

PRACTICAL KNOTS HITCHES AND SPLICES

ROPEWORK



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ROPE USE TABLE

Use	Knot or Splice	Page
Anchor knot	Fishermen's bend	17
Bag tie	Miller's tie	15
Boat tie	Clove hitch No. 1 or 2	16
	Double half hitch	14
	Fishermen's bend	17
Binder twine tying	Weaver's knot	12
Binding rope ends (permanent)	Whipping	5
	Walker knot	7
Binding rope ends (temporary)	Miller's tie	15
	Overhand knot	8
Cattle throwing	Tackle for throwing cattle	30
Chest handles	Figure eight knot	8
Clevis hitch	Fishermen's bend	17
Clothesline hitch	Double half hitch	14
Crossed rope fastening	Clove hitch No. 2	16
Dragging logs or timbers	Timber hitch	14
Electric drop-cord shortening	Sheepshank	18
Fishhook tie	Fishermen's bend	17
Guy rope fastening	Clove hitch No. 1 or 2	16
	Double half hitch	14
	Fishermen's bend	17
Halter	Adjustable halter	27
Halter knot	Halter tie	10
Handhold in rope	Figure eight knot	8
Heavy hauling (joining ropes)	Carrick bend	13
Horse throwing	Tackle for throwing horses	29
Loop (permanent)	Spliced eye	19
Loop that never slips nor jams	Bowline knot	9
Package tying	Figure eight (packer's knot)	8
	Square knot	11
Pulling up pipe or posts	Well-pipe hitch	15
Sack tie	Miller's tie	15
Shorten rope without cutting	Sheepshank	18
Sling for sacks, bales, etc.	Bowline on a bight	10
Splicing (straight pull)	Short splice	21
Splicing (hay rope or any pulley)	Long splice	22
Swing hitch (child's)	Fishermen's bend	17
Tow rope; stacking outfits, etc.	Bowline knot	9
Tying ropes together	Square knot	11
	Weaver's knot	12
	Carrick bend	13
Tying large and small ropes together	Weaver's knot	12

ROPEWORK

Practical Knots, Hitches, and Splices

NEARLY EVERYONE makes daily use of rope, cord, and other tying materials, and so needs a practical understanding of knots, splices, and hitches. Even a shoestring must be properly tied if it is to stay in place, look well, and untie easily. Every motorist should know how to attach a tow rope without having to crawl underneath the car and should be able to tie it so it will not slip or come loose and yet will untie readily. Because it is intensely interesting as well as useful, the study of ropework and knots is one of the most popular projects and hobbies for 4-H club members, rural youth groups, Boy Scouts, school students, and others.

A knowledge of ropework is of great practical use on the farm, where rope finds daily use in a variety of ways. The farmer who knows the correct, easy way of mending a broken hay rope, tying up a cow or horse so it cannot strangle, making the correct hitches for snaking timbers, hoisting hay poles or pulling well pipe, making an adjustable halter, or making strong sure knots that can readily be untied again, will save much time and trouble and can sometimes avoid serious risks to life and property.

Though there is an almost endless variety of knots, hitches, and splices for special uses, this bulletin presents only a few of the most practical and necessary. It is better to be thoroughly familiar with a few of the most useful ones than to try to learn a great many and then not be able to make them when needed.

Sources of Fiber

Many different fibers are used for rope making, but the most common are Manila and sisal. Manila rope is the strongest and is most used.

Manila fiber comes from the Abaca plant grown in the Philippine Islands and gets its name from the city of Manila. The trunk of the plant resembles the banana tree and is closely wrapped with long leaves which yield fibers from 6 to 12 feet or more in length.

Sisal fiber is about three-fourths as strong as Manila and comes principally from Mexico and Central America. Sisal fibers are taken

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from the leaves of any of the *Agave* species of plants and are much shorter than Manila, usually from 2 to 4 feet long.

New Manila fiber usually has a silky appearance with a slightly golden tint, while new sisal fiber has a more dull and woody appearance with a slightly greenish tint. Sisal fibers are usually a little coarser than Manila. Manila fiber comes in all grades from brown in the cheaper grades to almost white in the best grades.

Strength of Rope

The strength in pounds of new Manila rope is roughly 8,000 times the square of the diameter in inches. One-sixth the breaking strength is usually the safe load. Thus a $\frac{1}{2}$ -inch new Manila rope will have a breaking strength of 2,000 pounds ($\frac{1}{2} \times \frac{1}{2} = \frac{1}{4} \times 8,000 = 2,000$) and a safe-load rating of 333 pounds ($2,000 \div 6 = 333$). By the same formula, a 1-inch new Manila rope would be rated at 8,000 pounds breaking strength and 1,333 pounds working load.

The breaking strength of sisal is about 6,000 times the square of the diameter.

Moisture Affects Strength of Rope

The strength of rope is materially affected by moisture. Five per cent of moisture, by weight, will increase the strength of new Manila rope 20 per cent or more. Manila rope exposed to the weather one year will still gain considerable strength when moistened, although not as much as new rope. The strength of sisal rope is less influenced by moisture. Rope kept in stock or stored in a heated building in winter dries out and is considerably weaker, due to loss of moisture.

Strength of Rope, Splices, and Knots

A splice usually is not over 90 per cent as strong as the original rope. A knot reduces the strength of a rope about 40 to 50 per cent.

Four-strand rope is of approximately the same strength as three-strand but weighs about 5 per cent more.

Taking Rope from the Coil

Cut the binding cords and start pulling out the rope from the center of the coil. It should uncoil counter-clockwise, or the opposite way from which the hands of a clock travel. If it uncoils clockwise, turn the coil over and pull the end out of the opposite side. Rope uncoiled in this way will come out without kinks or snarls.

Relaying Untwisted Strands

Loose strands may be easily relaid in the rope if they have not been untwisted long enough for the strand itself to become loose and untwisted. Hold the rope in the left hand, end up. Select the loose strand that happens to be farthest to the left. Grasp it with the right hand close to the rope, give it a tightening twist (clockwise), and lay it across the other strands from left to right. Hold it firmly in place with the left hand, being careful to keep all the twist in the strand, for it is this twist that holds the strand in place when finished. Proceed as before, selecting the strand that now comes farthest to the left. Continue with each strand in turn until the end of the rope is reached. Follow up immediately with the left hand as the relaying progresses. The end of the rope should then be secured with whipping or other suitable method. Never use a wire to bind the strands of a rope for sometimes a rope will be pulled through the hands and a wire may cause a severe injury.

Holding Rope When Tying Knots

Learning to make knots and hitches and remembering them afterwards is much easier when the student adopts a certain routine or system for holding rope, making loops, and carrying out other common steps. Mastering the following simple rules will make much of the work second nature.

When working with one rope, hold it in the left hand with the long part towards you, and the short end away.

When placing rope around a post, always take the short end and pass it around from left to right.

The first time a rope is crossed in making a knot or hitch around a post, the short end should be passed over (above) the long part. In most cases, the same rule applies to making a bight or loop used to start a knot.

When tying two ropes together, hold one rope in each hand with the long parts toward you, the short ends away, and with the left one placed over the right one.

There are usually several methods of making each knot and splice, but only one of the simplest and easiest to remember is shown here. The letters A, B, C, etc., given in the instructions, correspond to the various steps shown in the diagrams or figures.

BINDING ROPE ENDS

Methods of securing strands at the ends of rope to prevent unraveling

Whipping—Whipping (Fig. 1) is used as a permanent fastening for the end of a rope. Use a strong, hard-laid string.

