping in the direction of the break (fig. 125) and drawing the wraps firmly and closely together upon the taut rope. Now pass the end over the two wraps as indicated by the arrow in fig. 125, and wind it once more about the taut rope, completing the hitch by passing it through the loop thus formed (fig. 126). The hitch will not hold unless it is tied very firmly and tightened while the weight is being applied to the new rope. The taut line hitch is very useful in case of emergency but it should not be used as a permanent fastening.

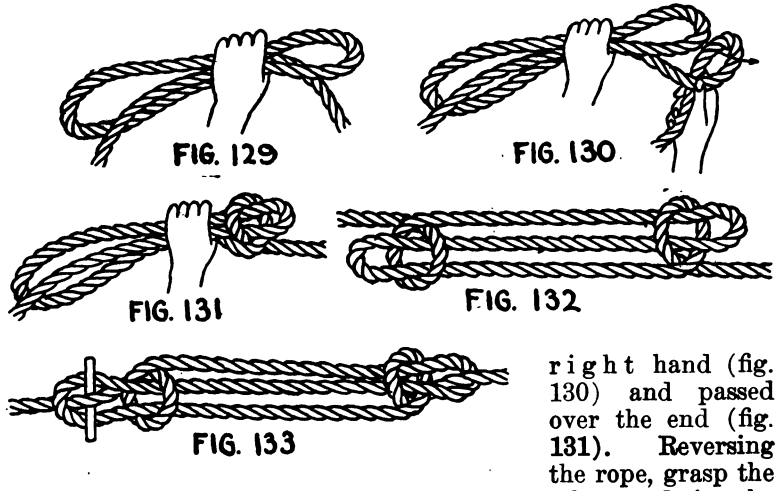
Running Hitch or Snubbing Hitch. The taut line hitch described in the preceding paragraph forms the principal part of the running hitch which is used in snubbing animals. The animal can be easily held by simply throwing the rope around a post and holding to the free end which forms a half-hitch



SNUBBING HITCH

around the rope to which the animal is fastened (fig. 127). By using the half hitch in this manner any slack can easily be taken up and as easily the animal can be given more rope. If a more permanent fastening is desired the free end may be wrapped about the standing part as indicated by the arrow in fig. 127 and the hitch then completed (fig. 128) as described for the taut line hitch in figs. 125 and 126. The running hitch will not slip in the direction of the pull, i. e., toward the post, but by taking hold with one hand at *a* and the other at *b*, (fig. 128) it can be slid quite easily in the opposite direction and the slack thus quickly taken up. The running hitch should never be used as a permanent tie.

Sheepshank. For shortening ropes of any size, either temporarily or permanently, there is no form of fastening that is more satisfactory than the sheepshank. This hitch is made by grasping the rope in the left hand, then bringing it up with the right hand so as to form a loop large enough to reduce the rope to the desired length (fig. 129). The ropes are then held in the left hand as in fig. 129, a half hitch is made with the



SHEEPSHANK

right hand (fig. 130) and passed over the end (fig. 131). Reversing the rope, grasp the other end in the left hand as shown in fig. 129 and complete the hitch as described in figs. 130 and 131. Fig. 132 shows the temporary sheepshank completed. To make a permanent shortening the ends are passed through the bights or toggled as shown in fig. 133. Sometimes the ends are whipped

to the bights with binder twine, or else the overhand knot is used.

Racking Hitch. The racking hitch is often used by railroad men as a hook fastening for large ropes where heavy loads are to be lifted. In making the hitch the rope is held in the hands, palms up, and two loops are formed by turning the hands in the direction of the arrows (fig. 134). The loops are each given a full turn and hung on the hook as shown in fig. 135.

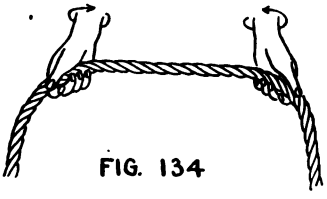


FIG. 134

RACKING HITCH

FIG. 135

Catspaw. The catspaw is a very satisfactory hitch and although a little more difficult to make than the racking hitch, it is easier untied. With the long end of the rope toward the right side of the body make a loop and grasp the ropes at the crossing with the left hand (fig. 136). With the right hand bring up the loop as indicated by the arrow in fig. 136 and hold it with the left as shown in fig. 137. Now with the right hand begin wrapping the long part of the rope over itself and the other two ropes as shown in fig. 138. The loops are then adjusted until they are the same length and are then fastened (fig. 139).

