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# SCOUT PIONEERING

by

**John Sweet**

with

Illustrations by the Author

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To my four brothers  
Stephen, Leslie, Eric and Bill  
—all good Scouts in their day

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### PUBLISHER'S NOTE

In this age of adaptation, measurements are correctly, if, for the moment, unintelligibly, given in terms of the metric scale. Anxious to toe the line wherever possible, we nevertheless feel that those who will be dealing with the provision of equipment for pioneering projects would be involved in a great deal of conversion work if we yielded to the temptation to be ultra-modern, and we have therefore opted in this first edition for using the more familiar Imperial scale.

## FOREWORD

Pioneering, as it is known to Scouts, started appropriately enough with *Scouting for Boys*. In Camp Fire Yarn No. 8 the Founder sketched in the possibilities, touched lightly on technical training, made suggestions for a few simple Patrol activities at Troop Room level, and held out the carrot in the shape of one or two rather more ambitious outdoor projects, all delightfully illustrated. The captions to the pictures made it all sound so easy.

*"A Patrol hut may be made by placing slender trees together, and by covering the framework with sods."*

*"You can make a simple raft from 'sausages'—waterproof covers filled with straw or dry leaves. Lash them to a frame of Scout staves".*

—and there, in clearcut black-and-white, was a Scout in full uniform skilfully navigating such a craft towards infinity under a billowing sail improvised from his own raincoat! The neck was buttoned round the mast, and the yard-arm had been slipped through the sleeves with lashings round the cuffs to hold the sail at full-spread and stop the wind from spilling out. This, for sure, was the stuff that dreams are made of, and constituted a clear exposition of B.-P.'s revolutionary education theory, which was—

- to provoke interest
- to provide sound basic training
- to apply training instantly
- to stimulate the imagination
- to leave the end open.

Despite this rousing start, however, pioneering remained for most Scout Troops a distant prospect until the establishment of Wood Badge training at Gilwell Park in the year 1920, followed presently by the publication of Gilcraft's most useful book *Preparing the Way: Pioneering*. Even then, pioneering came to be regarded as a highly specialized activity for experts only, and despite the efforts and exhortations of the ubiquitous Training Team, so it remained until our return to Gilwell after the Second World War and the appearance of those cheerful books *Pioneering Projects* and *Fun With Ropes and Spars*, both by the then Camp Chief, John Thurman, with splendid illustrations by the best of all Scout artists since B.-P., Kenneth Brookes. Till then our repertoire had been limited to a few standard projects of the Monkey Bridge, Aerial Runway variety, and very good they were; but once you'd done them there was nothing for it but to do them again. With the appearance of *Pioneering Projects* the scope expanded tenfold. A plethora of interesting and amusing possibilities was presented, some of them imaginative and adventurous in the extreme, but all very much in line with those early drawings in Camp Fire Yarn No. 8.

The technique of presentation, too, was a return to B.-P. In the

intervening years Gilcraft had been less concerned with fun than with laying down a foundation of sound basic training. His handful of projects was accompanied by a wealth of technical detail and much cautionary advice. Thurman, like B.-P., was content to offer his reader an artist's impression of the completed structure with a few technicalities lightly sketched in, and from then on to leave it to the man, or rather the boy, on the spot. The effect of this was to remove pioneering from the grip of the specialist and to make it rather better fun for the ordinary Scout Troop.

In this book we shall try to maintain the tradition established by B.-P., consolidated by Gilcraft, and liberated, amplified, and made merry by our old friend and confederate of many happy years, John Thurman. Especially, we shall try once more to convince Scout Leaders everywhere that pioneering in one form or another is not something for other boys, but for their boys in particular.

## SECTION ONE

### LIGHT PIONEERING

#### 1. "NO PREVIOUS EXPERIENCE REQUIRED"

Start from scratch. On Troop Night invite the Patrol Leaders to join you in a brief off-stage consultation. Hand to each a faggot of about a dozen 4 ft. garden canes and a handful of 4 in. elastic bands, and send them back to their Patrols with the request that they will build you a rigid three-dimensional structure which will maintain its rigidity when passed rigger-fashion from hand to hand.

While this is under way, a novel indoor string-burn is laid on by the Scouter team to put the structure to practical use. A line of two-strand sisal twine is stretched across the Troop Room at a height of 48 ins. Patrols operate throughout from behind a baseline fifteen feet away, and compete to burn through the string first. Wax tapers and matches, and more canes and elastic bands are available on request.

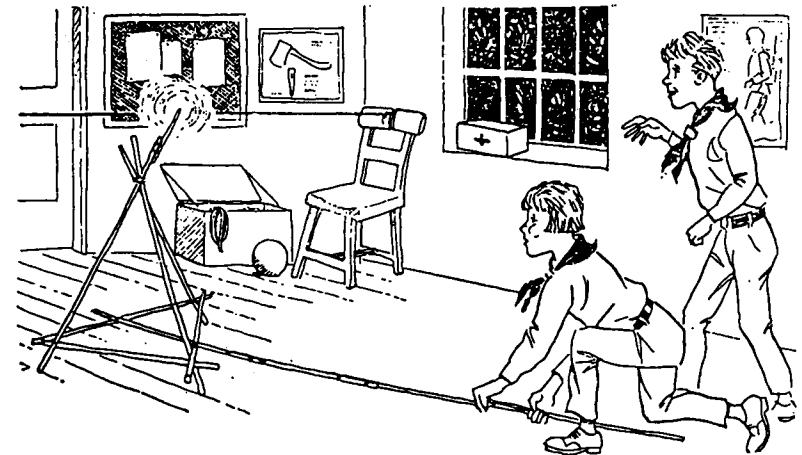


Fig. 1

Or hand them two light lashings and a small single-sheave pulley block (obtainable from most hardware merchants or department stores) and ask them to mount a tackle in such a way that the block will be used to advantage—that is to say, to boost pulling power.

At the Patrol Leaders' Council a few theoretical exercises might

be acceptable. For instance:

A mooring buoy has sprung a leak and is now lying in deep water in mid-river. Its position is marked by a float. The capacity of the buoy is fifteen gallons, and as one gallon of water weighs ten pounds, the dead-weight of the buoy is 150 lb. It must be raised and brought to the bank. Only a light raft is available, plus a few lengths of light cordage. How should the job be tackled?

Put on a table-top demonstration of the parbuckle in operation, or better still, use one Patrol Leader as the object to be moved and another as the anchorage, then invite the boys to say how the same principle could best be applied to raise a heavy log up a ramp onto the deck of a motor lorry.

Ask the boys to say how they could use a garden spade or an trenching tool and a single rope to lay down an anchorage to the best advantage in sandy ground.

Explain that the Harvester's Hitch (*Chart XVII*), having three returns on the moving part of the tackle, gives a mechanical advantage of three to one (less friction), then invite the boys to say—or, better still, to demonstrate with light cord—how the same device could be used to give, in principle at least, a purchase of eighty-one to one.

Out of doors drive a picket deeply into the ground at an angle and ask the boys to draw it with a lever spar.

Rig up a slack line between two fixed points (failing all else, a boy at each end will do) provide two Scout staves, and invite them to 'invent' the Spanish Windlass for themselves. They will undoubtedly tumble to the right idea in the end, and it is much better, in this as in other things, that they should be allowed *to find out for themselves*. Any necessary polishing up instruction can be given later, but the joy and pride of discovery should be theirs by right, even if it has to be handed to them on a plate with watercress round it.

\* \* \*

It is perhaps significant that while other traditional activities in Scouting have been taken up widely elsewhere, pioneering alone remains our own speciality. Outsiders seem to regard the building of unnecessary bridges and other improbable structures as an amusing eccentricity on our part, all of a piece with rubbing two sticks together to make fire, or baking a hedgehog in clay, and no serious attempt has yet been made to follow our lead. Long may it remain so! We should feel grateful that one activity at least remains uniquely ours.

The point is, of course, that in the vocabulary of Scouting, pioneering is as much a game as British Bulldogs. Utilitarianism has no part in our philosophy. We build for fun, with the firm resolve to unbuild as soon as the fun is over. Sufficient for us that in the process the Patrol System will be given full play. For in everything that matters the building of a pioneering structure may surely

be regarded as the ideal 'Patrol Activity'. It has all the essential ingredients: fun and adventure, mostly out of doors; disciplined team-work under boy-leadership; the practical application of technical skills (learning by doing); scope for on-the-spot improvisation (for pioneering structures are notoriously idiosyncratic!); pride of corporate achievement in the completed structure, tempered always by the recognition of all-too-obvious defects in workmanship; and, frequently, the extra bonus of putting the structure to use in some interesting or fun-making way. For example:

Trestles are built to specification with staves and sisal lashings, and are at once used in an exciting 'Chariot Race'.

Sheerlegs, bamboo poles and sisal, are used to make 'Tibetan Cages' for the ceremonial transport of Scout Leaders or other dignitaries to the camp fire.

A Monkey Bridge is thrown across the stream and used as one of the 'incidents' in an Obstacle Expedition.

A wheel is improvised from two old car tyres packed with greensticks and lashed together. The wheel is mounted in a frame of light spars to make a highly mobile go-kart, which is later used to provide high-speed transport from point to point in the same Obstacle Expedition.

Portable hand-operated swing-limb ballistae are used to hurl defiance and water-bombs at the enemy in the final throes of a Wide Game.

Rafts or coracles are built and used as floating gas-rigs to tap the bed of the local duck-pond for the volatile methane gas.

A beacon tower is built and used to light up the campsite as the Patrols make for home at the end of a night operation.

Far-fetched, you think? Not at all. Every one of the activities has been carried out within the memory of one (retired) Scout Leader, some with even greater success than others! And, indeed, when you come to think of it, it is activities such as these—colourful, unorthodox, always good for a laugh—which make Scouting what it was always intended to be: a unique experience in the life of any boy or man.

\* \* \*

Before we move on, it might be as well to give a few clues and solutions to some of the challenges we hurled out at the beginning. In the first activity only six of the canes provided would be needed to build a tetrahedron. The others were included merely to confuse

and exercise the mind. This is the classic pioneering structure, being conceived entirely in terms of the triangle, which alone guarantees rigidity—something the boys should learn at the very outset of their pioneering careers.

In the string-burn, the extra canes would be lap-jointed together (two elastic-band sheer lashings would be needed for each joint) to make a long 'pusher'. The wax taper would be mounted on the structure at the right elevation. On all but highly polished floors the feet of the tetrahedron would need to be padded with Scout berets (or equal) to facilitate movement.

To gain any advantage from a single block it should be secured to the load (e.g. the rope under strain), not to the fixed anchorage.

The only way of dealing with the sunk mooring buoy would be to raise it to just below the surface and tow it shorewards in that position. It is a simple matter of physics that if you submerge an article in water, its dead-weight is reduced by the weight of water it displaces, so while the buoy remains submerged its own weight only would be borne by the raft.

In the parbuckle problem the bight of the rope would be laid on the ground under the lorry so that one man could stand on it while the two free ends were carried under the log and up the ramp to the operators standing on the deck.

The best way of dealing with the anchorage problem would be to dig a deep trench at right-angles to the line of the strain, and bury the spade or entrenching tool with the rope attached, thus converting it into a crude 'deadman anchorage'.

To gain a purchase in principle of 81 to 1, four Harvester's Hitches should be mounted in series, each trebling the pulling power of the one before it. That is to say, the hitch would have to be made in the pulling part of the rope at each stage, giving a build-up of  $3 \times 3 \times 3 \times 3$ .

In the picket problem, the lever should be applied so that the pull is in line with the picket, not at right-angles to it. Usually rolling hitches are used to attach the lever to the picket, but in very stubborn cases it may be found necessary to square-lash the two together.

Successful pioneering depends on team-spirit—and generates it! At Patrol level the partnership between the Patrol Leader and his Assistant is vital. It might help to build up a good working relationship if in these early activities *both* boys were brought to the briefing session. No need to overdo it. The unique Scouter-Patrol Leader relationship must not be whittled away—but for too long the office of Assistant Patrol Leader has remained a sinecure, and it may be that pioneering could help to bring about a change.

## 2. INSTANT PIONEERING

The building of a major pioneering structure involves a lot of hard, slow work which can become extremely laborious. Sooner or

later your Scouts will discover for themselves the deep satisfaction that comes from a hard job well done, but if in the early stages too great a demand is made upon their ability to persevere, their enthusiasm will melt in the sun as they move from one boring square lashing to another. Workmanship will suffer, and the complete structure, so far from being a source of 'deep satisfaction' might well turn out to be a thing of contempt and ridicule. A monkey bridge which turns turtle is always hilarious—largely depending on who is making use of it at the time—but may equally put a boy off pioneering for life.

We by no means subscribe to the view that in a Movement which claims to develop character, everything should be made easy for the boy, or even that his ration of fun should be provided without an equal ration of conscious effort on his part. On the other hand, at the beginning of any new activity the intelligent boy will have to be convinced that the end result justifies the labour involved, and nothing will do this better than a quick return on his early investment. Start at the point where fun is guaranteed and boredom hardly possible. The Indoor String Burn is always good for a laugh and would give the boys their first experience of applying elastic band lashings. It is more than probable that they will not immediately tumble to the technique of using them to the best advantage, and at the succeeding Patrol Leaders' Council the opportunity might arise to pass on a few tips, which the Patrol Leaders in turn will relay to their Scouts in time for the next bout of mini-pioneering.

In using elastic the thing to remember is that rubber has a powerful friction grip on anything it touches, most of all upon itself. It is therefore quite useless to work with a slack band and imagine that it can be tightened with a good hard stretch at the end. The rule is that from the outset the band should be kept under reasonable strain, with the accent on 'reasonable'.

Use 4 in. x  $\frac{1}{2}$  in. bands. They can be bought by the pound from most stationers or any office supplies shop. A single band will be found long enough for most lashings with garden canes, but if greater length is needed two or more bands can be linked together with larkshead knots.

When sheer lashing two canes together in parallel for strength, loop the band over the ends of both canes and follow with a series of similar loops, working towards the end. Lap-joints should have a 15 in. overlap, with a sheer-lashing at each end. If the sheers are to be opened out like scissors, it will be found convenient to make the lashing fairly close to the end of the canes and then push it down to the required position. In this case a slightly different method should be used. Start by looping the band round one cane, follow with a number of turns round both, working towards the end, and lock by slipping the bight over the tip of the other cane. If thought desirable, a single frapping turn can be applied.

For square lashings, loop the band where you would normally put your first clove-hitch, square-lash on the so-called Japanese

principle with both parts of the band together, and finish by slipping the bight over any convenient end. Frapping turns are not necessary.

Diagonal lashings are best started with a larkshead knot over the crutch with a matchstick slipped through to provide a small toggle so that the bight can be slipped over both ends of the stick to give a final lock. It is largely a matter of commonsense, but it never does any harm to get your Patrol Leaders off to a flying start by giving them a preview of what you have in mind for them.

\* \* \*

Weaponry of any kind has a natural fascination for boys, and once the technique of using rubber bands has been mastered—plus the even more important lesson of the key role of the simple triangle in the conception of all pioneering structures—no better way could be found to keep their interest alive than by encouraging the fabrication and use of various diabolical, but relatively harmless, devices in which the Patrols find themselves in fierce contention, both indoors and out.

If a suitable location can be found within reach of the headquarters, with lots of open space available, one idea would be to build a small, highly combustible bonfire in the middle of the arena, and invite the

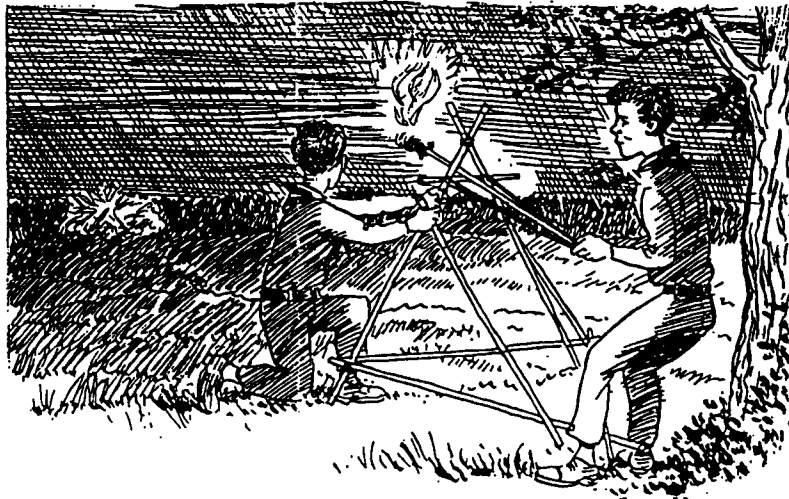


Fig. 2

Patrols, stationed at different points of the compass round the perimeter of a fairly wide circle, to set fire to it by launching flaming bolts into its heart. A certain amount of the impedimenta would have to be prepared in advance at the Patrol Leaders' Council—e.g. the actual firing mechanism, and the so-called 'flaming bolts' (three at least for each Patrol), but the erection of the 'launching pads' will be done on the spot by the boys themselves under the direction, perhaps, of the Assistant Patrol Leader, while the Patrol Leaders themselves stand back and act as 'Fire Control Officers'.

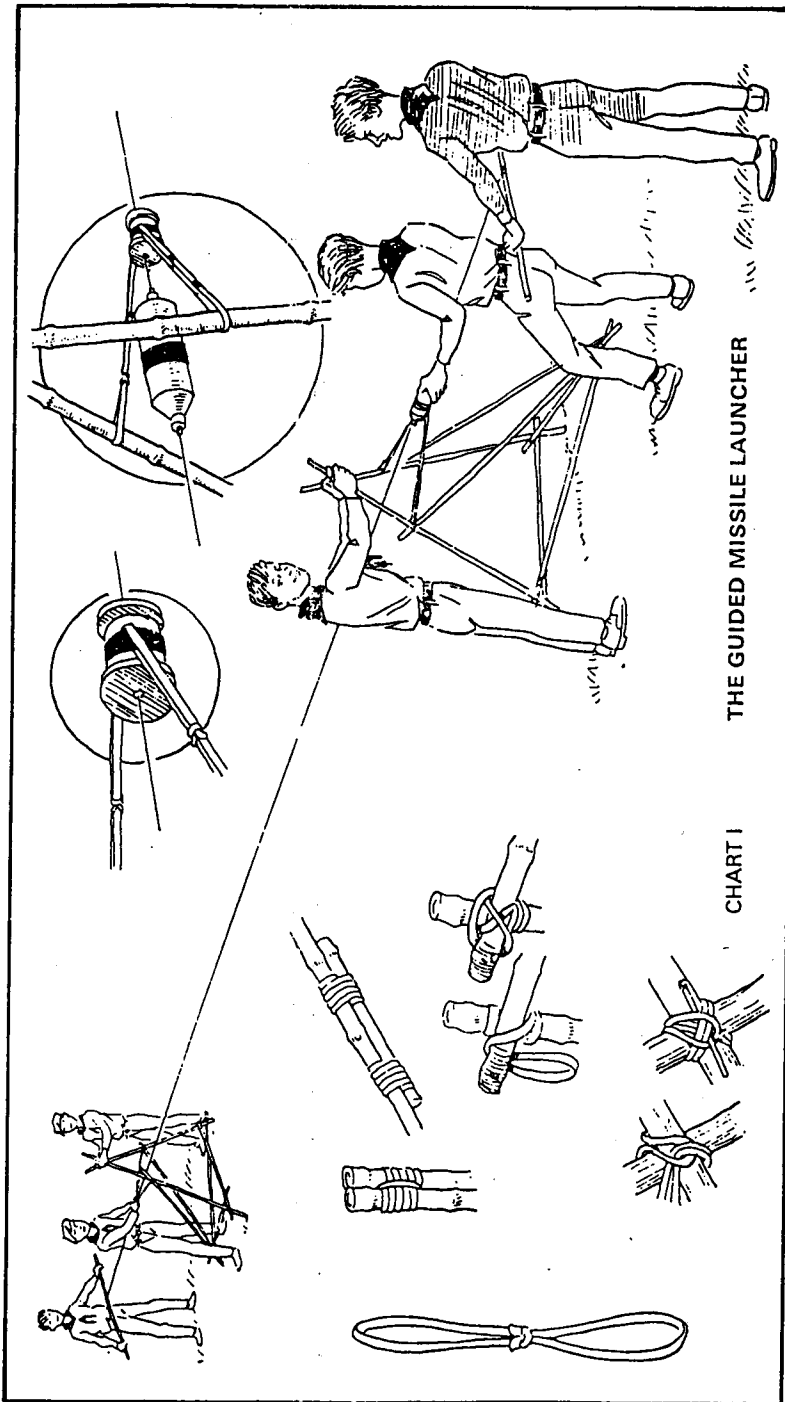
Their job will be to see that the bolts are fired in salvos, and that the recovery service after each flight is tightly controlled, so that no one enters the target area while firing is still in progress. The role of the Scouter-in-charge will be to act as 'Safety Officer' to curb over-enthusiasm and minimise the risk of damage to person or property.

A word of caution. In this and all such enterprises, the greater risk is not that damage will be done or someone hurt but that your boys will suffer disappointment and frustration because of the abject failure of some part of their own apparatus. Almost invariably this failure occurs, not in the actual pioneering, but in such things as the pre-fabricated firing devices or in the missile itself. The wise Scout Leader will always make it his responsibility to inspect and test the work done at the Patrol Leaders' Council before passing it as fit for use. He will impress upon the Council that only the best is good enough for the boys in *his* Troop and *their* Patrols, and to let the side down through careless, shoddy workmanship—with the consequent ruination of a perfectly good Troop Meeting—would be, for them and himself, a crime of the highest degree. Indeed, the situation will present a fine opportunity for practical training in corporate responsibility. No need to lay it on with a tar-brush. Patrol Leaders of whatever age and experience are quite capable of latching on to abstract ideas, and the fact that this one is directly related to forthcoming activity will add greatly to its potency.

'The Guided-Missile Launcher' can be used in perfect safety both indoors and out. Two 'launching pads' are set up at opposite ends of the field of operation. The launching mechanism consists of a wooden cotton reel with two strings of 4 in. rubber bands secured to its side with insulation tape and attached to the legs of the 'pad' as shown in the diagram (Chart 1). Two of these will be required for each Patrol (another job for the Patrol Leaders' Council!) The missile consists of the top halves of two plastic washing-up liquid bottles, joined firmly together with several turns of insulation tape. (The coloured variety is recommended for the sake of appearance.) Before the joint is made, however, the hinged caps should be removed from the bottle-stoppers, and a line of strong, fine cord threaded through. The missile can then be assembled, and the ends of the cord carried through the cotton-reels at each end and tied off to a straining bar, consisting of yet another 4 ft. garden cane.

The object of the exercise is to shoot the missile the maximum distance along the guide-line in both directions. Out of doors a 'shoot' of some fifty yards is quite possible, but if the activity is confined to the Troop Room it might add to the fun if the contending Patrols worked from opposite corners on the 'crown Green' principle in bowling, with the idea of intercepting each other's missile in mid-flight.

As always in these apparently trifling activities, a fair measure of know-how, commonsense, and co-ordination is called for. It will be found for instance, that when firing, the best results are obtained



THE GUIDED MISSILE LAUNCHER

CHART I

by gripping the missile with both hands and using it to draw back the firing mechanism as far as it will safely go without snapping the rubber bands. Left to themselves, boys will invariably opt for the impact method, which may seem better fun but is never effective. It is of the greatest importance, also, that the guide-line should be kept at full-stretch while firing is in progress. The role of the linesman is vital in keeping the line running straight and true from end to end. The bombardier will sometimes tend to lift or dip, or deviate from one side to the other, and it will be up to the linesmen to make the necessary adjustment.

\* \* \*

'The Bouncing Bazooka' was 'invented' during the first National Cub Scout Leaders' Weekend at Gilwell, and it would be no bad thing to suggest to your Scouts that they should pass the things on to the Pack (if acceptable) when their own interest is exhausted. Initially the bazooka consisted of the barrel only. This was gripped between the knees with the butt resting on the ground and held by the feet. The Mark II version, as shown in the illustration, was produced spontaneously at a Sunday morning get-together of Patrol Leaders at Stoke-on-Trent some years later.

In action this weapon is not nearly so lethal as it may appear, but the parabolic flight of the bolt makes it more suitable for use out of doors, where the risk of damage to roof and ceiling is avoided.

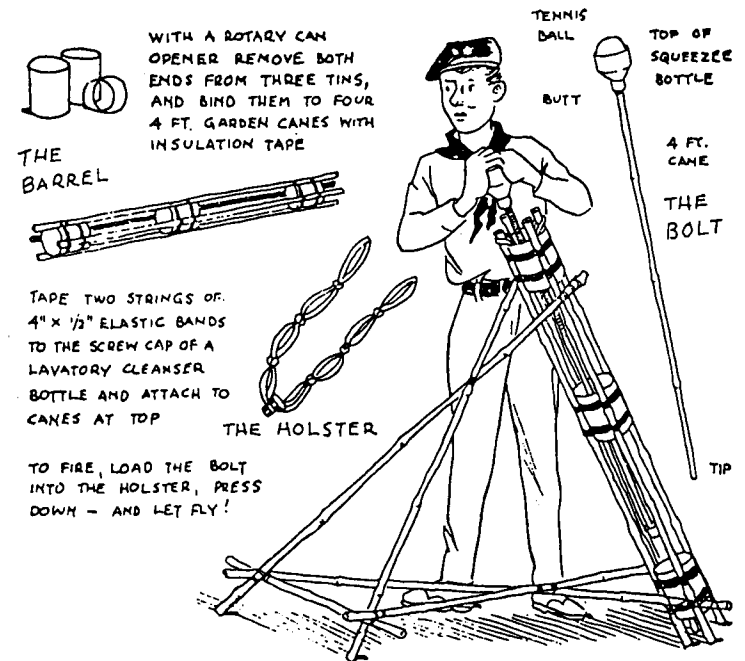


Fig. 3



In all these light-hearted activities fun will obviously be the keynote, but let no one imagine that they are without real training value. This will come through quiet insistence on sound pioneering principles, plus sound workmanship by the individual Scout, and sound team-work under the leadership of the Patrol Leader and his Assistant. Sooner or later, if the Patrol System is to become a reality in your Troop, your boy-leaders must learn that their job is not so much to do the work themselves as to see that it is done, and done well. The building of a pioneering structure provides the perfect opportunity for this. For yourself, the great break-through in your leadership training will come when you see that a young Patrol Leader has put every other member of his Patrol to work before getting down to it himself—and that he has not kept the most interesting job for himself! It need hardly be said that this sort of thing does not 'come natural' to any normal boy. It is all a matter of training. If you take good care to ensure that your Patrol Leaders have their share of fun at the Patrol Leaders' Council—or better still at a pukka Patrol Leader Training Course—they will be quite content to stand back and direct the work of their minions without interfering. It is in small affairs of this sort that leadership and responsibility have their beginning.

\* \* \*

It would be a mistake to overdo this (or any other) sideline activity in the Troop Night programme to the detriment of more purposeful training in badge-work etc. But as in all things continuity and progression are important, and if your boys appear to enjoy what we have dubbed 'Instant Pioneering' many other possibilities are open to them—windmills, watermills, flag-bearing spires or wind-vanes, chart racks, miniature kon-tikis with plastic sails, or even man-bearing rafts, in which a number of plastic bags, fully inflated, are pinned between two strong frames of garden canes. In rafts of this sort floatability is never the problem. Stability is another matter—but in suitable conditions this is something that your boys should be allowed to discover for themselves.

One guaranteed success is 'The Wymondham Land Yacht'—so called because it first took off at a Scout Leaders' Conference at Wymondham College in the County of Norfolk many happy years ago. This consisted of a light frame of garden canes, with a sail of light polythene, and wheels improvised by sealing two metal pie dishes together with insulation tape, with a cotton reel wedged between them to take the axle (a 6 in. nail). We have since discovered that excellent small, rubber-tyred wheels can be bought quite cheaply at any good Do-It-Yourself shop, but in truth our pie-dish wheels did all that was required of them. A fair wind was blowing at the time, and one thing we had overlooked was the need to compensate for the lack of a crew by weighting the after-end of the yacht with ballast of some sort. The yacht went off like a greyhound the moment it was released, veering and tacking in the most

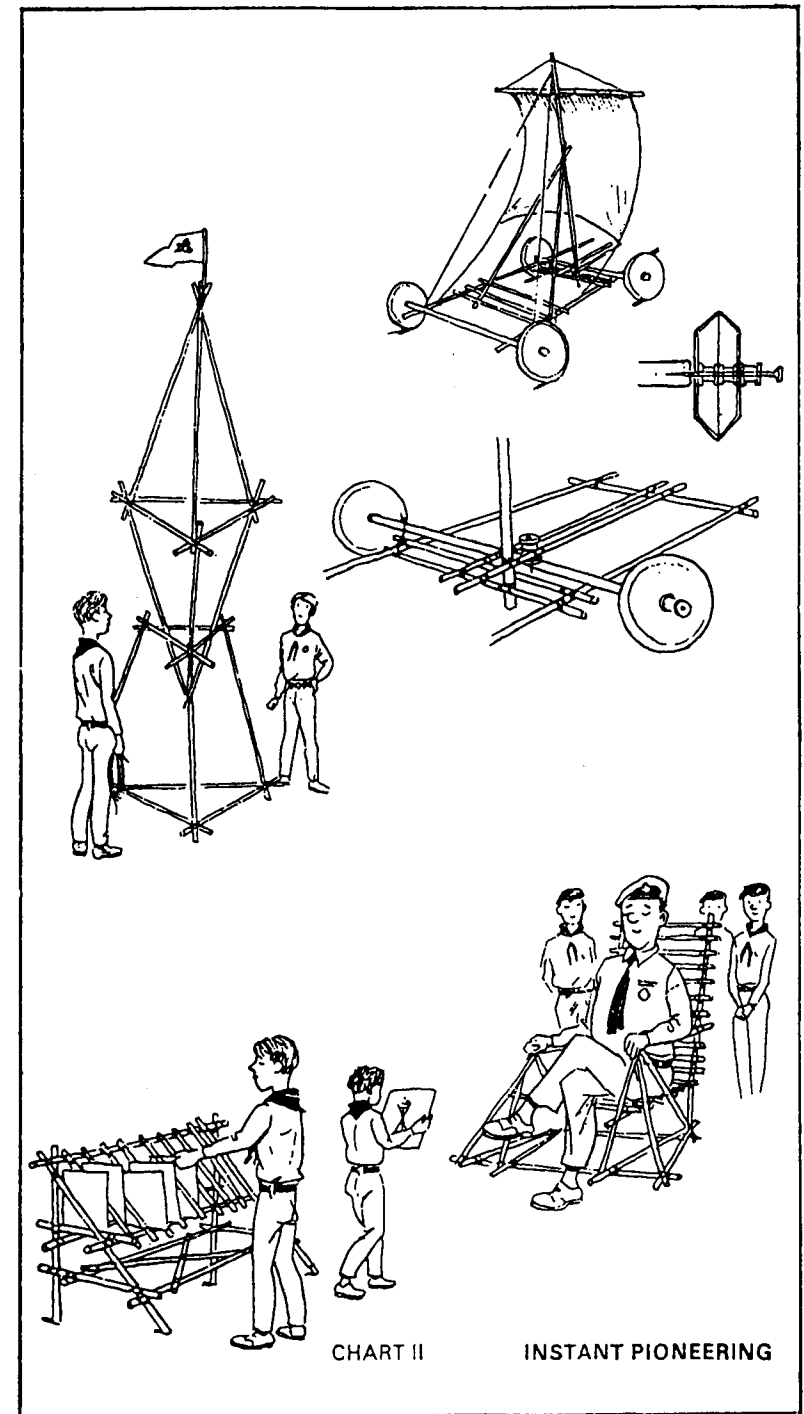


CHART II

INSTANT PIONEERING

alarming fashion until it finally disappeared over the edge of an ornamental lake. A great success.

\* \* \*

'The Humane Treadmill' entails a considerable amount of fabrication and is best tackled by the Troop as a whole, each Patrol doing one unit of the construction. It amounts to precision pioneering, and it would be worthwhile to take the trouble to mark the exact position of the rubber-band lashings with loops of coloured insulation tape before the work begins—another nice little job for the tail-end of the Patrol Leaders' Council meeting.