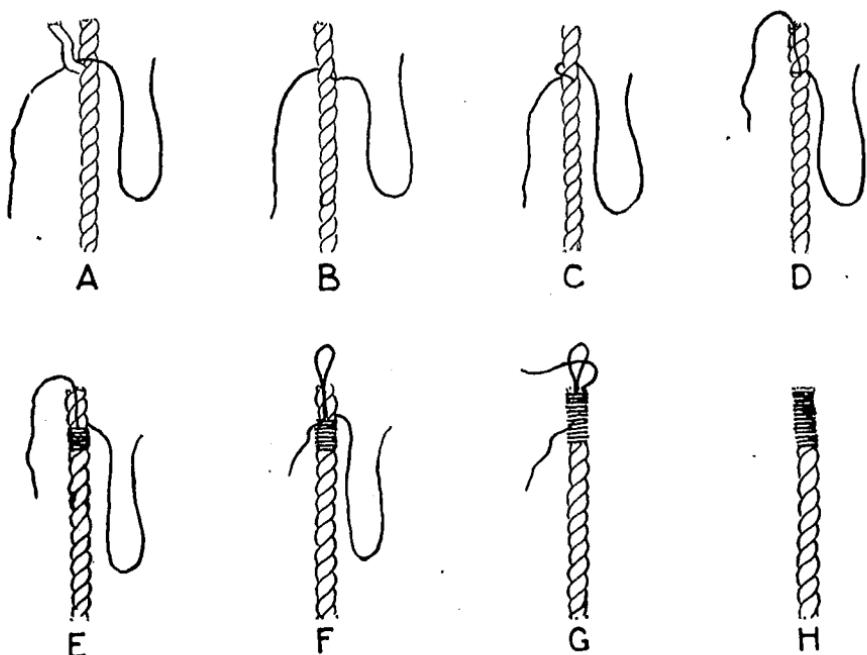


FIG. 1. Whipping

- A. Hold the rope in the left hand, with the end extending up. Unlay one strand one full turn and place the string under it with from 4 to 6 inches of the short end extending through to the left.
- B. Twist the unlaid strand tightly, pull it towards the end of the rope and relay. The string will now be threaded through the rope.
- C. Give the long part of the string one turn clockwise over the rope between the short end of the string and the end of the rope.
- D. Place the short end of the string on the rope lengthwise and wedge it temporarily between the strands at the end.
- The half hitch thus formed in the string around the strand will anchor the whipping in place, should the rope shrink and the whipping become loose.
- E. Wind the long part of the string clockwise, close and tight over the short end towards the end of the rope until about half way.
- F. Fold the short end back parallel to itself, forming a loop a little past the end of the rope.
- G. Wind as before over the doubled short end until nearly to the end of the rope, then place the long part of the string through the loop.
- H. Give a strong pull on the short end of the string (which comes out of the whipping halfway down). This will draw loop and

long part well underneath the whipping. Cut both ends off close and roll between the fingers until the cut ends disappear, leaving no knots or ends exposed.

Walker Knot—Used as a permanent fastening where the increased size is desirable for a handhold (Fig. 2).

A. Unlay one strand five turns.

B. Unlay the other strands the same distance. Hold the rope, end upright, with each strand on its own side of the rope. Number the strands. The strand farthest to the left is No. 1, that in front (between yourself and the rope) is No. 2, and the one on the right is No. 3.

C. By crossing No. 1 strand in front of the rope (between yourself and the rope), make a loop extending out to the left.

D. Pass the end of No. 1 behind the rope and through the loop.

E. Make a loop with strand No. 2 like No. 1, but a little lower. Do not place No. 2 over behind the end of No. 1, but in front and lower.

F. Pass the end of No. 2 through its own loop. It passes through No. 1 loop in order to get to its own.

G. Make a loop with strand No. 3 like the others, slightly lower than No. 2.

H. Pass the end of No. 3 through both previous loops and through its own.

I. Place thumb and fingers of left hand on each side of No. 1

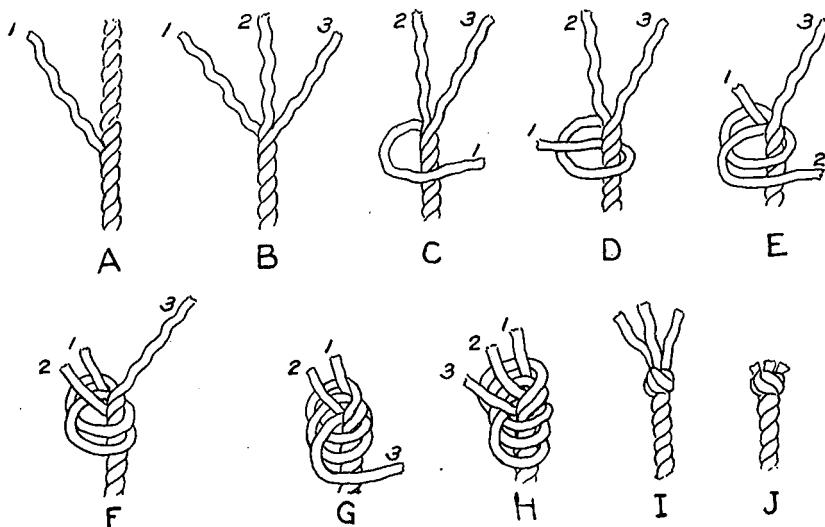


FIG. 2. Walker knot

strand, above the loop it passed through. Grasp the end with the right hand, give it a tightening twist, and pull slightly. Do the same with No. 2, then No. 3, and back to No. 1, etc. Pull the strands up gradually and always in the order they are numbered, until tight. Take care to allow no strain to come on the rope below the knot. When the knot appears as shown in Step I, hold the rope in the two hands with the knot end away and roll the knot towards the end of the rope with the two thumbs. Then give each of the three strands a final jerk. (Place them one at a time in the machinist's vise, if one is available, and pull on the rope.)

J. Cut the strands off a short distance from the end, leaving a length about equal to the diameter of the rope.

KNOTS USED IN ENDS OF ROPE

Knots for making chest handles, handholds, and for temporary fastening to prevent unraveling

Bight—The bight (Fig. 3) is the first step in tying many knots. Hold the rope in the left hand, the short end away from you, and form a loop extending down. Have the short end extending up on the right side.

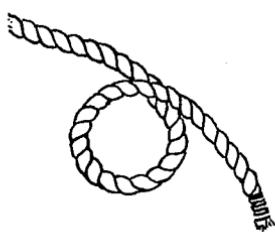


FIG. 3. The bight

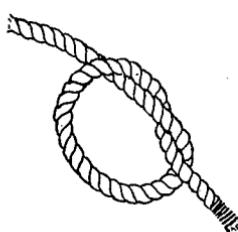


FIG. 4. Overhand knot

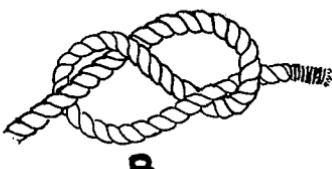
Overhand Knot—Sometimes used as a temporary knot to prevent strands from untwisting; also a part of many knots (Fig. 4).

Form the bight and place the short end through it from left to right. It is difficult to untie if pulled tight. The breaking strength is approximately 45 per cent of that of straight rope.

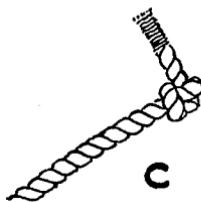
Figure Eight Knot—The figure eight knot (Fig. 5) is used as a temporary knot at the end of a rope, as a handhold, on ends of rope used for rope handles on account of its flat surface and size, and as a



A



B



C

FIG. 5. Figure eight knot

packer's knot for roping trunks or boxes or tying packages. When used as a packer's knot, it is tied in the end of the rope or cord as shown in Step B, and the long part placed around the object, then through the end loop. When the rope is pulled up tight, it has a tendency to jam, thus preventing the long end from slipping until the roping is finished.

Step C shows flat bearing surface when used on rope handles for a box or chest.

A. Hold the rope in the left hand and make a regular bight.

B. Pass the short end *over* the long part, down on the left side, underneath, up on the right, and down through the bight.

C. Pull up tight.

Note the large flat surface on the underside which makes it desirable for rope handles on a box or chest.

The breaking strength is approximately 48 per cent of that of straight rope.

KNOTS FOR FORMING LOOPS

Used for attaching tow ropes and hay ropes, barrel slings, and for tying animals

Bowline Knot—The bowline knot (Fig. 6) is the best knot for forming a loop at the end of a rope which will never slip and is always easily untied after a very heavy pull. It is often called the "King of Knots." It is especially valuable for fastening the end of a tow rope on an automobile, because the knot itself may be tied out in the open, without the necessity of crawling under the car, and it is always easily untied.

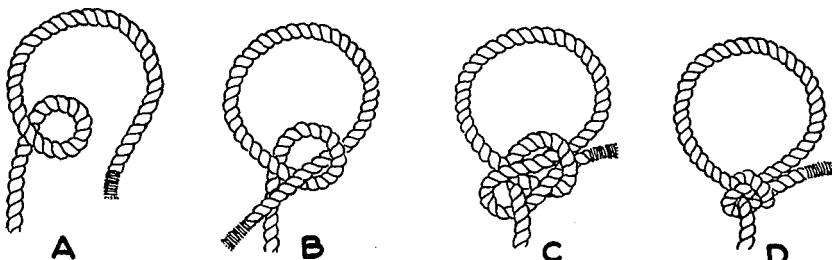


FIG. 6. Bowline knot

A. Hold the rope in the left hand, short end away from you. Form a small regular bight and pass the short end around the post from *left* to *right*. Have the bight also extend towards the right.

B. Pass the short end through the bight from underneath.

C. Pass the short end *over* the long part, down on the left, underneath, up on the right side, and down through the bight. Note that the two ropes lay parallel where they pass through the bight.

D. Reach under the knot with the left hand and grasp the short end and right side of the loop. Grasp the long part of the rope with the right hand and pull between the two hands, allowing no strain to come on the loop until the knot is pulled up tight.

This method of tying leaves the loop which is around the post open, for the short end extends through the bight and is on the outside. The breaking strength is approximately 60 per cent of that of straight rope.