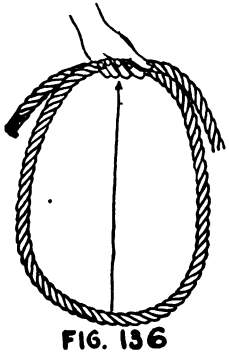


FIG. 136

FIG. 137

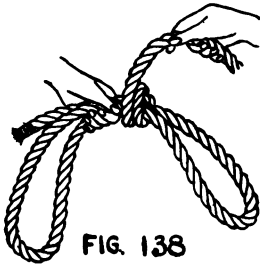
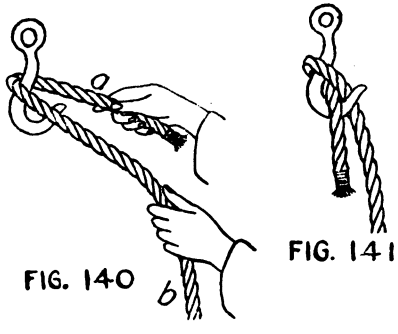


FIG. 138

CATSPAW HITCH

FIG. 139

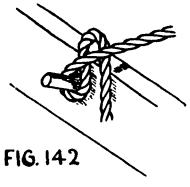


BLACKWALL HITCH

Blackwall Hitch. This is a simple, though satisfactory temporary hitch that may be used with either a rope or chain when the pull is continuous. A bight is made in the rope and is passed behind the hook (fig. 140). The free end *a* is then passed through the hook and the standing part *b* passed over it from the opposite side (fig. 141).

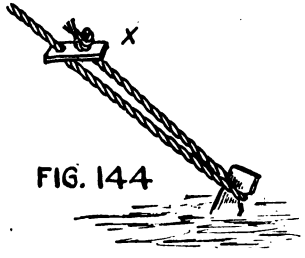
Slippery Hitch. The slippery hitch can only be used when there is a steady pull. Its value consists in the readiness with which it can be cast off in cases of emergency. A sharp pull on the end of the rope loosens it. The method of making the hitch may be seen from the illustration (fig. 142).

Marlinspike Hitch. This hitch is made by beginning a simple slip knot. But instead of drawing the loop through and tightening the knot, the loop is only drawn through far enough so that a marlinspike can be placed in position to hold it, as in fig. 143. This hitch is used only as a means of getting a purchase on the seizing stuff when serving a rope.



SLIPPERY HITCH

MARLINSPIKE HITCH



TENT ROPE LASHING

Regulating Lashing. A regulating lashing is very convenient on ropes where the tension needs frequent changing. It is often used on tent ropes, but may be used on any sort of guy rope where the tension is not too great. The rope is tightened by slipping the wooden block *x* in the direction of the pull (fig. 144).

ROPE END KNOTS

The Crown Knot. The crown knot, while in itself not a complete and permanent fastening and of small value when used alone, is nevertheless very important as the basis of rope end splices.

To make the knot unlay the end of the rope far enough so that the knot or splice, if a splice is to be made, may be completed, then bring strand 1 down between strand nos. 2 and 3 forming a loop (fig. 145). Pass strand 2 across the loop thus formed, as shown by the arrows in fig. 145, so that it will lie between the loop and strand 3. Strand 3 is now passed through the first loop as indicated in fig. 146 and shown in fig. 147. Pull the crown down tightly by pulling gradually on each of the strands.

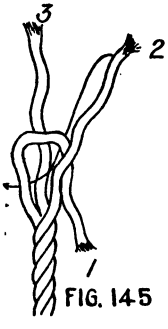


FIG. 145

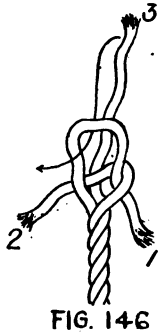


FIG. 146

CROWN KNOT

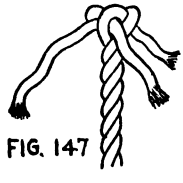


FIG. 147

Wall Knot. Among the rope end fastenings that are easily and quickly made, the wall knot is the most used. For a small rope unlay the strands about three inches. Hold the rope in the left hand, loose strands upward. With the right hand grasp the end of strand 1 and bring it across the rope, forming a loop and allowing the end to hang free (fig. 148). Hold the loose end in position with the left thumb. Grasp strand 2, pass it under

