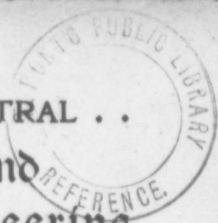


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. THE CENTRAL . .
Railway and
Engineering
Club
OF CANADA



OFFICIAL PROCEEDINGS

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TORONTO, CAN., January 28th, 1913

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THE CENTRAL RAILWAY AND ENGINEERING
CLUB OF CANADA MEETING

COURT ROOM No. 2, TEMPLE BUILDING,
TORONTO, January 28th, 1913.

The President, Mr. A. M. Wickens, occupied the chair.

Chairman,—

The first order of business is the reading of the minutes of the previous meeting. As you have all had a copy of the proceedings, no doubt you have read same, and a motion to adopt the minutes as read will be in order.

Moved by Mr. Wright, seconded by Mr. Mills, that the minutes of the previous meeting be adopted as read.—Carried.

Chairman,—

The next order of the business is the remarks of the President.

I am not in very good condition to-night as I have rather a bad throat; perhaps this is a good thing for the members, as I shall not be able to inflict a long speech on you.

In the first place, I want to thank the members for electing me as President. The matter was entirely in your hands and came quite as a surprise to me. Now, gentlemen, you have done it and have got to take the consequences. I do not think that there is any organization in Canada worth belonging to more than this is, and we are going to try and make it, this year, just as sociable and just as useful as it is possible for it to be.

I also want to thank you for the able lot of members you have put on the Executive, because it does not matter what kind of a President you have got, he has got to be surrounded by men who are willing to work, if the organization is to be a success, and with the Executive you have selected this year, I think that success is assured.

I also think that your Reception Committee this year is a good Committee. I want to warn the Reception Committee that I expect them to get down here on time and to be on hand to receive the members and their friends. It is up to the Reception Committee to make every man who comes to this.

meeting acquainted with his fellow members and to make him feel at home when he comes here. It is not for the Secretary or for the President to do this, and I want every man on that Committee to feel that the success of this Club hangs on him, and if every one looks at it like this there will not be any trouble about this year's business.

I hope the members will try and get here on time, so that we can get the meetings started early and have plenty of time for discussion, and still get home in good time, so that our wives will not be asking us what has kept us out so late.

There is another important point I want to touch on. The members receive the monthly proceedings of these meetings and you will notice that the book contains a lot of advertisements. Now there are a lot of members in this Club who are instrumental in buying material such as is advertised in the Journal of this Club. If you will be kind enough to write to the advertisers and ask for prices, and at the same time mention the Club's Journal, you will greatly assist the Club to forge ahead. Give the advertisers a chance at your business, it is not necessary to buy from them if you can do better elsewhere, but give them a chance, show them that you are interested in the advertisements, and do not forget to mention that you saw the advertisement in the Club book. By this means, you will greatly assist in the success of this Club.

If this is carried out, it will not be long, say three or four years, before this Club will be in a position to have permanent quarters, open every night, and do away with hiring rooms.

There are one or two other things I want to call your attention to.

The paper for to-night is on "Knots for Engineers," by Mr. G. D. Bly, Master Mechanic of the Monarch Supply Co., and the paper for the next meeting will be by Mr. E. A. Wilkinson, of the Lunkenheimer Co., on "Valves." I think both these papers will be remarkably interesting.

I also want to draw your attention to the fact that the Executive have started to work quickly, and we are arranging to have a first class dinner at the Prince George Hotel, on the evening of the 14th of February—St. Valentine's Day. The dinner will be an excellent one, talent and music will be provided, and the evening will provide a first class time for every man who attends it. We expect to have a good turn out on that night, and any of those who have attended before know that they will get their money's worth.

I will request the Executive Committee to wait for a few minutes after this meeting.

To-night we should present the Past President's Jewel to Mr. Bannan, but I regret to say that owing to sickness he is prevented from being here, but I trust that by next meeting

night he will be well enough to attend when we will present the jewel to him.