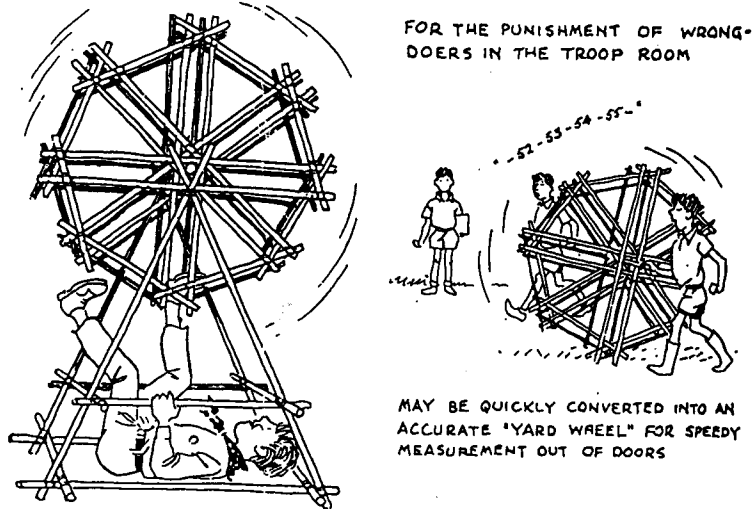


Fig. 4

In action it will be found that the frame has a tendency to emulate the Leaning Tower of Pisa when the treadmill is running at top speed. No way of preventing this has yet been devised, short of pinning the frame down with guy-lines, so there is still room for research.

The treadmill can easily be adapted for surveying purposes, as shown in the illustration. In this case the tip of one spoke should be clearly marked with insulation tape, so that the enumerator can count the revolutions without difficulty. It then becomes a simple matter of multiplying the known circumference of the wheel by the number of turns.

If (as may well be) it is argued that an easier way of measuring distance would be to use a metallic tape, one can only sadly agree and admit that the same general argument would destroy the case for almost every other pioneering activity in this or any other Scout publication. Fortunately, boys do not always take the rationalist point of view. They don't mind a touch of absurdity in what they are doing, so long as it is done in private, and always provided that the end-product, however lunatic it may be, does more or less what

twas intended to do.

And, of course, there is the prospect of 'the real thing' still to come, and not too far away.

### 3. PATROLS IN ACTION

In the field of light pioneering nothing to beat the Scout staff chariot race has ever been devised. For this garden canes and elastic bands will be laid aside, and light spars such as Scout staves, bamboo rods, or sweet chestnut poles will be needed, together with real cordage for lashings (codline or three-strand sisal twine).

The chariot race originated at Gilwell in the very early days of Leader Training and for many years was used on every Scout Wood Badge Course as a classic demonstration of B.-P.'s method in action:

the Patrol as the unit of activity,

the immediate application of newly acquired skills (knots and lashings),

the construction of a basic unit in mainline pioneering (the trestle),

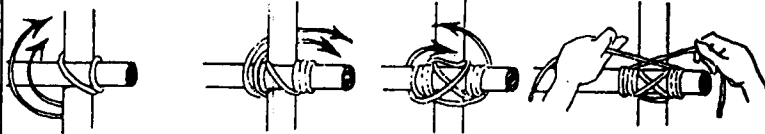
light-hearted competition between Patrols,

—all leading up to a dashing climax out of doors in which the structures were used and tested to the limit—or even beyond it.

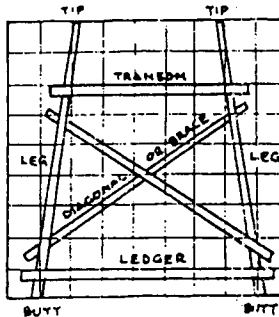
In a lifetime of Scouting the present writer must have witnessed scores of such chariot races on the Training Ground at Gilwell and elsewhere. The rate of failure in the chariots themselves was always pretty high, but never once did the activity itself prove to be anything but hilariously successful.

Six Scout staves will be needed for each Patrol, nine codline (or sisal) lashings 9 ft. long, two hauling lines about 15 ft. by 1 in. circumference, and a 9 ft. knotting rope to serve as 'reins' for the charioteer. Your Patrol Leaders, well-briefed and trained in advance, will know all there is to know about the nature of the exercise, the correct proportions and construction of the trestle and the various knots and lashings involved, and will have been given ample opportunity to pass on the technical training to their boys in time for the great event. (And do bear in mind that timing is important.) It will have been impressed upon them that the *shape* of the trestle is the Patrol Leader's responsibility, that it should be tailored to suit their chosen charioteer, who will almost invariably be the smallest and lightest boy in the Patrol, but that above all symmetry (to ensure equal distribution of the various stresses and strains it will have to endure) is essential. The charioteer will be required to stand on the ledger with his feet braced against the legs, and with nothing else

THE JAPANESE SQUARE LASHING



Middle the lashing round one spar and work with both ends. Apply normal square lashing, using both parts of rope as one. Bring one end across so that frapping turns go in opposite directions. Finish with reef knot



In Mainline Pioneering the classic proportions of the trestle are as shown in the diagram but for the Chariot Race the trestle should be tailored to suit the charioceer

Square lashings everywhere except where diagonals cross each other

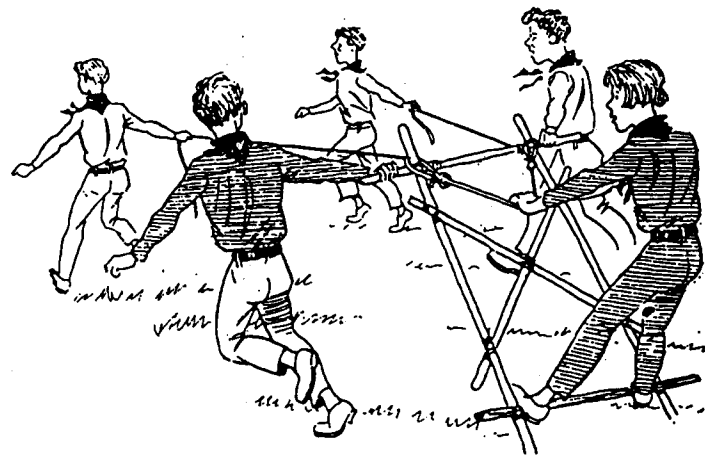
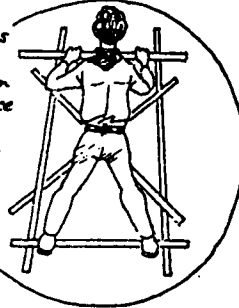


CHART III THE CHARIOT

to support him but the 'reins', which) will be looped with bowlines across the joints between the transom and the top of the legs. It is, as many an old Gilwellian will testify, a situation calling for nerve and courage, and a fine experience for any adventure-hungry boy. The chariot is held by two Scouts, one at the top of each leg, with one or two men on each drag rope, and is dragged at full gallop along the measured course and back again, with an exciting turn-round at the halfway mark. The trestles are then closely examined and points awarded, not only on the result of the race, but perhaps even more generously for the way in which the trestles have stood up to the hammering they have been given. A simple activity, but all the better for that.



The two lashings used in the construction of a trestle are, of course, the square and the diagonal. The well-proved 'traditional' methods of making these lashings are dealt with in a later section of the book, but with light materials the so-called 'Japanese Square' and 'Filipino Diagonal' lashings are strongly recommended.

The square lashing is used whenever spars cross, at whatever angle, and bear upon each other. The diagonal is used when spars cross without touching, so that they have to be sprung together, or in situations where they will tend to spring apart under strain. In building a trestle, for instance, square lashings will be used at all points except where the diagonal braces cross at the centre. This should be the last lashing to be put on.

The exotic alternative lashings mentioned above are quick and easy to make, and although quite suitable for light pioneering should never be regarded as replacing the orthodox, well-tried lashings in mainline pioneering.

The Japanese lashing has actually been in general use in all parts of the Orient for countless years and is so-called merely because John Thurman picked it up in that country during one of his many world tours. He might just as easily have found it in India (as the author was ruefully informed by a distinguished member of the International Training Team from that great country many years ago) or in China, Malaysia or Indonesia. To make it, simply double the lashings round one spar and work on the double with both parts of the cord together, crossing over and under spars at right-angles without allowing the turns to over-ride. No more than three turns will be needed (bearing in mind that they are made 'on the double'). After this, frapping turns should be applied by separating the two parts so that they can be brought between the spars in opposite directions to draw them together and then tied off with a reef knot. It need hardly be said that in this as in every other lashing the tension must be maintained from the word go. The idea that a good hard tug at the end will do the trick springs at once to the mind of the young pioneer and must be scotched before it has

had time to become established there.

The Filipino Diagonal lashing is similar to its oriental stable-mate except that it starts with a slip knot across the diagonals to draw them together. Follow with two or three turns at right-angles to the slip knot (actually a larkshead knot), working with both parts of the cord together, then put on similar turns at right-angles, divide as before to frap, and finish with a reef knot.

As to knots, apart from the reef and larkshead in the lashings, only bowlines will be needed in the chariot race, provided they are made over the crutches, where they cannot possibly disengage. However, with two men on each hauling rope, it might be a good idea to include the man-harness in the pre-training of Patrol Leaders to give No. 2 something to grip.

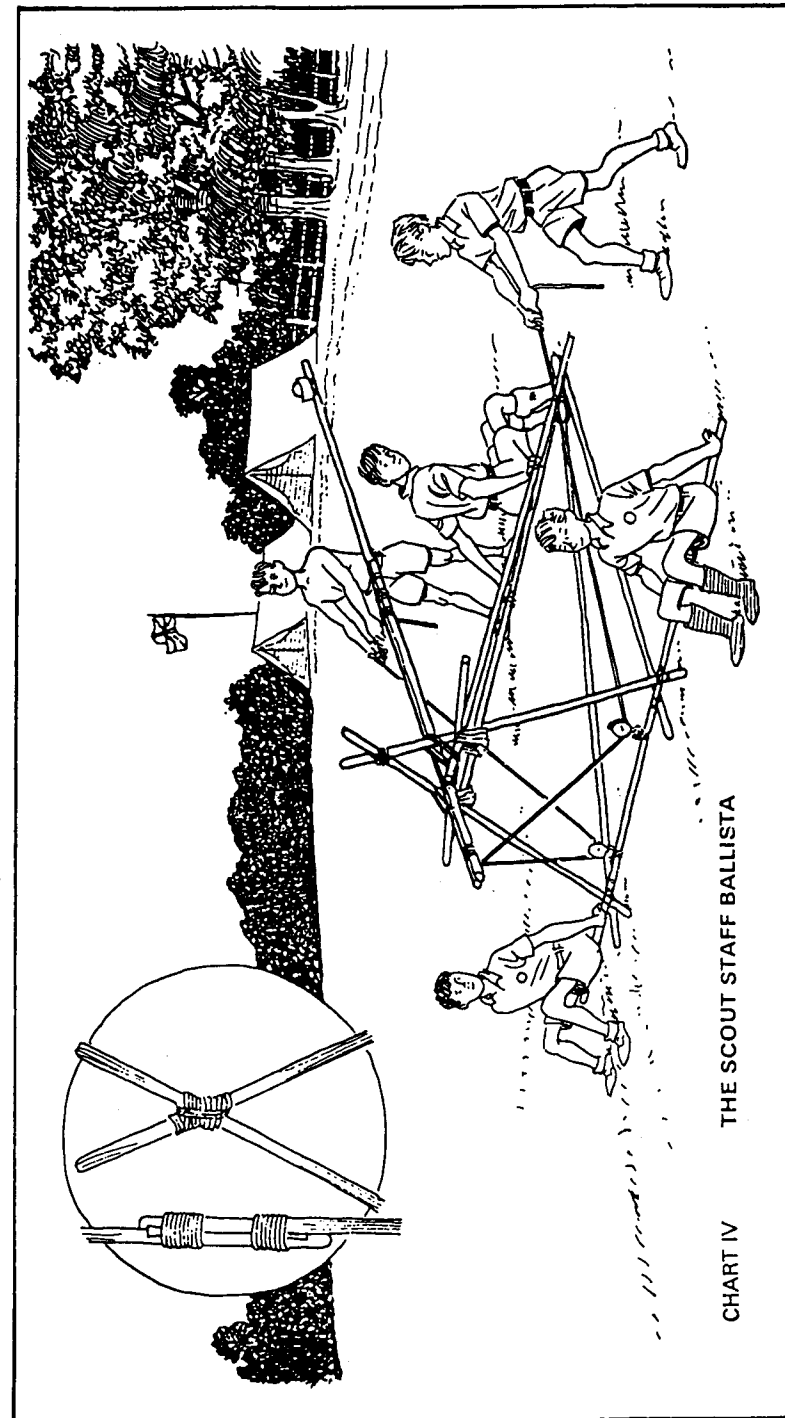
Learning knots from the printed page is one of life's more difficult and exasperating tasks, to be avoided if at all possible. Indeed, in a gregarious movement like Scouting, with its universally accepted policy of localised Adult Leader Training, no one should be called upon to suffer this particular hardship.

However, for those of my readers who prefer to 'do it the hard way', the various knots, bends and hitches commonly used in Scout pioneering will be found in Section 3 of this book. At this point all that need be said is that knotting, in itself, is *not* a Scouting activity. Knots, bends and hitches, like the boys who use them, only come to life when they are active. They should always be demonstrated doing their job, and demonstration should be followed without delay by Patrol action in which the newly acquired skill is put to practical use in an interesting, amusing, or adventurous way—as for instance in the classic example of the Chariot Race!

\* \* \*

The 'Scout staff Ballista' is a guaranteed fun-rouser in almost any situation. On a hot afternoon in camp, for instance, it can be used to hurl water-bombs at the enemy, while in the snows of winter there will never be the slightest problem about ammunition. At other times the shot-holders can be charged with smallshot in the form of pine cones, conkers, crab apples, or whatever else Nature can provide. No missile can be said to be completely safe, but a striking feature of this weapon is that, however fierce the battle may appear to be, the parabolic flight of the missile minimises the risk of hurt or harm to the person, and provided nothing more lethal than a tennis ball is loaded into the machine, even the most conscientious and responsible Scout Leader need have no cause for alarm.

A good plan is to have the opposing firing lines clearly marked out with sisal, starting at about thirty yards apart, and drawing closer at intervals of five yards or so. Having built their ballista and armed themselves for battle, the Patrols would start from



opposite ends of the total area, rush up to the thirty-yard line, and continue firing until a blast on the Scouter's whistle permitted them to move forward to the next five-yard line. Ammunition would be interchangeable, so that continuous fire could be maintained, each side re-loading with ammo kindly supplied by the enemy.

The building of the ballista will introduce your boys to the sheer lashing in its two variants. In one form, it is used to join spars together in parallel to increase strength, or to butt-joint them to increase length, and in the other, to lash them together near the top with the intention of opening them like scissors with a ledger lashed between them at the feet to form sheerlegs.

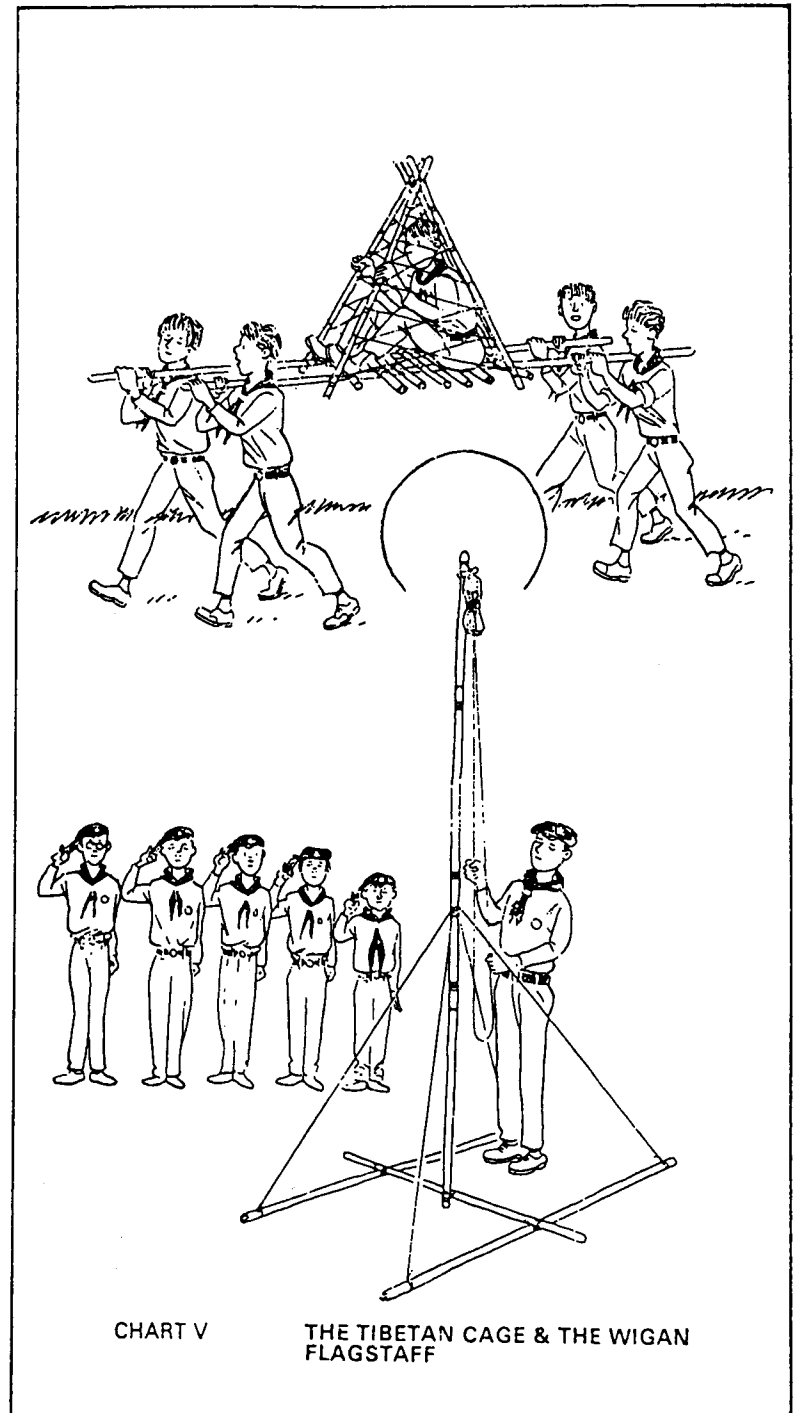
The lashings have two important differences. In its first form, the two spars must be drawn tightly together and no frapping turns should be used. Start with a clovehitch round both spars, lock the clovehitch by twisting the free end round the standing part of the rope, follow with a number of very tight turns and finish with another clovehitch, locking it as best you may by wedging the tail into the lashing. If necessary, small softwood wedges can be inserted for greater security.

In its second form (i.e. to make sheerlegs), the lashing starts with a clovehitch, locked as before, round one spar at the required distance from the end. This is followed by a number of turns round both spars, drawn together with not more than three frapping turns. If necessary the butts can be separated slightly to facilitate the frapping process at the other end of the spars, and the job is completed with another clovehitch. In building sheerlegs, the sheer lashing should be completed and the legs opened the required distance before the butts are square-lashed to the ledger.

The ballista may quickly be converted into a very efficient line-shooter by removing the hinged throwing arm and replacing it with a catapult-type sling made from linked rubber bands fitted with a shot-holder of soft leather. The free end of the line—a long length of sail-twine—should be weighted with a round pebble about one inch in diameter. This is best done by tying the twine round the pebble and sealing it in position with a few turns of plastic insulation tape. The line should be snaked down on a ground-sheet or table top to ensure free running. With this simple device your boys will be able to shoot with great accuracy two or three times the distance they could possibly throw a line of any sort. They could add to the fun by rigging up a target of some sort.

\* \* \*

In situations where no smooth turf is available for the Chariot Race, the 'Tibetan Cage' will make an excellent alternative. It will call for spars of greater length and strength than the ordinary Scout staff. Bamboo rods, or light poles of sweet chestnut from 12 to 15 ft. in length will be found ideal for the main bearers, with Scout staves for cross-members and for the 'cages' themselves. The general



idea will be clear from the illustration (Chart V). If the cage is to be used for ceremonial purposes, e.g. to convey the Scout Leader or some distinguished visitor to the campfire (as so often used to happen in the days of innocence at Gilwell) it would be polite to leave the front of the cage open and to spend more time, perhaps, on what the French call 'paraboloïde hyperbolique', which, being interpreted, means nothing more than decorative string-work with sisal or cord. Boys always enjoy this sort of thing. Alternatively the cages can be used for an inter-Patrol race in which the captives (perhaps members of a rival Patrol) would be borne shoulder-high round a circular course by teams of four. It has one advantage over the chariot in that it can be used almost anywhere without risk of damage to the turf.

\* \* \*

The 'Wigan (self-supporting) Flagstaff,' in which two or three staves are lap-jointed with sheer lashings and raised on the crossbar of a ground-frame in the form of a letter H, with guylines to the four extremities, is sufficiently well-known to require no more detailed description here. Your boys will enjoy making it in competition with each other—once only! Patrol Leaders should be taught to use rolling hitches (known as tautline hitches in Canada and the United States) to attach the guylines to the flagstaff, and round turns and two half-hitches to make the free ends fast under strain to the ground-frame. A small bowline should be clove-hitched to the top of the flagstaff and the halyard threaded through the loop before it is erected. The work will need careful co-ordination by the Patrol Leader and will again provide an opportunity for him to stand back and direct the job without interfering more than is absolutely necessary.

\* \* \*

The 'Cooler' is based on the idea of the now long obsolete pillory:

*"an instrument for the punishment of malefactors which flourished in rural England in the late 18th and early 19th centuries. It consisted of a wooden frame, with circular holes for the head and arms, in which the prisoner was seated and exposed to public view. It was found to be counter-effective as a form of punishment, tending more to excite sympathy for the wrong-doer than condemnation for his wrong-doing, and was abolished by law in 1837."*

(No harm in treating your Scouts to this titbit of English history.)

The fact that the pillory didn't work as intended need not stop you from introducing it as a bit of fun to enliven a dull Troop meeting on a damp night in autumn or winter. It should be painless in operation but effective in restraining the prisoner, who will generally be some high-spirited type over-reacting to the dullness of the official programme. Not to be taken seriously, of course, but upon

such as offend in this way, or persist in breaking the rules of some game or other, sentence of 'one minute in the cooler' will be pronounced by whoever is in charge, and the clamps will be applied by two picked gaolers—ideally members of his own Patrol.

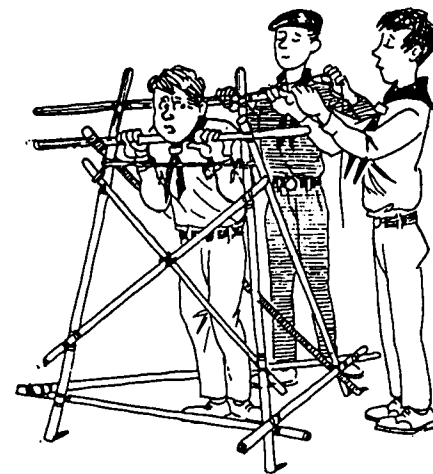


Fig. 5

Now, let it be said that in almost every Troop there is at least one personality-type who will not take kindly to having this light-hearted indignity inflicted upon his person, believing that it will result in loss of face (which was, of course, precisely the intention of the old-time pillory). Others, at the opposite extreme, might even go out of their way to court notoriety by inviting themselves to a spell in the cooler. Scout Leaders, from their intimate knowledge of their boys, and in consultation with the Patrol Leaders concerned, will find their own ways of dealing with such situations when they arise, and in any event will use it or not according to their own discretion. It might be tried once, if approved by the Patrol Leaders Council, and thereafter only when asked for by the boys themselves.

#### 4. THE PATROL IN CAMP

Summer camp will offer many opportunities for practical and imaginative light pioneering which should not be allowed to drift. True enough, camp itself is no longer the great adventure it once was. Today our boys go to camp expecting to be allowed to climb dizzy rock faces, plunge down brumey potholes, go pony-trekking, canoeing in white water, and so on, and the focus has moved away inevitably from the tented field to the wider horizon of the surrounding countryside. This is all to the good, but the Scout Movement has always prided itself on the high standard of its camping and at whatever cost it must be maintained. The best—indeed the only

way—to ensure good camping is to give the boys a personal and particular pride in their habitat, and nothing is better calculated to achieve this objective than to encourage them to 'do it themselves'. In the psychology of Brownsea Island, anything a boy does or makes increases its value fourfold. Hence the importance of gadgetry.

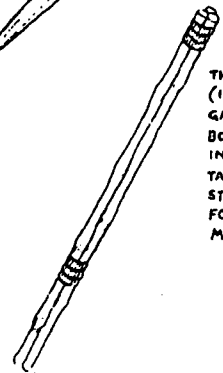
For myself, in trying to assess the place of the humble camp gadget in relation to the acknowledged excellence of our camping tradition, I would place it next in importance to the ritual of morning inspection, flagbreak, and prayers. Indeed, without a fine display of gadgets to be seen and admired, inspection itself would become rather pointless in the eyes of the boys and, as we are always being reminded, it is what the boys think and feel that matters.

The Scouter's definition of a gadget is 'anything useful made from material found on the spot.' For many years this was taken to mean 'natural' material, but when Gilwell, having exhausted its own supply and raked the surrounding countryside (including the whole of Epping Forest) for 'natural' firewood, was obliged to stock up with offcuts from sawmills, broken-down pieces of furniture, old whiskey packing cases and other oddments, the boys displayed remarkable ingenuity in turning them to good account, and the tradition was amply maintained. As the years have gone by it has become increasingly difficult (in the British Isles, at any rate) to find campsites sufficiently provided with suitable gadget wood. Bear in mind that for gadget-making the wood *has* to be green—deadwood is useless—and that moreover it must be *unwanted* greenwood! All very well in thickly wooded areas with lots of coppice growth, but I shudder to think how much damage generations of 'woodcrafty' Scout campers must have caused by inexpert pruning on private estates where they have been given generous hospitality.

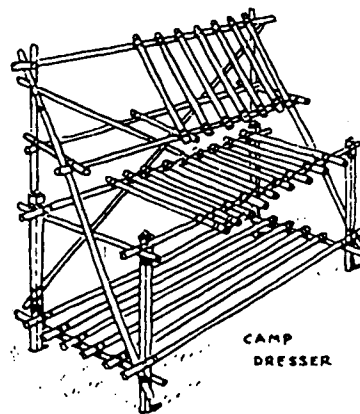
However, the problem is easily solved. With a good faggot of 4 ft. garden canes and a few dozen 4 in. rubber bands, a roll of strong adhesive tape and a ball of sisal twine, your Patrol Leaders will have all they need to equip their camp kitchens to the highest requirements. Stakes of sufficient strength to rail off the kitchen or act as legs for seats and tables can be made by binding three or four canes together with tape and using a 'dibber' (merely a pointed baton about one inch in diameter) to make the necessary holes in the ground. Rubber bands de-nature fairly rapidly when exposed to the elements, but will easily outlast your fourteen days in camp, and can therefore be used for speedy lashings. They can also be used to prevent that unsightly sag which invariably develops in the sisal 'rails' round the kitchen area. Simply insert a *stretched* band between the sisal and the stake so that it acts as a spring to take up the slack automatically. The use of 4 ft. canes will also do away with the trip-wire type of kitchen rails which have caused so much distress to visiting District Commissioners in the past.

Tabletops and work-benches can be made with what the Guides

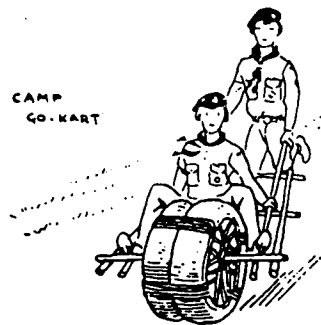
USE A 'DIBBER'  
TO MAKE HOLES  
TO TAKE THE  
CANE 'PICKETS'



THREE 4 FT.  
(100 MM)  
GARDEN CANES  
BOUND WITH  
INSULATION  
TAPE MAKE  
STRONG 'PICKETS'  
FOR GADGET-  
MAKING



CAMP  
DRESSER



CAMP  
GO-KART

Fig. 6

call the 'snake' lashing to secure the canes in position, and your tables can be equipped with permanent easy-wipe tablecloths improvised from well-washed fertilizer bags stretched over the tops and laced underneath. The cook's work-bench will, of course, be furnished with a proper (countersunk) sink unit, and here again the ubiquitous polythene sack can be utilised as a soak-away channel debouching directly through the greasetrap into the wet pit. In arable country there will be no lack of these useful articles lying discarded in hedge or ditch, but in any case plastic bags or sheets can be bought at small expense, and so long as they are totally prohibited in the sleeping tent for whatever purpose they can be used in all sorts of ways. For instance, a number of sacks can be overlapped and stapled together to make the tiles for a splendid rain-proof sun-roof or windbreak for the kitchen or dining-shelter. The fuel rack can be made weather-proof with a plastic roof and side-curtains, the chopping-block area can be provided with a druggel to catch the wood chips and sawdust and prevent them fouling up the turf, and the shelves of the larder-box can be lined and the roof covered, with ample eaves to protect the butter-muslin fly-screen.

It is true, of course, that polythene and other plastics do not 'breathe' like woven fabrics, and are subject to condensation in very much the same way as the rubberised underside of groundsheets. This should not inhibit their use in and around the camp, but renders them not only unsuitable but positively dangerous in the

sleeping-tent. In recent years one or two alarmist theorists have raised their voices on this subject—inspired, no doubt, by the shocking reports of children who have suffocated by putting their heads into plastic bags—but perhaps more immediate notice will be taken of the actual experience of a Girl Guide who wrote to the author some years ago to say that she had spent a summer night under a cloudless sky with only a sheet of polythene between her sleeping-bag and the turf, and woke shivering in the early morning to find that she was lying in what amounted to a miniature dew-pond.

You have been warned!

Another use for discarded fertilizer bags is, of course, to receive non-combustible refuse which, at one time, would be 'burned, bashed, and buried' as a matter of course, but is now better dealt with through the normal channels of waste disposal—either locally, after consultation with the landowner, or 'way back home'. Indeed, I am informed that in the British Isles many farmers issue fertilizer bags for no other purpose.

Clearly there is still plenty of room for experiment and research, and for the inventive genius of your boys in and around the camp. Let it be said that almost everything you need for comfortable camping can be bought over the counter by money raised by your devoted Group Council. You will find it far from inexpensive, but the value will be much greater in terms of real Scouting than the price-tag might suggest. Nowhere else in the world but in a Scout camp, and never again in their lifetime, will such an opportunity for self-training and self-expression present itself to your boys. It would be a pity to let it slide.

\* \* \*

Many other ideas suggest themselves in the field of light pioneering at summer camp:

Self-closing gates of great variety.

'Ceremonial' gateways involving what Mr. Eric Franklin dubbed 'string sculpture' when he first introduced it to the Movement many years ago but which has lately been 're-discovered' as 'Paraboloide Hyperbolique' by the Scouts of France. (The main difference between the two is that Mr. Franklin advocated the use of clove-hitches, whereas our French brothers use screw eyes.)

Flagstaves of the telescopic or skylon variety.

'Hedge-hopper' bridges or stiles (especially useful in the near vicinity of camp in drystone wall country.)

High-rise incinerator bins to alleviate the pong of burning refuse at ground-level.

Lofted airing lines for wet towels, blankets and sleeping-bags etc.

Camp chariots with wheels improvised by packing two discarded car tyres with greensticks.

Ducking stools, trip-line operated shower-baths, water-skid pads or flying trapezes for enabling bathers to avoid the muddy shallows when entering the water on hot days.

Dredgers for scooping the mud from the bottom of fouled-up swimming pools.

—plus such bits of nonsense as the P.P.P.P.P. (the Pecker's Portable Periodic Picket-plonker, invented and brought to near-perfection by a certain Woodpecker Patrol on a memorable Wood Badge Course at Gilwell many moons ago), and whatever else the imagination and resourcefulness of your own boys may devise when encouraged to do so. Many ideas may be found in such publications as *'THE PATROL LEADER'S HANDBOOK'* and the various small volumes in the *'PATROL BOOKS'* series published by The Scout Association in London, but the aim should be to encourage your boys to *think for themselves*. This, after all, is the purpose of the exercise, and if you miss this opportunity at summer camp it can never be replaced.

\* \* \*

For shallow-water rafting, maximum buoyancy can be attained by inflating a number of polythene sacks, simply by whirling them round the head, and pinning them between two frames of Scout staves or light bamboo poles. Inevitably your air-filled 'buoyancy tanks' will deflate fairly quickly, however tightly you secure the tops, but if the depth of your navigable water allows for increased displacement your boys could always test the *SCOUTING FOR BOYS* method by filling the sacks with straw or dry leaves. Another idea would be to organise a massive collection of washing-up liquid bottles for some months before the opening of summer camp, and make use of these in much the same way as the floats of old-time sea-planes were said to be packed with ping-pong balls.