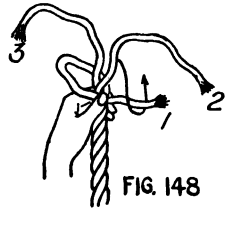


FIG. 148

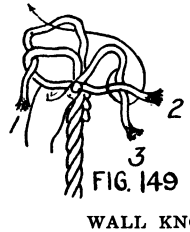


FIG. 149

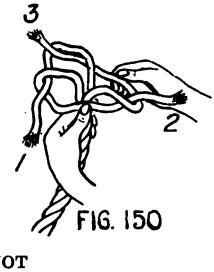


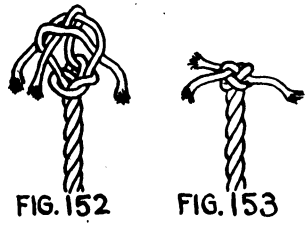
FIG. 150


FIG. 151

WALL KNOT

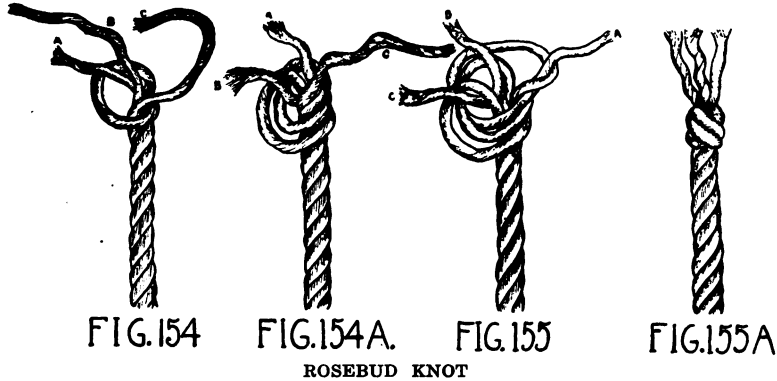
strand 1 (see arrow in fig. 148) and hold it against the rope with the thumb of the left hand (fig. 149). Again with the right hand, grasp strand 3, pass it under strand 2 and up through the first loop formed as indicated by the arrow in fig. 149 and shown in fig. 150. Draw each strand gradually until the knot is tight (fig. 151).

Wall and Crown Knot. A more secure fastening than the wall knot is made by first making the wall knot (figs. 148, 149, 150 and 151) then finishing with the crown (fig. 152) also (see description of crown knot, figs. 145, 146 and 147). The two knots are drawn together as in fig. 153.



WALL AND CROWN KNOT

Rose Bud Knot. This is a simple and practical end knot. Form the first loop by bringing the left strand *a* down to the left, around the other strands and up through the loop thus formed (fig. 154). Make the second loop by bending the strand



ROSEBUD KNOT

b down to the left in front of the first loop, around back of the rope and through the two loops formed (fig. 154-A). Form the third loop by bending strand *c* down to the left in front of the other two loops around the rope and up through all three loops (fig. 155). Tighten each strand gradually until the knot is formed (fig. 155-A).

Matthew Walker Knot. This is one of the most permanent of the end knots and one of the most difficult. It can be most easily made by loosely constructing the wall knot (fig. 156; also figs. 148, 149 and 150) then continuing as follows: Pass end *a*

FIG. 156

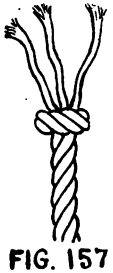


FIG. 157

MATTHEW WALKER KNOT

through the loop with *b*, end *b* through the loop with *c* and *c* through loop *a* as indicated by the arrows in fig. 156. Tighten the knot gradually by drawing each of the ends (fig. 157).

Diamond Knot. This knot is very satisfactory when tied in the end of a rope but is most used as an ornamental knot some distance from the end. When it is necessary to unlay the ends farther down the rope and relay the strands again when the knot is completed.

In beginning the diamond knot a crown knot is first made (figs. 145, 146 and 147). Do not draw strands down tight but arrange loosely as in fig. 158. Pass end *a* around the loop of the next strand *c* and up through the center at *x* similarly; pass *b* around *a*, and *c* around b, each passing through the center *x* as indicated by the arrows. When tightening the knot tighten the crown knot at the base first; if tightened by drawing on the ends first it will be drawn away from the twisted strands of the rope. Fig. 159 shows the diamond knot completed.

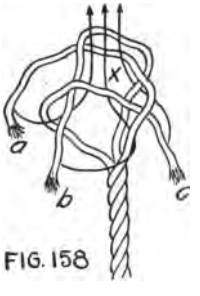


FIG. 158

FIG. 159

DIAMOND KNOT

SPLICES

End or Crown Splice. This is a permanent fastening on the end of a rope to prevent its unraveling. First make the crown knot described in figs. 145, 146 and 147. Then splice back the loose ends. Strand 1 is passed over the nearest strand *a* on the main rope and under the sec-

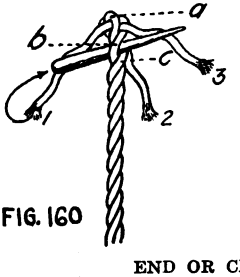


FIG. 160

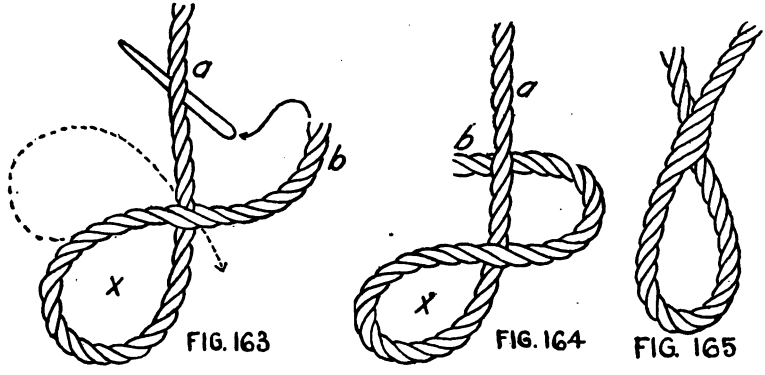
FIG. 161

FIG. 162

END OR CROWN SPLICE

ond *b*, diagonally, almost at right angles to the twist of the strands (fig. 160). Strands 2 and 3 in turn, are in like manner spliced back, 2 over *b* and under *c*, and 3 over *c* and under *a*. Each strand is tucked under but one strand of the main rope at a time (fig. 161). To make a smooth, tapering splice, cut out a portion of the fibers after each tuck and when finished pound the splice lightly with a short stick or hammer and roll it on the floor under the foot (fig. 162). In splicing ropes a smooth, pointed, hard wood stick or marlinspike is very convenient in raising the strands.