The next order of business is the announcement of the new members.

NEW MEMBERS

- J. D. Scott, Rep. Holden Co., Limited, Montreal.
 John McKinney, Second Engineer, S. Frank Wilson & Sons, Toronto.
 G. C. Mooring, Proprietor, Modern Machine Shop, Toronto.
 Geo. White, Planer Hand, Gurney Foundry Co., Toronto.
 Thomas Buchan, Machinist, Gurney Foundry Co., Toronto.
 Adam R. Taylor, Engineer, Toronto.
 G. Powell, Representative, Brunswick-Balke Callender Co., Toronto.

MEMBERS PRESENT.

W. S. Davis	W. Chidley	G. M. Smith
G. H. Virles	A. R. Woodley	W. Dennett
J. Callanan, Jr.	J. Kelly	A. Gardiner
A. Stark	W. C. Smith	J. Barker
H. G. Woodley	W. Kemp	G. P. Beswick
C. D. Scott	J. H. Stananought	E. E. Cummings
F. A. Thompson	F. Smith	A. Terry
A. Harris	L. R. Whiting	T. Brown
L. Salter	J. M. Clements	J. Lindsay
J. Lindsay	W. A. Davis	F. R. Wickson
E. J. Woodison	E. Logan	W. C. Sealy
J. H. Morrison	T. Walsh	G. Baldwin
E. B. Fleury	T. Buchan	J. Wright
N. A. Davis	H. Paton	H. G. Fletcher
J. Herriot	T. B. Cole	R. Pearson
D. Cairns	S. Pearson	J. Reid
H. O. R. Horwood	J. Wright	G. D. Bly
A. M. Wickens	L. S. Hyde	C. L. Worth

Chairman,—

■ I have now much pleasure in calling on Mr. Bly to read his paper on "Knots for Engineers."

KNOTS FOR ENGINEERS

BY G. D. BLY, CHIEF ENGINEER, MONARCH SUPPLY CO.,
TORONTO

*Their usefulness. convenience, and danger. Knots that are
Knots. Knots that are not knots. Knots that can be
untied, and knots that cannot be untied*

In presenting this paper, I can truly say it is a knotty subject, and one that requires our careful consideration as well as a great deal of study, together with a considerable amount of practice.

Many a man has lost his life through the carelessness of someone tying knots that have slipped or come untied, and many of us, no doubt, have been saved from an untimely end, or a terrible accident, more by good luck, or the hand of Providence, than by the skill of those who tied the knots.

I have seen some very painful accidents caused by the slipping of knots or hitches made by unskilled persons. I recall but a year or so ago when an engineer was killed in one of our large Toronto office buildings by the slipping of a rope or a knot. Many such accidents could be avoided if men would educate themselves in the art of making fast rope ends.

The uses of knots are infinite: In the most common vocations of life, one or two simple knots are indispensable; in building, mining, and engineering, in fact in almost every land occupation knots of some kind are employed, while on ship-board knots can almost be numbered by the dozen, and each is appropriated a specific duty.

True it is in the calling of those who follow the sea that knot making has found its widest application, and has attained its highest stage of advancement. Sailors are noted the world over for their exceptional skill in this line of work, and many a staunch ship in bygone days, battling in a life or death struggle with the fierce blasts and mountainous waves of a mighty tornado, has owed her final escape from a watery grave to the knowledge and dexterity of her crew in the use of ropes and knots.

Even in our own time, when steam and steel have made such radical changes in the science of navigating, ropes are still an indispensable adjunct in the management of a vessel, and no sailor is ever rated as a first class seaman who has not acquired a ready and expert nimbleness in the tying of knots.

Comparatively few of the operating engineers, either in the stationary or railway service, have deemed it worth while to acquire even an ordinary working knowledge of this most useful art of tying knots, though perhaps there come occasions in the life of each and every one of us when the ability of being able to make a few simple scientific knots would greatly facilitate our work, and possibly avert the humiliation incident to a public exhibition of ignorance and clumsiness in the manipulation of ropes and tackle.