\* \* \*

Let it be said that no project in this or any other book on Scout pioneering can be guaranteed unless the workmanship is sound. It is easy to lay the blame for non-success on the designer, but the plain truth is that every one of the projects in this book has been field tested (unless a direct statement to the contrary has been made) and found possible. This is not to say that they were always



proved to be 100% efficient; merely that they did more or less what they were supposed to do, to the satisfaction of their builders. Even the Camp Go-Kart (described in some detail in *PATROL BOOK No. 1*) was found to be eccentric and incalculable in performance, depending on the load it was required to carry, but gave great joy and happiness to a Wood Badge Course at Shrubland Park, in the county of Suffolk, England, when it was first put to the test. Fairer than that we cannot hope to be.

Nothing—but *nothing*—is more thrilling to a young Scout than to spend a wet night at Summer camp in a brushwood shelter which he has made with a couple of companions.

Everything depends, of course, upon the availability of good thatching material. This is always the great problem, and you are lucky indeed if your camp is within range of a pine-wood, or heathland, or even by reed-beds or on a farm in wheat-growing country where straw is plentiful. Wherever it may be, the special 'Country Code for Backwoodsmen' should be strictly observed, and if necessary enforced:

Do not cut standing timber or brushwood without express permission from the landowner.

Collect thatching material from as wide an area as possible—do NOT denude one spot.

Use a bushman saw, secateurs, or a sharp knife—never a hand-axe—to cut material for your shelter.

Cut close and clean.

If light branches are used (by permission) undercut first with the bushman saw to prevent stripping.

Daub the 'wounds' on trees, however slight, with clay or mud as a rough-and-ready protection against the weather and possible infection.

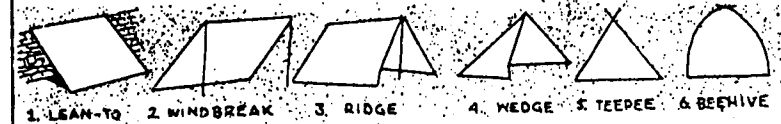
If coppice growth is taken from the foot of a well-grown tree, it is advisable to concentrate on one tree and remove all the growth, rather than to take odd stalks here and there.

Stack discarded brushwood and foliage neatly.

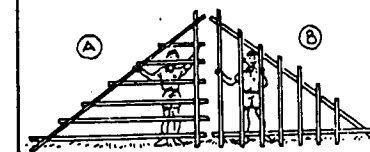
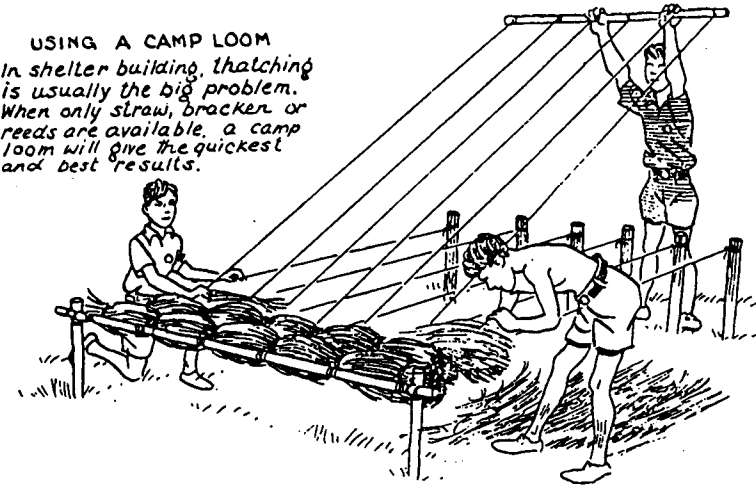
Leave everything TIDY.

In building the framework of their shelter, your boys should be warned that even the lightest thatching material is fairly heavy when

The type of windbreak or shelter will depend on (a) materials available (b) location (c) season or weather (d) purpose - e.g. a 'one-night stand' or (e) a semi-permanent shack. The six main types are:-



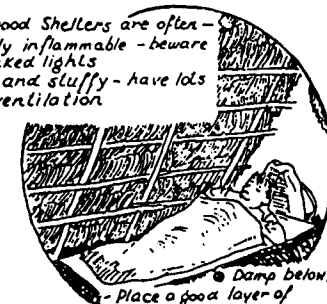
USING A CAMP LOOM  
In shelter building, thatching is usually the big problem. When only straw, bracken or reeds are available, a camp loom will give the quickest and best results.



CANADIAN BEAVER MAT THATCH

When heather or pine tips are used, the Canadian Beaver Mat is recommended. Place frame 'A' on the ground and thatch from the base upwards by hooking the stalks over the crossbars. Place frame 'B' on top and lash together. Two Beaver Mats will make a snug 'Wedge Shelter'.

Brushwood Shelters are often -  
● Highly inflammable - beware of naked lights  
● Hot and stuffy - have lots of ventilation



● Damp below.  
- Place a good layer of thatch UNDER the groundsheet.

CHART VI

WINDBREAKS, SHACKS AND SHELTERS

applied in sufficient quantity to make the roof reasonably weather-proof. Other necessary precautions are shown in Chart VI. Straw, bracken, and reeds are best bound tightly together with a camp loom. To make this, set up a line of six or more pickets about three feet high above ground-level, facing a crossbar about seven feet away and no more than eighteen inches above ground-level. Sisal cords are secured to the tops of the pickets, then passed twice round the crossbar and back to the shuttle about twelve feet away.

To operate the loom one man moves the shuttle up and down, and from one side of the pickets to the other alternately, while the thatching material is packed in very tightly from both sides of the loom at once. When thatching is completed, the lines on the two end pickets should be taken off and secured with round turns and two half-hitches to a second light spar equal in size to the crossbar of the loom. The other lines may then be taken off the pickets one by one and similarly secured to the spar. The thatch can then be taken off the loom and lashed to the frame of the windbreak or shelter, always bearing in mind that the line of the straws or reeds must follow the slope of the roof to form a proper watershed.

In thatching with heather or pine tips, the Canadian Beaver Mat, as advocated by that great exponent of backwoodsmanship, the legendary Dan Beard, seems an excellent idea, though I have to confess that this is one thing I have never actually tested for myself. The diagram (Chart VI) is self-explanatory.

All this, of course, is pure Brownsea Island and may be regarded by some as being hopelessly out of keeping with the 'sophisticated' spirit of the age in which we live. One way of finding out the truth of the matter would be to put it on offer to the boys . . .

## SECTION TWO



Fig. 7

## THE QUARTERMASTER AND HIS STORE

### 1. THE MAN AND THE JOB

A good quartermaster is a bird of rare plumage, worth his weight in gold to any Group/District/County lucky enough to have his services.

Bear in mind, however, that your good Q.M. loves his gear for its own sake and is only truly relaxed and happy when he has it under his eye, oiled, coiled, docketed, all cutting edges safely masked, everything shining bright and ready for use—but not actually *in use*! To be honest, the good man would have to admit that he would much prefer that you came into his store to inspect and admire, rather than that his gear should be taken away and used. His motto might well be, 'A place for everything, and everything (permanently) in its place'.

Nevertheless, your Q.M. is an excellent fellow and should be treated always as friend and brother. His advice should be sought (and sometimes actually taken), his rules obeyed, his discipline accepted—always on the understanding that his equipment is there for you, and others, to use, and has no other justification.

His terms of appointment should be:

1. To maintain the gear in working order ready for immediate use.
2. To issue it promptly to anyone authorised to receive it, on conditions drawn up by himself and approved by the proper authority.
3. To accept it back into store in reasonable condition after use.

The word 'reasonable' should be included in the remit to cover all possible eventualities. Wet ropes, for instance, need to be dried out slowly and cannot always be serviced adequately on the spot; nor would it be considered 'reasonable' to expect a Patrol of young Scouts to embark on a tedious make-and-mend operation when they had worn themselves out in the erection and demolition of some (for them) highly ambitious pioneering venture. In such a situation the good, kind man would presumably be satisfied if, for instance, temporary first-aid was administered to a frayed rope-end, even if he had to show the boys how to make a figure-of-eight knot himself. In any event, he would never want to bring an exciting and satisfying day's Scouting to a crashing anti-climax by demanding too much of his young customers.

Rules of any sort tend to be restrictive in practice, but unless there is some measure of control—and unless the chain of responsibility is properly understood and accepted by all concerned—confusion, wastage and loss are inevitable. The problem has always been to make the gear readily available without risking it unduly. At Troop level this should be regarded as a matter of basic training in responsibility through the medium of the Patrol Leaders' Council. Neglect to do this would endorse slackness and a slap-happy attitude to communal property and would amount to training-in-reverse—which is something the responsible adult leader should always have in mind as a dread possibility!

Heavy pioneering equipment will probably be held at District or County level. It will need much tighter control than Group-held property and should be firmly in the hands of one man, however many assistants he may have. The real problem, however, may well prove to be not so much a matter of conserving the gear as of persuading people to use it. The experience of the years is that Troop Scouters, on the whole, fight shy of this excellent facility. It may have something to do with their own lack of practical pioneering experience, but for whatever reason, they seem strangely reluctant to make use of District or County equipment—this in many cases despite the presence of a popular and accommodating Q.M. and the encouragement of an enthusiastic Assistant District Commissioner (Scouts) whose sole object in life is to open up more and more adventurous opportunities for the Scouters and Scouts in his bailiwick.

It may be that more could be done to popularise pioneering as a free-for-all activity if the gear available was listed in the District or County Year Book, with perhaps a few suggestions for its use, according to the age and experience of the prospective customers. (High risk projects of the aerial runway variety would certainly not be on offer to unaccompanied Scout Patrols, whereas the District Venture Unit, with or without an adult leader, might safely attempt 'Traicher's Folly' or the 'Hourglass Tower'.) And if it is thought good for public relations to publish photographs of local Scout V.I.P.s in the Year Book, it might be an idea to include in the portrait

gallery a smiling mug-shot of your friendly neighbourhood Q.M. against a businesslike background of ropes, spars, blocks, etc., if only to humanise the relationship.

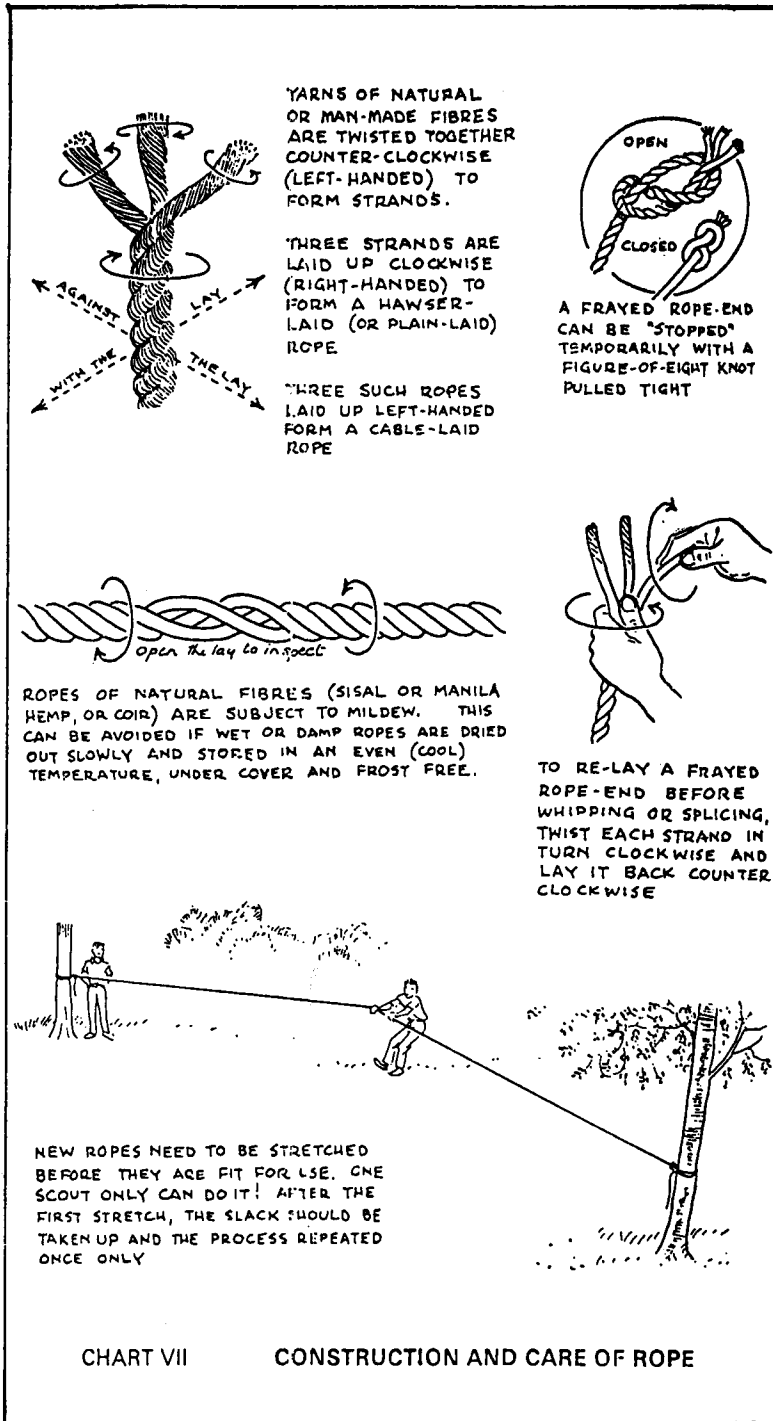
However that may be, greater efforts are obviously needed to open up this adventurous, creative, challenging Scouting activity to the boys who would undoubtedly revel in it if given the chance to do so. Everything, finally, will depend on the attitude of the Troop Scout Leader, and he is the man who must be won over. Scouters who are themselves well-versed in the simple techniques of pioneering will need no encouragement and might even have to be restrained! To the others, a vast company, we would merely say that in all fairness they should at least allow their boys to have a go. One thing is pretty certain. If they do they will add another dimension to their training programme.

## 2. ROPES AND CORDAGE

'Cordage' is a collective term covering everything from a spool of sail-twine to a 120 fathom coil of 6 in. cable, but it is usually applied to lines and cords less than one inch in circumference. Originally most ropes were made of natural fibre—sisal or manila hemp, or coir—but in recent years man-made fibres are being used increasingly in the manufacture of nylon, terylene, and polypropylene ropes which for many purposes are undoubtedly superior in performance to hemp.

Ropes of certain artificial fibres are said to have twice the tensile strength of manila, and because of their elasticity will stand up much better to severe working stresses and strains. They are lighter, more flexible and resilient in all weather conditions, and being water-proof are not subject to rot and mildew which is endemic in ropes of natural fibre. They are, however, allergic to any abrasive or crushing force—even more so than hemp—and have such a strong friction grip on each other that it is possible to cross-cut a  $\frac{5}{8}$ th in. nylon sling in about ten seconds with another length of the same sort of rope. It may well be that their high degree of elasticity, which is a terrific advantage in rock-climbing, may prove to be a positive disadvantage when they are applied to certain purposes in pioneering—e.g. when a lateral strain is imposed on a hawser which has been drawn taut, as for instance in an aerial runway. There is still a lot of room for research in the use of synthetic ropes in pioneering.

It has been claimed by the manufacturers of at least one proprietary brand of nylon rope that 'all established climbers' knots work equally well' with the named rope, but the complete failure of one conscientiously made round-turn and two half-hitches, and the consequent loss of an expensive mud-weight in the reedy depths of the Norfolk Broads, leads one to call this statement into question. Rock-climbers, led by Mr. K. Tarbuck, have already



started to invent their own knots to exploit the high friction-grip of nylon on nylon, and meanwhile seem to have discarded that king of knots, the bowline—and the equally regal alpine butterfly—in favour of the crude figure-of-eight loop! The reason for this is that the figure-of-eight loop can be quickly and easily made in the most difficult situations and is equally effective to form a non-slip loop in any part of the rope. In effect, you get two reliable knots for the price of one. 'Difficult situations' don't normally occur with any frequency in Scout pioneering, but there is no reason why every knot should not be considered on its merits in relation to the job in hand.

What can be stated with certainty is that, for the time being, any knots, bends, or hitches made in ropes of synthetic fibre should be made with an extra long tail, with whatever additional 'locks' are possible in the shape of extra half-hitches or by tucking the tail through the lay.

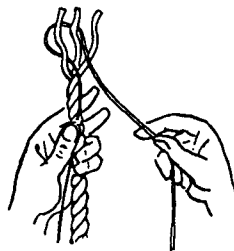
\* \* \*

Rope of whatever kind is a marvel of applied mechanics. Consider! When natural fibres are used they must be twisted up together in one direction to make yarns. (In synthetic ropes the yarns are in one length throughout the rope, with a consequent increase in tensile strength.) The yarns are twisted in the reverse direction to make strands. Strands are twisted in the original direction to form the rope. At each stage the tendency is for the fibre/yarn/strand to return to its original state, but in the unending struggle to do this each acts in opposition to the other, so that a balance of counter-acting forces is achieved and the energy generated by the effort to untwist is held in suspension within the rope. It is this which gives life and vigour to the rope, and it is this which can so easily be dissipated if the rope is neglected or ill-treated, especially if the ends are left unstopped. Scouts should be trained to regard a frayed rope-end as an open wound—something to be dealt with at once as a matter of urgency, if only by the application of a rough-and-ready tourniquet in the shape of a figure-of-eight knot until such time as a permanent whipping can be made. The ends of nylon lines and cords can be annealed by scorching the end in a candle flame, but heavier nylon ropes and all lines or ropes of natural fibre will require an orthodox whipping with waxed whipping twine.

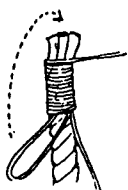
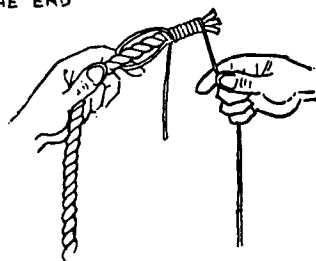
The sailmaker's is undoubtedly the best whipping for the end of a laid rope, with the west-country as second choice. This is equally secure, but laborious to make and certainly not so neat in appearance as the immaculate sailmaker's. It consists merely of a series of overhand knots tied on alternate sides of the rope, starting near the end and working back down the rope to finish with a reef knot. Both these whippings—with perhaps the addition of the American plain whipping—should be included in Patrol Leader training. In

## THE SAILMAKER'S WHIPPING

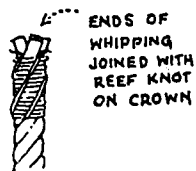
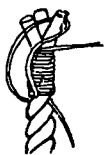
UNLAY THE END OF THE ROPE FOR ABOUT 2 ins. AND PUT A LOOP OF WHIPPING TWINE ROUND ONE STRAND



HOLD THE LOOP DOWN THE ROPE AND BIND TIGHTLY TOWARDS THE END



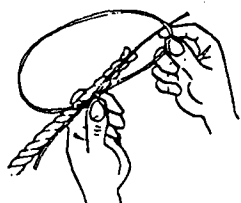
RAISE THE LOOP AND SLID IT OVER THE TOP OF THE STRAND IT EMBRACES



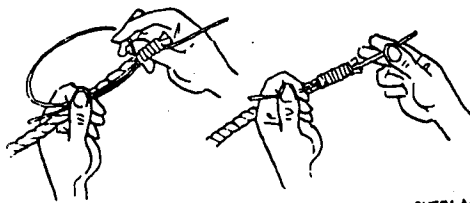
ENDS OF WHIPPING JOINED WITH REEF KNOT ON CROWN

PULL THE SHORT END TO TIGHTEN THE WHIPPING AND CARRY IT UP TO THE CROWN

## THE AMERICAN PLAIN WHIPPING



YOU WILL NEED ABOUT 2 FT. OF TWINE. MAKE A LOOP AND HOLD IT OVERLAPPING THE END OF THE ROPE WITH THE ENDS OF THE TWINE EXTENDING BEYOND THE LOOP AT BOTH SIDES.



PICK UP THE SIDE OF THE LOOP WHICH OVERLAPS THE END OF THE ROPE AND BIND TIGHTLY UNTIL YOU HAVE USED UP AS MUCH OF THE LOOP AS POSSIBLE, THEN PULL BOTH ENDS HARD TO TIGHTEN AND CUT OFF THE UNWANTED TAILS. THIS WHIPPING IS PARTICULARLY USEFUL ON THE ENDS OF BRAIDED THROWING LINES

CHART VIII

WHIPPING

any event, whippings should always be preferred to the clumsy back-splice (known to seamen as 'the lazy man's whipping') if for no other reason than that splices tend to thicken the rope and prevent it from being reeved through blocks.

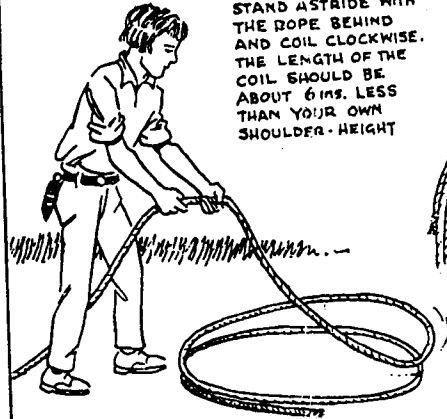
Light cordage, such as sisal twine and codline, can be 'stoppered' with fair efficiency by doctoring the ends with household adhesives, though they are apt to become tacky when wet. Binder-twine is cheap (and rather nasty) and may be considered by some quite good enough for the construction of camp gadgets, but it is certainly not recommended by the present writer for that or any other purpose in Scouting. Indeed, let it be said that as boys give to Scouting the most valuable thing they possess, namely many irreplaceable hours of their own boyhood, the least we can do to justify their confidence in us is to provide them with the best we can afford in the way of equipment.

Rope is specified by its circumference in inches and its length in feet or fathoms (though it is often sold over the counter by the yard!) In many catalogues you will find the diameter of the rope given in millimetres. For quick conversion, remember that to find the diameter in millimetres you multiply the circumference in inches by eight so that a rope with a 1 inch circumference will be 8 mm. in diameter. Under the metric system the length will be given in metres. Anything below 1 in. circumference is known as 'line'. Most ropes in common use are laid up right-handed, that is with the strands running upwards from left to right. This is known as plain or hawser-laid, and such ropes should always be coiled with the lay in a clockwise direction. If a standard procedure is adopted when hanking or coiling, the next man to use the rope will find it much easier to handle. New ropes fresh from the maker's coil will need to be stretched before being cut into working lengths and stowed away. A good method of stretching is to suspend the rope between two fixed points and pull it sideways as far as it will go. To avoid over-strain this should be done by one Scout only, after which the slack in the rope can be taken up and the process repeated once only. An astonishing increase in overall length will result.

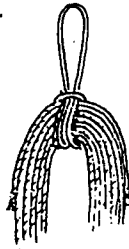
Cordage should never be stored where it is subject to extremes of temperature. Heavy ropes are best coiled on the ground. This should be done before the rope is carried back to the store and care must be taken to avoid dragging it along the ground. Arrange the rope with the two free ends hanging down the coil and put a small strop round the top as shown in the diagram. A good method of making a strop is by joining the ends of a 6 ft. length of cord with the fisherman's knot and tucking the tails into the lay to make a neat

ALWAYS COIL OR HANK WITH THE LAY OF THE ROPE

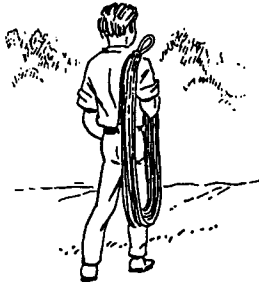
COILING A HAWSER



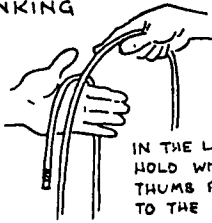
STAND ASTRIDE WITH THE ROPE BEHIND AND COIL CLOCKWISE. THE LENGTH OF THE COIL SHOULD BE ABOUT 6 INS. LESS THAN YOUR OWN SHOULDER-HEIGHT



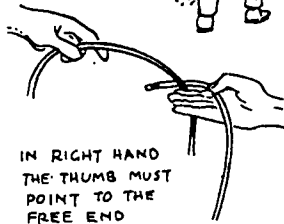
ARRANGE THE ROPE WITH THE TWO ENDS HANGING DOWN THE COIL. WITH A SMALL STROP PUT TWO TURNS ROUND THE TOP OF THE COIL AND SLIP ONE END OF THE LOOP THROUGH THE OTHER



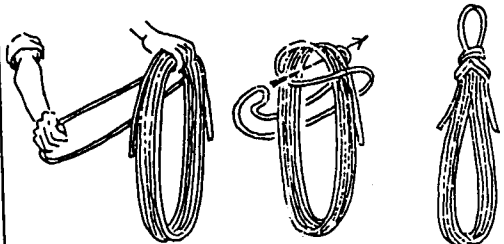
HANKING



IN THE LEFT HAND HOLD WITH LEFT THUMB POINTING TO THE RIGHT



IN RIGHT HAND THE THUMB MUST POINT TO THE FREE END



TAKE OUT ANY TURN OTHER THAN THE LAST, CARRY IT RIGHT ROUND THE HANK AND UP THROUGH THE LOOP. ROPES OF THE SAME SIZE AND LENGTH CAN BE LOOPED TOGETHER WITH SISAL TWINE OR A SMALL STROP.

MEMO  
 To: *Spic*  
 From: *The Q.M.*  
 • *Finally soon this rope is going to be used by another Scout Troop*  
 • *If you could help (if you can't) don't hinder. But I think you'll care so that your successors will have to get out a couple of more Q.M.*

CHART IX

COILING AND HANKING

job. The practice of tying off the coil in three or more places is not advocated, as this prevents the hawser from falling into its natural position when hung from a wall hook in the Q.M.'s store.

Lighter cordage can be hanked and strung up in festoons according to size and length. Lashings and knotting ropes should be hanked and festooned in similar fashion, or better still strung up from the middle point, so that individual ropes can be drawn out as required.

For light lashings, suitable for use with Scout staves, bamboo rods and other light spars, it will be found economical in the long run to buy good quality codline rather than sisal-twine but if sisal is used (because it is initially much cheaper) let it be the three-strand variety. You get less in length for your money but it has been found much better for light pioneering than the two-strand variety.

In preparing his lashing-lengths the Q.M. will have in mind the need to relate them to his spars, both as to length and thickness. An easily remembered formula is three feet of lashing to one inch of the combined diameter of the spars to be lashed. Thus a 3 in. tip lashed to a 5 in. butt would require 24 ft. of rope.

The size of the lashing is a matter for commonsense. It would be an obvious nonsense to use rope, or even line, on staves or bamboo poles of less than 1 1/2 in. diameter. Three-strand sisal, or better still codline, is quite strong enough for this purpose. Spars up to 3 in. scantling will take 3/4 in. line. Above that size lashings of 1 in. to 1 1/2 in. should be used, depending on the nature of the strain to which the structure will be subjected, and bearing the ever-important factor of safety in mind.

The safe working load of a rope is usually regarded as about one-ninth of its calculated breaking strain. This provides a generous margin of safety and allows for the weakening effect of knots and splices and normal wear and tear in the rope itself. Nevertheless, if any appreciable risk is involved in the use of any but split-new ropes, they should be spot-checked by opening the lay at various points down the rope to make quite sure that no serious deterioration has taken place. It frequently starts in the core of the rope and is not always apparent. The rule should be 'If in doubt, leave it out.' If, for instance, a much-used 3 in. hawser is being considered for an aerial runway or the footrope of a monkey bridge, it would need to be inspected for every fathom of its length; and if this somewhat boring task could not be faced, the rope should be rejected. (Not, of course, that any responsible Q.M. would have issued such a rope for such a purpose in the first place, but it cannot be emphasised too strongly that in all such situations final responsibility must rest with the Scouter-in-Charge.)

A rough-and-ready guide to the safe working load of manila and sisal rope is to square the circumference and call it hundredweights. Thus, a one inch rope, although its breaking strain will be 9 cwt., is safe for 1 cwt. and a 3 in. hawser will safely hold a strain of 9 cwt., its actual breaking strain being a little over four tons.

Wet ropes must be dried out slowly. Out of doors it is best to lay

them in the shade in an open coil of maximum length. Indoors they should be strung clear of the floor and air-dried naturally in an even temperature. All main ropes should be inspected when they come off the job, and any signs of damage—e.g. through rubbing or chafing—should be clearly marked and the rope laid aside for attention before it is returned to the store. Ropes which have been in use for some time might well be demoted to second-class and colour-coded with a few dabs of red paint, 'for light duty only'. A demoted *hawser*, however, is best cut into shorter lengths to prevent it being given a key role in mainline pioneering.

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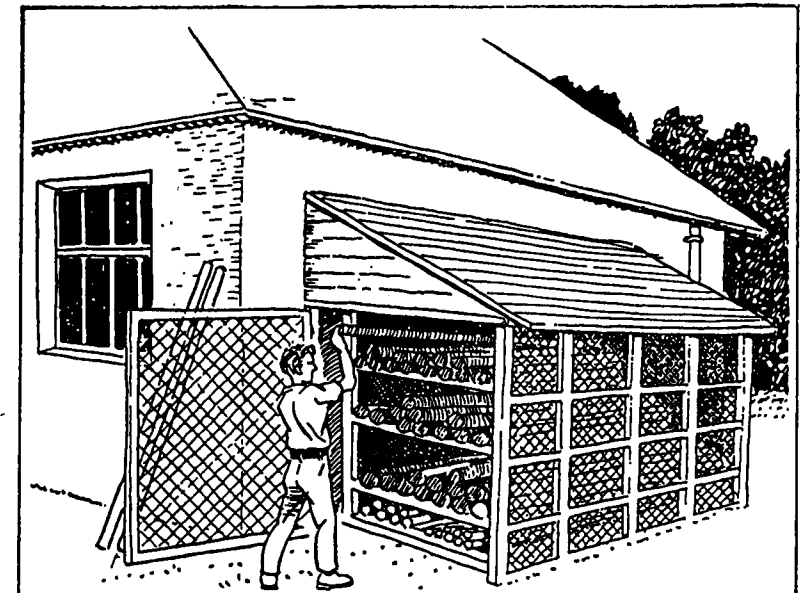
Throwing-lines should not be kept in the general rope store, where they may be confused with the working cordage, and in no circumstances should they be used for other purposes. A few 'messenger' lines of three-strand sisal with lobstersticks attached will be found most useful. An ordinary tent mallet makes a perfectly good lobsterstick, but an even better article can be improvised by wrapping a round stone in a dishcloth, or something of the sort, and lashing it into the crutch of a pronged stick. The sisal line should be made fast to the haft close under the head with a rolling-hitch for a downward strain and secured with an extra half-hitch (sometimes called a killick hitch) near the butt. Lobstick sticks are much easier to throw than ordinary lines and have the added advantage that they will crash through twigs and foliage which might baffle an unweighted line. The technique of using them is dealt with more fully in Section 3 of this book.

### 3. SPARS AND PICKETS

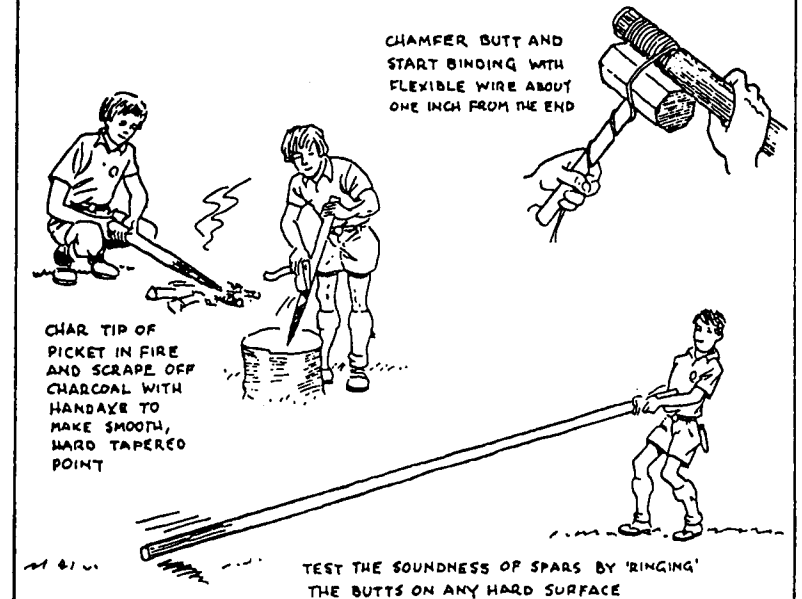
For major pioneering structures spars of up to 12 ft. by 4 to 5 in. butt will be needed. In the British Isles they are available at reasonable cost from the Forestry Commission if a full load is ordered at one time, carriage charges being equated so that the same price applies irrespective of delivery distance. Peeled spars cost fractionally more but are strongly recommended. Officers of the Commission are invariably friendly and co-operative, and are always ready to give advice on this or any other matter concerning the cultivation and use of trees.