Loop Splice. The loop splice, (seldon used except in making rope halters), may be made at any point in the rope, it is simply a permanent loop thru which another rope or some part of the



LOOP SPLICE

same rope is to pass. In making the loop splice for a halter raise two strands (fig. 163), pass the long end *a*, or lead rope, under the strands thus raised so that when the loop *x* is drawn to the desired size the rope *a* will pass thru beneath the two strands at right angles to the direction in which they are laid. This is very important for if the long end *a* is passed under the raised strands in the direction indicated by the dotted line the loop splice when completed cannot be properly drawn up. To complete the splice raise two strands in the long part of the rope, as indicated by the marlinspike (fig. 163) and pass the short end through (fig. 164). Draw the ropes closely together as in fig. 165.

Eye Splice or Side Splice. The eye splice is used both in making halters and in splicing one rope to another. Untwist the end of the rope and place the strands in position, the two outside strands straddling the main rope and the middle or top strand running along the top of the rope. Now with the marlinspike

raise any one of the strands as *a* and pass the center strand 1, under it, diagonally to the right (fig. 166). Turn the main rope toward the left and pass strand 2 over strand *a* and under the strand *b* lying next to it (fig. 167). Now in order to pass strand 3 under strand *c* so that it will be diagonal to the strands of the main rope it will be necessary to bring the rope to the position in which it was first held. Then raise strand *c* of the main rope and be particular that strand 3 passes under it from the lower side so that the end comes out where strand 1 entered (fig. 168).

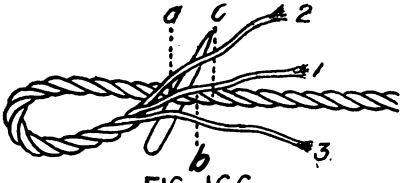


FIG. 166

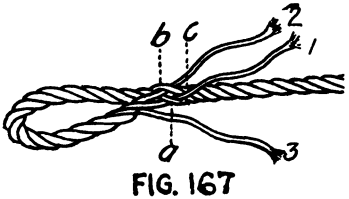


FIG. 167

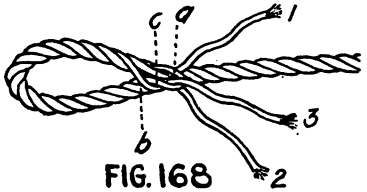


FIG. 168


FIG. 169

EYE SPLICE

Each loose strand should now pass under but one strand of the main rope. No two should be under the same strand and no two should come out from between the same two strands. Complete the splice by splicing in the strands as described for the end splice (figs. 160, 161 and 162). Fig. 169 shows the splice completed.

Short Splice. To join two ropes together where there is a straight pull and where they are not required to pass through pulleys, the short splice is often used.

In making the splice the ends of the two ropes are unlaid for a sufficient distance and the two ends then locked together so that those from one end pass alternately between those from the other end (fig. 170). Notice that the strands from opposite sides are in pairs. Then taking two strands from opposite sides, as the pair *a* and no. 1 and tie the simple overhand knot in its right hand form as shown in fig. 171. (See overhand knot fig. 6.) Similarly with the right hand knot tie together the strands forming the pairs *b* no. 2 and *c* no. 3. Draw the knots tightly, then passing each strand of the rope *x*

diagonally to the left, tuck the ends under the strands of *y* as described for the end splice in figs. 160, 161 and 162. Turn the rope end for end and in the same manner splice down the strands of the rope *y* (fig. 172). Splice down the strands

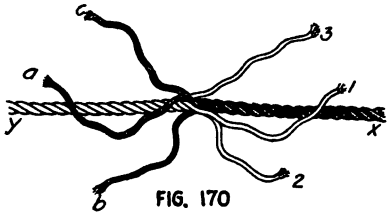


FIG. 170

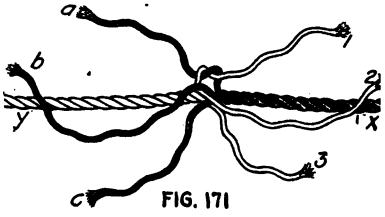


FIG. 171

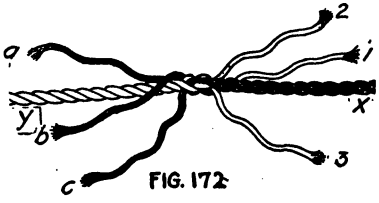


FIG. 172

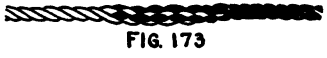


FIG. 173

SHORT SPLICE

alternately, and each strand but one place each time. When the splice is completed each strand from both ropes should be spliced under at least two places (fig. 173). The length of the splice must depend upon the size of the rope and the load to be placed upon it. This splice may be made without tying the overhand knots by simply splicing under the strands.