Doubtless many of the aforesaid engineers have had little or no opportunity to acquaint themselves with the correct methods of fastening rope ends together, or attaching them to hooks, rings, beams or other objects. Another class of engineers contemptuously aver that there is neither art or knack in the knot tying operation, and just any old knot, so long as it doesn't slip under the tension will fulfill the requirements of engineering practice. This opinion may be honestly conceived, but to the observer who has watched sailors at their work, and beheld the marvellous ease and dispatch with which they tie and untie the multitudinous knots aboard ship, and the almost magical results they accomplish in the way of rope fastening, by means of their various hitches and bends, the jeering contentions of these engineers are as absurd as their awkward and bungling attempts at knot-making are ridiculous. Clove hitches, running bow-lines, Becket bends, etc., are terms as meaningless to such men as the procession of the equinoxes is to the average Mexican Peon, or Newton's law of gravitation to the untutored Fiji Islander.

Call upon one of these scoffing engineers to fasten two rope ends together, and curiously enough, in nine cases out of ten the result will be grotesque and an utterly unreliable production shown in Fig. 8, and disdainfully designated by sailors as the "granny" knot. When the strain comes on this knot it slips, allowing the two rope ends to part, so as to expose the casting, or whatever has been entrusted to its keeping, to the danger of a more or less serious fall. Or if by chance the knots holds, the rope wedges and jams so tightly that the workman who is called upon to undo it will be pretty apt to indulge in some prodigiously wicked language ere he has succeeded in separating the two ropes.

Knot making is a hobby with many sailors, many of whom will spend hours and hours of their leisure time in fashioning knots that are wonderful in their complexity and ingenuity. These intricate affairs are, in general, more ornamental than useful. In practical nautical work, the most useful knots are those capable of being tied quickly, that do not slip under any load, and never jam or wedge so as to prevent its being undone quickly.

A little child cannot dress itself without first learning to tie one or two simple knots. Why, there is scarcely a day of our lives but we are confronted with this great problem in some form or other, and yet if I was to hand you a piece of cord and ask you to tie a knot such as you tie in your shoe-lace every morning of your lives, I doubt very much if you could do it in the first, second or even the third attempt. This may seem ridiculous, but nevertheless it is true. But many say, what is the use of me wasting my time learning to tie knots. How embarrassing it is for a mechanic, or a man who calls himself such, to be thrown a piece of rope by his boss and told to put two half hitches or a clove-hitch on a piece of timber or casting. He takes the rope, looks at it, then at the boss and then at the timber or casting as if to say what does he mean, and then goes over and makes some kind of twists and turns, and when he is through, he does not know what he has got or if it will hold, and when the piece begins to move, he trembles for fear it will slip and kill someone. Then if it does hold and when he comes to untie it, he may work fifteen or twenty minutes and have to give it up as a bad job, then go and look for the axe.

No doubt, some will say that the making of hitches and the tying of knots belong to the sailor aboard the old sailing craft of long ago, which has been superceeded by the huge steamships of to-day. To this I would say that the making fast of rope is as essential to the engineer as it was to the sailor of long ago. The man who has acquired a small amount of knowledge in the art of tying knots may proceed as follows:

Fig. 1 : Is a loop, or as the sailors term, the bight of a line, and is used in almost every knot known to the nautical world.

Fig. 2 : Is a simple or overhand knot and is made by passing the end of the line through loop No. 1.

Fig. 3 : Is a double knot or twist and is made by passing the end twice through loop No. 1.