Spars should be colour-coded as to length, and are best stored in racks under cover in the open. On isolated camp and training grounds this may present something of a problem. One solution is to build a sort of 'spar port' on the side of an existing building, enclosed with a padlocked grill of strong steel wire. Nothing is completely proof against determined vandalism, but most vandals are easily discouraged if obstacles are put in their way.

In woodland areas sweet chestnut poles are often grown as a



A 'SPAR-PORT' ENCLOSED WITH A PAD-LOCKED GRILL OF STRONG STEEL WIRE WILL PROVIDE AN AIRY, FROST-FREE, VANDAL-PROOF COVER. SPARS SHOULD BE RACKED ACCORDING TO LENGTH, WITH BUTTS TOWARDS THE DOOR.



CHAR TIP OF PICKET IN FIRE AND SCRAPE OFF CHARCOAL WITH HANDAXE TO MAKE SMOOTH, HARD TAPERED POINT

CHAMFER BUTT AND START BINDING WITH FLEXIBLE WIRE ABOUT ONE INCH FROM THE END

TEST THE SOUNDNESS OF SPARS BY 'RINGING' THE BUTTS ON ANY HARD SURFACE

CHART X

SPARS & PICKETS

saleable crop and may be bought quite cheaply. They are reasonably resilient (as compared, for instance, with poplar) and may also be used as light-duty pickets where the stronger and more reliable ash is not available. In the nature of things, pickets come in for rough treatment, and the provident Q.M. will do what he can to protect their vulnerable crowns—by chamfering the edges, by annealing in the fire, by whipping with soft wire and staples, or by whatever expedient he can devise. It has to be admitted, however, that nothing has yet proved completely resistant to the enthusiastic bashing with mallet or maul in inexperienced hands—and there will be no shortage of those.

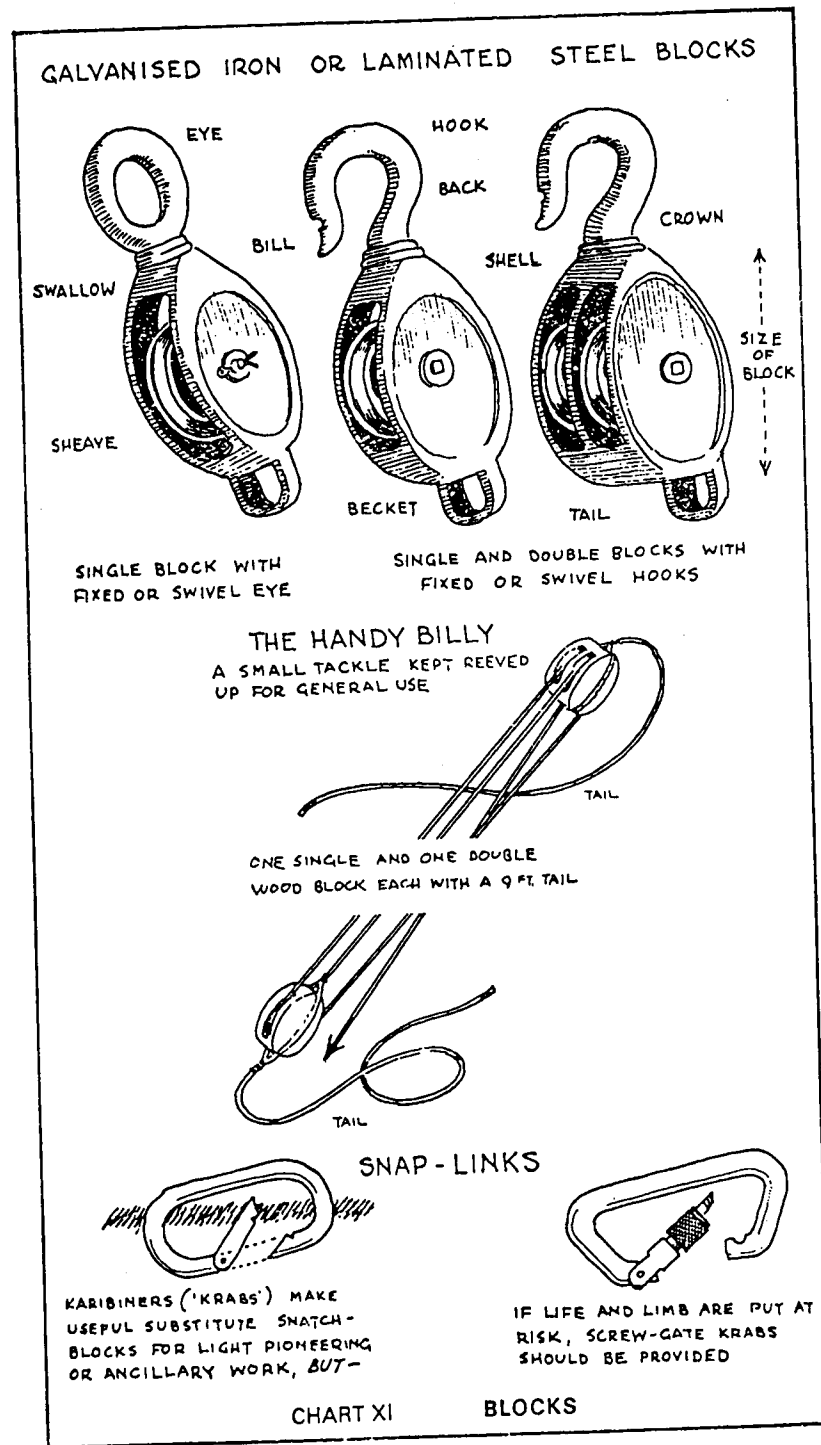
Pickets should be in lengths of 3 ft. and 4 ft. A good way of pointing 'green' pickets is to heat-treat their tips in the fire and scrape off the char. If this patient process is repeated again and again it will produce a round, smooth taper, starting a foot or so from the end of the pickets and ending in a beautifully case-hardened point.

Great care should be taken to make sure that both spars and pickets are free from rot and shakes (flaws in the grain) which are liable to occur in the heartwood and cannot be seen. They can be easily tested by gripping the tip and 'ringing' the butt on any hard surface, when the invisible flaw will be heard as well as felt.

In addition to spars and pickets, the Q.M. will need to hold in stock a good supply of short poles and batons of various lengths, for such things as the treads of rope ladders, the decks of rafts, and the roadways of bridges. In time this need will be met from the flotsam and jetsam of broken staves and spars, but initially the demand will far exceed the supply, and nothing should be allowed to go on to the scrapheap or the fire which might come in useful later.

#### 4. BLOCKS

Blocks are expensive items of equipment, but will outlast all others and are undoubtedly a sound long-term investment. They are available in galvanised iron or laminated steel, with fixed or swivel hooks or eyes, in any size to suit the cordage you mean to use, and with one, two, or three sheaves—although in Scouting triple blocks are seldom called for. Blocks are denominated by the length of the shell, which is usually three times the circumference of the rope for which they are intended; and it is, of course, essential that rope and block should be in perfect accord. Small iron blocks can be bought quite cheaply from your local ironmonger, but they are 'cheap' in other respects too, and are not really worth buying. Army surplus stores may still have small double and single blocks of fairly good quality for disposal, including some small wood blocks which make excellent 'Handy Billies'; but secondhand material can never be guaranteed, and if blocks of anything above 3 in. shell are required the Q.M. should do his shopping elsewhere





Snap-links (karabiners or 'krabs') are a useful adjunct in light pioneering, or ancillary work in general, and although the ex-war-service variety have been condemned by the British Mountaineering Council for use on mountains, there is no good reason why the Q.M. should not have a few in stock for use as rough-and-ready light snatch-blocks. It should be clearly understood, however, that they are NOT to be used for such adventurous capers as roping down (abseiling) from treetops and other risk-laden situations. If activities of this sort are to be included in the pioneering programme, at least one pair of the much more dependable screw-gate krabs should be included in the armoury.

The 'Handy Billy' is a small tackle consisting of one single and one double wood block, each with a rope strop and tail, so that it can be quickly mounted and dismounted by the non-lock method described in a later section of this book. The 'Handy Billy' is the one and only tackle which should be kept in store reeved up and ready for use. All other blocks should be kept oiled and ready, but independent of their tackle. They are best kept festooned on wall hooks according to size, labelled with the size of the relevant ropes. It should be regarded as the responsibility of the Q.M. to issue blocks and tackle in proper relation to each other. The actual reeving and unreeving of tackle should be done on the job by the pioneers themselves. The closer they are to the job, the less danger there will be of the blocks capsizing en route, with the consequent twisting of the falls into inextricable confusion. When this does occur, much the best plan is to unreeve the tackle and start all over again from scratch.

\* \* \*

The building of Aerial Runways is bound to be popular in any pioneering community, second only perhaps to the ubiquitous Monkey Bridge. Because of the inherent dangers, the greatest care must be taken in the selection, maintenance and issue of the requisite equipment, which, in the British Isles, must be in strict accordance with the official 'Aerial Runway Code' and Rule 55 of the Association, which is quoted in full at the Appendix to this book. Additional copies of the 'Code' and the accompanying chart may be had from any Scout shop, and the wise Q.M. might consider it worthwhile to have at least one copy of the Code and chart mounted on sheets of hardboard or plywood, protected with clear varnish, for issue with the rest of the gear to the adult leader in charge of the project. But since we are dealing with blocks at the moment, let it be clearly understood that the use of hooked blocks to carry the travelling seat is now prohibited, and that snatch-blocks—that is, blocks with a hinged strap on the side so that it can be opened and slipped on to the rope at any point—must not be used for this purpose. Such blocks, in any case, are extremely expensive and not at all necessary. It is a simple matter to reeve the hawser

through an ordinary single block before the runway is erected. It would be highly unprofessional for a Q.M. to issue a hooked block for this particular purpose. The block must have an eye or ring. In most pioneering situations it is sufficient to close the mouth of a hook with a secure mousing, but mousings are never 100% reliable, and to employ one in this situation would be an act of irresponsibility on the part of the person in charge of the operation.

When it comes to the mousing of hooked blocks, the Q.M. will probably find that the block-maker has made things difficult by omitting to provide enough 'bill' to hold the twine. This can be overcome by filing a small notch into the metal an inch or so from the point, just deep enough to give the mousings something to grip. The actual mousing process should be left to the pioneers themselves, and the Q.M.'s responsibility in this matter ends with the issue of the necessary material, which, for preference should be tarred hemp spunyarn or thin, strong waxed marline, but *not* sisal-twine.

## 5. ODDS AND ENDS

A good Q.M. will certainly have his own 'glory hole' into which he will pour every unconsidered trifle for which he imagines some use may yet be found: strips of hessian and old tent canvas, discarded car tyres, plastic drums and containers (freely obtainable from wine merchants, chemists, and swimming bath managers, who will be only too happy to get rid of these bulky non-returnables.) In country areas there will be no lack of discarded plastic fertilizer bags, for which many uses can be found, e.g. for reducing the chafing of ropes on trees and in the saddles of sheerlegs. Old perambulator or cycle wheels—or even complete cycle frames—are worth collecting, provided they can be stored out of sight. Plywood tea-chests, biscuit tins, 2 lb. glass jars with screw-top covers for storing nails, screws, screw-eyes and hooks, tins of any sort—or for that matter anything for which room can be found, without cluttering up the landscape too much, can be held in store as potentially useful equipment.

One important 'oddment' which should not be lacking is a sound, well-constructed bosun's chair for use on aerial runways, as specified in the Code, complete with seat belt and a foolproof method of attachment to the eye or ring of the travelling block. Seats for purposes other than runways can be improvised on the spot by means of the scaffold hitch, and suitable boards should be kept in stock, perhaps notched at each side near the ends to take the ropes, and with a supply of eight foot strops to go with them.

## 6. LIGHT EQUIPMENT

For mini-pioneering activities there has never been anything to

beat the original 'Scout broomstick' or 'pole', later dignified by the name of 'staff' or 'stave'. In the very early days this was a beautifully turned and waisted 5 ft. pole of seasoned ash complete with brass ferrule. It was practically unbreakable and could be (and was) handed down from father to son like a family heirloom. The modern Scout staff is lighter and less durable, but equally useful while it lasts, and in the opinion of the present writer remains an essential item of basic training equipment. With a battery of staves at the rate of one per head of Scout membership, and a few oddments in the way of sisal lashings and other light cordage, a wide variety of games and creative activities can be added to the Troop Night repertoire, and the way opened, through training, to more strenuous and adventurous activities out of doors. Scout intellectuals who profess scorn for these simple fun-making activities betray their own short-sightedness in not recognising their training value.

'Instant' pioneering with garden canes and elastic bands has become increasingly popular since it first saw the light of day under the 'Lid' at Gilwell some years ago, and provision should be made for this at Group level at least. Four-foot canes will be found most suitable, and it would be as well to buy the better quality, plus a few shorter, lighter, *straight* canes for the improvisation of arrows, bolts, and other weapons of assault, which understandably, have a great appeal to boys of Scout age. The ends of canes should be protected with a few turns of insulation tape and the coloured variety looks more cheerful than the black stuff.

Until recently it was possible to cut excellent rubber bands of varying width from discarded inner tubes, but the introduction of the tubeless tyre has put a stop to that. Cycle tyres are a poor substitute. We are now obliged to buy expensive rubber bands from the local stationer or office supplies shop. It will be found that 4 in. x  $\frac{1}{2}$  in. bands are best. They can easily be linked with lark'shead knots if longer lengths are required. Because they are expensive they should be treated with respect. As we have pointed out rubber de-natures fairly quickly if exposed to the elements or to changes of temperature. Bands should be kept in sealed tins or glass jars and issued and received back into store with the same care and attention as any other item of equipment. No schoolboy can resist the pull of elastic. Unless taught otherwise he will pocket your bands without compunction. This, plus the inevitable wastage through accident and misuse, will quickly run you out of stock. Be warned! Do not regard this as a trivial or unimportant matter. Insist that all bands, broken or not, are returned—the broken bands separate from the others. Keep the broken bands in a separate container. They can easily be knotted together, two by two, for subsequent re-issue.

In recent years bamboo rods have been used successfully when the need was for something longer and in some ways stronger than Scout staves or sweet chestnut poles. Unfortunately bamboo is not imported into the British Isles in any great quantity, but it is in fairly general use for the transport of certain materials and other

fabrics, and you may be lucky enough to pick up a few useful lengths from a local furniture store. Its greatest advantage is that it is extremely light in proportion to its length, so that the smallest Scout can have the satisfaction of working with man-size materials. On the other hand it is easily crushable, and because nature has developed it to withstand a vertical strain only, it will develop a 'greenstick' fracture if subjected to a bending moment of any severity. It might therefore be regarded as safe enough for such sportive activities as 'The Tibetan Cage' or for the swinging arm of the 'Twinshot Ballista', or for 'Skylon Flagstuffs' and ornamental gateways, but where personal risk is entailed in the erection and use of a structure no great reliance can be placed upon bamboo.

## 7. TOOLS

As far as tools are concerned, a great deal will depend on the terrain, the nature of the activities which are possible, and the equipment which will have to be maintained and serviced. The following are suggestions only, for the Q.M. will certainly have his own ideas on the subject.

Spades, entrenching tools, picks and shovels will certainly be needed if mainline pioneering is on the agenda, plus a few heavy mallets and at least one maul or 'beadle' for driving in larger pickets. Sledge hammers are not recommended for this purpose, but it might be as well to have at least one in reserve and it will certainly be needed if forestry is included in the pioneering programme. The Q.M. himself will need to have a sharp hand-axe and chopping-block in his store. There is no better tool for cutting heavy cordage. Other hand-axes might be made available to Scout pioneers, but only at the discretion of the Q.M. Felling axes should not be on issue to unaccompanied Scouts, and only to Venture Scouts if the purpose is known and approved.

Small hand stones should always be issued with the axes, and, if necessary, the young pioneers or foresters should be instructed in their use. It would be as well, for instance, to demonstrate the simple drill needed to avoid damage to fingers when using the small, circular carborundum stone, i.e. lay the stone on a flat surface and lift it without allowing the fingertips to protrude. Indeed, the Q.M. is in an excellent position to put over the odd tip to his young customers, always provided that in doing so he does not deliberately by-pass their own Scout Leader. Tact is not the least of the qualities needed by a good Q.M.!

Bow saws will be found invaluable, but again the purpose must be stated before they are issued to Scouts. It has been known for a keen Patrol Leader to trim up a structure by amputating the ends of the spars to give a neat finish. The 24 in. bow saw is probably as much as a Scout can handle, but Venture Scouts will certainly expect to be issued with nothing less than the 30 in. Bow saws,

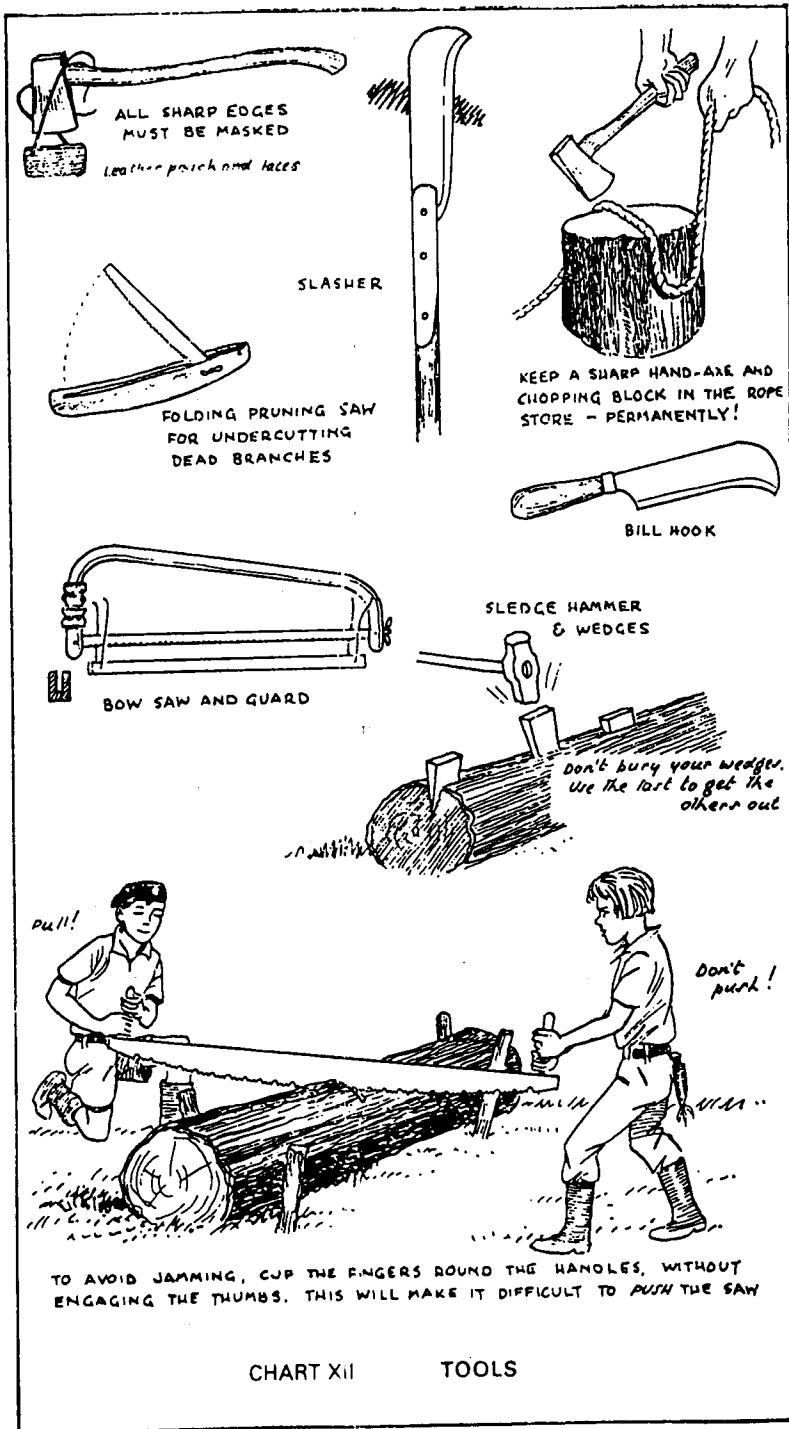


CHART XII TOOLS

In particular, are apt to get out of true and should be tested before they are issued to make sure they are in working order. Nothing is more annoying than to find oneself working far from base with a saw that jams continually. The type of bow saw with the wing-nut strainer on the blade is undoubtedly the best buy.

It might be as well, too, to keep at least one small pruning saw with the hinged blade in stock. They are invaluable for off-the-ground work, such as the undercutting of dead branches.

Sharp-edged tools of any kind should be inspected in the presence of the user before being handed over, and should always be issued with the cutting edge masked. In this respect it is well to remember that saw cuts are usually much more painful and dangerous than wounds inflicted with knives or axes, and as the long-handed crosscut saw is an awkward tool to handle, the blade should be wrapped in old sackcloth when it is being carried around the site. This crude 'mask', however, is apt to collect damp, and should be removed before the saw is hung horizontally on two wooden wall-pegs in the store.

After use all tools should be returned clean and dry, and again a ritual inspection should be made in the presence of the users. This need take no more than a few seconds, but its psychological effect will be considerable—especially if an oily cloth is rubbed over the blade before the tool is put to sleep.

If forestry of any kind is envisaged a few additional items will be needed: crosscut saws have already been mentioned; add a few felling axes (2½ pounders for Scouts, 3½ to 4½ pounders for Venture Scouts and Scouters); a chain saw or two (best kept in oil in an old billy-can or meat tin); a few strong lanyards for attachment to tools which are being used above ground-level; slashers or billhooks for clearing undergrowth and brushwood; sledge hammers and an assortment of steel wedges for splitting heavy timber; a can of raw linseed oil for the hafts of axes etc.; a drum of vegetable tar and a tar brush for doctoring open wounds on trees; a draw-knife and auger; an emergency First Aid kit.

In addition the Q.M. will certainly need a work bench, complete with vice, and tools of his own for the necessary fettling of tools on general issue. It will all cost money—but no more than is spent by the average Scout Group on its once or twice a year heavy camping gear; and provided full use of the pioneering equipment can be guaranteed, the expense of the operation is hardly worth consideration.

## 8. SALESMANSHIP

We make no apology for the use of this jaundiced word. Clearly something has gone seriously wrong with our determined efforts over many years to sell pioneering as an adventurous activity open to all Scouts everywhere, and it would be a wicked waste of time, labour, and money, and—not least—enthusiasm, to set up a well stocked, well manned local Activity Centre for Pioneering, and then

fall flat on our faces as amateur ad-men. Much has already been made of the personality and attitude of that key figure, 'your friendly neighbourhood quartermaster' and the almost equally important Assistant District Commissioners (Scouts) and (Venture Scouts), but the problem of overcoming initial inertia remains and must be tackled afresh by whatever means seem appropriate to local circumstances. Direct advertising in the District and County newsletters should not be despised, but it must be done regularly to have much effect. Another idea would be to organise a series of boy training courses in such subjects as forestry, conservation, jobmanship, and quartermastering, as well as pioneering, and apply to the appropriate authority (under Rule 76) for recognition as the official testing agency in the appropriate proficiency badges. In almost every District there are at least one or two Scouters or Instructors who are themselves keen practical men, and who might be only too willing to help staff such courses. In recent years weekend training courses for Scout Leaders and their Patrol Leaders *together* have enjoyed considerable success, and their range might well be extended to cover the outdoor badges.

On permanent camping and training grounds the siting of the Q.M.'s store might make all the difference to the use that is made of his gear. Ideally it should be placed somewhere near the focal point in the area—perhaps cheek by jowl with the providore or tuck shop—and should advertise its presence with an eye-catching sign. A noticeboard outside the door might well have on display a sample of the gear available and charts of possible activities, which should be changed frequently. If an 'Emergencies List'—names, addresses and telephone numbers for doctors, ambulance, hospital and police, together with bus or train time-tables is on permanent display, Scouts and Scouters will be drawn to the spot willy-nilly and possible sales resistance might well be overcome.

Another important point is that, weather permitting, the door of the Q.M.'s store should be kept open whenever the Q.M. or one of his assistants is in residence. Indeed, if ever the policy of the open door was called for, it is here and now.

A counsel of perfection, perhaps! And why not? It is by no means every Scout who will have the opportunity to climb dizzy rock faces, plunge down brumey potholes, go gliding, flying, parascending, boat sailing, or canoeing in white water, but pioneering is a real adventure open to all.

## SECTION THREE

### THE COMPLEAT PIONEER

#### 1. KNOWING THE ROPES

There is more to ropework than the making of knots, and when introducing the subject to Scouts it would be as well to forget about the ritual of reef, sheetbend, clove-hitch, bowline, and the rest and plunge them straightway into action of a different kind. The author of *SCOUTING FOR BOYS* had the right idea. He suggested, you may remember, that the Patrol should use their Patrol Leader as the log when practising the parbuckle. You might do worse than take a leaf out of the Founder's book. For instance:

1. If you are lucky enough to have access to a stage—failing that, a short flight of uncarpeted stairs will do equally as well—try moving, lowering and raising a volunteer 'log' a la B.-P. by means of the parbuckle. Make quite sure that the operators 'know their ropes' before the critical point in the operation is reached—and it might be as well to wrap your 'log' in a blanket!

2. At the Patrol Leaders' Council, demonstrate the making of the Rope Tackle (Harvester's Hitch) so that the training can be passed on during Patrol Time on Troop Night, then organise a three man tug-o'-war—the smallest Scout in the Patrol v. two beefier opponents—to prove (hopefully) the fantastic three-to-one purchase of this excellent device.

3. Demonstrate the Tucked Eyesplice (sometimes called The Docker's Splice) and hold a Patrol Competition to establish the Troop Record for making the longest linked rope with 9 ft. practice ropes in a given time.

4. Explain the theory *only* of the Spanish Windlass to your Patrol Leaders, provide the necessary (light) materials, and see which Patrol can 're-invent' it first.

5. Call up the Patrol Leaders and while your Assistant keeps the Troop happy by telling them a funny story, teach them the marlinspike hitch. Provide ropes and Scout staves and send them back to pass on the instruction to their boys so that, *unaided by the Patrol Leader*, they can make a five-rung swarming ladder of 10 in. rise, and use it to get a man over a branch, beam, or other suitable obstacle.

6. Use the figure-of-eight loop to convert a throwing line into a lariat and practice lassoing, first on a stationary and then on a moving target.

The whole purpose of the exercise, of course, will be to convince all concerned that ropework, so far from being an academic subject, can be not only fun-making but adventurous and even mildly dangerous. From that point it should be easier to persuade them to apply themselves to the grind of mastering a few basic knots; without them, they will never get very far in pioneering, sailing, rock-climbing, caving, or rescue work.

Start with the Draw Hitch—easy to learn and fun to operate. Follow with the relay race called 'Dick Turpin', in which the boys pair off, ride up to the hitching-rail, make their steed fast with the Highwayman's Hitch, remount before releasing the knot, then ride back in triumph to touch off the next pair. Follow this with the round turn and two half-hitches, undoubtedly the best knot for making fast under strain. Get one Scout to haul away on the standing part of the rope while you secure the strain with the round turn and then put on the two half-hitches at leisure.

\* \* \*

Quite early in their pioneering careers your Scouts must be made to appreciate that rope of any kind is particularly vulnerable to misuse and mismanagement and must be treated with the respect it needs and deserves. This should be done, not by lecturing, but by making a public and continuing demonstration of respect oneself. Boys will model themselves not on what they are told, but on what they see being done. A Scouter who says one thing and is later seen doing something rather different—probably because it is momentarily more convenient to himself—will not only destroy confidence in the enterprise but more importantly in his own integrity. For instance, to allow a wet or de-stranding rope to go untended into the rope locker for whatever apparently good reason will undo at a stroke all that may have been said about the care and conservation of Troop-owned property *as a whole*. This is 'training in reverse' and, let's face it, *it does happen!*

This is not to say that some verbal instruction will not be necessary; but let it be accompanied always by demonstration and the actual handling of the cordage or gear under review. Dramatise the situation wherever possible: e.g. there would be no harm in doctoring a length of expendable rope (say the fag-end of a condemned hawser) in order to demonstrate the disastrous effects of neglect. How? Simply by soaking it overnight, then leaving it in a tight coil in the boilerhouse to dry. Or secretly remove the whipping from the end of a rope with which you are about to demonstrate, then, without saying a word about it, apply a figure-of-eight stopper knot or, if time allows, a quick West-Country whipping, before putting it to further use. Whenever possible allow the boys to *notice*, to find out for themselves. Asking is better than telling.

QUESTION: What is the most important thing about the bowline?

ANSWER: It makes a completely reliable non-slip loop in the end of most ropes. (Note: That statement must be qualified because rock-climbers have found that it is almost impossible to make the bowline in some artificial ropes, notably the kernmantel (core-and-sheath) rope.)

QUESTION: Which is the better knot for joining ropes of the same thickness—the reef or the sheet-bend?

ANSWER: The sheet-bend. (The boys can prove this for themselves by joining two ropes, first with a loosely-tied reef, then with an equally loose sheet-bend, and shaking the ropes violently.)

QUESTION: The running bowline and the figure-of-eight loop are both slip knots. In what important respect do they differ?

ANSWER: The running bowline only grips while under strain. The figure-of-eight loop is a slip and grip knot.

QUESTION: If you break a reef knot by gripping the two ends on the same side of the knot and jerking them apart, you get an entirely different knot. (Demonstrate.) What is it?

ANSWER: The larkshead.

QUESTION: What could it be used for?

ANSWER: To secure a rope or strop temporarily to a spar or another rope. (Demonstrate.)

QUESTION: If you repeat the same process with a grannie knot, what do you get?

ANSWER: A clove-hitch.

And so it will go on: the object being, of course, to impart liveliness, activity, and perhaps a certain amount of fun to what might otherwise be a deadly dull academic exercise.

\* \* \*

In training boys to handle ropes the standard procedure should be:

1. Demonstrate to small numbers at a time—ideally to the Patrol Leaders (and perhaps their Assistants) only, so that they can have the kudos of passing on the instruction to their own boys.

2. Use rope, not string, *except when demonstrating the reef knot*. For this use very light material, including bandages.

3. Keep your trainees behind you, where they can watch the knot being made as they will see it when making it themselves. Make sure that everyone has an unobstructed view.

4. Demonstrate only one or two knots at a time.

5. Do not issue practice ropes to the trainees until each demonstration is over, but follow immediately with practice.

6. Show the knot doing its job: e.g. the overhand loop, the larkshead, and the round-turn are all used in the improvisation of a climbing rope stretcher. Demonstrate, let the boys carry on with it, and then make use of the stretcher.

7. Do not treat knotting as a subject in itself. Mix with such activities as parbuckling, abseiling practice, the Spanish Windlass,

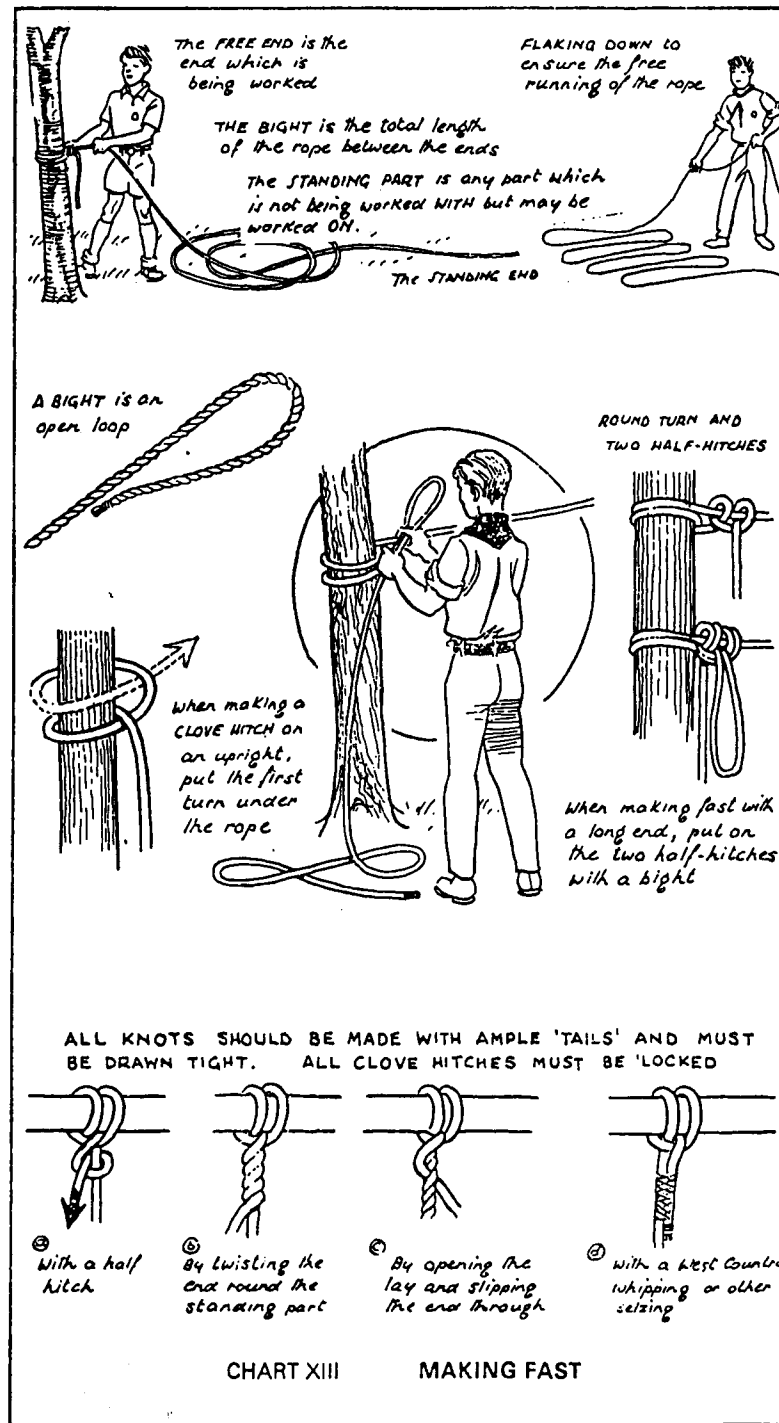
the gun tackle, the use of the Handy Billy, the reeving of tackle, hanking and coiling, the bandaging of broken limbs, the tying of a bootlace with the bow-reef (or even Dad's bow-tie before an important social engagement) so that knots, bends and hitches are related to their everyday use and to the more adventurous activities in prospect—pioneering, sailing, rock-climbing, rescue work, and so on.