Halter Tie—The halter tie (Fig. 7) is used for tying animals and is suitable for either rope or leather.

A. Hold the rope in the left hand, short end away. Pass the short end around the post from *left* to *right*. Let the short end remain on the right without crossing the long part and grasp both parts with the left hand.

B. Pass the short end *over* the double rope or loop from right to left between yourself and the post, forming a bight on the right side.

C. Pass the short end down on the left and under from left to right.

D. Reach the right hand through the bight, grasp the short end close to the knot and draw through a loop of it. (Do not pull the end through.)

E. Draw the knot up tight and pass the short end loosely through the last loop made as an extra precaution against its becoming untied. The halter tie will jam if used for a very heavy pull.



FIG. 7. Halter tie

Bowline on a Bight—Used where a double loop is desired at the end or any part of the rope (Fig. 8). Used for footholds when lowering a person down a well, over a cliff, etc. Used by firemen for lowering an unconscious person from a building by placing one loop under the arms and the other at the bend of the knees. Sometimes used as a sling for a barrel or bag. The knot will hold whether the

strain comes on either rope, either loop, or both. The knot will never slip, if properly made, and is always easily untied.

A. Fold the rope back and hold the loop end up in the left hand. Form a regular bight with the doubled rope.

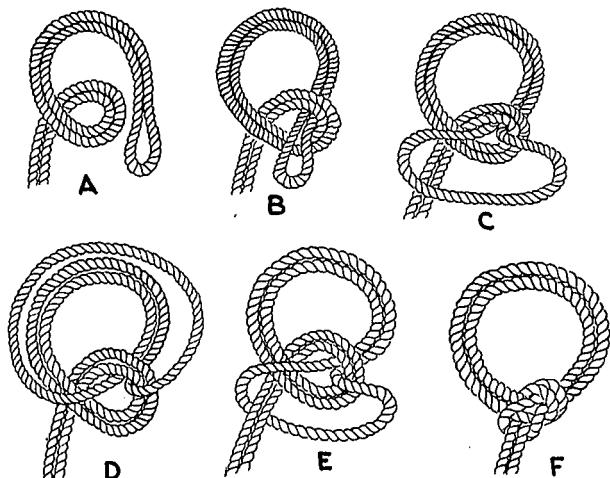


FIG. 8. Bowline on a bight

take the slack out of this single loop. If pulled up wrong, this knot is worthless because it turns over and becomes a slip knot.

F. See that it is properly tied and pulled up. The two long parts should pass up through the single loop, form a half hitch around the double rope that forms the loop, and then form the large double loop.

The breaking strength is approximately 60 per cent of that of straight rope.

KNOTS FOR TYING ROPES TOGETHER

Used for tying packages, joining ropes of different sizes, and tying ropes together so they will untie easily

Square Knot—The square knot (Fig. 9) is the most common for tying two ropes or cords together when tying up bundles and packages. It is not so desirable for tying ropes together for a heavy pull because it is very difficult to untie. The double bow knot for tying shoestrings is merely the square knot with the ends looped back to form bows and to permit easy untying.

A. Hold one rope in each hand, short ends away. Place the left hand rope over the right one. (It is well to remember this, for the

B. Pass the loop end up through the bight from underneath.

C. Pull the loop end through the bight and open it up.

D. Pass the open loop end up and over the whole knot.

E. Pass the loop down on the farther side of the knot. Pull on the two ropes that

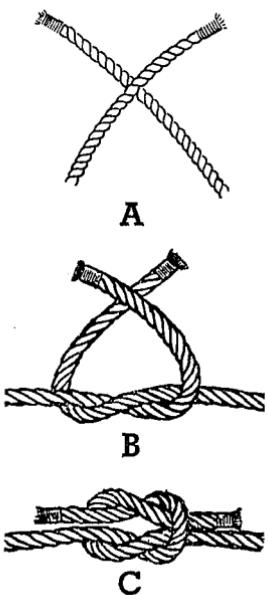


FIG. 9. Square knot

first half of the square knot is used in splicing.)

B. Do all the tying with the left-hand short end. Pass it down on the farther side and under the right-hand piece and up. Then place it *over* the short end of the right-hand piece again.

C. Pull it through towards you and note that both short ends are twisted together and both long ends together. Both ends of the same rope come out on the same side of the loop. It is simply two loops hooked together.

The square knot may often be untied by grasping the short end and long part of the same rope (same side of the knot) and giving them a jerk in opposite directions causing the rope to straighten out. The other part may then be slid off.

The breaking strength is approximately 45 per cent of that of straight rope.

Weaver's Knot—The weaver's knot (Fig. 10) is especially valuable for tying leather straps together and for tying ropes of different sizes together. It is one of the very few knots that will hold for this use. Also a good knot for general use. It is better than the square knot, but is rather difficult to untie after a very heavy pull. When tying together ropes of unequal size, hold the large one in the left hand.

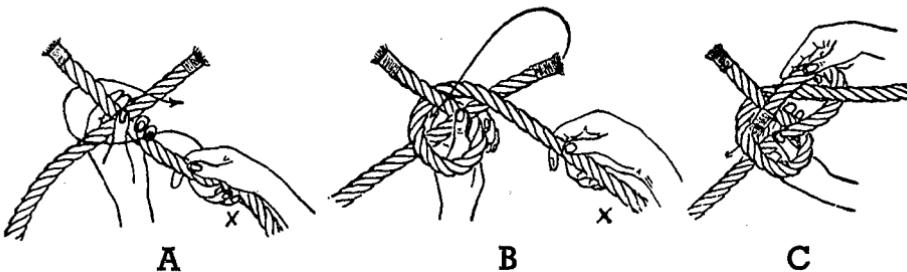


FIG. 10. Weaver's knot

A. Hold one rope in each hand, short ends away. Place the left-hand rope *over* the right.

B. Grasp the right-hand rope about a foot down from the place where the ropes cross and give it one clockwise turn around its own short end, bringing it back between the short ends.

C. Bend the short end of the left-hand piece over towards the left, between yourself and the other short end and down through the loop. Pull the knot up tight by holding the short and long part of the left-hand piece of rope together with the left hand and pull on the long part only of the right rope with the right hand. The breaking strength is approximately 60 per cent of that of straight rope.

Carrick Bend—The Carrick bend (Fig. 11) is the best knot for tying two ropes together for a very heavy pull. It should always be used with a block of wood or other object placed in the diamond-

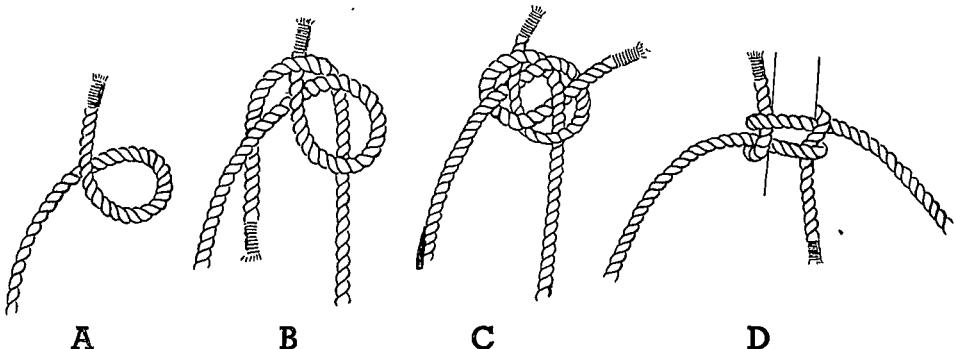


FIG. 11. Carrick bend

shaped opening in the center. For greatest strength use a round stick. It never slips and is always easily untied; in fact, it actually falls apart after the heaviest pull.

A. Hold one rope in each hand, short ends away. Make a regular bight in the left-hand piece near the end.

B. Place the right-hand piece on the farther side of the bight. Then pass the short end of it between yourself and the short end of the left rope from right to left, and down on the farther side of the left-hand long part.

C. Grasp the same short end and bring it towards you between the long parts and pass it over the left side of the bight, behind its own long part, and out over the right side of the bight.

It will now have a diamond-shaped opening in the center through which a block of wood or other object must be inserted.

D. Tighten the knot. The long parts press the short ends against the block, preventing the knot from slipping.

The breaking strength is approximately 65 per cent of that of straight rope.

HITCHES

Used for hauling, hoisting, securing guy ropes, tying grain sacks, and shortening rope without cutting

Single Half Hitch—The single half hitch (Fig. 12) is a part of many other hitches. It will not hold if used alone. Hold the rope in the left hand, short end away. Pass the short end around the post from *left to right*, over the long part from right to left, down on the left of the long part, up through between the loop and the post, and over the right side of the loop.

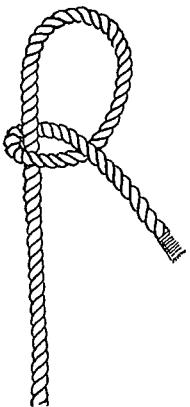


FIG. 12. Single half hitch

Double Half Hitch—The double half hitch (Fig. 13) is used for guy ropes, clotheslines, etc. It does not slip and will not jam easily.