The Long Splice. Every farmer, in fact every person who has occasion to use rope, should learn to make the long splice. It is easily made, is as secure as any other part of the rope and leaves it so nearly its original size as not to impair its use through pulleys.

To make the splice first unlay the strands of the rope. A ⅜-inch rope will require a free end of about 18 inches, a 1-inch rope about 36 inches, and larger ropes in proportion. Now lock the strands of the two ropes together as in beginning the short splice, in such a manner that the strands from one end pass alternately between the strands of the other end, forming the pairs *a* no. 1, *b* no. 2 and *c* no. 3 (fig. 170). At this point care should be taken that the strands are properly paired for a mistake here cannot be detected until the splice is completed and means that the work must be repeated.

The strands from any two of the pairs as *b* no. 2 and *c* no. 3 are now tied together leaving the other pair as *a* no. 1 free (fig. 174). Unlay strand *a*, one turn from its rope *x* and follow it by relaying strand no. 1 in its place, drawing it firmly and keeping it twisted tightly. Continue until 6 or 8 inches from the end of

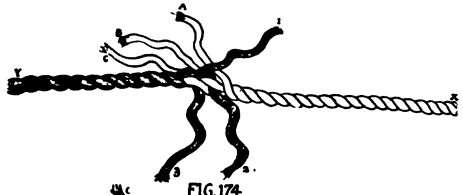


FIG.174

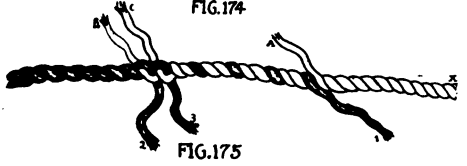


FIG.175
LONG SPLICE

the relayed strand (no. 1) depending on the size of the rope (fig. 175), and tie as shown in fig. 178.

Turn the rope end for end and unfasten either pair of the tied strands as *b* no. 2 (fig. 175). Proceeding as before, unlay strand *b* from its rope *x* and relay strand no. 2 in its place, and tie as in fig. 178. The rope should now appear as in fig. 176, the ties should be separated the same distance and each strand coming from the left, x should be placed in front of the strand from the right *y*, and tied as in fig. 176. Crossing the strands otherwise, as *a* behind no 1, a mistake often made, makes it impossible to complete the splice properly.

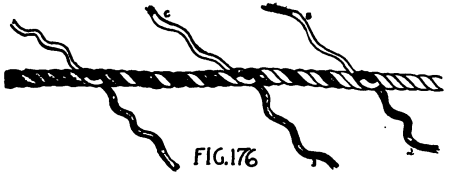


FIG.176

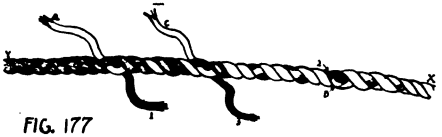


FIG. 177
THE LONG SPLICE


FIG. 178

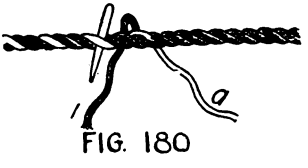


FIG. 180

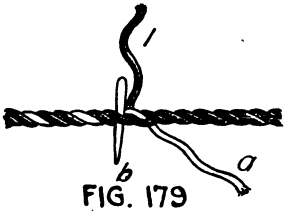


FIG. 179

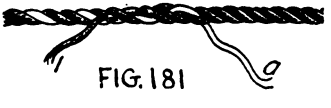


FIG. 181
FINISHING THE LONG SPLICE

The splice is completed as follows: With the ends properly tied (as described in fig. 176), with the right hand overhand

knot (fig. 178) and drawn down firmly into the rope (fig. 179). The end (no. 1) is now spliced down by being pased over the first strand *a* and under the second *b* as shown by the marlinspike in fig. 179, then over the third *c* and under the fourth *a* as shown in fig. 180. Draw down the end no. 1 and cut it off leaving it ¼-inch long (fig. 181). In identically the same manner, splice down and cut off each of the remaining strands *a, b, c,* no. 2 and no. 3. The splice is finished by pounding down the uneven parts and rolling it on the floor under the foot (fig. 182).

FIG. 182

LONG SPLICE FINISHED

Mending Broken Strands. It is often desirable to mend a broken strand (fig. 183) or even to remove a portion of a rope that is badly worn or frayed. In either case unlay the strands as far as necessary, procure a new strand of sufficient length and relay it, as shown in fig. 184 and described for the long splice in figs. 174 and 175. The ends are tied with an overhand knot and finished as described for the long splice. See figs. 178 to 181.

FIG. 183

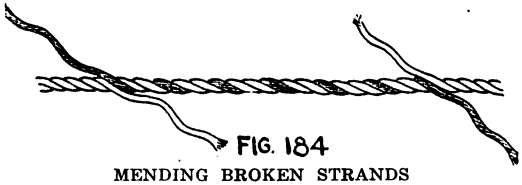


FIG. 184

MENDING BROKEN STRANDS

HALTERS

Rope Halters. Rope halters are inexpensive yet very convenient and serviceable especially in handling cattle. For cattle, halters are usually made of 5/8-inch rope but for horses, large cows and bulls a 3/4-inch rope should be used. An ordinary halter will require about 13 feet of rope. This will allow for a tie rope 6 feet long, a 36-inch headpiece and 14-inch nosepiece.