\* \* \*

You will occasionally have to train a boy who has a blind spot so far as knotting is concerned. This has nothing to do with his intelligence or ability to comprehend, but is merely due to a lack of co-ordination between brain, eye and hand, which makes him almost naturally ham-fisted. Long experience in the training of Scouters has proved that even men of great attainments in other walks of life—high ranking army officers, lawyers, intellectuals of all kinds—not infrequently suffer from this disability and appear to be quite incapable of mastering even the simplest of knots. A Patrol Leader in this category will need to be handled with great discretion, so that he does not lose face with his peers. Private—and patient—tuition is the only answer, *but it must be given*. If anyone can cure your Scout of lifelong ham-fistedness, the opportunity and the remedy are with you here and now.

\* \* \*

Like most technical subjects, ropework has its own vocabulary—call it 'jargon' if you like—which is actually a sort of oral shorthand. Most of the generally accepted terms used in pioneering are given in the Glossary at the end of this book, but it is not intended that they should be learned like the alphabet or the ten times table. Every Scouter of any experience has met keen young Scouts who can reel off the parts of a hand-axe with great fluency, followed, perhaps, by a word-perfect recital of the 'safety rules', yet have obviously never been given an opportunity to handle the tool itself. In pioneering the practice should be to use the jargon sparingly but accurately *on the job*, so that your trainees pick it up by eye, ear, and touch simultaneously. After all, no time is wasted if while supervising the erection of a pair of sheerlegs you ask someone to 'heel in the butts about six inches' instead of telling him to 'dig a couple of holes and put the thick ends into the ground.' Another typical situation would be the stretching of a hawser across a stream during the building of a ropeway. It would be just as easy to ask someone to 'make the free end fast to that anchorage' as to request him to 'tie the end of the rope to that tree stump,' and you might think it better to ask two others to 'keep the strain going to stop the bight getting into the gravy' than to request tamely that they 'keep the middle of the rope out of the water'. Any Scout Leader who



imagines that sailor-talk, or indeed the jargon of any adventurous pursuit, does not have the ring of poetry in the ears of an adventure-hungry boy is in the wrong movement.

The trouble with jargon, on the other hand, is that it can sometimes be confusing, the same term being used for two quite different things. A clear case of this is the use of the word 'bight'. 'THE bight' is the total length of the rope between the ends, while 'A bight' is simply an open loop at any point. The term 'standing part' is defined by more than one authority as 'the part of the rope which is not actively being used in the making of a knot as distinct from the bight and the end.' To the literal mind this would seem to exclude the rope in its entirety, and is not very helpful. In this book, therefore, it will be used to mean any part of the rope which is not being worked itself but which may be worked *on*: thus the two half-hitches of a round turn and two half-hitches (surely the most awkwardly named knot in the language!) would be made on the standing part, while the far end of the rope would be called the standing end. Don't blame us for the jargon. It is as firmly established in the minds of habitual rope-users as is the Welsh tongue in the counties of Anglesey, Caernarvonshire and Merioneth (to mention but a few), and it is not for us to tamper with it.

Talking of which, your early training in pioneering might well include the other basic techniques illustrated in Chart XIII. 'Flaking down' (known to our transatlantic cousins as 'fakin' down) is used as a matter of course on shipboard to ensure the free running of a rope, and is particularly useful in pioneering when the need is to throw a very light 'messenger' line (that is, a line which will be used to draw a heavier rope or hawser across or over an obstacle.) The *intelligent* handling of rope, too, should be emphasised to your congenitally intelligent trainees from the word go: e.g. the common-sense of hooking the free end of a rope *under* the inactive standing part when making a clovehitch round an upright. Similarly, the use of a bight when making fast. How often have we seen Scouts dragging fathoms of the free end through a knot? Intelligent or not, we have yet to meet a Scout who has tumbled to this simple expedient of his own accord. It is all a matter of training.

Another thing: do make sure that all hands understand that knots which may have been shown in the open condition for purposes of demonstration must not merely be 'drawn tight', but must be 'made tight' as stated in the chart. 'Drawn tight' suggests that the tightening process can be done by a final tug, whereas the strain must be kept going from the outset, and 'digital pressure' (as in First Aid) applied to maximize the friction grip of rope on rope, or rope on spar. A classic example of this occurs when using blocks and tackle. The falls run in both directions, so that by gripping them together midway between the blocks the contending forces cancel each other out most effectively. If the actual handling of the falls is considered too risky, a light rope passed round them and held by Scouts at either side would have the same effect. The rope could

be tightened or eased as needed while the strain is being taken up and secured.

It is in matters of this sort that your true pioneer begins to find his feet—to learn a proper respect for his calling, and in so doing, for himself. It is as far removed from routine 'knotting' in the Troop Room as fresh-caught mackerel is from fish fingers.

\* \* \*

Many excellent books have been written on the subject of knots, bends and hitches, but here we shall concern ourselves only with those which are an essential part of the pioneer's stock-in-trade.

Let us begin by codifying them according to usage:

- a. To join ropes of equal thickness—the sheetbend, the fisherman's knot. Not—repeat not—the reef.
- b. To join ropes of unequal thickness—the double sheetbend.
- c. To join hawsers or ropes above 2 in. circumference—the carrick bend.
- d. To join the ends of light material tightly drawn round some other object (e.g. to finish off a west-country whipping or a Japanese square lashing)—the reef knot.
- e. To make fast—the clovehitch, the fisherman's bend.
- f. To make fast under strain—the round turn and two half-hitches.
- g. To make fast against an oblique strain—the rolling hitch (known to American Scouts as the tautline hitch—and a very good name for it, too!)
- h. To shorten a rope temporarily—the sheepshank.
- i. To relieve the strain on a suspect section of rope—the sheepshank.
- j. To tighten a rope temporarily between two fixed points—the sheepshank.
- k. To join the ends of two ropes which will hold a considerable strain but can be released by remote control (e.g. from the far side of a stream)—the sheepshank.
- l. To make a non-slip loop in the end of a rope—the bowline, the figure-of-eight loop. (Charts XIV, XV.)
- m. To make several such loops—the bowline-on-the-bight, the triple bowline.
- n. To make a non-locking slip knot—the running bowline (Chart XV), the timberhitch.
- o. To make fast for quick release—the highwayman's (draw) hitch.
- p. To suspend a strop or rope temporarily—the larkshank.
- q. To attach a rope or strop to the hook of a block—the catspaw.
- r. To make a slip-and-grip noose—the figure-of-eight (Chart XIV).
- s. To make a non-slip loop in the bight of the rope—the figure-of-eight loop (Chart No. XIV), the man-harness knot, the

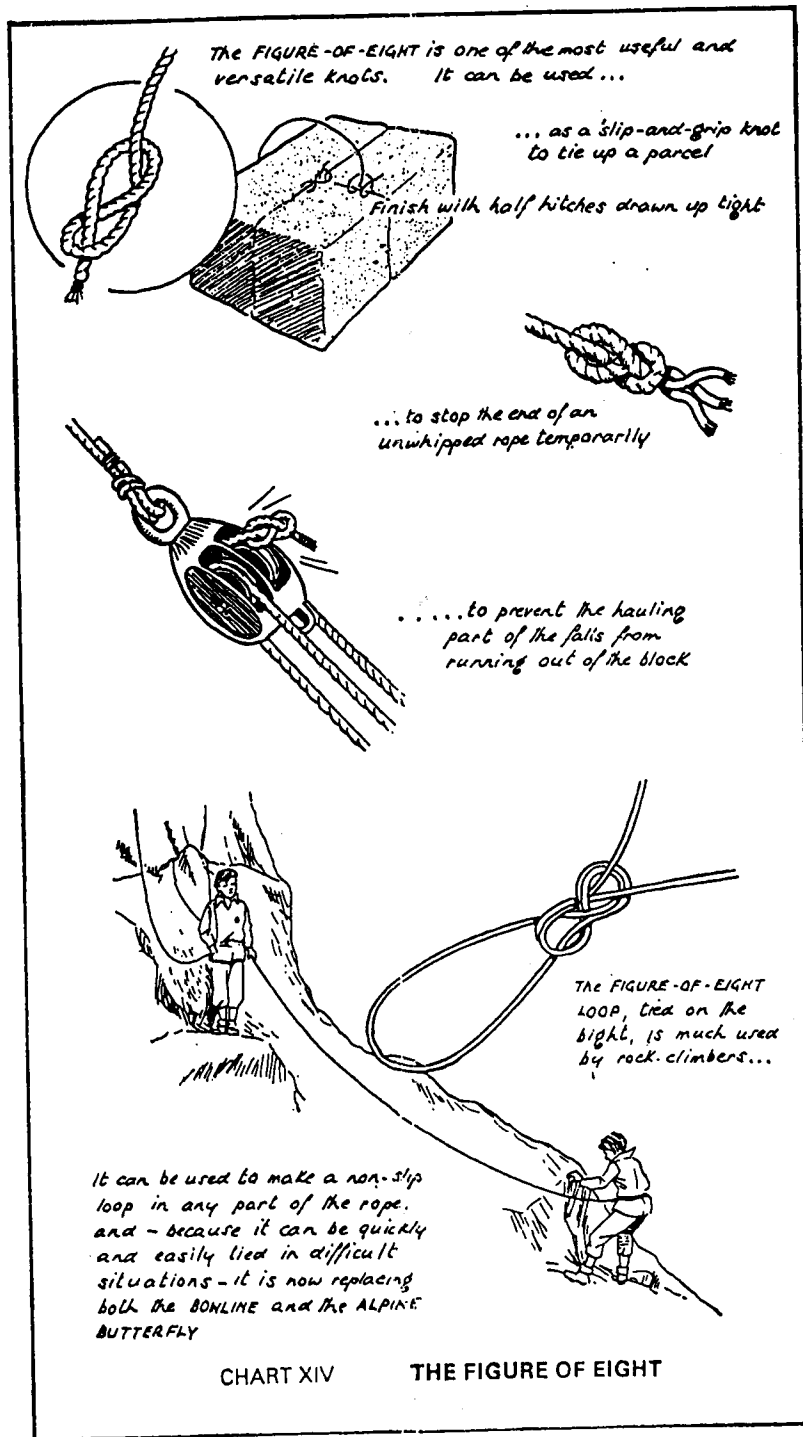


CHART XIV

THE FIGURE OF EIGHT

alpine butterfly.

- t. To make a braking knot—the prussik knot, the tarbuck knot.
- u. To act as a sheave—the harvester's hitch (rope tackle). (Chart XVII.)
- v. To act as a temporary stopper to prevent a rope unlaying, or to stop the end of a rope from running out through a block—the figure-of-eight knot (Chart XIV.)

A formidable list, but in total a mere fraction of the number of knots, bends and hitches you will find in any book devoted to the subject!

\* \* \*

The definition of a good knot is one that can be quickly and easily made, will fulfil the purpose for which it is intended, and can easily be unmade after use. Most knots, however, are liable to lock under severe strain. There are various devices to minimise this tendency:

- a. Making the final tuck with a bight of the free end (as in the slip-reef.)
- b. Inserting a toggle to keep the final tuck open.
- c. Putting an extra half-hitch or two on the standing part, or on the bight itself, as in the water bowline.

Similarly, knots which will not withstand a variable strain—e.g. the sheepshank and the harvester's hitch—can be locked by inserting a toggle, or by seizing some part of the knot to the standing part.

\* \* \*

All knots have a weakening effect on ropes, chiefly because they almost invariably create 'nips' which upset the even distribution of tension between the constituent parts—fibres, yarns, and strands. If you compare the alpine butterfly with the much cruder figure-of-eight loop (both used to make non-slip loops in, and at right-angles to, the bight of a climbing rope) you will see that in the first named the rope seems to flow naturally through the knot, while in the second a severe wrenching strain is imposed. It is possible that in opting for the figure-of-eight loop for the middleman on a climbing rope, convenience and speed have been preferred to a higher degree of security, but this is a matter of opinion. All knots have their merits and demerits and should always be considered in relation to the job in hand.

\* \* \*

Having finally convinced all concerned (we hope!) that the reef knot is not to be trusted for joining ropes of any kind (and is certainly not the best knot for tying up parcels!) let us consider the



making of the other knots, bends, and hitches in our codified list:

### 1. The Sheet Bend

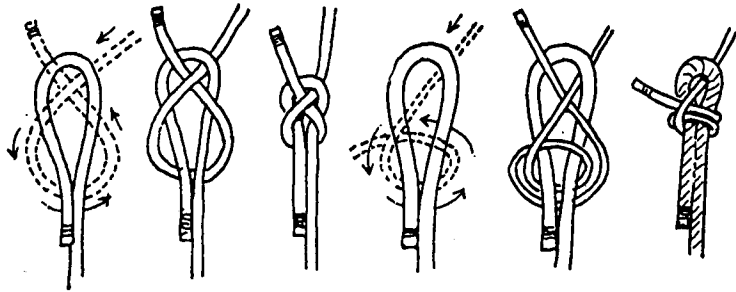


Fig. 8.

Note that the knot should be made sailor-fashion. Cross the free end of the rope in your right hand over the end of the other. Hold both ropes with your fingertips and bring your right hand down towards you, turning it over as you do so to put a loop on the left-hand rope round the other. Carry this end round behind the other rope and across the bight, weaving it over, under, and over. Draw it tight.

### 2. The Double Sheet Bend

This knot should always be preferred when joining ropes of unequal thickness. It is made in exactly the same way as the Sheet Bend with the addition of a second turn round the bottom of the bight, which should always be made in the thicker of the two ropes.

### 3. The Fisherman's Knot



Fig. 9.

This is particularly useful in light cordage and has the advantage that it can take a considerable strain and can later be undone with comparative ease, merely by working the two overhand knots apart. To make it, overlap the ends of the lines, and with the free end of each put an overhand knot round the standing part of the other, then draw them together until they lock firmly. Leave a reasonable tail below each overhand knot and for greater security open the lay and tuck the end through (always remembering to work *across* the lay.) This knot is ideal for improvising strops at short notice.

### 4. The Carrick Bend

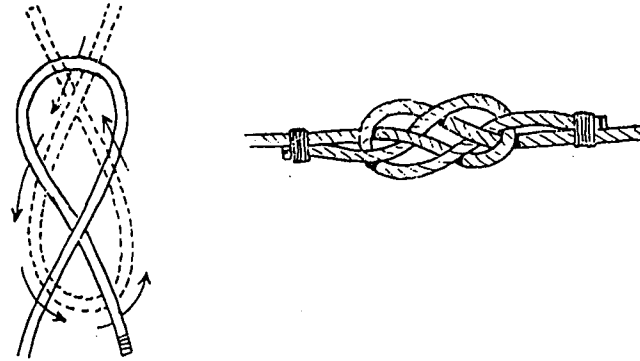


Fig. 10.

Ropes of 2 in. circumference and over do not take kindly to the sharp bends to which they would be subjected in any of the above knots. The Carrick Bend, described by one authority (our friend and fellow-Scouter, Mr. Eric Franklin) as 'probably the finest bend ever made', has the great advantage that it avoids the sharper 'nips' of the sheet bend and can be kept open if the two free ends below the knot are seized to the standing part with twine. To make it put an underhand loop in the end of one rope, slip the end of the other rope under both parts of the loop, over the standing part of the second rope, under itself, then across the loop, over, under, over and out. This knot can be drawn tight, but it makes a rather untidy bunch, which tends to defeat the main purpose of the exercise.

### 5. The Reef Knot

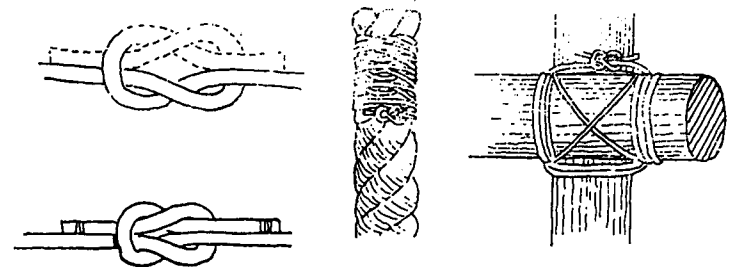


Fig. 11.

This knot should only be used for joining light cordage which bears upon a surface providing a friction grip. In pioneering its usefulness is confined to finishing off the west-country whipping and the Japanese square lashing. It can be made 'slippery' by finishing the knot with a bight of one, or both, free ends.

### 6. The Clove Hitch

This hitch is basic to pioneering. It consists of two similar overhand

loops, the second placed behind the first. Made in this way it can be slipped on to the end of a spar.

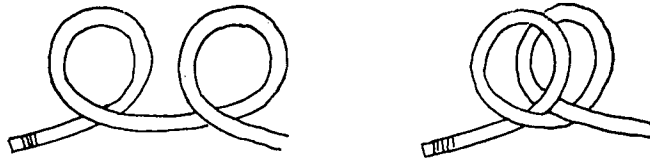


Fig. 12.

On a horizontal spar, when the end is not available, put the first turn *over* the spar and work from right to left. On an upright, it will be found most convenient, as already stated, to put the first turn *under* the standing part to keep it under control while the second turn is put on above the other. Keep the turns close together and remember to lock your clove hitches by one or other of the methods shown in Chart XIII.

The final clove hitch on a lashing should be locked by tucking a bight of the tail-end (not the end itself) into any convenient crevice between the rope and the spar, using a splicing fid if necessary. (See also *Lashings*, page 80).

### 7. The Fisherman's Bend

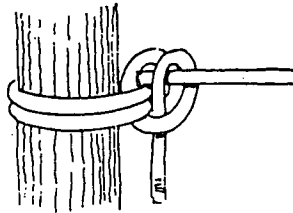


Fig. 13.

—so called, though it is actually not a bend but a hitch. It is merely a round turn and two half-hitches with the first half-hitch tucked between the turns and the spar. It is marginally more secure than the round turn and two half-hitches, but has the great disadvantage that it cannot conveniently be made in a rope under strain.

### 8. The Round Turn and Two Half-hitches

Quite the best hitch for making fast under strain. Note that the round turn actually goes twice round the anchorage, which will enable you to hold the severest strain while the two half-hitches (which form a clovehitch round the standing part) are put on. The hitches should be close alongside each other, and if the knot is to hold for any length of time or is of special importance (e.g. to secure the sky-rope of an aerial runway to a treetop) it should certainly be locked by one of the methods applied to the clove hitch.

When making fast with a long free end, it will be found convenient to use a bight of the rope to put on the two half-hitches. (See Chart XIII).

### 9. The Rolling Hitch

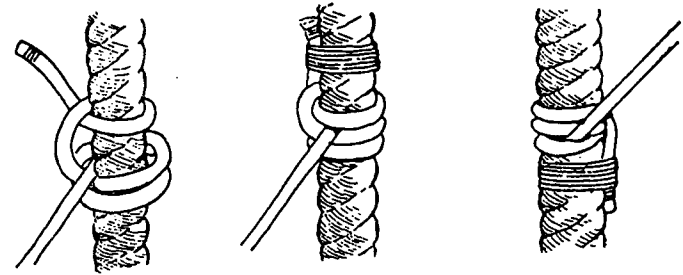


Fig. 14.

This hitch is first cousin to the clove hitch except that it is designed to withstand an oblique strain and has two turns instead of one, in the acute angle between the rope itself and the hawser or spar to which it is being secured. The second of these turns should be wedged between turn No. 1 and the standing part to form a lock. The third turn is then put on above (or below) the acute angle, as for a clove hitch.

### 10. The Sheepshank

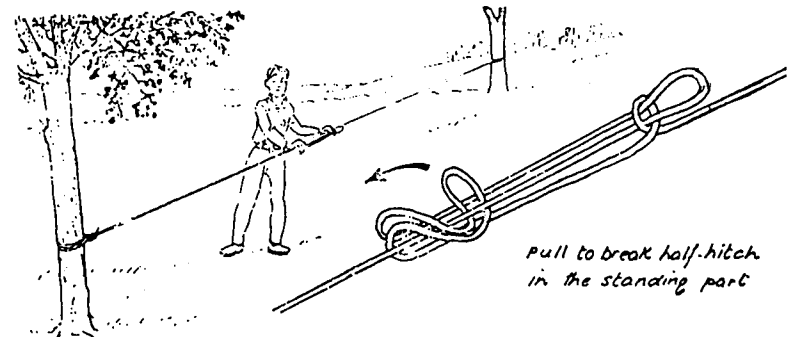
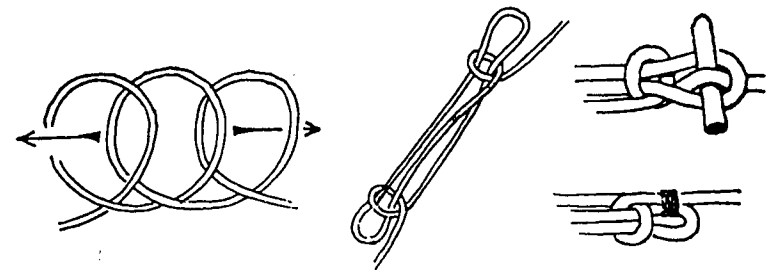
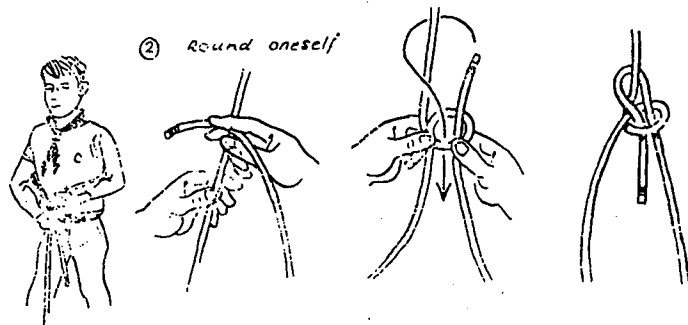
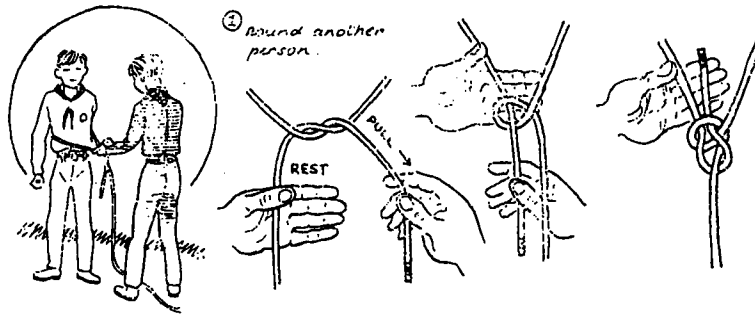


Fig. 15.

The **BOWLINE** is generally regarded as the most reliable knot for forming a non-slip loop in the end of a rope. There are two ways of making it.



THE **RUNNING BOWLINE** makes a non-locking slip-knot

THE **WATER BOWLINE** has an extra hitch to prevent jamming

THE **BOWLINE-ON-THE-BIGHT** provides two loops that will not tighten

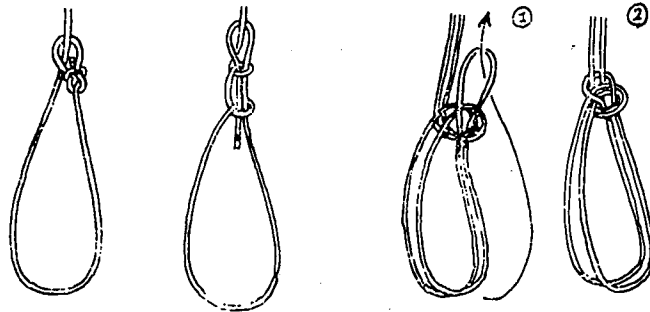


CHART XV

BOWLINES

Make three overhand loops in the rope, slip the middle rope through the others to convert them into half-hitches, and pull in both directions. This hitch will hold firm under strain, but can easily be shaken loose when it is released. The half-hitches can be locked by slipping small toggles through the bights, or by seizing them with a few turns of twine.

If the sheepshank is used to take the slack out of a fixed rope, the better method is to pull the rope into the form of a letter S, put the first half-hitch round one end in the usual style, then bring the other end of the S back along the rope to make an overhand knot and break it into a half-hitch by pulling it away from the middle of the knot.

Note that when the object is to relieve the strain on a weak section of the rope, the weak part must pass through both half-hitches.

To join two ropes with a sheepshank, overlap the ends, turn each end back on itself to make a small bight, and put a half-hitch round it with the other rope. The knot will hold while the strain is upon it, but will fall apart when shaken loose.

### 11. The Bowline

Said to be 'such a good knot that sailors rarely use any other!' Its classic use, however—and it has no equal—is to make a completely reliable non-slip loop in the end of a rope. There are two methods of making it (See Chart XV.): (a) When the maker of the knot is facing the person or object to be encircled by the loop. (b) When making it round himself. The knot should always be made sailor-fashion, as shown in the chart, and it is always wise to leave an ample tail which can be used to put a 'safety hitch' round the neck of the loop.

### 12. The Running Bowline

This is simply a small bowline made with the end of the rope round the standing part to form a noose. It will grip under strain but cannot lock when the strain is released.

### 13. The Water Bowline

This has an extra half-hitch round the neck of the loop to minimise the tendency to jam under severe strain, or when the rope is liable to be immersed in water. Note that it should be made with an extra long tail which can be locked by both half-hitches.

### 14. The Bowline-on-the-bight

Used in rescue work or to sling a log or other lengthy object. It provides two non-slip loops. To make it, start in the usual way, using the bight instead of the single rope, then draw the two loops up through the top of the bight above the half-hitches, and adjust as necessary.

### 15. The Triple Bowline

This provides three non-slip loops and is simply an ordinary

bowline made on the bight with the end pulled down through the half-hitch to form the third loop.

### 16. The Larkshead

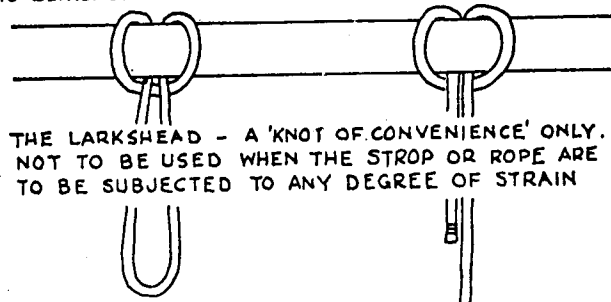


Fig. 16.

This knot has a very limited use in pioneering. Perhaps the best that can be said of it is that it should never be used—as we fear it too often has been in the past!—to link the hook of a block to an anchorage with a strop. The proper use of a strop in this situation is described under the heading of *LASHINGS* later in this section.

On the other hand, the larkshead makes a good sling, and is useful in the Q.M.'s store for attaching labels to hanks of cordage and other tackle.

### 17. The Catspaw

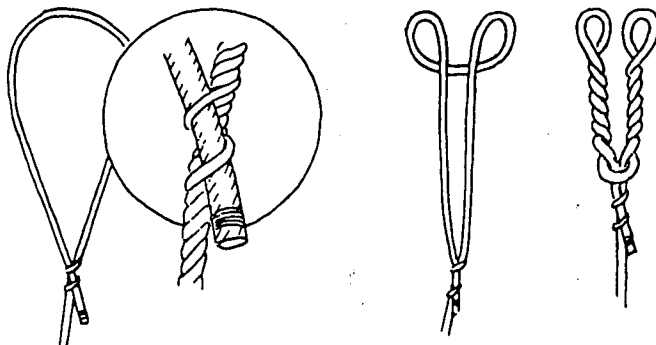


Fig 17.

This makes a temporary loop in a rope for hooking on to a tackle. To make it, take a bight of the rope and working with both hands together turn it back several times on itself to form two small loops, which can then be slipped over the hook and topped with a mousing.

If the Catspaw is made near the end of the rope it is sound practice to make a loop of the required size, either with a bowline (which might have a tendency to lock under a severe strain) or better still

by opening the lay and slipping the free end through it twice. The two loops are then twisted up as before.

It may be that the Water Bowline could be used to make the loop, but until this moment it has never occurred to me to try it out! There is always room for experiment and research in pioneering.

### 18. The Timberhitch

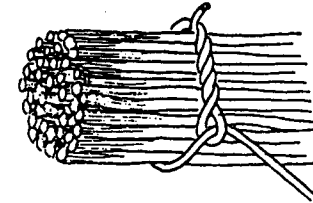


Fig. 18.

The simplest of the non-locking slip-knots. Pass the rope once round the load, loop the free end round the standing part and twist it several times so that it locks against the load when the rope is under strain. The only thing to remember is that the turns must go with the lay.

When being used to haul or tow a long spar, the timberhitch should be made near the rear end of the load with an extra half-hitch or two (known as a 'killick' hitch) towards the leading end.

### 19. The Highwayman's (Draw) Hitch

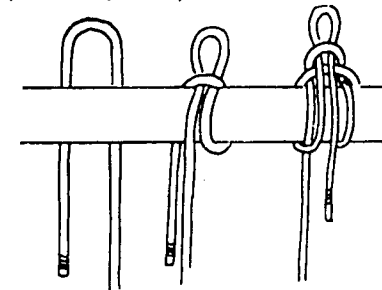


Fig. 19.

This is definitely a 'fun' knot—fun to make and use—but is also extremely useful as a quick-release knot. The standing part will hold a considerable strain, which can then be released with a single tug on the free end.

To make it, pass a bight of the rope behind the hitching rail, then pick up a bight of the standing part, pass it in front of the rail and up through the first bight, followed by a bight of the free end in the same fashion.

### 20. The Man Harness Knot

In his book '*AN A.B.C. OF KNOTS*' (published by Messrs.

Brown, Son and Ferguson) Eric Franklin gives the following colourful description of the origin of this knot:

"This knot is also known as the Artillery Knot and it was formerly used in rope employed in hauling gun carriages; one end of the rope was fastened to a ring on the end of the axle and Man Harness Knots made along the length of the rope. The soldier could slip his arm in up to the shoulder and haul on the rope yet still have both hands free for his hand weapons, etc."

This no doubt had a strong appeal to the imagination of the early, stove-carrying Boy Scouts, who frequently made use of the knot on the drag-ropes of their trek-carts.

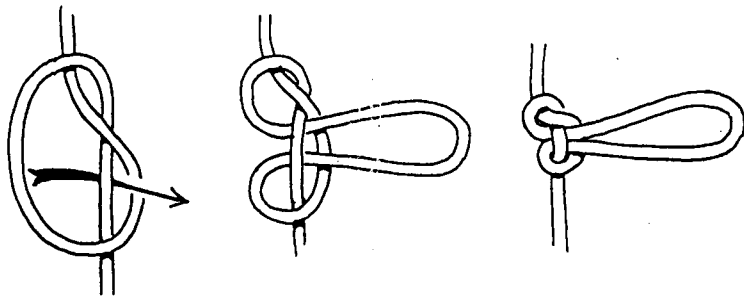


Fig. 20.