The first half is the same as the single half hitch. Next pass the short end *over* the long part from right to left, down, under, and up through this last loop and over the right side of the loop.

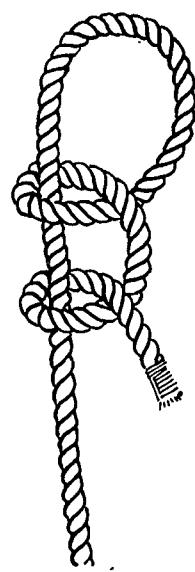


FIG. 13. Double half hitch

Note that the short end passes *over* the long part both times. The breaking strength is approximately 75 per cent of the straight rope.

Timber Hitch—The timber hitch (Fig. 14) is used to drag timbers or logs and is usually placed several feet from the end of the timber. A half hitch is made near the end with the long part of the rope to keep the timber from swinging sidewise.

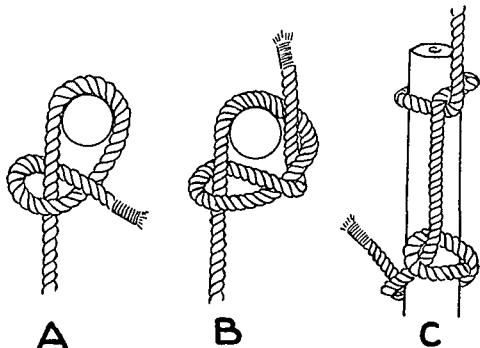


FIG. 14. Timber hitch

A. Make a regular single half hitch.

B. Pass the short end up between the right side of the large loop and the timber.

C. Form a bight in the long part near the end of the timber and turn it in such a way that the part to be pulled is underneath. Drop it over the end of the timber and draw tight.

Well-Pipe Hitch—

The well-pipe hitch (Fig. 15) is used for pulling pipe from a well and for pulling posts, etc.

A. Place the rope around the pipe from *left to right*. Pass the short end under the long part and wind down not less than four turns, then place it *over* the long part and put in the double half hitch. It will slide on the pipe very easily until a strain is put on the long part, when it will lock. It does not slip and is always easily untied.

B. This shows how the hitch appears on the pipe.

The breaking strength is approximately 70 per cent of that of straight rope.

Miller's Tie—The miller's tie (Fig. 16) is used for tying grain and flour sacks, as a temporary fastening to prevent the strands at the end of a rope from untwisting, and may be used for tying a bandage on a finger. It may be tied with or without a loop. It is never used as a hitch for securing the end of a rope for a pull because it will easily pull out.

A. Grasp the top of the sack in the left hand and place the cord around from *left to right*. Pass the short end *over* the long part and around once more, this second turn being *below* the first. Wind loosely.

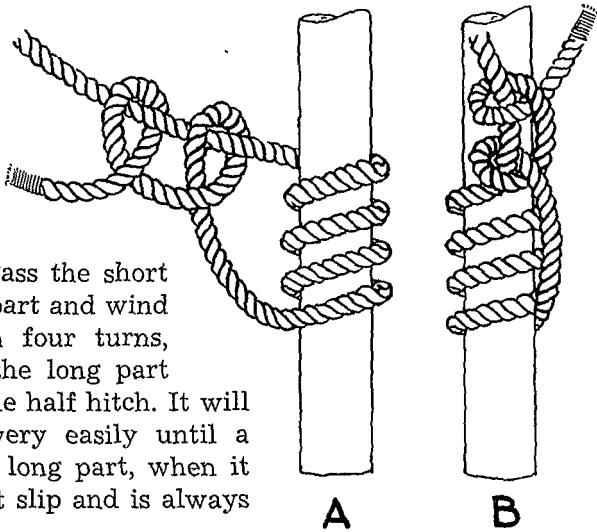


FIG. 15. Well-pipe hitch

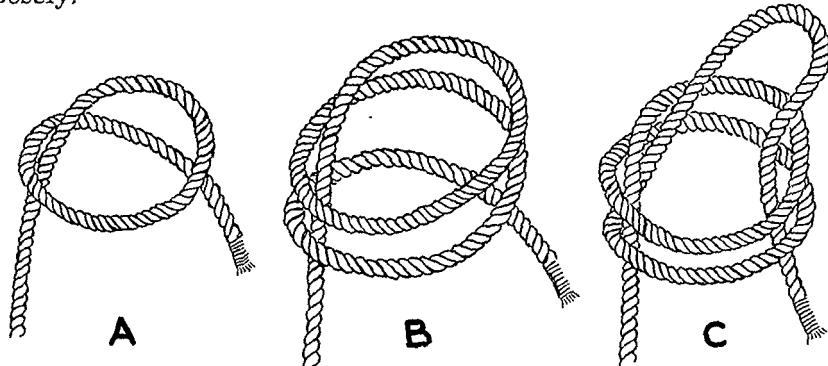


FIG. 16. Miller's tie

B. Pass the short end *over* the long part again and around from left to right, this turn being still farther down. There will now be two turns of cord on the side towards you and three on the farther side.

C. Push the third or last turn on the farther side up between the sack and the first two turns. The end may be pulled entirely through or a loop made. Pull on both ends in opposite directions until tight.

If made without a loop, it is fairly easy to untie by pulling on one end of the string. If made with a loop, a slight jerk on the loop end will very easily untie it.

Clove Hitch No. 1—This method of making the clove hitch (Fig. 17) is used only when it can be dropped over a post or other object. It is used for fastening guy lines, tent ropes, tying up a boat, etc., and sometimes as a grain or flour-sack tie. It will jam if given a heavy pull.

A. With the short end form a loop or bight extending up (the regular bight upside down), with the short end on the farther side.

B. Form a second bight out to the right of the first one. This one should also extend up with the short end on the farther side.

C. Slide the right-hand loop across the left one (between yourself and the left one). Drop the double loop over the post and pull up tight. The breaking strength is approximately 75 per cent of straight rope.

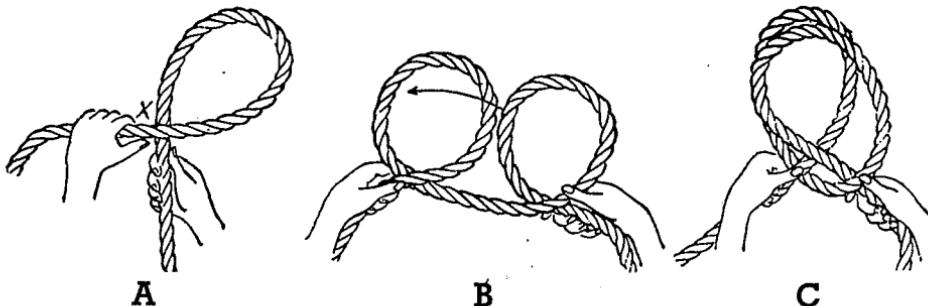


FIG. 17. Clove hitch No. 1

Clove Hitch No. 2—This method (Fig. 18) is used to tie the clove hitch around a tall pole or tree, when it is not possible to use the other method, or for attaching one rope or cord to another where they cross. It is often used when tying packages. Each time the cord or rope crosses any other, it is given a clove hitch around it. If any part of the cord becomes broken or cut, the rest will remain intact and the package will not come entirely unwrapped. It is difficult to untie after a heavy pull.

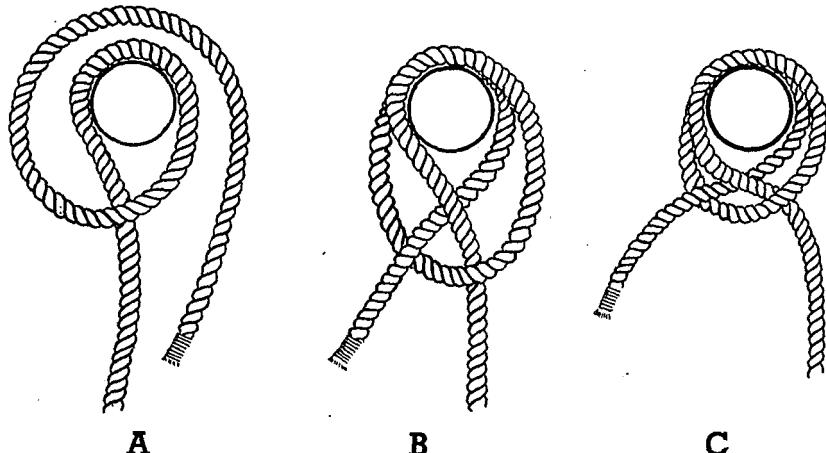


FIG. 18. Clove hitch No. 2

A. Hold the rope in the left hand, short end away. Pass the short end around the post from *left to right* and *over* the long part from right to left.