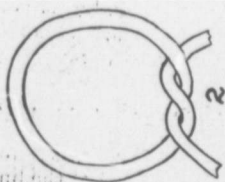
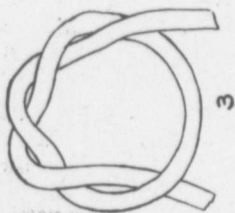
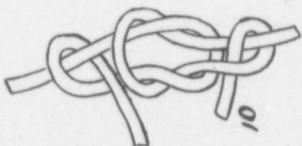
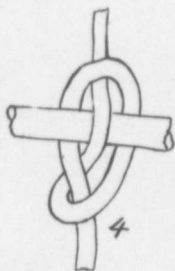
Fig. 4 : Is a boat or toggle knot, and is made by passing the bight of the rope through loop No. 1, and then passing a toggle, such as a piece of wood or iron through the bight and over loop No. 1.

Fig. 5 : Is the first stage of the bow-line, and is made by making loop No. 1.

Fig. 6 : The second stage by passing the end of the line up through loop No. 1, and under the standing part of the line.

Fig. 7 : The third stage, by passing the end down through loop No. 1, then pulling taut, and then we have the bow-line complete, and a knot which will not slip and can be easily untied.

Fig. 8 : Is a production of the "granny knot," and one that is pretty nearly always made by the inexperienced man. It is the most easily made of all knots. It is made by crossing



the two ends of the line making one twist, then crossing the ends again, and passing one end back through the loop, thus formed opposite to the running part of the line. This is a production which is both unsightly and dangerous. It will both slip and jam, and cannot be untied. It is the most despised knot throughout the nautical world.

Fig. 9 : Is the square or reef knot and is unlike the granny knot. It will not slip, but if used with smaller ropes it may jam. It is made similar to the granny knot, by crossing the ends of the line making one twist, then passing one end through the loop beside the running part of the line. If you are doubtful of this slipping under heavy strains, you may increase the surety of it by passing each end around the standing part of the line and through a loop formed by itself as shown in Fig. 10.

Fig. 11 : Is the weaver's knot. This is used for tying small cords, threads, etc. It is made by crossing the two ends, catching them between the thumb and finger, then passing the thread around the thumb between the cross, pulling tight, and we have the weaver's knot complete.

Fig. 12 : Is the sheet bend, and is similar to the weaver's knot, but being made with ropes, it is formed differently. To produce this knot, we form a loop at or near the end of the rope, or we may use it to shorten two lines by making the loop anywhere along one line. Having selected the place for the knot we form a loop, pass the end of the other line up through it and down under it, up across and under its own part pulling taut.

Fig. 13 : Is the sheet bend with a toggle. It is made the same as No. 12, only that a toggle of wood or iron may be used to prevent it from jamming.

Fig. 14 : The stevedore knot commenced. It is formed by first making a loop then passing the end around the line twice, then passing the end back through the loop.

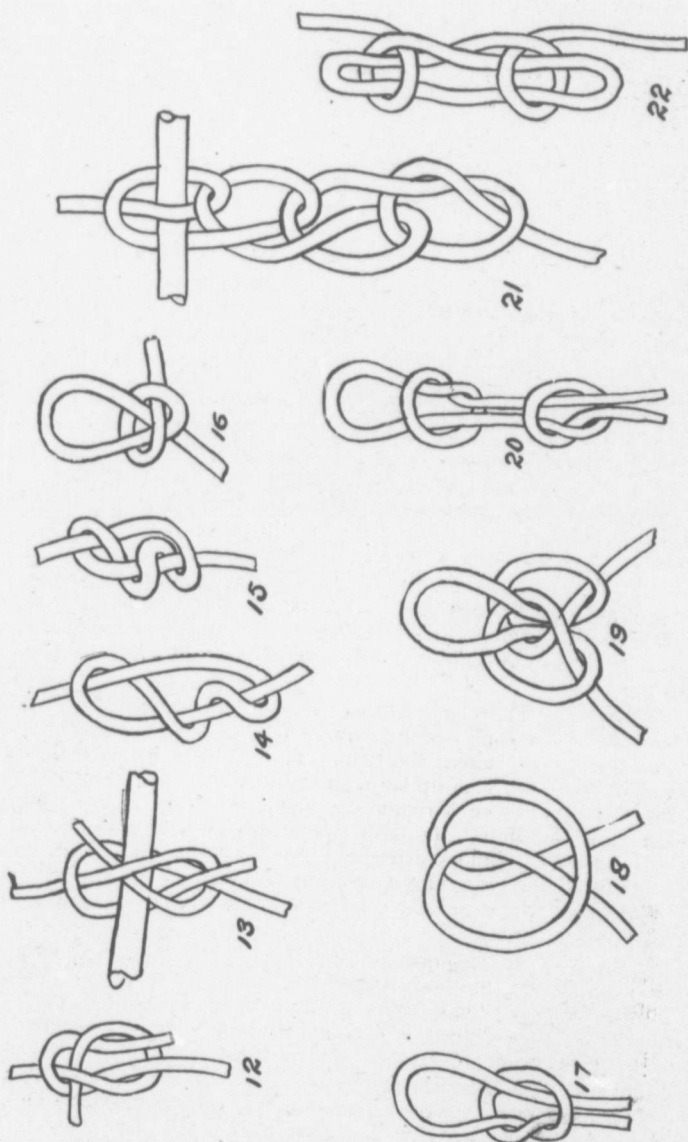
Fig. 15 : Is the stevedore knot complete.