This method of making the knot should be clear from the diagram, but it is by no means foolproof (if you will excuse the term), and perhaps a better way of making it is to place one end of the rope under the right foot and then drop a loop down along the side of the leg so that it lies over the standing part. Complete as shown in the diagram.

### 21. The Alpine Butterfly

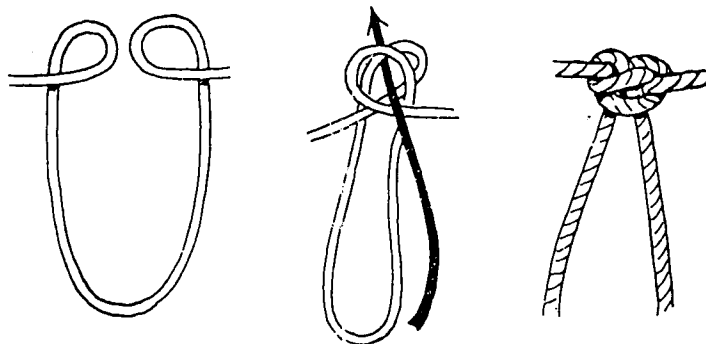


Fig. 21.

If the Bowline is 'the King of Knots' this must surely be the 'Queen'. It is without question the best knot for making a non-slip loop in the bight of a rope, and is so easy to make that one can only wonder why it is not in more general use.

Simply make a bight of the required size with two small overhand loops turned inwards at the top. Overlap the loops and bring the bight up and through from front to back. Adjust as necessary—and then take time to admire your own handiwork.

We all have our favourite knots, and this is mine.

### 22. The Prussik Knot

This is quite simply a rock-climber's version of our own familiar larkshead, made with a strop round another rope with two turns through the bight, as compared with the single turn of the larkshead. This gives it a much better friction grip on the rope to which it is bent, and its great virtue is that it will act as a braking knot on a taut rope but will lock the moment it reaches slack rope.

Its use in rope-climbing is shown in Chart XXI.

### 23. The Tarbuck Knot

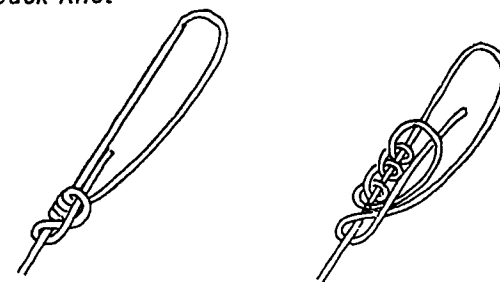


Fig. 22.

Another rock-climber's knot, described by its inventor as 'an energy-absorbing sliding knot'. Unfortunately it was designed in the days when climbing ropes of Italian hemp were favoured by mountaineers and it is much less effective in ropes of the modern man-made fibres. It is, however, a very fine slip-and-grip knot and its possibilities in pioneering have yet to be explored.

### 24. The Harvester's Hitch (Rope Tackle)

This excellent device to multiply pulling power is described in some detail under the sub-head 'Shifts and Expedients' later in this section, and is illustrated in Chart XVII. It is merely an incomplete sheepshank with the free end brought round an anchorage of some sort and dogged back through the bight.

### 25. The Marlinspike Hitch

Simply make a forehand loop and lay it down the rope, then slip your marlinspike or baton, Scout staff, or whatever, through the hitch to lock it. You will observe that the upper end of the hitch is actually an overhand knot and it is important to remember, when making a rope-ladder, that this overhand knot should be on the underside of the tread so that it will lock when the climber's weight comes on it.

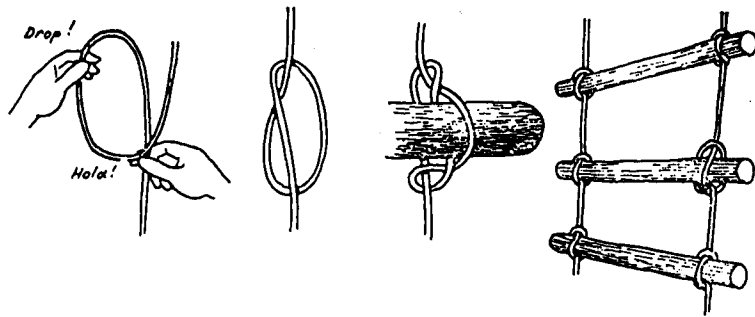


Fig. 23.

### 26. The Scaffold Hitch

When used to make a seat for a swing or derrick, two strops made from 15 ft. lengths of  $1\frac{1}{2}$  in. circumference rope will be required. If need be the strops can be improvised on the spot with fisherman's knots. The seat board should be about 24 in. long by 10 in. wide by 1 in. thick. Personally we have never known the scaffold hitch to fail, but in preparing your board it is a good idea to cut notches in the sides about 4 in. from the end to give the strops something to bite into.

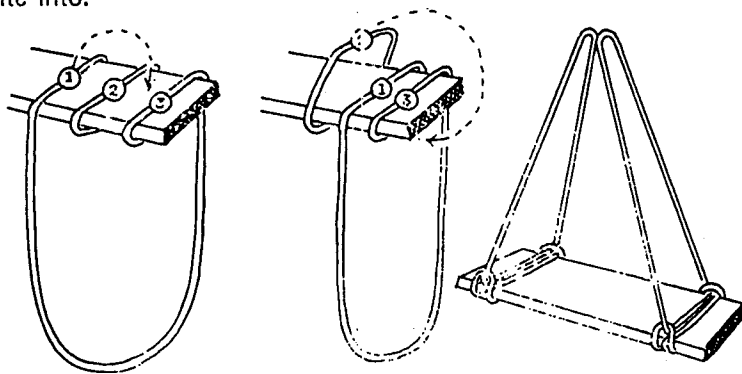


Fig. 24.

To make the Scaffold Hitch, open the strop and lay three turns across the end of the board. Lift the inside turn (No. 1) over its neighbour (No. 2), then lift No. 2 and pass it over Nos. 1 and 3 and over the end of the board. Raise the belly of the strop over the end of the board and work the hitch into the notch as necessary. Repeat the process at the other end of the board, then bring up both strops together and make them fast by whatever method seems appropriate in the circumstances; e.g. if a hooked block is being used to carry the chair, a larkshead in the end of each strop would meet the need. Otherwise it might be considered advisable to use the method described in the Aerial Runway Code, where the use of a hooked block is not permitted. It all depends on the use that is being made of the bosun's chair and the degree of risk involved.

N.B. The Scaffold Hitch is forbidden under the terms of the Aerial Runway Code, but that is no reason why it should be discarded for other purposes.

\* \* \*

### WHIPPING

The ends of all ropes must be 'stopped', and whippings should be regarded as the normal method of doing this and included in the basic training programme of your pioneers, with the Sailmaker's as first choice, followed perhaps by the west-country and the American Plain Whipping in that order of priority, all as described in Section 2 of this book and shown in Chart VIII.

The ends of nylon and other synthetic fibre ropes can be fused solid merely by applying a lighted match. It is generally advisable to wrap the end tightly with brown gumstrip to hold the threads together before applying the heat treatment, and care should be taken to avoid the molten 'dripping' which, as we have reason to know, can inflict a grievous burn. If the fingers are used to mould the end into a neat crown, wet them well before handling the molten fibres. You have been warned!

Use thin nylon or Terylene whipping twine, tarred hemp spunyarn (if you can get it) or waxed twine.

\* \* \*

### SPLICES

Start with the easiest of all, the Docker's Splice, sometimes called the Tucked Eye Splice. This is a quick method of putting a temporary eye in a rope at any point and is often used by the makers of ridge tents to hold the dolly of the main guylines. All splices are made by opening the lay and tucking one part of the rope through the other. In most splices this is done strand by strand and can only be done at the end of the rope. In the Docker's Splice the whole rope is used.

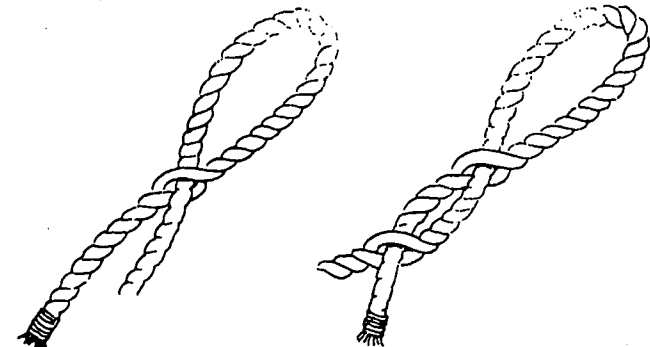


Fig. 25.

The important thing to remember in all splices is to work against (or across) the lay. In a hawser-laid rope the lay will run from left to right (clockwise) so your eye should be made against the clock. Open the lay at the chosen point in the rope and tuck the end through to make an eye of the required size. Now open the lay of the other part of the rope immediately below the first tuck and pull the other end through until both tucks lock together. If making the eye near the end of the rope, leave a reasonable tail and make sure that the end is securely whipped.

\* \* \*

The Back Splice is known in the British Navy as 'the lazy man's whipping' and should only be used to stop the end of a rope temporarily when no whipping twin is readily available. It has the effect of bulging the end of the rope and might well prevent it from being reeved through a block.

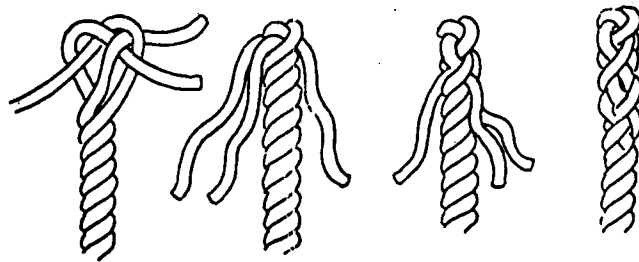


Fig. 26.

Begin by de-stranding the rope for roughly six times its circumference. Hold the rope so that the three strands hang down, one at the back, the others at either side. Bring the back strand up and over to make an arch and hold it on the front of the rope with the left thumb. Make a similar arch over the top of the first with either of the other strands, then weave the third over one and under the next, so that all three are held in a drooping position. Pull tight. Turn the rope away from you, and start tucking each strand in turn over the strand it touches and under the next, pulling them back towards the crown from time to time to keep your splice as tight as possible. Three sets of tucks will be enough, after which the ends can be trimmed off and the splice rolled between the hands to make a neat finish.

But how much easier—and better by far—to use a whipping!

\* \* \*

To make a permanent eyesplice, unlay the three strands, form an eye of the required size and tuck the *middle* strand through the lay. Now tuck the *left* strand through the lay to the left of the first tuck. Turn the rope over and tuck the right-hand strand into the one

unoccupied lay. Follow with a series of over-and-under tucks, all pulled up tight, and crop the ends as necessary.

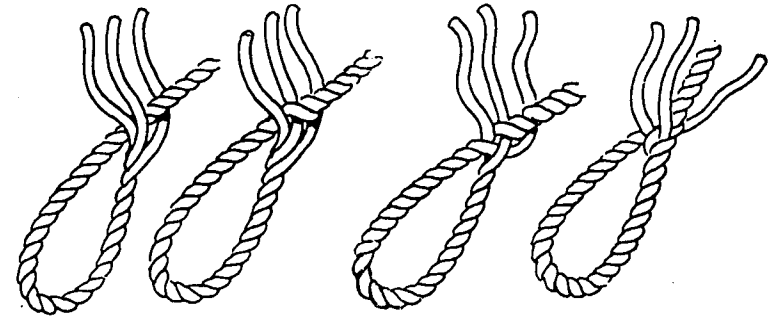


Fig. 27.

\* \* \*

The Short Splice is used to join the ends of two ropes of equal size. Like the Back Splice it has the effect of thickening the rope, and therefore limits its use to some extent.

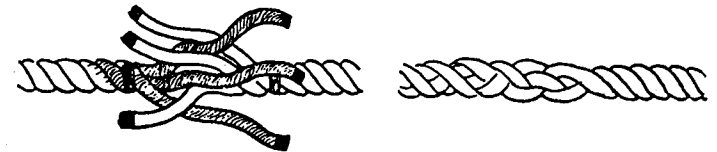


Fig. 28.

De-strand the ends of both ropes for a distance about three times the circumference of the rope, and 'marry' them end to end with the strands interlaced alternately. To prevent the rope unlaying further, put a single turn of whipping round it and join the ends with a reef knot. Take any strand, pass it over its neighbour in the opposite set of three and under the next—always remembering to work against the lay. Repeat the same procedure with each of the strands in turn, pulling them hard up against the temporary whipping to close the gap between the two ends, then repeat with a second set of tucks in the same direction; before turning the ropes round and working with the other strands over the single-strand whipping. Three sets of tucks in each direction will be needed, after which the ends can be trimmed and the splice rolled between the hands, or even on the ground under the sole of the shoe, to make a neat finish.

\* \* \*

If the rope is to be reeved through blocks it will be necessary to avoid bulging which occurs in the Short Splice, and the Long Splice should be used. However, as the weakening effect of this

(or indeed any other splice) is uncertain, it can never be regarded as wholly reliable when life and limb are at risk.

Unlay both ropes to a length equal to seven times their circumference and marry the ends so that the ends are interlaced alternately. Take out two adjacent strands, one from each rope, and twist them loosely together to keep them out of the way. Now unlay one strand of one rope even further, replacing it at each move by the corresponding strand of the other rope to within two or three inches of its end. Twist the two ends together. Follow the same procedure on the other side. The rope will look like this:

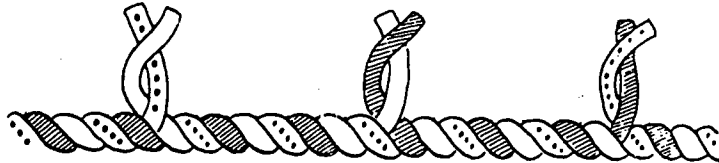


Fig. 29.

Now take each pair of loose strands in turn, cut away one half of each, twist them together, pass over one strand and under the next twice on opposite sides of the join, and cut off the tails. It may sound unduly complicated but is comparatively simple to do.

A Grommet is made with a single strand taken from a rope three and a half times the circumference of the required ring. In unlaying the strand, treat it with great care to avoid disturbing the lay. Close the strand to make a ring of the required size, and work it round and into its original lay until all the intervals are filled up. Finish as in the Long Splice, with perhaps a short west-country whipping for greater security.

### LASHINGS

Lashings should always be related to the size of the spars for which they are intended. For Scout staves, bamboo, and other light spars a 12 ft. length of blind cord or three-strand sisal will suffice. You will remember that for the spars usually employed in mainline pioneering lashing ropes should be at least one inch in circumference with at least 3 ft. of lashing for every inch of the combined diameters of the spars being lashed together. Hence, a five inch spar butt square-lashed to a three inch tip would need twenty-four feet of lashing length.

The Square Lashing is used whenever spars cross and bear upon each other at whatever angle. Start with a clove-hitch on the upright spar immediately below the cross-member and lock the clove-hitch by twisting the tail round the standing part. Carry the lashing over

the cross-member, first of all giving it a strong pull to bring the clove-hitch into the angle so that it cannot turn on the upright spar. If this is allowed to happen, the lashing, however tightly applied, will turn into a pudding of slack rope and will be useless, and perhaps dangerous! Now weave the lashing round the two spars to draw them close together, making each turn at right-angles to the other and taking care to maintain the strain on the rope throughout—sometimes by locking the lashing against the spar with the thumb. Follow with three or, at most, four complete turns round both spars then apply two or three frapping turns round the lashing between the two spars to draw them together and finish with another clove-hitch pulled well back into the angle so that it, too, cannot turn back on the spar it embraces. Finally lock your clove-hitch by taking up any loose tail with an extra half-hitch or two (this should not be necessary if you have selected your cordage to suit the job) and then tucking a bight of the end into any convenient crevice between spars and lashing. If you tuck the end itself away in this fashion you will have difficulty in undoing the lashing later, but it is most important that clove-hitches should always be locked.

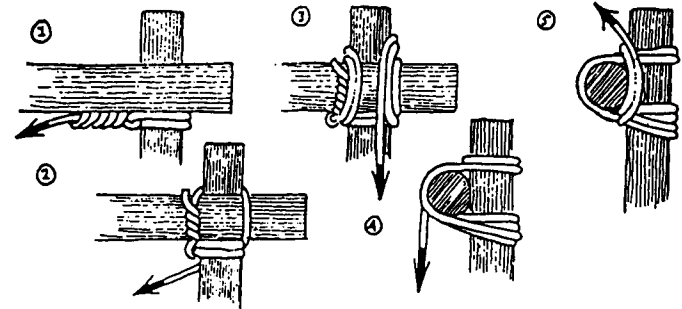


Fig. 30.

The Diagonal Lashing is used when spars cross but do not touch, or where they will tend to spring apart under pressure, e.g. at the centre point of a trestle.

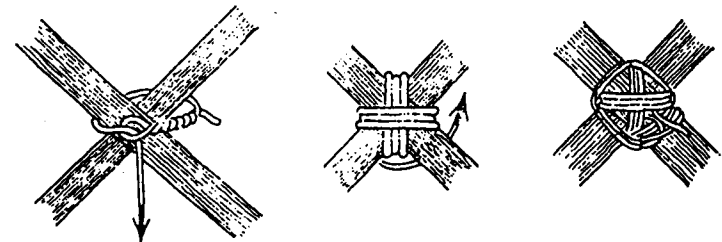


Fig. 31.



Start with a timber-hitch round both spars. This is, of course, a slip-knot which will enable you to exert pressure to draw the spars together. Three or four turns are then taken over the fork at right-angles to the knot (this is to prevent the timber-hitch from turning on the spars) followed by a similar number of turns round the other fork. Apply frapping turns as before, and finish with a locked clove-hitch round any convenient spar.

There are two different forms of Sheer Lashing. The first is used when two spars are lashed together for strength, or lap-jointed to increase length. In this case the lashings should not be allowed to separate the two spars and frapping turns will not be used. Start with a clove-hitch round both spars, lock it, bind tightly with seven or eight turns and finish with another clove-hitch. If need be, small wedges of softwood can be driven in between the lashings and the spars. Two such lashings will be needed, and when a lap-joint is made it should be at least three times as long as the combined diameter of the two spars.

When the two spars are to be opened out like scissors to make a pair of sheerlegs, start with a clove-hitch round one spar the required distance from the tip, depending on the purpose for which the sheers are intended. Lay the spars alongside each other and bind them—not too tightly—together. When it comes to applying the necessary frapping turns you will probably find it convenient to open the 'scissors' slightly by moving the butts of the two spars a foot or two apart. Finish with a locked clove-hitch. The actual construction of the sheerlegs beyond this point is dealt with fully in 'The Aerial Runway Code' which will be found at the Appendix to this book.

When three spars are lashed together the so-called Figure-of-Eight Lashing is used—(I say 'so-called' because 'figure-of-eight' is certainly not a true description.) Some pioneers—and most books on the subject—advocate one method, but our own experience supports another! Their method is to lay out the spars with the tip of one pointing in one direction, and with the other two, one at either side, pointing the opposite way. Our own preference is to lay the three spars alongside each other, butt to butt, tip to tip, and apply the lashing to the three tips a foot or eighteen inches from the end. Whatever method you use, the lashing starts with a clove-hitch round one of the outside spars followed by six or more loose turns over and under the other spars, topped off with frapping turns between each pair and a final clove-hitch. The three legs are then opened out and erected to make an equilateral triangle at the base. If you find difficulty in achieving this objective your lashings have been put on too tightly—but you are less likely to suffer this frustration if you have followed our own alternative in preference

to the orthodox method!

To complete the tripod thus formed, three extra spars should be square-lashed across the butts a foot or so from the base, and for greater security the butts should be heeled into the turf. If it is used for lifting purposes, with a tackle slung from the crutches, it is known as a Gyn.

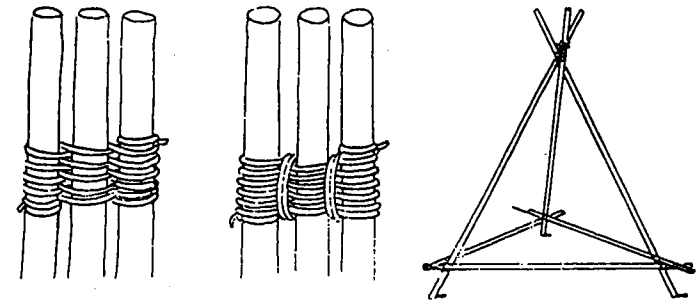


Fig. 32.

When lashing a block to a spar begin with a clove-hitch round the spar above the block, put three or four turns round the spar and the hook or through the eye of the block, and finish with a clove-hitch round the spar below the block. If a hooked block is used, a secure mousing will be absolutely essential.

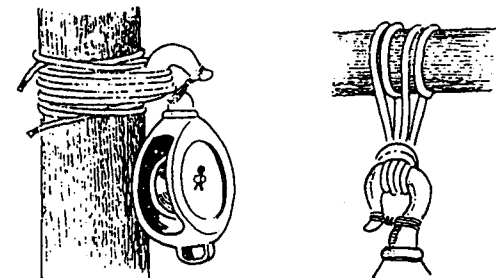


Fig. 33.

If a strop is used, do not be tempted to take the easy way out by putting a larkshead round the spar with a catspaw round the hook. This will impose a severe cutting strain through a single thickness of the strop which might easily break it with disastrous results. The better method is to middle the strop on the spar, take three turns round it in opposite directions to bring the extremities together, make a larkshead in the two bights, and slip them onto the hook. Close the hook with a mousing. Remember that the block will probably carry a considerable strain. If it breaks adrift aloft it will fall like a meteor. A falling block is a potential killer. Be warned.

To 'mouse' the hook of a block, take a length of tarred hemp spunyarn or waxed sailtwine, middle it and put a clovehitch round the back of the hook, then carry four or five very tight turns in opposite directions round the bill and back again. Frap with overhand knots and finish with a reef. Many hooked blocks have insufficient lip to hold the mousing in position, and there is always a danger that it will slip over the tip of the bill. To prevent this, make a shallow file cut near the tip to give your twine something to grip. No mousing, however, can be regarded as 100 per cent secure. They should be used with discretion and inspected frequently when tackle is in use. (See also The Aerial Runway Code.)

At one time sisal twine was in common use for mousings, but experience has taught us that the hard fibres of this type of hemp never have sufficient friction grip on the metal to prevent it from slipping, and it should now be ruled out for this purpose.

\* \* \*

After use all rope and cordage should be hanked or coiled and returned to the store more or less as it was received. Heavy ropes should be coiled on the ground in a clockwise direction. If the rope is wet it will need to be dried out slowly before being stowed away, but in any event it should be taken off the job in a properly made coil. This means that it should be coiled with the lay. Stand with your back to the bight and haul the rope between your legs, laying the turns alongside or over each other in a coil of about four feet in diameter. Keep a small strop of sisal twine handy and slip a larkshank knot round the rope in one place only, so that the two free ends hang down without trailing below the bottom of the coil when it is shouldered back to the Q.M.'s store.

Smaller ropes, lines and lashings can most conveniently be hanked in the hand and again this should be done with the lay (clockwise). This means that a right-handed Scout will start with the end of the rope in his left hand, thumb pointing to the bight, while a left-hander will hold it in his right hand with the thumb pointing to the free end of the rope. When the hank is complete, hold it in the left hand with the two ends hanging down the coil, take out any turn other than the last with the right hand, carry it right round the hank and up through the top of the coil. This method will leave a convenient loop at the head of each hank so that they can be strung together with sisal for ease of handling.

## 2. ANCHORAGES AND HOLDFASTS

The subject of anchorages and holdfasts is dealt with in considerable detail in the official 'Aerial Runway Code' which is given in

full at the Appendix to this book. The Code is 'required reading' for all Scout Leaders who plan to build ropeways of any kind, and as the Aerial Runway shares with the Monkey Bridge the distinction of being by far and away the most popular of all pioneering projects, this *diktat* must surely include all readers of this book. Many other technicalities of general application to pioneering are covered by the Code and can easily be found by reference to the index.

## 3. SETTING UP A STRAIN

The best way of moving or lifting heavy loads, or of increasing pulling power on a rope, is to make use of blocks and tackle.

A block was originally a block of wood with a hole in it through which a rope was reeved. In time it was found that the friction of the rope on the wood could be very much reduced if the hole was enlarged to take a pulley-wheel or sheave. Then the surplus wood was cut away from the outer shell and a groove, or score, made in it to take a rope strop so that the block could be easily mounted as required.

Originally, one must suppose, blocks of this sort were used on ship-board to raise loads from deck-level. This meant that the block was secured aloft, with one end of the hauling rope made fast to the load and the other carried up, reeved through the block, and brought back to deck-level. This would be a matter of convenience only, with no increase of power. If, on the other hand, the same device was used to raise or lower a load over the side of the vessel, the block would need to be secured to the load itself and would therefore move with it. The intelligent seamen operating the rope over the side would at once notice an important difference in the behaviour of the tackle. In order to raise (or lower) the load through a distance of, say, six feet, they would need to haul in (or pay out) twelve feet of rope, but the strain would be considerably reduced—indeed, they would find that one man could now do the work of two! They had, in fact, discovered a new sort of machine, comparable in importance to the discovery of the wheel itself!

And very soon it must have occurred to these same resourceful mariners that if they made use of two blocks instead of one, they could still raise a load aloft from deck-level by fixing one block to the load and the other overhead.

Today small wooden blocks are still in use, but in general they have been superseded by galvanised iron or laminated steel blocks, and friction has been further reduced by introducing roller-bearings between the sheave and its pin.

\* \* \*

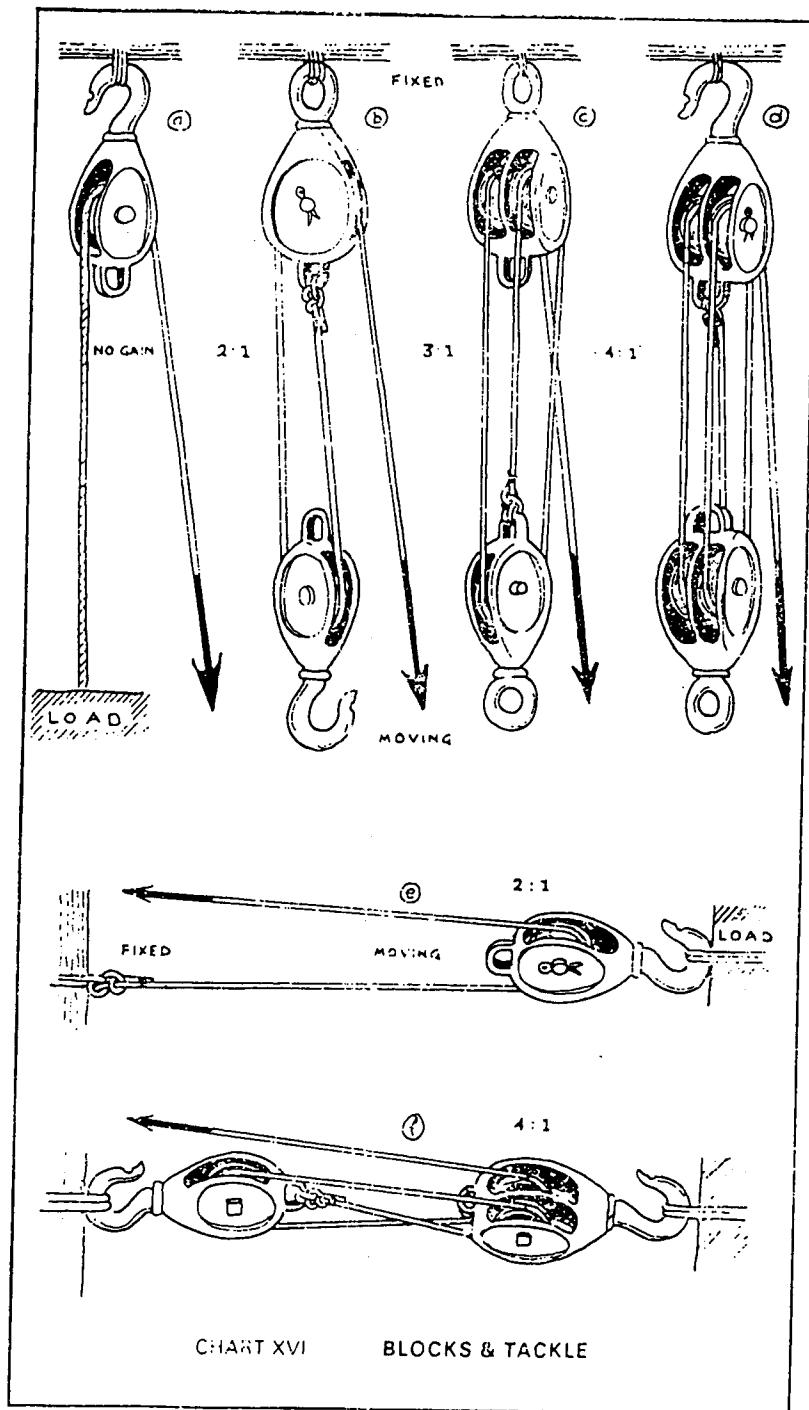


CHART XVI BLOCKS & TACKLE

## PURCHASES

In this book the word 'purchase' is taken in its dictionary meaning, which is:—

"(Mech.) advantage gained by the application of any mechanical power, leverage: an appliance furnishing this, as a rope, pulley, etc."

Anyone who has suffered the pangs of O-level physics will know that there is more to 'mechanical advantage' than that, but let us agree to forget about all such abstractions for the time being and follow the experience of those early mariners working from the deck of their ship. We have already discovered, with them, that to gain any advantage from a single block it must move with the load. Otherwise it can only be regarded as a 'block of convenience.' All things being equal, therefore, tackle should be mounted so that you face the load. *The percentage is always in the moving block.*

A *single whip*, in nautical parlance, is a rope reeved through a single (fixed) block overhead to hoist a weight. No power gained. Mounted in reverse (e), purchase two to one.

A *double whip* consists of two single blocks. If the standing part of the fall is secured to the fixed block (b), power gained two to one. If in reverse, three to one.

A *luff tackle* (c) and (f) comprises two large blocks (6 in. or over) one single, one double. Power gained three or four to one.

A *Handy Billy* is a small tackle for general purposes comprising one single and one double block, each with a rope tail. It is so designed that it can be used to strain a rope or move a load, then, when the strain is secured, taken off and moved to another job. This is the one and only tackle which is kept in the reeved up condition. Power gained as for a luff tackle.

*Overhaul.* A purchase is said to be overhauled when the two blocks are separated to the full extent of the falls.

*Round up.* The opposite to 'overhaul', when the two blocks are together, or 'chock-a-block'.

\* \* \*

## REEVING AND MOUNTING A TACKLE

In reeving a tackle lay the two blocks on their sides in line with each other with the hooks or eyes pointing away. Stand between them with the rope on the right hand side of the block with most sheaves. Pass the rope through the lowermost sheave of block Number One from right to left, then turn and reeve it in the same way through block Number Two, then back through the uppermost

sheave of Number One block and back to tie off on the becket of the single block with a round turn and two half-hitches. In this instance only a very short tail should be left on the rope so that the tackle will not become chock-a-block too soon. An inch or so of tail whipped to the fall with a few turns of spunyarn will do the trick.

Your Patrol Leaders should be trained to reeve their tackle as close as possible to the job, so that it is moved about as little as may be. Blocks and tackle in the slack condition are awkward to handle. The blocks are apt to turn over in transit, causing the falls to cross, and as often as not the whole tackle has to be taken apart and reeved all over again. At the conclusion of the operation the tackle should be dismantled and returned to the Q.M.'s store with the blocks separated from the coiled rope. The one exception to this rule is the Handy Billy, which is generally stowed away ready for instant use.

The orthodox methods of securing blocks and tackle to an anchorage are dealt with in 'The Aerial Runway Code', but it will be seen that all involve the tackle as an integral part of the structure and therefore immobilise it while the structure remains in situ. The unique feature of the Handy Billy is that it can be used again and again. This is possible because of the non-lock method of attaching it to the ropes under strain. It is, of course, a very light tackle, and would be quite ineffective on, for instance, the main hawser of a Monkey Bridge, although it could well be used to strain the handrail ropes.

As already stated the tackle comprises two small blocks, one single, one double, reeved up together, each having a tail some 6 ft. in length. In use the following procedure should be followed:

1. Hand strain the rope and make it fast temporarily to the anchorage.
2. Secure the tail of the single block of the Handy Billy to the anchorage immediately above the rope.
3. Overhaul the tackle and attach the tail of the double block to the rope by first putting a half-hitch round the rope *against* the lay, then carry the tail *under* the rope and wind it into the lay between the strands.
4. One man should hold the free end of the tail to prevent it from unwinding while one or two others work the Handy Billy.