B. Pass the rope around the post again, this turn being *below* the first one, then under both ropes that form the first loop, from right to left, and out between the two turns of rope that appear on the left side of the post.

C. Pull up tight. It is the same as Clove Hitch No. 1 except that it is upside down.

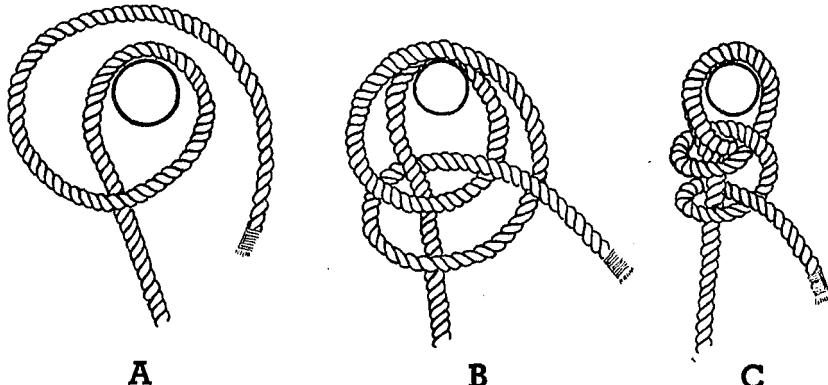


FIG. 19. Fishermen's bend

Fishermen's Bend—The fishermen's bend (Fig. 19) is used for fastening a rope to an anchor, clevis, or ring, tying fishline to a hook, fastening a child's swing ropes to the support, and for general use. It is the best hitch for a very heavy pull. It never slips, is always easily untied, and stands wear especially well because of the double

loop. It is often used on an anchor or fishline with one half hitch only, lashing or whipping the short end to the long part. It is much more easily untied after a heavy pull than any of the other hitches.

A. Hold the rope in left hand, short end away. Pass the short end around the post from *left to right* loosely and *over* the long part from right to left. Place the fingers of the left hand up through this turn next the post.

B. Pass the rope around the post the second time from left to right, this second turn being *above* the first one, *over* the long part again, up through both loops, and over the right side of the loops.

C. Pull up tight, and, if desired, put in the second regular half hitch. The second half hitch does not add extra strength, but if there is considerable slack in the rope at times, it is not so apt to loosen. If the short end is to be lashed to the long part, do not put in the second half hitch.

The breaking strength is approximately 70 per cent of that of straight rope.

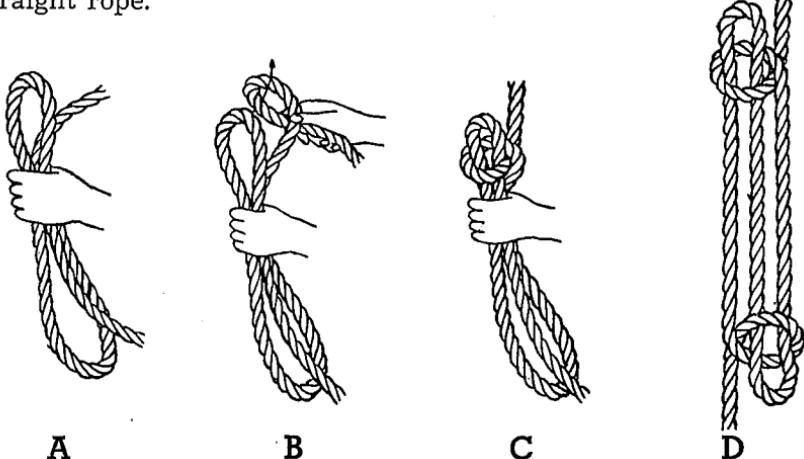


FIG. 20. Sheepshank

Sheepshank—The sheepshank (Fig. 20) is used for temporarily shortening a rope or an electric drop-light cord. It may be placed in any part of the rope without using the ends. It is safe unless slack is allowed in the rope, when it may come out. The loops may be secured to the rope with string to prevent its coming out.

A. Double the rope and hold the loop up in the left hand.

B. Grasp the piece that hangs on the right-hand side at a considerable distance from the loop, depending upon the amount of slack to be taken up, and form a small bight in it.

C. Turn the bight so that the part to be pulled will come underneath and slip the bight over the loop.

D. Reverse ends holding the other loop up. Form a bight in the rope as before and slip it over this loop. This forms a half hitch at each end, made with the rope on which the strain is to come. Pull up, and see that the three ropes between the half hitches are of even tension. The sheepshank is safe and will hold until the rope breaks, unless slack allows it to fall out. In case the hitch is to be used in a rope which is slack part of the time, tie the loops to the single ropes to prevent their coming out.

The breaking strength is approximately 45 per cent of that of straight rope.

SPLICED EYE

*Used for making halters and for permanent loops
in the ends of a rope*

Spliced Eye—The spliced eye (Fig. 21) is used where the full strength of the rope is wanted and for permanent loops such as in a rope halter.

A. Unlay all strands five turns. Spread them out in the order they are made in the rope, and, looking at the right side, the strand nearest the unlaid rope (to the right in the illustration) is strand No. 1, the middle one No. 2, and the one farthest away from the unlaid rope (to the left) is No. 3.

B. Measure the size of loop wanted and grasp the rope with both hands a few inches each side of the place where the splicing is to start and loosen the rope enough to slip the left thumb under any *one strand*. Then fold back strand No. 1 near its end and insert while the thumb is being withdrawn. The folded strand is more easily pushed through the rope than the loose end.

C. Pull strand No. 1 about half way through.

D. Place strand No. 2 under the next strand in the rope down or away from the loop.

E. Place strand No. 3 under the next strand in the rope. Each loose strand is now under a separate strand in the rope.

F. Reverse rope ready for splicing in the loose strands.

G. Pull slack out of the strands. Give each strand a tightening twist as it is pulled up.

H. Start the splicing with No. 3 strand, then No. 2, and last No. 1. Strand No. 3 is folded back near its end and carried clockwise up and over the first strand on the farther side of it, which is the one it was first placed under. Then it is tucked underneath this strand and pulled toward you.

I. Pull slack out of strand No. 3. This completes one turn.

J. Give each of the other strands one turn, the same as strand No. 3.

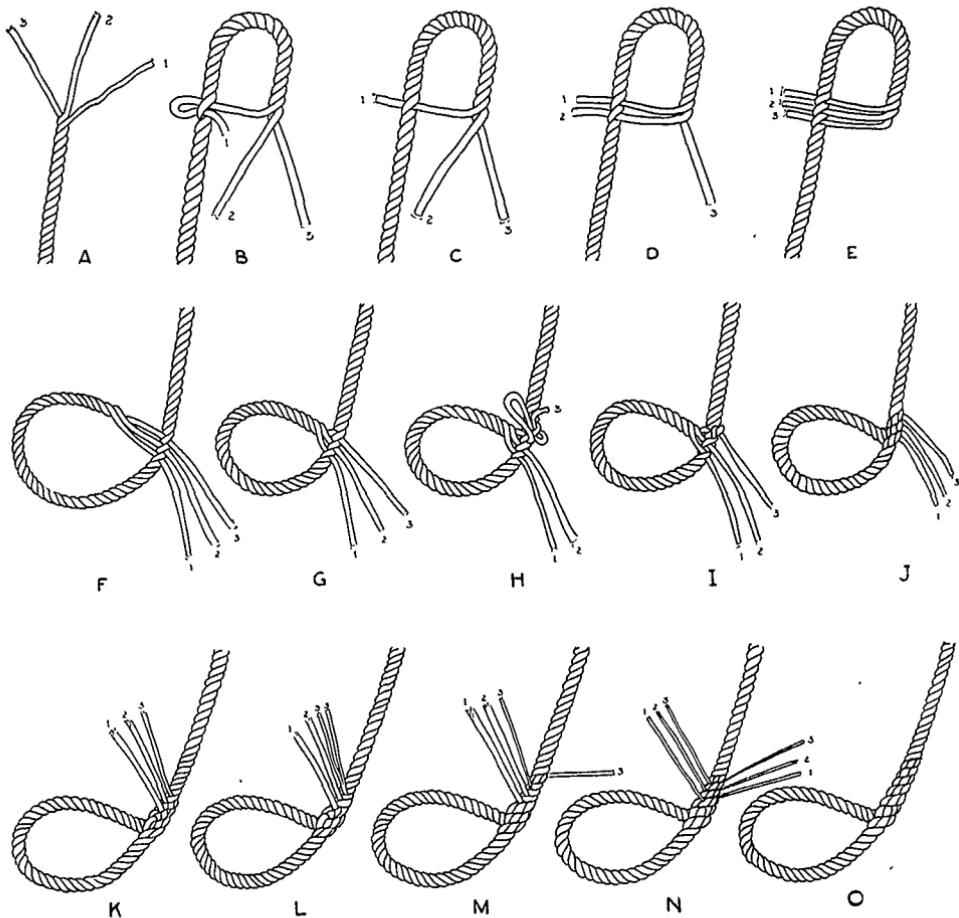


FIG. 21. Spliced eye

K. Start with strand No. 3, and give each strand another or second turn around the same strand in the rope it was placed around before.