Fig. 16 : Is a slip knot and may be made in two ways. First: by forming a loop holding by the thumb and finger, and then forming a second loop passing the end over under and through the second loop, and we have the ordinary slip knot. If we wish to have a slip knot in the middle of a line, which we often want, we may proceed as in Fig. No. 17.

Fig. 17 : Forming a loop in the middle of the line, bending the loop back to the hand holding with the thumb, thus forming two loops, then passing one loop down and up through the other one, and we have the slip knot in the middle of the line.

Fig. 18 : The Flemish loop, or double slip knot, is produced by first making a loop, Fig. 17, then doubling it back, crossing the centres as in Fig. 18,

Fig. 19 : then passing the centre of the loop first formed



down back of the cross and then up through in front of the cross, and pull through forming two knots, and we have the Flemish loop complete, Fig. 20.

Fig. 21 : The chain knot with toggle. This is used for shortening a line. Form a loop as in Fig. 17, and then loop the line through loop after loop until the desired length is reached, then pass a toggle of wood or iron through the last loop, in this way we may shorten a line to any length without having either end free.

Fig. 22 : Is a sheep-shank, and is used by farmers in this form very frequently for shortening the reins on horses.

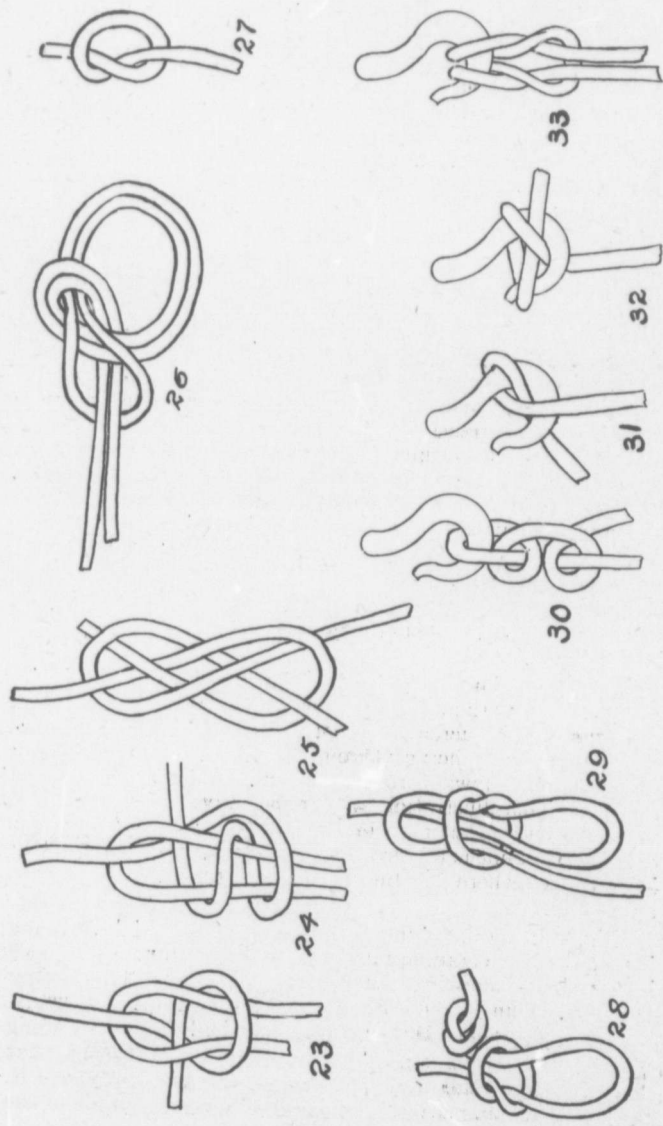
Fig. 23 : The Becket bend. It is made similar to the sheet bend or the weaver's knot, by forming a loop at or near the end of the line, and then passing the other end up through and down under both parts of the loop and under its own part. This knot never slips or jams when properly made, and is exceedingly strong and simple to tie. The Becket bend is one of the sailor's most useful knots, and probably conforms with greater exactness to the principle of the scientific knot tying than any other knot, save perhaps, the clove hitch. No engineer should neglect to include this knot in his repertory. Its simplicity and absolute freedom from slipping or jamming under any amount of tension makes its use highly desirable.