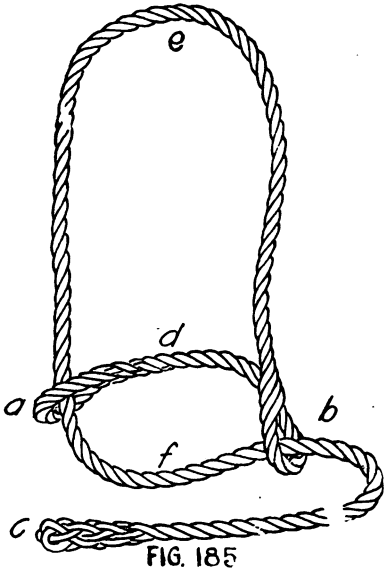


FIG. 185
DOUBLE LOOP HALTER

Double Loop Halter. The double loop halter has the advantage of being adjustable to animals of different sizes but it is not satisfactory for continuous use because there is some danger of its becoming loose and slipping off the head.

In beginning the double loop halter first make an eye splice (figs. 166 to 169) in one end of the rope. The loop of the splice should be just large enough to allow the rope to pass through, otherwise the halter will loosen readily. From the loop of the eye splice measure the distance that will be required to reach nearly around the animal's nose and make a loop splice (figs. 163, 164 and 165) of the same size as the loop of the eye splice. Finish the end of the rope with the end splice (figs. 160, 161 and 162, see also crown knot figs. 145, 146 and 147) and pass the end through the loops as shown in fig. 185. In the illustration *a* is the eye splice, *b* the loop splice, *c* the end splice, *d* the nosepiece, *e* the headpiece and *f* the part passing under the jaw.

Single Loop Halter. The single loop halter will not slip nor loosen and for the same reason it is not adjustable to different sized heads. Since it is not adjustable it will be necessary to ascertain the required length of the headpiece and nosepiece by measuring the halter on the animal's head before making the halter.

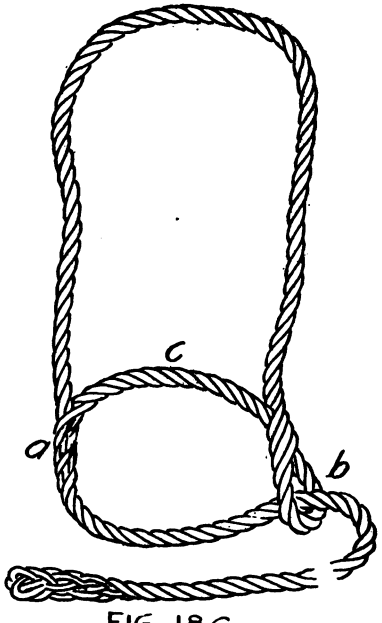


FIG. 186

SINGLE LOOP HALTER

In making the single loop halter (fig. 186) the loop splice *b* described in figs. 163, 164 and 165 is made first, then the nosepiece (*c*, fig. 186) is side-spliced into the cheek piece *a*. For description of the side splice see figs. 166 to 169. See also end splice figs. 160, 161 and 162. Now pass the end through the loop splice and the halter is complete.

Temporary Halter. A very convenient halter for leading or temporarily holding cattle is made by fastening an iron ring or making a loop in the end of a rope. The end with the ring is first passed around the animal's neck. A loop *a* is then formed in the main rope, (fig. 187) passed through the loop *b* and over the animal's nose as shown in fig. 188. To remove the halter it is only necessary to slip the loop from the nose and draw on the standing part of the rope. Since the halter may be re-

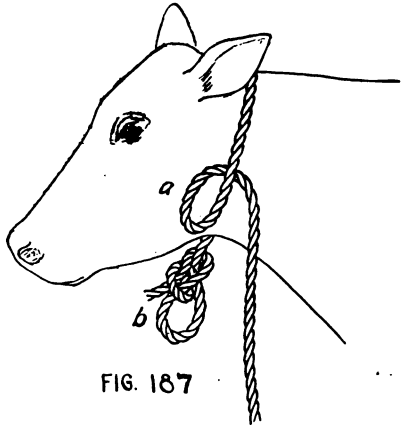


FIG. 187

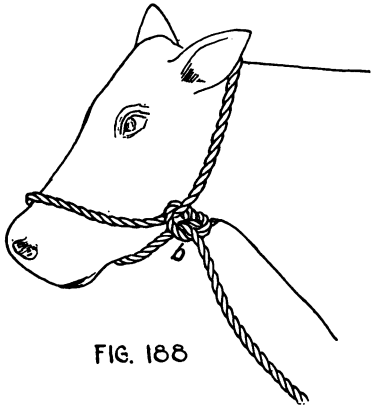


FIG. 188

TEMPORARY HALTERS

moved without passing the rope over the head it is very useful when dehorning cattle.