L. Split strand No. 3 in half for tapering the splice.

M. Give one-half of strand No. 3 two turns, the same as the full strand and around the same strand in the rope. Either half may be used.

N. Split and turn strands No. 2 and No. 1 the same as strand No. 3.

O. Cut off the ends of the six half strands and roll the splice under the foot. The ends should not be cut too short or they will work out. The length left should equal the diameter of the rope. Splitting the strands is for tapering only and does not add to the strength. The breaking strength is approximately 100 per cent of straight rope.

SPLICES

Used for permanent joining of ropes, both for straight pulls and for hayfork and general pulley work

Short Splice—The short splice (Fig. 22) is used for permanently joining the ends of rope that is not required to pass through pulleys.

A. Unlay one strand eight turns (count the humps on the side towards you only) and tie a string around the rope at that point. Tie a string around the other rope at the same distance from the end.

B. Unlay all strands down to the strings. Be sure that each strand is on its own side of the rope.

C. Place the ends of the rope together so that the strands alternate (no two strands from the same rope lie together).

D. Hold the rope so that one strand coming from the left-hand piece extends up. Lay this strand over the first one on the farther side coming from the right-hand rope and tie the first half of the square knot.

E. Rotate the rope until another strand from the left-hand rope comes up and place it over the strand from the right-hand rope and tie as before. Do the same with the third pair. Pull each pair up tight. If the knots have been tied correctly, each strand from the left-hand rope will now extend out towards the right and come from underneath the right-hand strand it was tied with and towards you.

F. Remove the string around the right-hand rope (either side that happens to be on the right). From the left-hand rope, select any strand that happens to extend up. Fold it back near its end, pass it over the first strand in the rope down on the farther side of it (the one it was tied with) and pull it underneath this strand toward you. (The same as the spliced eye, Fig. 21). Pull it through tight and at the same time give it a tightening twist.

G. Give each of the other strands the same clockwise turn. Then select each pair that is twisted together and pull them up tight. This is the middle of the splice, and if slack is left it makes a loose job.

H. Give each strand another turn around the same strand it was wrapped around before. Each strand will then have had two turns around the strand it was first tied with.

I. Give one of the strands one more turn and another strand two more turns. Leave the third one as it was. This leaves one strand with two, one with three, and one with four turns.

J. Divide the four-turn strand in half. Give one of these halves

two more turns around the same strand in the rope that the full strand was turned and in the same way. The half not used is later cut off.

K. Divide the three-turn strand, then the two-turn strand, and work the same as the four-turn strand. This leaves six half strands coming out of the rope at different places.

L. Reverse the ends of the rope bringing the unworked side to the right. Remove the string around the rope and work exactly as before.

M. When all splicing is finished, give each of the twelve half strands a tightening twist and pull to make sure everything is tight.

N. Cut off all the loose half-strands a short distance from the rope, leaving a length equal to the diameter of the rope. After the ends are cut off, lay the splice on the floor and roll it with the foot.

The breaking strength is approximately 90 per cent of that of straight rope.

Long Splice—The long splice (Fig. 23) is used in hay ropes or in any rope running through a pulley. The increase in diameter is very slight, and the flexibility and wearing qualities are not impaired.

A. Unlay one strand 16 turns and tie a string around it at this point. Tie a string around the other rope the same distance from the end.

B. Unlay all strands down to the strings and make sure that each strand is on its own side of the rope.

C. Place the ends together so that the strands alternate (no two strands from the same rope lying together).

D. Push the ends tight together and rotate the ropes until any strand from the left-hand rope extends upward. Lay this strand over the first strand on the farther side of it, coming from the right-hand rope. Next give it a tightening twist and wrap it together with the right-hand strand in an anti-clockwise direction, one turn. Do the same with the right-hand strand and continue this twisting and wrapping first with one strand, then the other, until about half way to the ends of the strands. As each new turn is made, grasp it immediately with the left hand to prevent the twist from coming out. This is temporary and will be undone later but is very necessary to prevent the strands from becoming mixed up and to preserve their original twist.

E. Wrap another pair together the same as before; then rotate the rope until the remaining pair extend upward. Do not twist these together. Remove the string around the rope on the right-hand side only.