Fig. 24 : Is the double Becket bend. This is made the same as Fig. 23 with one additional bend, or twice around both parts of the loop, and passing the end under its own part and hauling taut. This greatly increases the strength of the Becket bend.

Fig. 25 : The Carric bend. The loop is made by laying the end of one rope under its own standing part. This done the rope is laid across the loop. The end carried under the side of the loop, then up through the loop over its own standing part and down through the loop. A little practice and study of this illustration will enable anyone to tie this knot with facility. Sailors often use the Carrie bend where an extra large knot is required, and also in tying the ends of very large ropes where the Becket bend or reef knot is hardly so applicable.

Fig. 26 : Is showing the bow-line on the bight. A loop is made on the standing parts of the double rope as was done in the single bow-line, and the bight is brought up through the loop, being pulled through sufficiently to pass down and over the lower part, thence up to its position.

Fig. 27 : Is the cow-hitch or noose, used by farmers for tying cattle in their stalls. It is made by tying a single knot the required distance from the end of the line, then tying a knot in the end of the line passing the line around the animal's neck



and through the knot (Fig. 28) pulling tight, and we have the noose complete and the cow tied securely in the stall.

Fig. 29 : Is the double bow or tom fool's knot. It is one of the most used, simplest, and yet one of the hardest knots to tie properly of all the knots known. It is made by placing the hands under the line in opposite directions, raising the right hand up, twisting it so as to bring the line across back of the fingers of the right hand and across the front of the left, catching the running parts of the line between the fingers of both hands, and pull through the loops just formed.