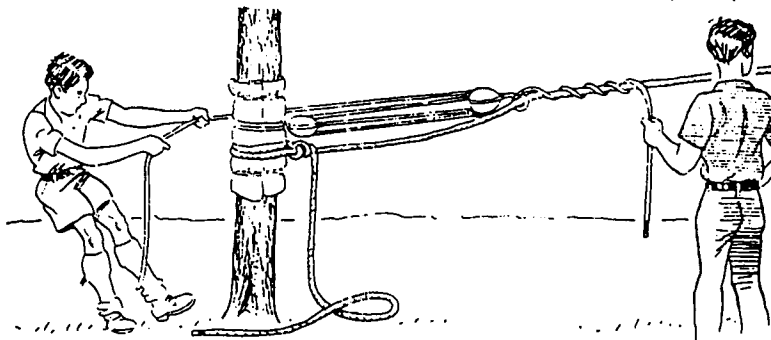


Fig. 34.

5. Maintain full strain on the Handy Billy while the rope is released from the anchorage, then take up the slack in the rope by hand-strain and tie off with a round turn and two half-hitches. The Handy Billy can then be taken off for use elsewhere.

\* \* \*

### SHIFTS AND EXPEDIENTS

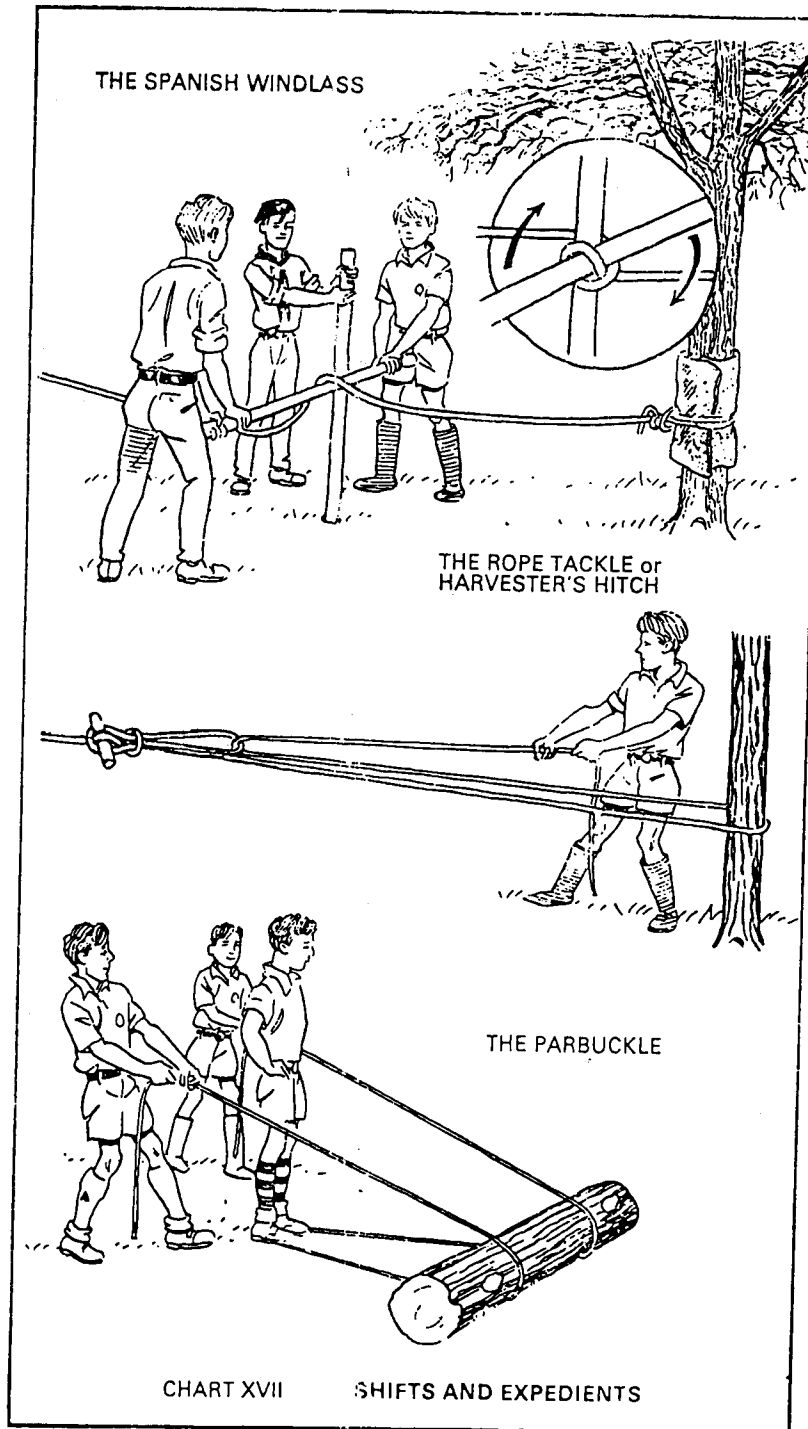
Where no blocks are available various crude but effective devices can be applied to multiply pulling power. Of these the Spanish Windlass is perhaps the most popular—probably because it contains an element of danger which is always attractive to boys especially if they discover that the principle employed is the same as in the Roman Ballista!

The windlass is operated by three Scouts, of whom one must be the designated and accepted leader. One end of a slack rope is secured to the load, the other to a fixed anchorage such as a tree. The Scout-in-charge holds a short stout spar against the rope with the butt lightly heeled into the turf to minimise the danger of kicking up which is always present in this situation. The other two slip a second spar under the rope close to the upright and raise it together to pick up the slack. Taking care to keep both ends of the spar above the rope, they move in a clockwise direction round the upright, stepping over the rope but never for one second relaxing their grip on the spar. The Scout-in-charge will move with them. As the slack is taken up the strain will increase progressively, and there will always be some danger that the spar will recoil with a kick like a mule. The boys must be made aware of this, and must act throughout under the direction of their appointed leader.

It is only fair to say that previous writers on this subject—notably Gilcraft in the very first book on Scout pioneering—have recommended that the Spanish Windlass should be used only by adults or experienced Venture Scouts. My own advice would be to avoid using it to raise heavy loads through the vertical plane, or even to move loads horizontally where the load itself might easily recoil, as for instance the butt of a fallen tree which could roll back on its own branches, but that otherwise, given a reasonable amount of experience with light gear (Scout staves and codline)—even to the point of deliberately creating the legendary kick-back—there is no good reason why Scout Patrols, under trained leadership, should not make use of this excellent contrivance.

\* \* \*

The device known as the Rope Tackle, or Harvester's Hitch, can be set up in the rope itself and needs no other equipment than a tree or similar anchorage. It is widely used by farmworkers and



hauliers to secure a load, and also by marquee erectors to strain their guylines. To make it:

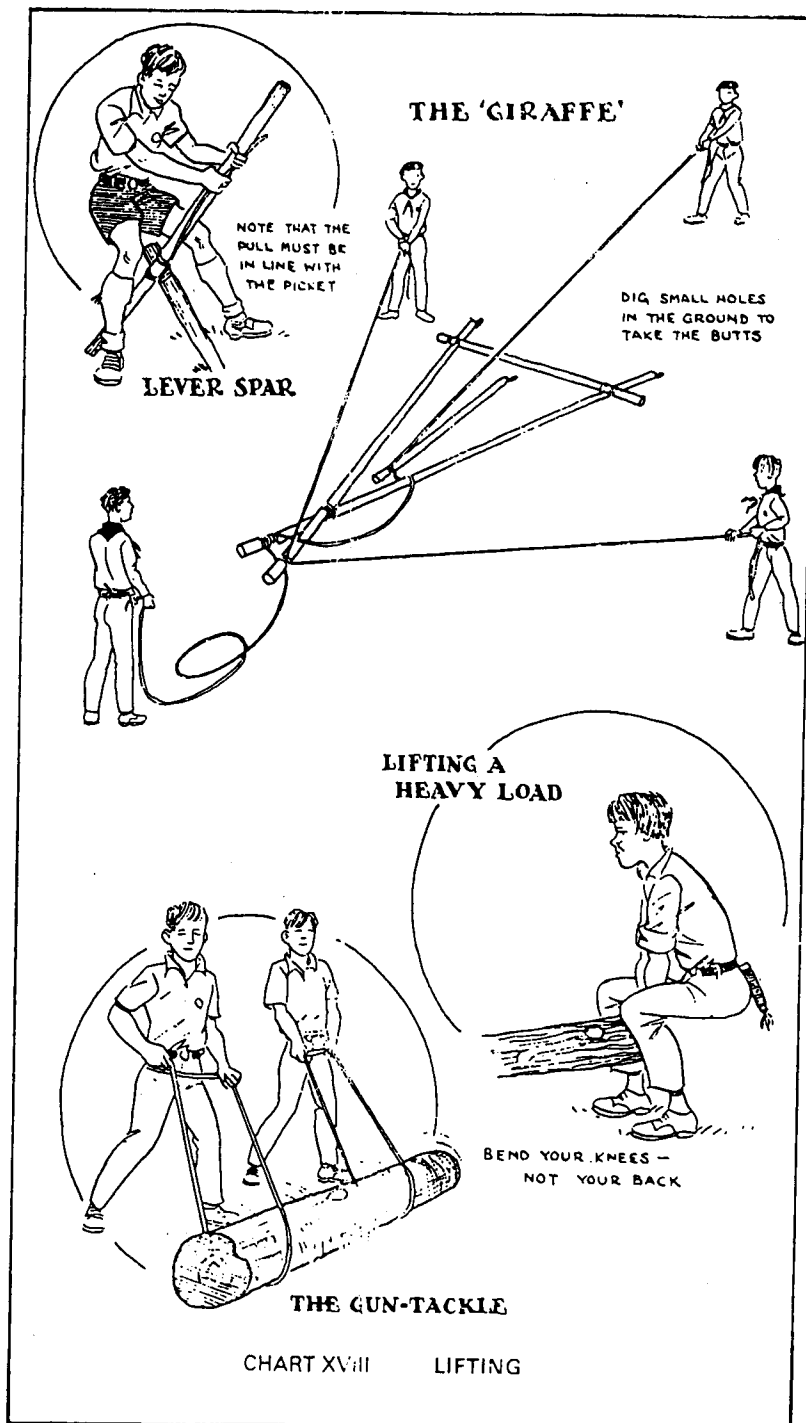
1. Pass the rope counter-clockwise round the tree (for preference one with smooth bark.)
  2. Lay the free end over the standing part some nine or twelve feet from the tree and let it hang.
  3. Standing with your back to the tree, pick up a loop of the standing part a foot or so short of the free end, put it over the top and make a half-hitch round it in much the same way as a bowline is made round oneself.
  4. Pull the free end back through the bight towards the tree. Power gained—three to one, there being three returns on the moving part.
  5. Secure the free end to the tree and lock the hitch, either by pushing a short baton through it or with a few turns of sisal twine.
- It will be obvious that this form of tackle is bound to be rather rough on the rope. Apart from the direct cutting strain when it is turned back through the bight, the chafing action is always considerable. This being so, the Harvester's Hitch should never be set up twice in the same part of the rope. An even better plan is to use a secondary rope attached to the main rope by the Handy Billy non-lock method. But it is a useful device and should be in the repertoire of all Scout pioneers.

\* \* \*

The Parbuckle is used when heavy logs or other objects roughly cylindrical in shape have to be moved, raised, or lowered. An anchorage of some sort will be needed, but if no convenient tree or bollard (such as a picket driven into the ground) is available, one, two, or three Scouts will provide quite a reliable anchor. Middle the rope round the anchorage—or get your anchor man, or men, to stand on the bight—then pass the two ends of the rope under the load and bring them back towards the anchor. If the hauliers work together the log can be moved with the greatest of ease. Indeed, one man working single-handed can often move a weight that three or four men would be quite unable to lift. If your improvised anchorage involves three Scouts, one man (the beefiest) should stand on the extremity of the bight and the slack should be taken up by the hauliers before the other two take up their positions on the rope.

\* \* \*

The lever is, of course, one of the six basic machines known to man. (The others are the wheel, the pulley, the inclined plane, the screw and the wedge.) Every Scout sooner or later will find himself



using one tent peg to lever out another which has apparently lodged itself permanently in unyielding ground, and will discover that (a) the pull should be exerted straight up the peg, not at an angle to it, and (b) the longer the heel of the lever (within reason) the greater the mechanical advantage will be.

The same device—and the same rules—can be applied to the drawing of recalcitrant pickets. Very often a great strain is set up by the lever—quite sufficient to break it without budging the picket—and it may well be found that ordinary knots, even well-made rolling-hitches, will tend to slide up the lever and botch up the job. A quickly made square lashing, without the final clove-hitch but hand-strained by an assistant, will generally save time and sweat.

The lever may also be used as a so-called 'giraffe' to raise the flagstaff, a heavier-than-ordinary pair of sheerlegs, or even a signalling tower. The method is to lay the lever spar, which should be about one half the length of the structure itself, alongside it, centre to centre. Holes should be dug in the ground immediately behind the butts of all spars involved in the structure, so that they will drop into place of their own accord as the device comes into operation; and it would be as well, perhaps, to top your structure with whatever cordage or gear that may be needed in the way of halyards, guylines, rope-ladders, or whatever, before raising it. Such things tend to be overlooked in the heat of battle, and it is always blush-making to have to lower your structure to make good the omission. The general idea will be clear from Chart XVIII but it will certainly be found necessary to fit a few extra guylines to keep both the 'giraffe' and the structure under control during the lifting process.

\* \* \*

Finally a few elementary 'do's and don'ts'.

When lifting a heavy load by hand, bend your knees, not your back.

Never carry a load that can be rolled.

When sharing a heavy load with another Scout never drop it without giving him due warning. You must work together. Lay the load down, rather than drop it.

When two Scouts are transporting a load of spars and other gear, a good idea is to use two of the spars as bearers with the others laid across them.

If a heavy log has lain for any length of time in the same position it may have embedded itself in the ground. Use the 'rock and roll' method to level out the sides of the trench it has made for itself and to gain momentum before trying to move it.

Two Scouts working together with two long strops can set up the so-called 'Gun Tackle' to roll a heavy log. Open the strops and

lay one at each end so that it overlaps the log by a foot or two. Roll the log onto the two overlaps. Pick up the bights and haul away on the parts which come over the top of the log so that it will roll towards you. The friction grip between the log and the ground will do the trick. If a change of direction is needed, one Scout can use his strop as a check rope while the other continues to haul in; or a short spar can be used to lever the log round to the desired angle.

Never allow a rope to trail along the ground. Avoid treading on rope. If the ground is damp, suspend the ropes from a branch or drape them over a fence rail.

While pioneering remember that all Scouts are conservationists. Your pioneering activities can hardly be expected to improve the environment but are bound to affect it to some extent. Damage to trees, shrubs, and other natural features should be avoided at all costs. If trees are used for rope work, make sure that they are adequately protected with a good padding of hessian or old canvas. Holes in the ground are a menace on grazing land and must be 'made good' and the loose soil well tamped down. Your final act before leaving the site should be to scan the ground systematically to make sure that no pegs, broken pickets, discarded rope-ends or straggles of sisal twine, or indeed any other 'foreign bodies' have been overlooked.

If private ground has been used, do not neglect to thank the owner verbally and to confirm your thanks later by letter through the post. This is something our sister Movement never fails to do, and perhaps it is high time that we started to learn from them, just as they are not too proud to learn from us.

#### 4. LINE-THROWING

The standard of line-throwing in Scouting has never been noticeably high, chiefly because it requires much more practice than we have ever had time to give it. Luckily, in pioneering lifelines are rarely called for, and it is so much easier to throw a weighted heaving line—easier still a lobline or lobsterstick—when the problem is merely to get a line from one side of a stream to another or over the branch of a tree.

A heaving line is generally a braided line of about three-quarter-inch circumference and is rather more expensive than ordinary rope. It should always be stowed away from other cordage and should be used for throwing *and for nothing else*.

You will usually find it advisable to load the free end to make it carry the full distance. The Monkey's Fist should be the first choice. It is much less complicated than may appear from the chart. Start about 6 ft. from the end and put four turns round the fingers of your left hand; remove them from your hand and put four turns round the

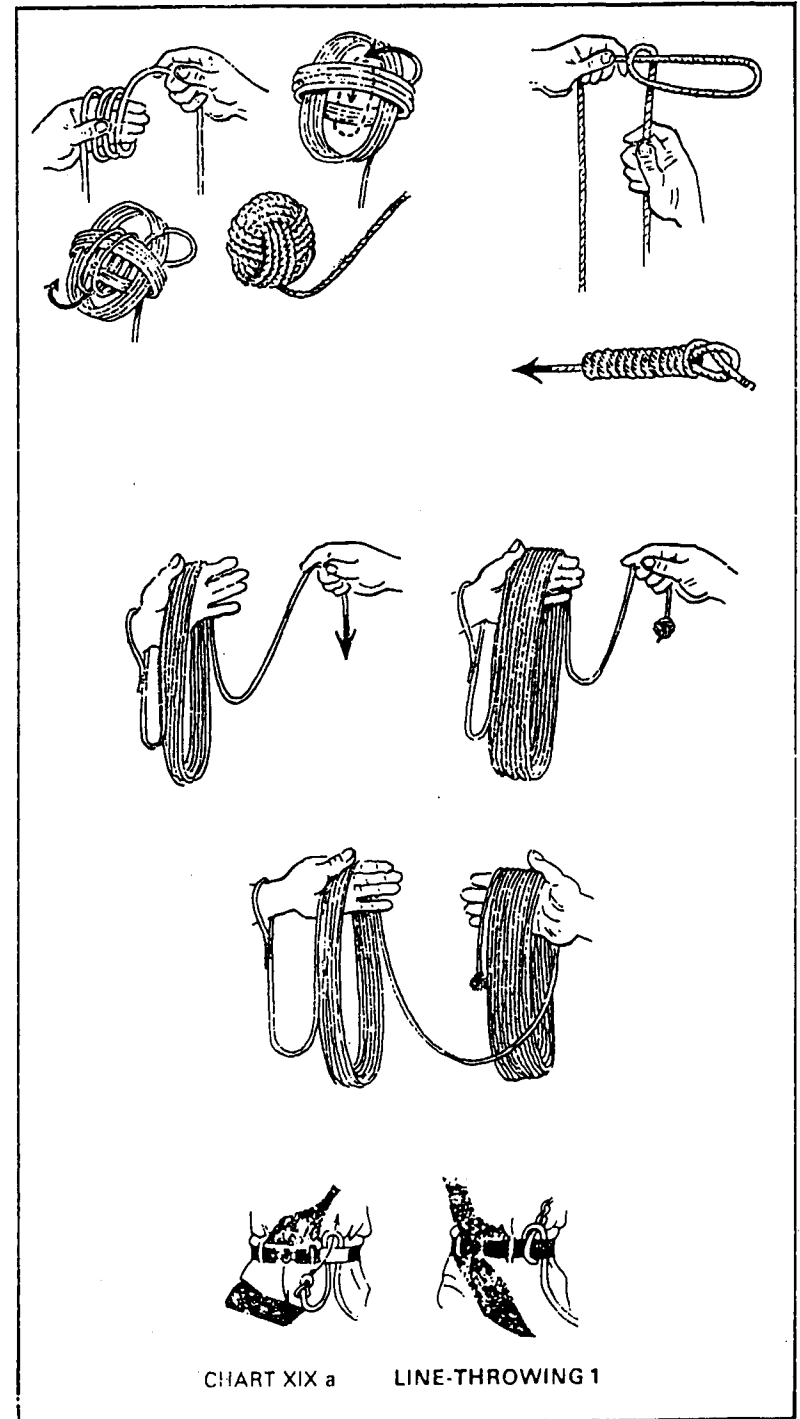


CHART XIX a LINE-THROWING 1

first set at right angles, then pass the end through and bind round the second set. Tighten as necessary and 'lose' the tail by tucking it into the 'fist'.

The Heaving Line Knot can be used for the same purpose. To make it, turn back the end of the line for about 5 ft. and bind both parts of the bight thus formed together, starting about 8 in. from the end. Slip the tail through the small loop at the end and pull to tighten.

In all line-throwing the secret of success lies in the free running of the line. Great care must be taken in laying up the turns, whether this is done on the hand or on the ground. The first thing to do, however, is to secure the standing part to oneself or some other fixture. Nothing is more ridiculous than to heave a line with great accuracy across a stream or river and then watch the other end snaking in pursuit. The standard heaving line should ideally have a wrist loop in the standing part, but in other improvised lines a good idea is to put a figure-of-eight stopper knot in the end, then tuck a bight of the standing part up through your belt, thread the tail through it and lock it against the stopper knot by drawing it tight.

Heaving lines are thrown in the same way as lifelines. Having put on the wrist loop, start laying the turns on the palm of the left hand, working away from the base of the thumb and placing the turns alongside each other towards the fingertips. The turns should be at most 24 in. long. If they are too long they will trail on the ground in the act of throwing and will tend to snarl up in mid-flight. Taking care not to disturb the arrangement of the turns, take out a third of their number and transfer them to the throwing hand. Make sure that the free end, with the Monkey's Fist, is now nearest the fingertips of your right hand. Always throw under-arm unless ground level obstacles, such as long grass, reeds, gorse, etc., make this inadvisable. Face the target with your left foot forward, swing both arms together across the body and finish with a good follow through straight over the target. Constant practice is the secret of success. Set up your own line-throwing range near your permanent base and try to keep the interest going by holding weekly, five minute only, inter-Patrol line-throwing championships. If necessary floodlight the range in winter.

A lobline is generally lighter than the standard heaving line and is more heavily weighted at the end—perhaps by inserting a fair sized stone in the Monkey's fist. In some Scandanavian countries such lines are fitted with small leather pockets filled with lead pellets. The line is carried on the belt with the cord wound round the pocket so that it will run off naturally when the weighted end is released. A mallet head (without the haft) makes an excellent substitute but when throwing do make sure the target is clear of chance passers-by. A blow from even an unweighted Monkey's Fist can be quite painful, from a mallet head even more so.

If sisal twine is used for your lobline, the best plan is to flake it

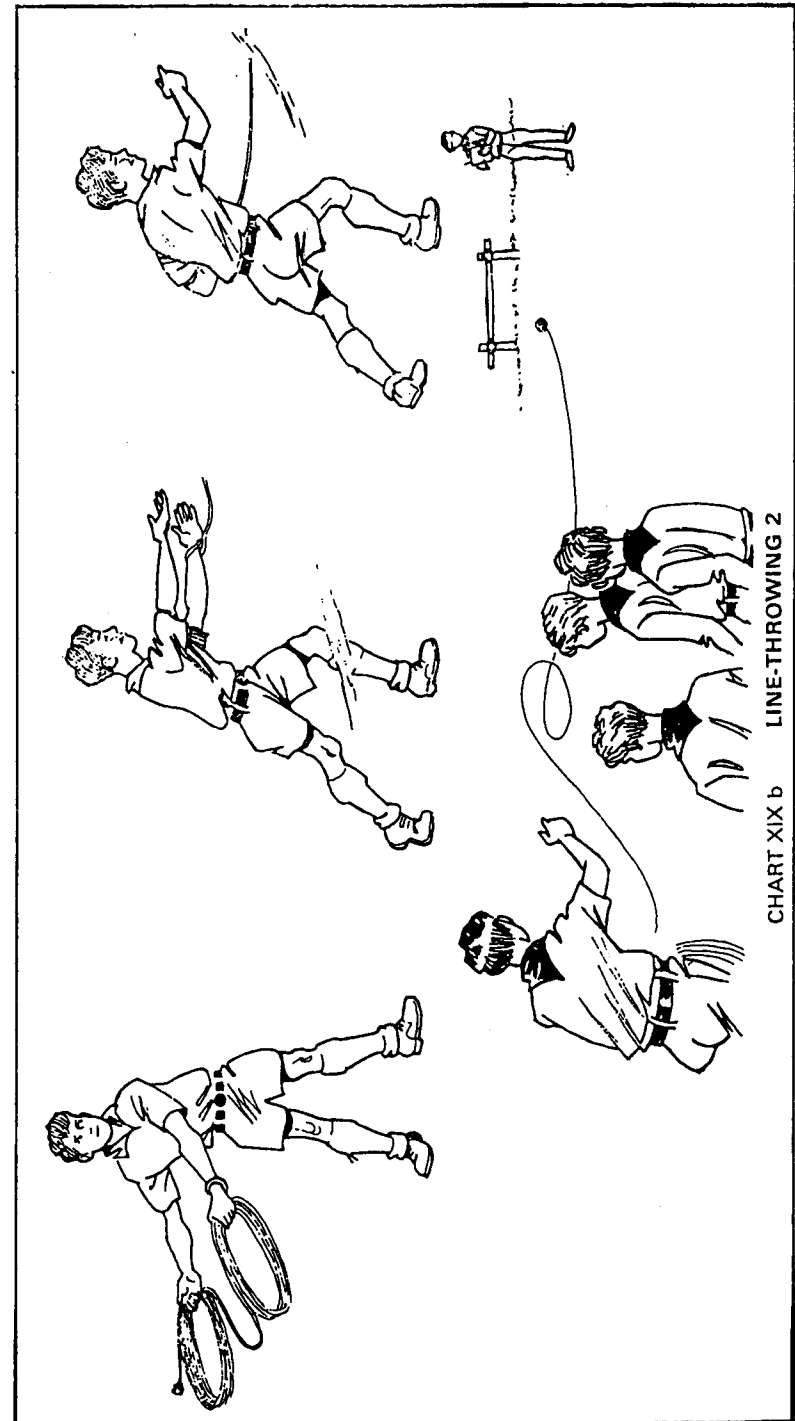
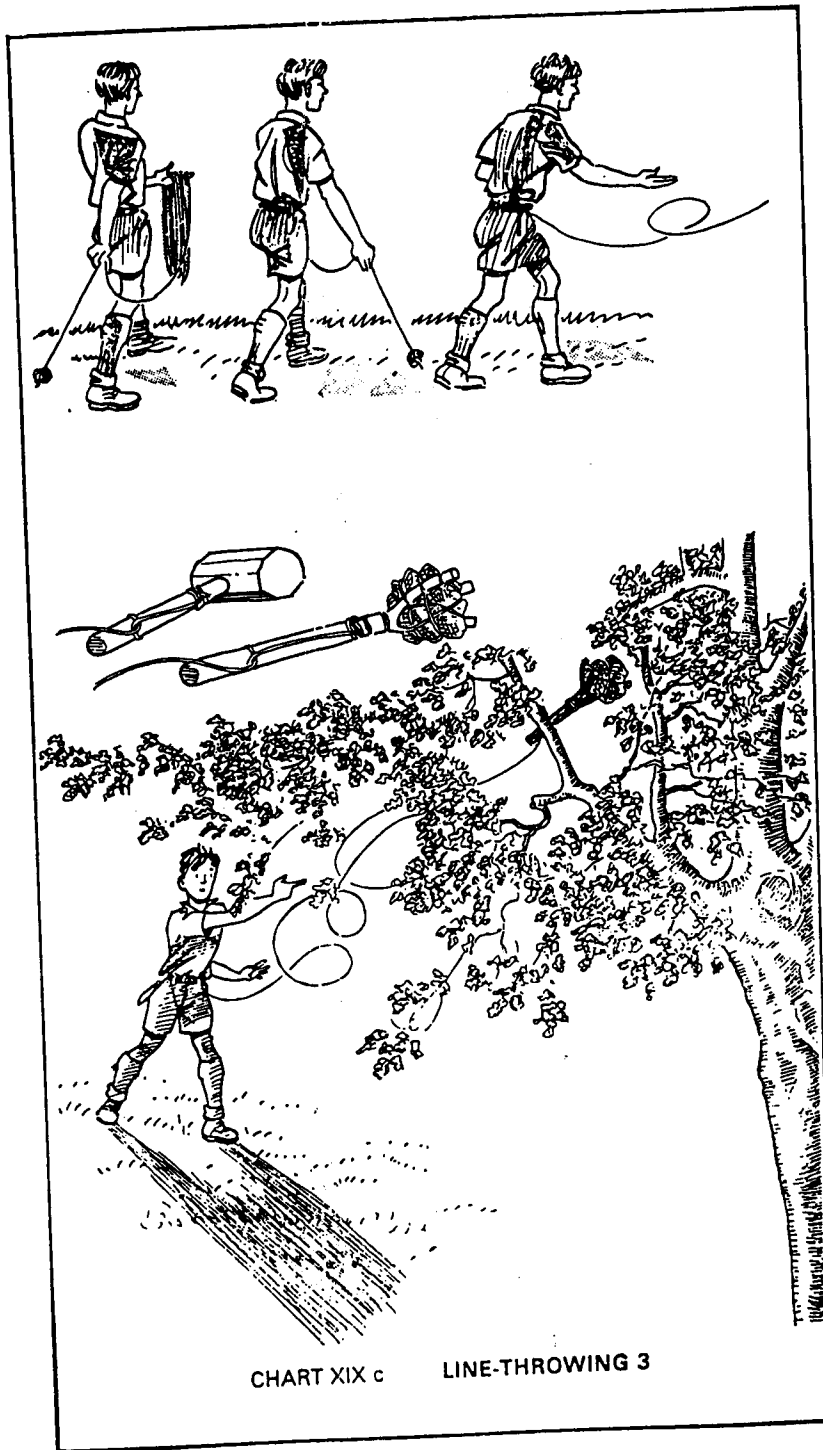


CHART XIX b LINE-THROWING 2





out on the ground. Remember to secure the standing part before you throw. Hold the line so that the weighted end is just clear of the ground with the arm at full downward stretch. Swing arm and line pendulum fashion from the shoulder without allowing the weighted end to kick up at either end of the swing, and throw underarm as before with a good follow through straight over the target. Left to themselves, boys will almost invariably whirl the lobline round their heads like a middle-west cowboy roping a steer, and it is always embarrassing to their trainers when they score an early success by this unorthodox and unscientific method. However, this does not happen often, and sooner or later the lesson of experience must be learned.

A better idea is to use the whole mallet as a lobstick, or to cut yourself a pronged greenstick and load it with a stone wrapped in a dishcloth and lashed into the crutch. The line should be made fast to the haft just below the crutch with a rolling hitch for a downward strain, reinforced with a killick hitch nearer the butt. The lobstick has three advantages over the lobline. 1. The haft provides a better grip and prevents rope-scorch to the hand. 2. Aim is generally better. 3. The extra weight at the head will enable it to crash through twigs and foliage which might otherwise baffle the line itself.

A good lobstick should be regarded as an essential part of Patrol training gear.

##### 5. 'UP AND OVER'

Inviting Scout Patrols to get themselves across imaginary obstacles such as raging torrents, yawning chasms, and bottomless ice-crevasses has always been a favoured ploy with Scout Leaders who delight in making life difficult but exciting for their boys by organising such things as Obstacle Expeditions, Adventure Journeys, Assault Courses, and the like. Long may it continue. Nowhere but in Scouting—or perhaps on an Outward Bound type course—will their intelligence, powers of imagination, practical ability and teamwork be challenged and exercised in this particular way, and because it provides them with a unique experience, it is surely something of considerable value in a Movement which claims to develop character.

In many situations, the task of crossing a natural obstacle would be much reduced if it were possible to work from both sides at once. The problem usually resolves itself into one of getting the first man across. If the distance is not too great the device known as the Scout Transporter can be used. This is merely a pair of sheerlegs controlled from the take-off side initially by four ropes, two of which are passed to the far bank as soon as the first man has been safely transported. A 'pusher' of some sort will be needed to raise the sheers beyond the perpendicular. This could be a light spar well padded with

a sack at the top, or a spar with a forked end. Care should be taken to see that the butts of the sheerlegs have found a firm foundation in the bed of the stream (real or imaginary) and that they are reasonably skid-proof. The passenger sits in the saddle of the sheers, facing in the direction of travel and prepared to leap ashore the moment it is safe to do so.

If the stream is too wide to jump, a simple pole-vault might be attempted. In earlier days this was regarded as one of the standard uses for the Scout staff, but if a soft landfall can be guaranteed, light spars up to 12 ft. in length might well be used, depending on the height of the bank on the take-off side.