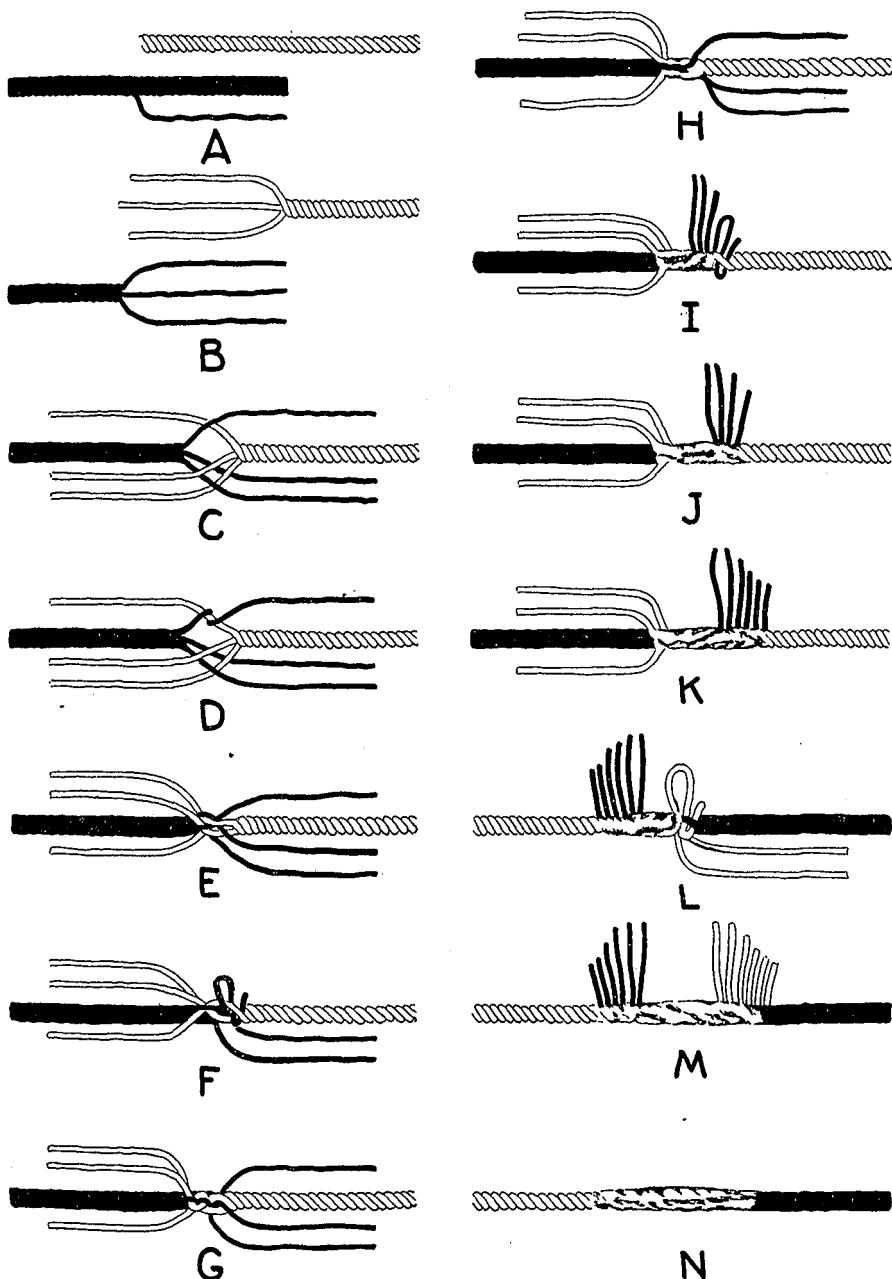


FIG. 22. Short splice

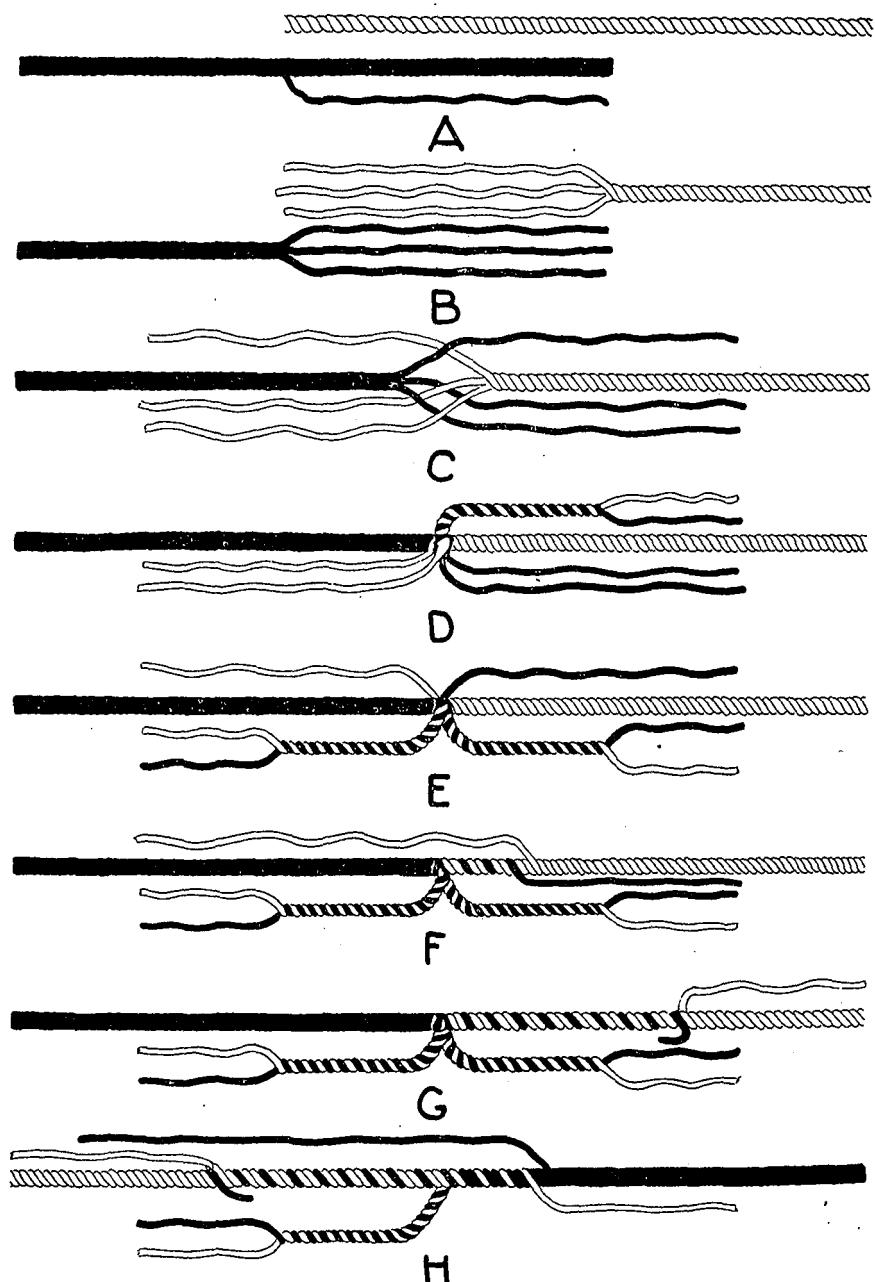


FIG. 23. Long splice

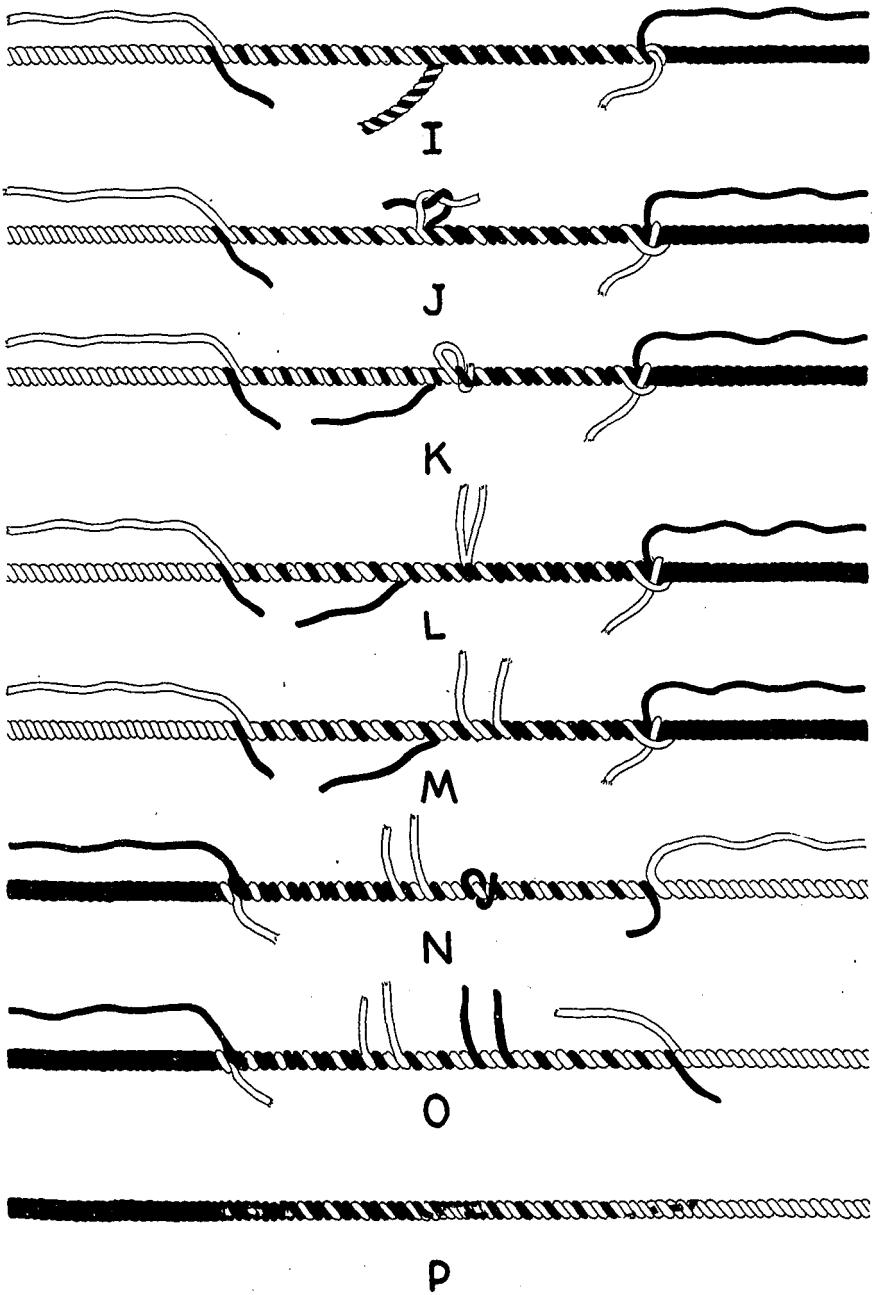


FIG. 23. Long splice—Continued

F. Unlay the strand which comes from the right-hand rope one turn at a time and wind into its place the one coming from the left-hand rope. At this time, take care to pull out all slack between the rope ends, or the center of the splice will be loose. When relaying this left-hand strand, take care to twist it up just as tight as it originally was and pull on it so as to make sure it will be carrying its share of the load. It should look exactly like the rest of the rope when finished.

G. Continue this relaying until four or five turns of the left-hand strand are left. (Count the humps on one side only.) Next, use this short strand to form a half hitch around the rope on the right of the long strand to prevent either from untwisting. (See Step J.)

H. Reverse ends of the rope (or step over it to permit working from left to right) and unlay one of the pairs which were temporarily wrapped together in Step D. Remove the string around the rope and unlay the strand from the right-hand rope and follow up with the left-hand strand the same as in Steps F and G. Be sure that you have reversed the rope as shown in Step H.

I. Place the half hitch around the rope as before. Cut off the center pair of strands four or five turns from the rope.

J. Untwist these strands and rotate the rope until they extend upward. Be sure that the strand coming from the left hand is *over* the other one. Tie the first half of the square knot.

K. Give the strands a tightening twist and pull the knot down smooth and tight into the rope. Fold back the strand which now extends toward the right and give it a clockwise turn around the first strand on the farther side of it, which is the one it was tied with.

L. Give this strand one more turn around the same strand as before, making a total of two turns, then split it in half.

M. Select either half and give it two turns around the same strand the full strand was turned.

N. Reverse ends of the rope (or step over it). Fold back the unworked strand and work it as described in Steps K, L, and M.

O. Split the strand and work half of it in two turns as before. The middle section is now finished. Remove the half hitch from one of the ends and cut off the long strand the same length as the short one. Tie them together as in Step J, making sure the strand coming from the left is *over* the other when making the knot.

P. Splice both end sections exactly like the middle one and cut all half strands about the same distance from the rope as its diameter. Roll all three sections of the splice under the foot. The breaking strength is approximately 88 per cent of straight rope.

Four-Strand Rope—Four-strand rope is spliced the same as three-strand except as follows:

Count off 22 turns instead of 16. Cut off core, if any, where rope ends meet.