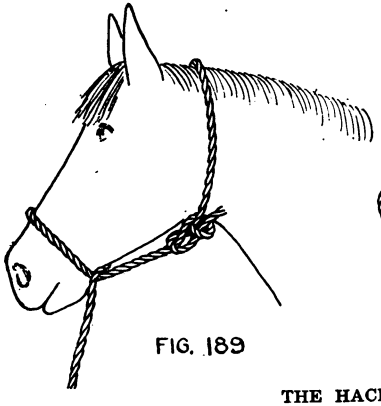


FIG. 189

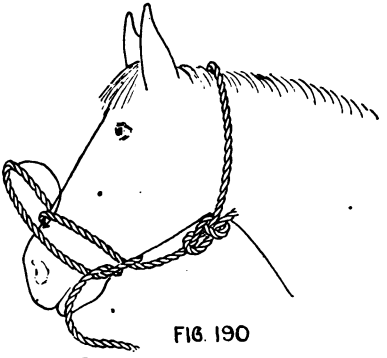


FIG. 190

THE HACKAMORE

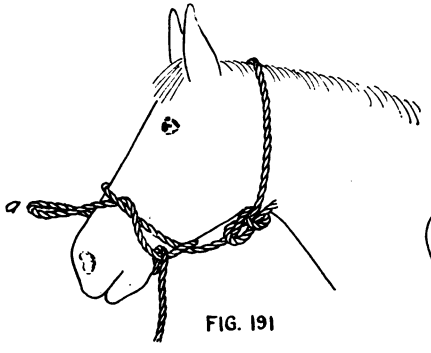


FIG. 191

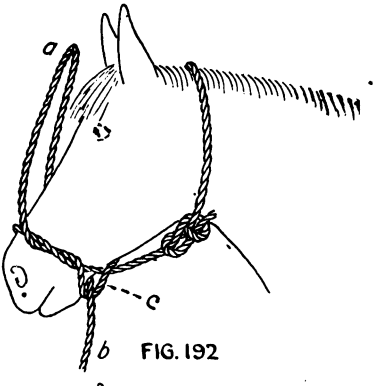


FIG. 192

The Hackamore. The hackamore is a temporary halter used for leading or tying either horses or cattle. It is easily and quickly made and is secure when properly drawn up.

In making the hackamore, a long rope is usually used. One end is passed around the animal's neck (fig. 189) and tied with a bowline knot. (For bowline knot see figs. 25 to 28.) A half hitch is then thrown in the rope and passed over the animal's

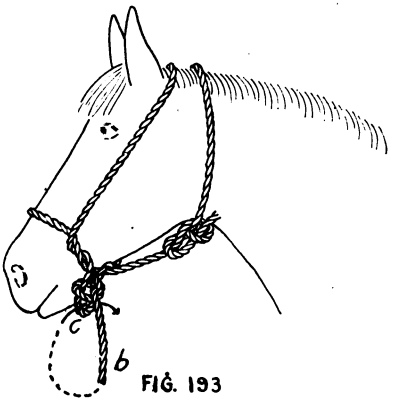


FIG. 193

FINISHING THE HACKAMORE

nose (fig. 189). In like manner a second half hitch is made below the first and passed over the nose (fig. 190). The front part of the first half hitch is then raised above the second as in fig. 190 and is then passed downward under the first half rope *b* in fig. 192. To prevent the loops from drawing tight, the loop *c* is drawn down and a half hitch thrown over it with the rope *b*. If the animal is to be left tied for any length of time the rope *b* is passed through the loop *c* below the half hitch as indicated by the arrow in fig. 193.

TACKLES

Leading or Tying. A simple but effective method of using a rope for breaking a colt to lead is shown in fig. 194. A strong leather halter is placed on the colt's head. A long rope is procured and one end is passed around the body over the withers and just behind the front legs. It is well to have an iron ring in the end of the rope, or a loop tied with a bowline knot (figs. 25 to 28) so that the loop which passes around the body will loosen as soon as the tie rope is slacked. (A ring is best.) Pass the rope through this ring or loop, then between the front legs and over the chin piece of the halter. When the rope is tightened the colt will usually lead up with but little resistance, and if he passes the person who is leading him the chin piece of the halter acts as a pulley and his head is drawn around to the side.

This method is also often used for breaking halter-pullers. In this case the long rope is simply tied to the manger. However, if the manger is low the rope should not be passed through the chin piece of the halter but through a rope or strap loop *a* which is fastened to it. Otherwise there is too great a pull on the top of the head.