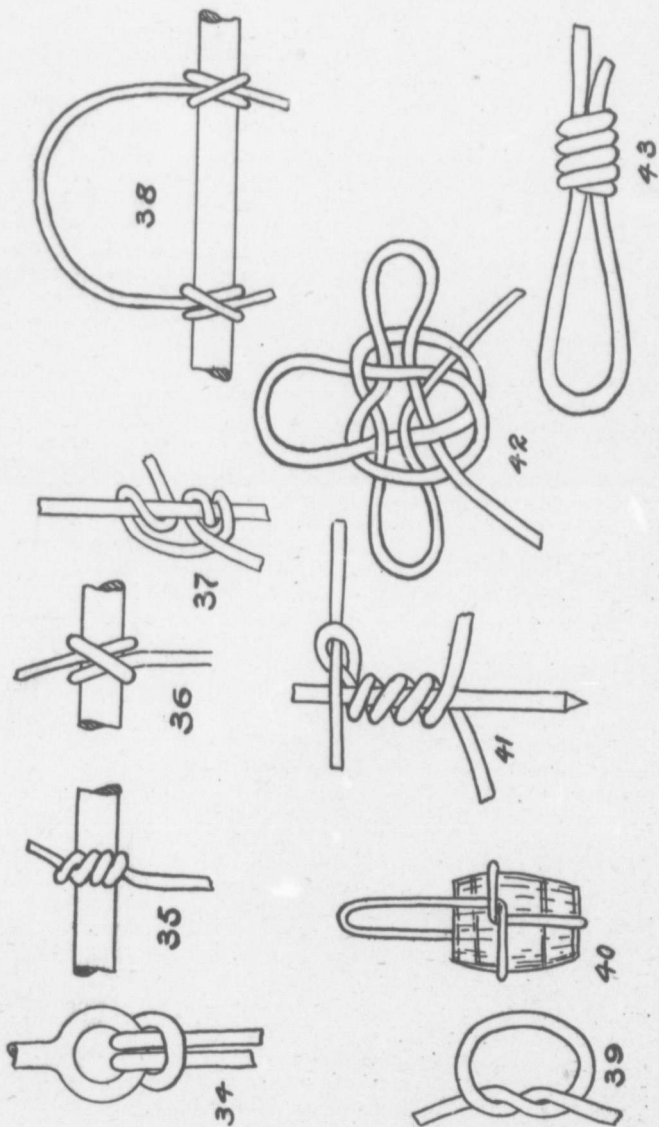
One of the most common tasks for engineers is the fastening of ropes to hooks for hoisting heavy machinery and other purposes. Yet few of us are sufficiently versed in the art of knot tying to be able to do this in a simple and effective way. The methods mostly in vogue in the engineering world, as observed by the speaker in a series of somewhat extensive wanderings.

Fig. 30 : Compare this with the famous Blackwall hitch, and note the excessive bungling and ungraceful appearance of the engineer's knot. The Blackwall hitch, Fig. 31, seems almost to be extremely simple and wholly inadequate along with its bulky and unsightly companion, but it has successfully survived the tests of time. The hitch is made as the illustration shows, by placing the end of the rope under the standing part in such a manner that when the load comes on, the end will be caught, and wedged between the hook and hauling part so tightly that the weight of a ton or more can be lifted safely. If the hook is so round and smooth that the rope will not wedge the midshipman's hitch shown in Fig. 32 may be used.

Fig. 32 : This hitch is equally as effective as the Blackwall hitch, but is slightly more complicated. The rope is first laid in the bend of the hook, the end brought around the back below the eye, across and under the point down under the standing part of the line, so that when the strain comes the end will jam between the hook and the line.

Another method for attaching ropes to hooks or eyes for the hoisting of heavy loads is shown in

Fig. 33 : This is termed by sailors as the cat's-paw. It consists, as will be observed, of an endless loop, and is exceedingly strong and trustworthy. Some may ask, why not make use of the hitch shown in Fig. 34, instead of the cat's-paw? It does surely look simpler, but the question may be easily answered by experimenting with the two under heavy loads. The hitch shown in Fig. 34 will draw up tight, notwithstanding its delusive simplicity and jam so tightly on the hook that a man would have to exert his utmost strength to remove it. The cat's-paw may be easily released by a single motion of the hand as soon as the tension is removed.



For fastening ropes to logs, poles, timbers or other objects which have a tendency to roll, we must use some form of hitch that is easily and quickly made, never slip under any load which the rope is capable of sustaining, one that will not jam, and one that is susceptible to instant release the moment the rope is let slack.

Fig. 35 : Is a timber hitch and is made by passing the end of the rope around the timber, then passing the end around the standing part, and back under its own part three or four times, then draw up tight. This will not slip, yet instantly the strain is released, it will come undone without any aid whatsoever. This hitch may be used in connection with the half hitch when it is required to sustain a pole in a vertical position.