After working one pair of strands each way from the middle, there are two pairs left. Work one of these pairs six turns one way and the other pair the same distance the opposite way. This makes four sections equally spaced, instead of three as in the three-strand rope. Splice the sections the same as three-strand rope. There is no regular method of splicing three- and four-strand ropes together.

ADJUSTABLE HALTER

A temporary halter easily adjusted for animals of different kinds and ages

Adjustable Halter—The adjustable halter (Fig. 24) is easily made and quickly adjusted.

Take the total length of rope as shown in the table.

ADJUSTABLE HALTER

Animal	Diameter inches	Total length feet	Approximate distance between loops for nose piece inches
Large cattle or horses	1/2	15	18
Small cattle or colts	3/8	12	15
Calves or sheep	1/4	10	10

A. Make a spliced eye just large enough for the rope to pass through freely. At the distance from the eye as shown in the table, open up the strands of the rope and pass the long end through from right to left.

B. Draw the long part through until the loop is about the size of the spliced eye.

C. Open up the strands of the long part of the rope at a point close to the loop, and pass the eye end through.

D. Pull out slack and form the rope to resemble the finished halter.

E. Pass the long end of the rope through the spliced eye, then through the second loop, and form a half hitch around the double part of the rope, above the loop.

F. Tighten the half hitch to complete the halter. The smaller of the loops goes over the nose of the animal, the larger behind the ears. This halter is very quickly taken out or the size changed. The end of the rope should be whipped.

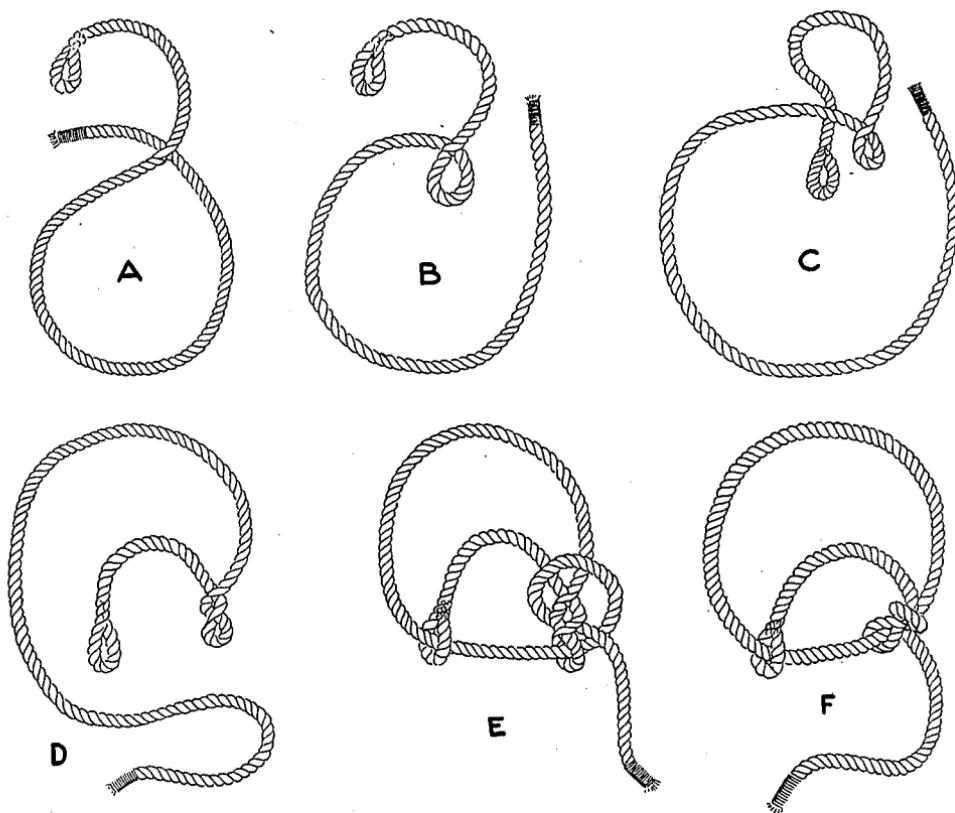


FIG. 24. Adjustable halter

TACKLES

Used for teaching colts to lead, curing "halter pullers," and for throwing animals

Leading or Tying—A simple but effective method of using a rope for breaking a colt to lead is shown in Fig. 25. 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 (Fig. 6) so that the loop which passes around the body will loosen as soon as the tie rope is slackened. (A ring is best.) Pass the rope through this ring or loop, then between the front legs and over the chinpiece of the halter. When the rope is tightened the colt will usually lead up. If he passes the person leading him, the chinpiece 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. If the manger is low, however, the rope should not be passed through the chinpiece

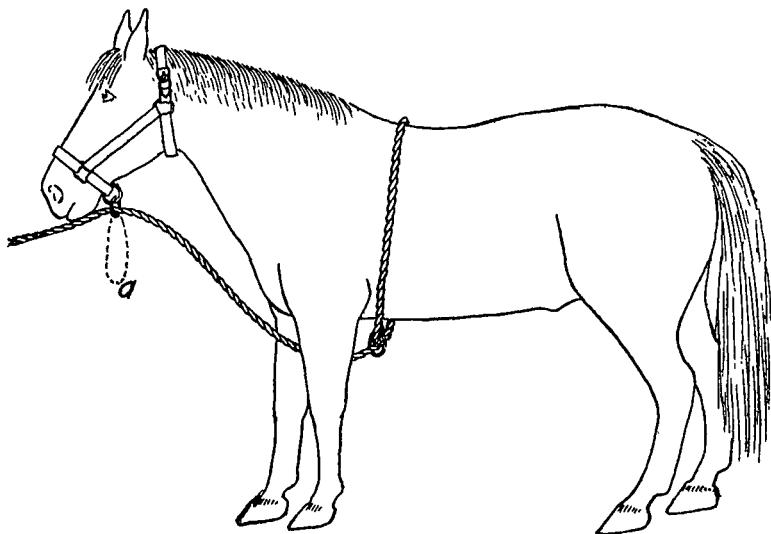


FIG. 25. Leading or tying

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 35 or 40 feet long should be used. The rope is doubled and a bowline on the bight tied in the center (Fig. 8). This is placed over the horse's head and adjusted to the size of the neck. The rope is then passed

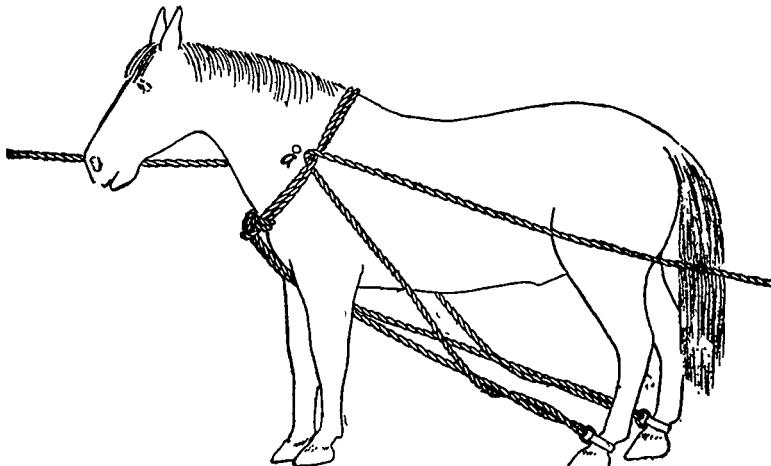


FIG. 26. Casting a horse

between the forelegs, around the ankles of the hind legs, once around the main rope, as shown in Fig. 26, 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 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.

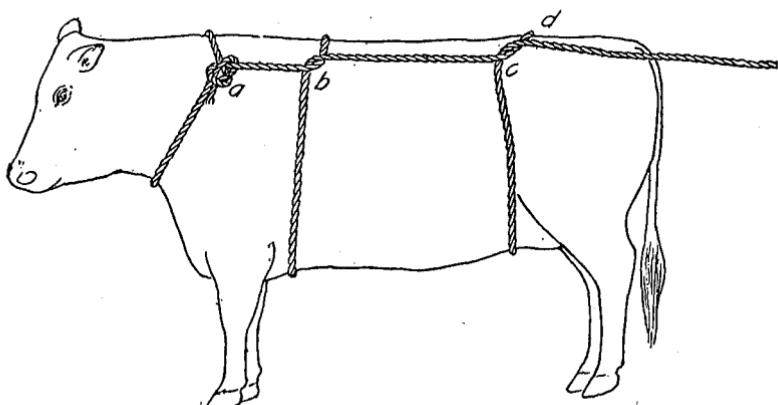


FIG. 27. Casting a cow

Casting Cattle—For casting cattle, the method shown in the accompanying illustration (Fig. 27) is simple and effective. A rope 35 or 40 feet long is needed. Place one end around the animal's neck and tie it with a bowline knot (Fig. 6). Next, pass the rope around the animal's body just back of the forelegs, making a half hitch over the withers at *b*. 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.