Casting Horses. For casting horses a rope not less than thirty-five or forty feet long, should be used. The rope is doubled and a bowline-on-the-bight tied in the center (figs. 42 to 45). This is placed over the horse's head and adjusted to the size of the neck. The rope is then passed between the fore legs, around the ankles of the hind legs, once around the main rope, as shown in fig. 195, and finally through the loop of the bowline-on-the-bight, at *a*. In order to prevent the rope from burning the hind ankles, ankle straps should be used. Hame straps with iron rings, placed on the ankles answer the purpose admirably. The loop around the neck should be loose enough so that it will not choke the animal when thrown. If the horse is to be thrown on the right side the person holding

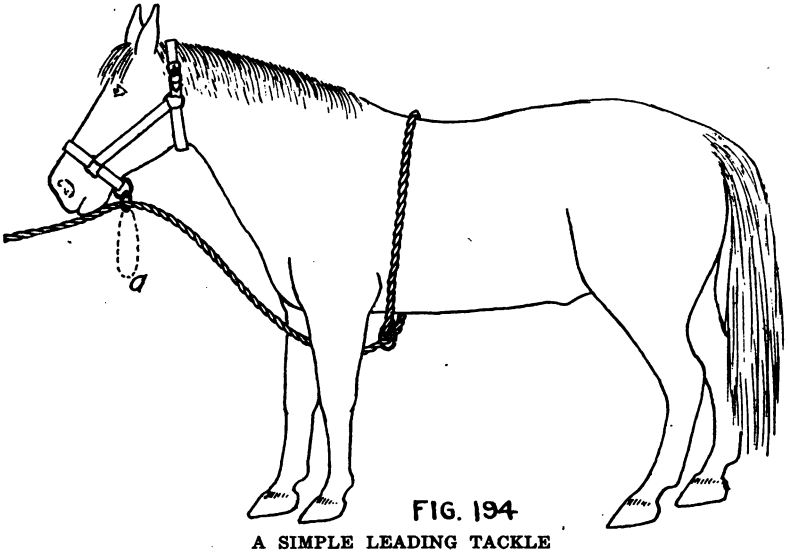


FIG. 194
A SIMPLE LEADING TACKLE

the rope on that side should stand in front and to the right, and the one holding the other rope to the rear on the left side. The horse is then caused to back and the ropes are pulled thus drawing his hind feet up toward the body. As soon as the horse is down the person at the halter should twist the head, turning the animal's nose upward as far from the ground as possible. This prevents him from getting up.

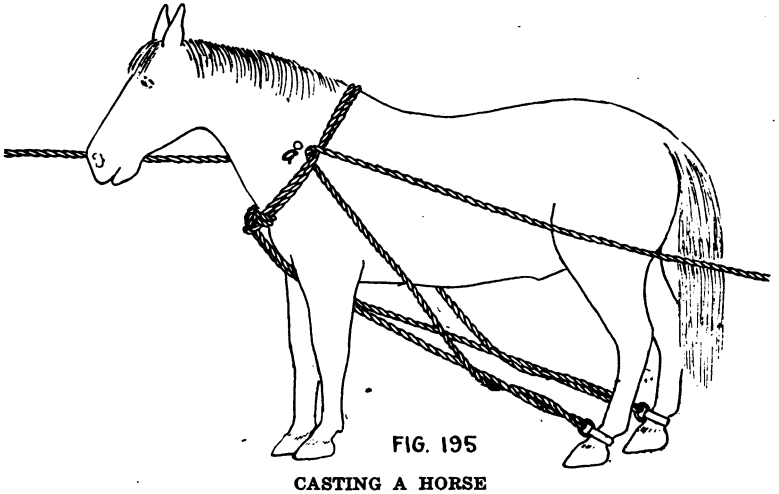
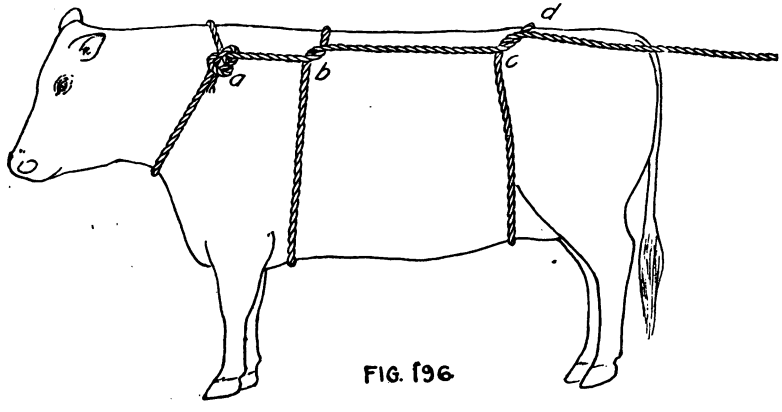


FIG. 195
CASTING A HORSE

Casting Cattle. For casting cattle, the method shown in the accompanying illustration (fig. 196) is simple and effective A rope thirty-five or forty feet long is needed. Place one end around the animal's neck and tie it with a bowline knot (figs. 25 to 28). Next, pass the rope around the animal's body just back of the fore legs, making a half hitch over the wtihers at *b*.



CASTING CATTLE

Now pass the rope around the body at the hips letting it draw up into the flanks. It is well to have the rope on one side, as at *c*, in front of the hip bone, and the one on the other side, as at *d*, behind it. This prevents the rope from drawing too far ahead over the loin, and also from slipping too far back. In throwing a cow care should be taken that the rope is entirely in front of the udder. To throw the animal, pull to the rear and toward the side upon which she is to be thrown. When the animal is down turn the head to prevent her from rising.