Fig. 36 : The most useful of all knots, afloat or ashore, is the clove hitch. This knot has a wide field of usefulness. There is not a sailor afloat in the wild winter storms, clawing with cold benumbed hands at the icy ropes of his storm tossed ship but has cause to bless the clever genius who gave the clove hitch to the world. The clove hitch is much employed in fastening a small rope to the standing part of a large one. It is made by passing the small rope around the large one under its own part, over and back around the large and through the loop thus formed with the end opposite its own running part as shown in Fig. 36.

Another valuable knot is the rolling hitch, shown in Fig. 37 : Its use is attended with the objection that it sustains strain only in one direction. But it is strong, simple to make, and may be instantly released the minute the tension is relieved. This hitch is constructed by carrying the smaller rope twice around the larger one and upon itself, as shown in the illustration, and then carrying the end up over all the turns, and make a half hitch around the large rope.

Many expert knot makers prefer the clove hitch to the timber hitch for attaching a rope to a pole, as shown in Fig. 36. Another use for the clove hitch is the making of rope ladders or rattlings, as the sailors term them and shown in Fig. 38.

If we wish to hoist a barrel part filled with oil or liquid of any kind, without a head, in fact any barrel filled without a head which requires to be lifted in a vertical position, some of us might be much puzzled for some time, but if we employ the barrel knot or sling, it can easily be solved. We may proceed as follows: by taking the end of the rope or tackle and making one over-hand knot in it (Fig. 39), then tying the ends together, making it long enough to reach over the barrel; then by taking the single part of the knot and passing it between the twists of the knot, we have the barrel sling complete (Fig. 40).

If we want to pull anything tight and we have no block and tackle at hand, we may use the Spanish windlass (Fig. 41). It is made by taking sticks or bars, laying one over the line and giving it one twist, then placing the upright between the stick and rope, then twisting around like any windlass. If we wish to stay a derrick or mast, we may use the mast-head knot (Fig. 42). It is made by making a series of loops one under the other, then drawing one through the other and pulling tight (Fig. 42).

Fig. 43: Now we come to the last, but not the least, a knot that is most despised, dreaded and shunned by all men, and with which none of us care to have much to do. This knot is known as the "hangman's knot," and is formed by making a loop, taking the end five or six times around the running part, then passing the end back through the turns, and we have the knot complete as in Fig. 43.

There are many other knots which will be unnecessary for me to explain in detail, such as pine knots, hard knots, tough knots, what knots, and the matrimonial knot, which is tied by the tongue and cannot be untied with the teeth.

Chairman,—

You have all heard Mr. Bly's paper, and I feel sure that if there are any knots you do not understand that Mr. Bly will be only too pleased to show you how they are done.

Moved by Mr. Wright, seconded by Mr. Beswick,—That a hearty vote of thanks be tendered to Mr. Bly for his paper, and the trouble he has taken to arrange his exhibits and the patience he has displayed in endeavouring to show everybody present how the knots are tied.

Carried.

MR. BLY,—

I do not know that I deserve any thanks. It is only my duty. It is always a pleasure to me if I can help my brother engineers. I am always willing to do what I can for the Club.

I do not want you to think that I am an expert knot tier, because I am not. These are only just a few that I have picked up through the natural course of my life. However, I want to thank you for your kind attention to-night, and I hope that I have interested you.

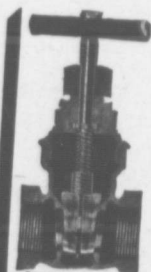
Chairman,—

Since our last meeting, I am sorry to have to tell you that one of our members, Mr. Frank Campbell, has suffered a sad

bereavement through the death of his wife. A wreath was sent on behalf of the members of the Club and Mr. Campbell has expressed his appreciation of our token of respect.

Moved by Mr. Beswick, seconded by Mr. Scott,—That the meeting be adjourned!

Carried.



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