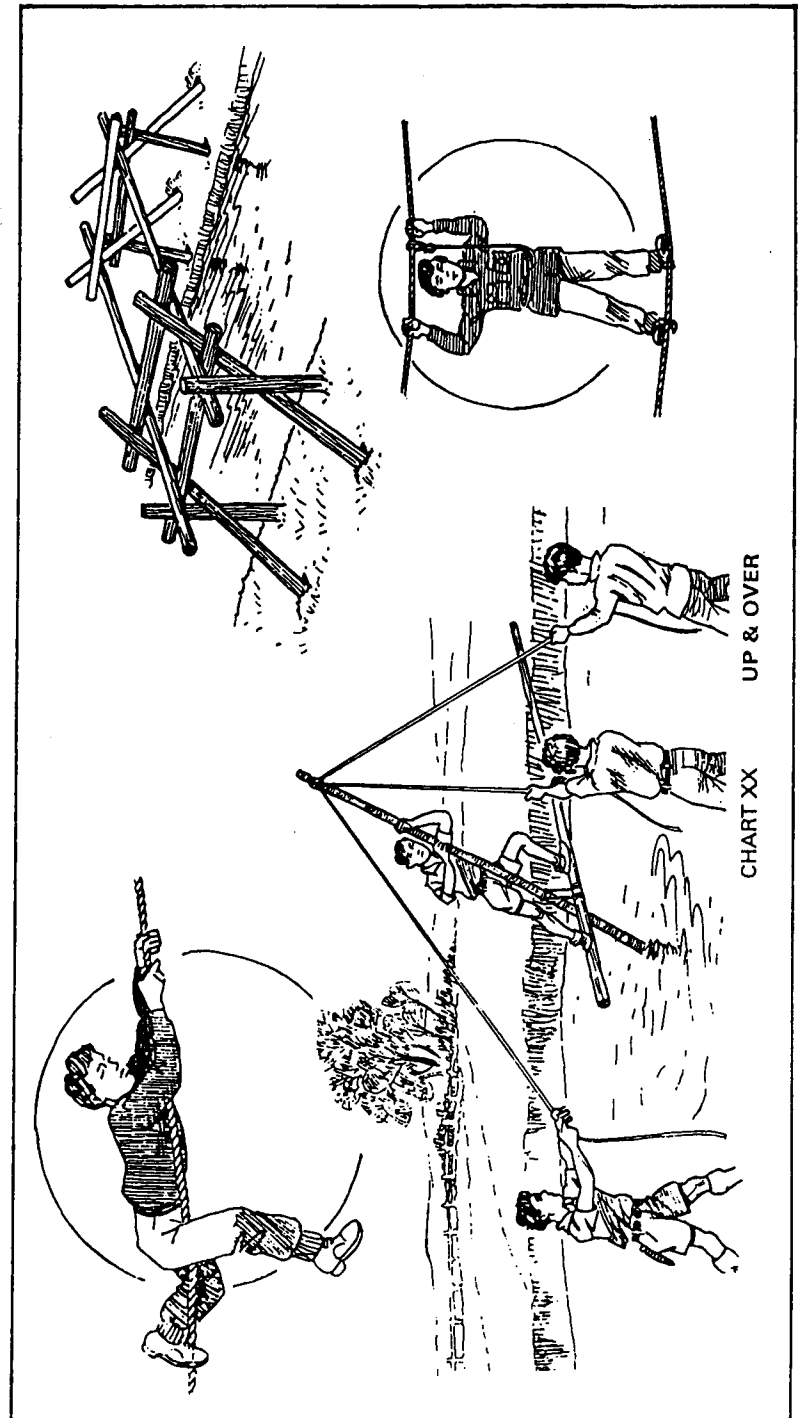
In other situations, when the far bank is conveniently furnished with trees with equally convenient branches, it is quite possible to throw a line across and then draw it back again to make a continuous line.

Two light lines will be needed. The middle of the first line should be weighted with a mallet head or noggin of wood so that it can be thrown over the selected branch on the far side. When attempting this feat it is best to keep the free ends of the throwing line as far apart as possible to prevent the bight from winding itself up inextricably. The whole purpose of the exercise is to dangle the weighted bight over the branch in a wide 'V' while the free ends are retained on the take-off side. A lobstick is then thrown through the 'V' and while one end of the first line is firmly held, the other end is released so that the lobstick can draw it back under the branch and across the gap. A heavier rope can then be drawn across and back again.

The next problem is to strain the rope so that some hero can venture across by means of the inaptly named 'Deadman Crawl'. The Harvester's Hitch can be brought into operation here, and from then on it will be a simple matter to stretch a second rope across to make a Commando Bridge.

It is not suggested that this is a suitable activity for younger Scouts straight up from the Cubs. Indeed, it might test some Venture Scouts well beyond their skill and ability—especially if they have been brought up to regard knotting and ropework as smallboy stuff they have long outgrown. This book is being written at a moment in Scout history when it is fashionable to take this lofty view of many of the traditional skills and activities of Scouting, but no Scout Leader who has himself crawled fearfully along a swaying rope or helped to set up a major pioneering project will share this opinion. Pioneering, admittedly is fun, but it is certainly not kids' stuff.

As for the Deadman Crawl, please remember that it is only possible on ropes of at least 2½ in. circumference (20 mm. diameter) and that it needs considerable rehearsal close to the ground before it goes higher. The method is to lie full-length along the rope with one leg dangling to lower the centre of gravity and maintain balance, and the second leg bent with the foot hooked over the



rope. Progression is made in a series of caterpillar loops. Draw the top foot up to the buttocks, raise the trunk clear of the rope and pull forward with outstretched arms.

Your Commando Bridge should be tailored to suit the smallest Scout who will be required to use it. Most of his weight will bear upon the foot-rope, so that the two ropes will be farthest apart at the point of no return. For greater security, and to give him more confidence, a short rope tied round his waist with a bowline, with a second (small) bowline running free on the handrope, with a fitted so that he can push it along with his hand. The footrope will probably stretch under the weight of the passengers, and it may be found necessary to take up the slack with the Harvester's Hitch from time to time.

The self-locking bridge has more spectator appeal as a display item than practical value in the field, but it is splendid fun and might be included in the limbering-up training of your young pioneers. It is best built with unpeeled spars, where the friction grip of the rough bark is a great advantage. In ideal conditions, in fact, the four retaining pickets can be dispensed with altogether so long as the four spars forming the ramp are well heeled into the ground.

The Gilwell Haymaker Bridge consists of nothing more elaborate than one horizontal spar loosely slung from an upright two or so feet from the butts—depending, so far as the upright is concerned, on the depth of the water at the bottom. The illustration (Chart XX) shows the general idea, and strangely enough it does work! The tricky part about this is, of course, that initially the upright is supported by guylines on the take-off side only. This means that it must be kept at an angle pointing away from the bank with the guylines in full tension while the heroic first-man-over does a quick balancing act along the spar, then levers it round with his feet to make a touchdown on the opposite bank. He then swings the tip of the spar back and takes charge of one of the guylines, after which it is plain sailing until all but the last man have crossed, at which stage the original procedure must be carried out in reverse, with the upright leaning towards the take-off side.

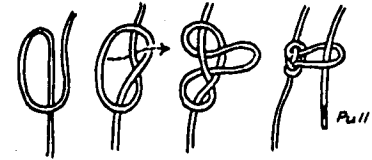
The task of getting a rope over a high branch may be made easier by using a lobsterstick, as suggested, but there remains the problem of making fast to the branch itself. One good way of doing this is to make a man-harness knot in the middle of the rope, slip the free end through the loop, and run it up the rope until it locks against the branch. The free end of the rope containing the man-harness should be drawn aside and tied off, after which your expert rope-climber can swarm up and down the rope in perfect safety. At the conclusion of the exercise, the man-harness can be drawn back and released at ground level.

If the rope is too thin for comfortable climbing, the stirrup-loop

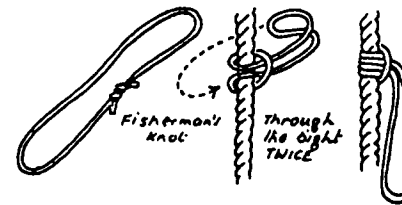
#### GEAR REQUIRED

One 60 ft (18 metre) length  
2 in. circumference (16 mm.  
diameter) rope.

Three 3 ft (1 metre) strips  
of 1 in. circumference (8 mm.  
diameter)



Put a man-harness knot in the middle of the rope. Throw the free end over a branch, pass it through the man-harness and pull it so that the knot travels up the rope and locks against the branch. Tie the standing part back to keep it out of the way.

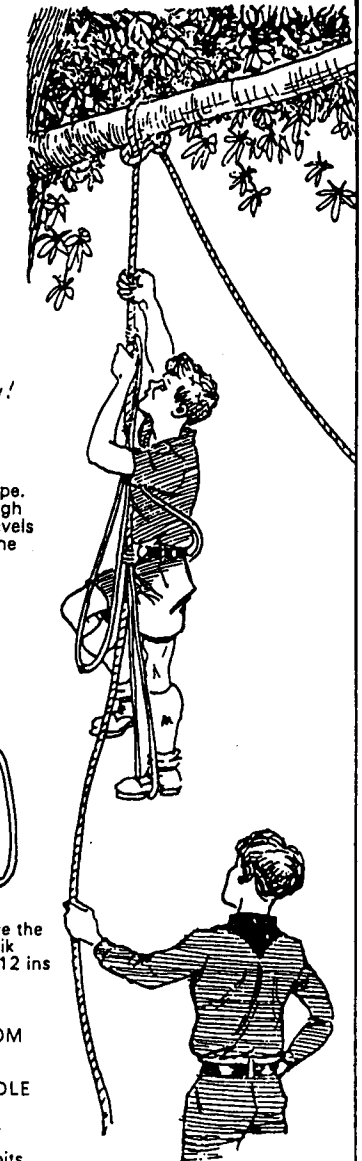


Bend your three strips on to the rope one above the other at intervals of about 12 inches with Prussik knots. The lowermost strop should hang about 12 inches clear of the ground.

Grip the rope and put your foot into the BOTTOM strop so that you can raise yourself clear of the ground. Slip the loop of the TOP strop round yourself under the armpits. Now push the MIDDLE strop up the rope (you will find that it will slide freely) and put your other foot in the loop. Transfer your weight to this leg, and push the TOP strop up until it again grips under the armpits. You will find that you are now supported by this strop and have both hands free to reach down and raise the BOTTOM strop, which is now in slack rope. Follow this drill until you have reached the top of the climb.

CHART XXI

ROPE CLIMBING BY THE STROP &  
STIRRUP LOOP METHOD



technique is recommended. Three strops, each about three feet in length, will be needed. These are bent on to the rope one above the other at intervals of 12 in. with what rock-climbers call the Prussik knot—actually nothing more elaborate than a larkshead with the loop passed twice through the bight. The lowermost strop should hang about 24 in. clear of the ground.

To use it, grip the rope and put your foot into the loop of the *bottom* strop so that you can raise yourself clear of the ground. Slip the loop of the *top* strop round your body under the armpits. Now push the prussik of the *middle* strop up the rope (you will find that it will slide freely) and put your other foot in the loop. Transfer your weight to this leg and push the prussik of the *top* strop up the rope until it engages under your armpits again. You will find that you are now supported by this loop and will have both hands free to raise the prussik of the *bottom* strop which is now in slack rope. Follow the same drill, raising each strop in turn, until you have reached the top of the climb and are in a position to haul yourself on to the branch.

The descent can be made in the same way, or you can have even better fun by roping down by the method rock-climbers call 'abseiling'. This is quite a simple process but it should only be attempted 'for real' after a good deal of practise on a slope at ground level.

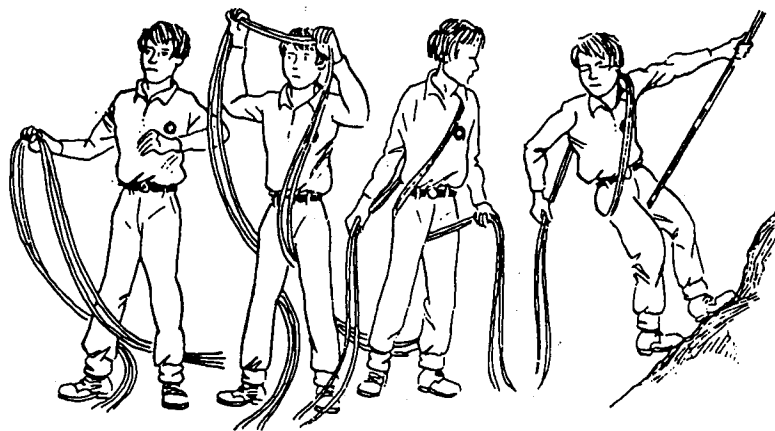


Fig. 35.

The method of getting on to the rope correctly makes quite a good Troop Night exercise. Middle the rope round an anchorage of some sort and stand facing it with the double rope lying on the floor between your feet. Twist round to the right without moving your feet, pick up a bight of the rope behind you with both hands, lift it over your head, and drop it over your left shoulder. Reach round behind with your right hand and grip this part of the rope with your thumb pointing down. Now pick up the other part of the

rope in front with your left hand. Lean back on the rope to take the strain, then move slowly backwards, paying out the rope with both hands as you move away from the belay. There is a knack to it, but it is quickly mastered. An uncarpeted staircase makes an excellent indoor training ground, but it is always wise to have a safety rope round the waist of the trainee until he has gained confidence and learned to trust his rope. The safety rope should be belayed round the body of a reliable man at the head of the pitch, so that he can pay it out in time with the speed of the descent.

In recent years, many County Training Grounds have equipped themselves with artificial climbing walls of various kinds. One such, known as 'Traacher's Folly' (because it was 'invented' by a young Scouter of that name) makes a good pioneering project in its own right. A full description of it will be found in Section 4 of this book.

A free abseil, in which the climber comes straight down the rope without having the benefit of a sloping rock-face to 'walk', imposes a severe wear-and-tear strain on both clothing and person. This can be alleviated if a reliable karabiner, preferably of the screwgate variety, and certainly *not* a secondhand article obtained from a dealer in ex-Army equipment, is clipped on to a figure-of-eight loop-rope round the legs. The double rope is then passed through the karabiner, up over the front of the body and dropped over the left shoulder as in the so-called 'classic' method, and is handled in exactly the same way.

Another method of descent from a high tree-top is by means of the Fireman's Slide. You will need two ropes of not less than 2½ in. circumference, and sufficiently long to stretch from the tree-top to ground level, at an angle of not more than 30 degrees to the ground, two reliable strops, and two screwgate karabiners. The ropes are made fast to a strong branch at the top of the slide and each of them is held at the required angle by two or three reliable men. The man in the tree puts one strop in a figure of eight loop round his thighs and connects it to the double rope with the karabiner. The second rope is looped round his chest and again secured with the karabiner to the double rope. The men below stand about twenty feet apart and take up the strain on their ropes. As the man comes sliding down, they control the speed of his descent by moving further apart or closer together as the occasion may demand. It sounds exciting—and from personal experience at Gilwell one can confirm that it is!—and it should only be attempted by older boys under direct Scout Leader control.

\* \* \*

The use of all this exotic equipment calls for courage and self-discipline of a high order, and it can, and should, be used in main-line pioneering as a character-training exercise in its own right.

Not all boys will rise to the challenge, of course, and it should be regarded as an optional activity for the sort of boy who takes to tree-climbing like a duck to water, and who in flat country yearns for mountains. There are some who don't, and they should never be made to feel inferior because they fight shy of heights. On the other hand, a great deal can be done through training in boyhood to help the individual to overcome irrational phobia of this kind, and pioneering is no different from any other branch of scoutcraft in providing the Scout Leader with unique opportunities to do just that. Gently does it! Whatever you do don't force it; and it need hardly be said that it would never do to encourage a boy to take some risk that you were not prepared to take yourself.

## SECTION FOUR

### MAINLINE PIONEERING

#### 1. TACKLING A PROJECT

Everyone will agree that the success of any worthwhile Scouting enterprise depends very largely on sound planning and organisation. In this respect, nothing makes heavier demands on the adult leader than what we have chosen to call 'mainline' pioneering. So many factors bear upon it: the site—the gear—transport—time—the age, experience and physical capability of the boys concerned: all must be taken into account and balanced one with the other before we can decide on what is possible and how it can be achieved.

At Gilwell, the International Centre for Adult Leader Training, where the present writer gained most of his experience under John Thurman, the problem was easily solved. The site, the gear, the men, the technical know-how, all were together in one place at one time. Long experience had provided definite answers to every how, what, when, and where. Even so, without wasting a minute, a great deal of time was devoted to planning and organisation; and all of it was necessary.

It is not suggested here that what was possible in the ideal setting of Gilwell is possible elsewhere, except at Training Grounds of a similar nature, but it may be of interest to learn how it was done.

In those days an entire morning was devoted to pioneering. It occurred late in the week and had been preceded by a fair amount of practical instruction in the handling of ropes and other gear, plus a few light-hearted excursions into the field of light pioneering as described in Section 1 of this book. The unique problem (not likely to occur elsewhere) was that six, seven, eight or more quite different projects had to be equipped, built, tested, appraised and dismantled in the course of three and a half hours. The Patrol Leaders' Council met on the eve of Pioneering Day for briefing and discussion. Artist's drawings of the proposed structures were displayed round the walls of the Gidney Cabin, and the Patrol Leaders were invited to view them before settling down to business. Lots were drawn from a hat, and each Patrol Leader took charge of the chart of his allotted project. The modus operandi for the following morning was crisply outlined: no formal inspection of personnel, but flagbreak half-an-hour earlier than usual—nine instead of nine-thirty. Patrols would fall in for flagbreak and prayers in working gear. Only the Duty Patrol Leader would be in uniform

so that the ceremony of flagbreak could be carried out with due decorum. Clearly it was to be a busy day. Overnight they would discuss the projects with their Patrols, work out their own plans of campaign, allocate duties, and draw up lists of equipment and tools they would require from the master list provided by the Q.M.—these lists to be handed in at flagbreak next day.

The effect of all this was to raise the temperature quite appreciably. Evenings at Gilwell at the close of the busy working day were always fairly quiet, but never so quiet as on the eve of Pioneering Day. Crouched over their charts in their dining shelters, the Patrols discussed and argued in low voices sometimes far into the night. From time to time an observer would see a worried Woodpigeon, an agitated Owl, surreptitiously practicing some bit of ropework, a knot, a lashing, an improvised straining device, which he had been shown earlier in the week but had not thought it worthwhile to learn properly. Now the moment of truth was upon him—and it had found him out just in time!

And this, mark you, was how it worked *with adults*.

Next morning, wet or fine, the Patrols were early astir. At flagbreak—which in those days was normally very much a spit-and-polish affair—they paraded looking purposeful but anxious, like the vanguard of a peasants' revolt. Prayers were brief but to the point, and never failed to include General Lord Astley's famous plea before the Battle of Edgehill: "*Lord, Thou knowest how busy I must be this day; if I forget Thee, do not Thou forget me.*" Somehow, it all added up and made a fine beginning to what turned out to be, invariably, a fine and memorable day.

Behind the scenes the Quartermaster had not, of course, waited for the Patrols to hand in their lists of gear before getting to work himself. With so many to cater for this would have made his difficult task impossible. Everything awaited the pioneers when they reported to the Q.M.'s store a few minutes after nine. Their own Q.M. was handed an itemised list on stiff card so that the gear could be checked both out and in. Spars, cordage, blocks, pickets, tools and all, were then man-handled to the site, and with only Mr. Kenneth Brookes' excellent pictures to guide them, each Patrol was left to carry on and test in three dimensions the theoretical plans they had made the night before.

At ten-thirty coffee was provided on the site—a thoughtful touch that was always highly appreciated by the thirsty pioneers—and the Quartermaster was in personal attendance to check that no additional gear was needed. All too often he would find that some item of gear which he had issued with one purpose in view had been used for some quite different, inappropriate, purpose. Such demands for extra gear were always met without question at the time, but were commented on later during the Course Leader's

'Tour of Appreciation'. This necessary and invaluable object lesson in Scout Leadership took place at 12.30, each project being visited in turn by all hands, 'appreciated' with truth but kindness, and sometimes tested. The Q.M. would then give a brief on-the-spot demonstration of how he wished his cordage to be hanked or coiled, his pickets, spars and tools wiped clean, and the Patrols got to work once more, each to dismantle any project other than their own, and return the gear to store, where it was carefully checked against the list, serviced as necessary and stowed away, or set aside for further attention if necessary.

Earlier in the proceedings the Patrol cooks had been released from pioneering duties to visit their steaming cooking pots, and, by the time the Scouts had washed and brushed up, lunch awaited them. First and last, it was a clearcut exposition of Scouting in action, and when everything has been said about the idealistic setting of Gilwell, it might still be regarded as an object lesson in the art of leadership as it should be—not only in the limited field of pioneering, but in the playing of the game as a whole.

In your own pioneering at Troop level your Patrol Leaders will doubtless have been involved in the plot from the outset. With you they will have prospected and surveyed the site, discussed the possibilities, checked the gear, selected the project or projects, planned the preparatory Troop Night training programme, and given whatever oratorical assistance is within their competence, exactly as they are expected to do in preparation for summer camp. All this is excellent training in its own right, and in addition will have the same effect upon morale as that eve-of-the-event meeting of the Patrol Leaders' Council at Gilwell.

If, as may often be the case, the event is to take place at the District or County Training Ground, the Warden should be consulted by the Scout Leader well in advance, and visited by the Patrol Leaders a week or so before the event, so that the boys can discuss their own ideas with him and obtain full advantage of his intimate knowledge of the site and its possibilities. These small expeditions away from the Troop are invaluable in creating the right relationship between the Patrol Leaders and the Scouter. It is all a matter of treating the boys, not as adults, but as intelligent and responsible individuals, and, as always, they will believe what *happens*, not what they are told!

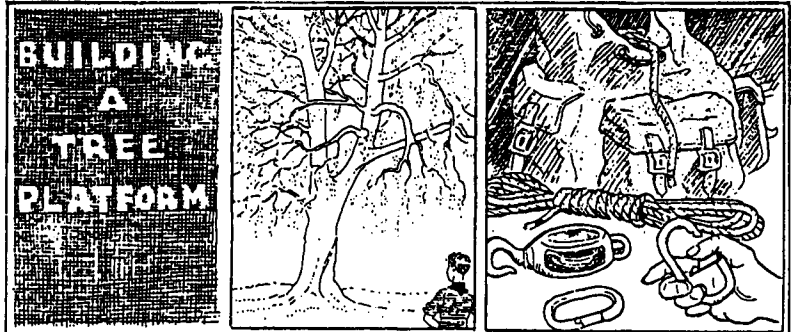
I am not myself an enthusiastic mountaineer, but it has always seemed to me that there must be a strong affinity between the approach to a rock-face and tackling a pioneering project. The experienced mountaineer will stand well back from the rock to

assess the possibilities and problems, and, with the eye of experience, will break the climb down into a series of shorter pitches, of varying degrees of difficulty, no doubt, but all of which will 'go', and all linked to form an unbroken chain to the head of the climb. He will select his gear accordingly—ropes, belays, strops, karibiners, pitons and hammer, whatever he is likely to need—and will have everything with him before he commits himself to the rock.

The same general principles apply in pioneering. If we take the building of a tree platform as the most direct analogy we can see that much time and labour would be saved and much frustration avoided if an intelligent survey was made from ground-level before the work began. Left to themselves, few boy-leaders will stop to think for more than one jump ahead before plunging into action. Someone, obviously, has to climb the tree. Up will go the born tree-climber, perhaps with a light messenger line attached to his belt. For a while he will be lost in the branches while at ground-level his Patrol Leader waits impatiently and the Scouts find other diversions. Presently the tree-man will call for someone to join him so that a heavy spar can be hauled up. After more delay the report from aloft will be that the spar is too heavy to manipulate, or the wrong size, or that the chosen branches won't 'go', or that some other unforeseen complication has arisen. Presently the entire Patrol will be up there, with most of the gear still lying on the ground at the foot of the tree, and an hour or more may elapse before the initial problems have been solved and the first foundation spar is in position.

That this is no wild exaggeration of what *can* happen will be confirmed by almost any Camp Warden you care to consult. No blame to the boys. It all comes down to a matter of leadership training, which is the prime purpose of the continuous exercise glibly referred to as 'The Patrol System'. Patrol Leaders must be *trained*—trained to think before they act. The Scout Leader's job in training should be, not to provide the right answers, but to ask the right questions. Learning by one's own mistakes is sound in principle but hardly acceptable as deliberate policy when life and limb may be at risk. The aim should be to train the boys to spot the possible mistakes and dangers before they occur; to observe, think, plan, before they dive into action. Perhaps the strip drawing (Chart XXII) might serve as a small illustration of the point we are trying to make—not only as it applies to the building of a tree platform, but in the approach to almost any major pioneering project.

One thing is certain: mainline pioneering in the Troop will never get off the ground unless, in the initial stages at least, the necessary spadework is carried out at adult level, leaving only the fun and excitement—and above all the sense of achievement—"We did it



The first and most difficult job will be to lash the foundation spars in position. Remember—**THEY MUST BE LEVEL.**

Choose a tree with a good spread of branches at the right height. Stand well back to carry out a ground survey from all sides.

Pack all the gear you will need into a rucksack—lashings, strops, a pulley block and snap-links (karibiners).



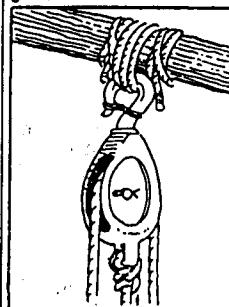
Take a light line up with you. Having reached your perch, clove-hitch one end to a convenient branch and lower the other to haul up your gear.



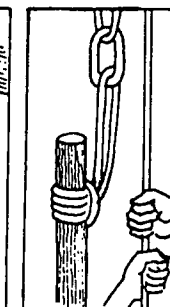
Use one of the 'krabs' to hitch your rucksack to a branch where you can get up and lower the gear without difficulty.



A long light spar—e.g. two staves sheered together—will help you in the tricky business of determining which branches will 'go' and the length of spar required.



Fix the block well above the level selected for the platform. Secure one end of the line to the becket, reeve the other through the block, then lower all three returns to your friends below. **ALL HAULING MUST BE DONE FROM GROUND LEVEL.**



Spars should be slung so that they hang vertically to avoid entanglement with branches. Use a prussik sling and krab near the tip.



You may find that a few upright spars have to be lashed into the tree to give you a level for your foundation spars.



As a precaution, belay yourself to a branch and make use of the tackle to hold the weight of the spars as you lash.

CHART XXII

BUILDING A TREE PLATFORM

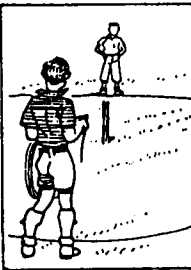
ourselves!"—to the boys. "The Scouter", said B.-P., "is the Patrol Leader of his Patrol Leaders." It is through this that your own personal satisfaction will come. They 'did it themselves' because you made it possible. Rest content with that and the awareness that your Patrol Leaders, at least, know how much you and perhaps others have done to help them. They must not be allowed to take such things for granted. That is all part of the training.

To summarise the Scout Leader's responsibility in introducing pioneering to the Troop:—

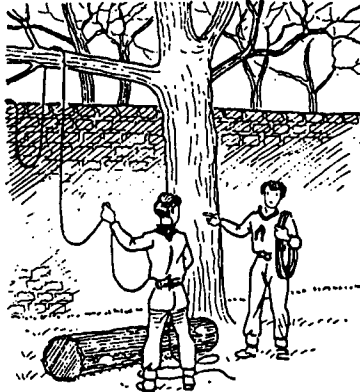
1. He must somehow 'sell' the idea to his Patrol Leaders' Council.
  2. He must provide the basic training, create the opportunity, and cope with incidental problems of location, gear and transport.
  3. Initially, perhaps, he might find it advisable to exercise remote control over the enterprise from, so to speak, a bird-watching position. (But please do not take that remark literally. Boys are more intelligent than birds and will not appreciate being watched from behind the nearest bush. Perhaps your best plan would be to slope off to chat up the warden or to fraternise with a fellow-Scouter in another part of the campsite, with just an occasional visit merely to show interest.)
  4. He will act as clock-watcher and keep the Patrol Leader informed when time is starting to run out.
  5. When the project is over, he will move in to see that all loose ends are safely tied.
  6. Without labouring the matter, he will do what he can to extract the maximum training benefit from the enterprise, perhaps by holding a private de-briefing session with the Patrol Leaders, and then encouraging them to follow suit at their own Patrols-in-Council.
- A tall order, perhaps, but great fun if you believe in what you are trying to do; which is, quite simply, to give your boys the sort of adventure which only Scouting can provide, and to help them to develop their own characters and personalities in the process.

## 2. LIMBERING UP

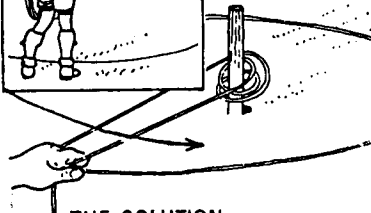
If your trainee pioneers run true to form one of the first things they will want to build—apart from the Aerial Runway, which must of necessity be held back until they have gathered much more practical experience in fieldwork—will almost certainly be a Monkey Bridge. No objection should be put in the way of this ambition, but a 'limbering up process'—as distinct from Troop Night training in theory and mock-up situations—will do them no harm at all and can be excellent fun in itself. What we are suggesting are such things as line-throwing, getting 'up-and-over', abseiling down steep, grassy slopes, rope-swallowing, rope-ladder making competitions, practical exercises in the use of blocks and tackle and expedients



**THE PROBLEM**  
Put a rolling hitch for a downward strain round the picket without entering the circle.




**THE PROBLEM**  
To raise the log over the wall and lower it gently on the other side without damaging the ornamental shrubbery.



**THE SOLUTION**  
Twice round the picket, keeping the free end under, then hold the bight on the perimeter, so that after the third time round the free end can be passed through and then drawn tight.

**THE PROBLEM**  
With a single spar, a board 24 in. x 10 in., two stools, and whatever cordage is needed, rig up a swinging derrick capable of raising a Scout 3 ft. clear of the ground and swinging him through an arc of 90°.



**THE PROBLEM**  
With the gear provided, erect a beacon 20 ft. high in the exact centre of a 30 ft. diameter circle, and, when it is anchored in position, light it—all without entering the circle.

CHART XXIII
LIMBERING UP



of the Spanish Windlass, parbuckle, and gun-tackle variety. If resourcefulness can be called into play so much the better. Here are a few suggestions:—

1. (a) Provide each Patrol with one spar about 15 ft. long (max.), one double and one single block and the tackle to go with it, two 18 ft. lashings, two short batons about 18 in. long, and two 1½ in. circumference ropes about 48 ft. long. If hooked blocks are used, tarred spunyarn for mousings should also be provided. The spars should be subjected to the ringing test before being handed over.

(b) Patrols work independently. The task is to secure the tackle to the spar so that a man may be raised without touching the spar to plant an upturned billycan on the top of it while it is held upright by the rest of the Patrol.

(Note: To minimise the risk, which is not as great as might appear at first glance, it might be as well to discuss this project with your Patrol Leaders in advance, when the following points can be made:

- i. The tackle should be mounted to disadvantage—that is, with the double block in the fixed position at the top of the spar and the single block moving.
- ii. If hooked blocks are used, the Patrol Leader himself should take full responsibility for the mousings.
- iii. The butt of the spar should be heeled into the turf, and for safety's sake must be kept vertical.
- iv. The four anchor men should work with the extreme ends of the lines to give the widest spread possible. The angle of the lines to the spar should not be less than 45 degrees.)

2. Provide eight pickets, a maul or heavy mallet, and a number of spars and invite the Patrol to build a ropeless bridge across an imaginary stream.

(Note: The method is to use the pickets as pylons to support the spars. Each pylon will consist of three pickets driven close together with the centre one three or four inches lower than the side pickets. Two such pylons will be needed at each side of the stream with a fourth picket lying between them to support the spars.)

Other 'limbering up' ideas are given in Chart XXIII. You can have fun inventing 'problems' of the same sort to suit the area in which you are operating at the time.

(Note: In the log-over-the-wall problem, the best plan would be to apply the principle of the parbuckle. One end of each rope would be thrown over that very convenient branch on the take-off side, which as you see is just a foot or two *higher* than the parapet, then carried over the wall and secured to convenient trees just slightly *lower* than the parapet. The bight of the two ropes would then be brought down and slipped under the ends of the log. The boys would then take up the slack and haul away together to raise the log up and over the wall, lowering away carefully on the other side.)

### 3. THE MONKEY BRIDGE

Apart from its popularity with young pioneers, the Monkey Bridge has several things in common with the Aerial Runway. Both are fairly hazardous by comparison with other pioneering structures, and together they have been at the centre of more mishaps than all the others put together.

Fortunately Monkey Bridge accidents are never serious, and because the causes can easily be diagnosed, they may as easily be eliminated.

The first thing to say is that the span between the two sets of sheerlegs should never exceed 45 ft. Stretched over a great distance the ropeway can easily turn-turtle—and indeed has been known to do so many times—catching the unfortunate traveller in the twisted ropes, where he may be left to dangle for some considerable time before the problem of his rescue can be solved.

The second common mistake is to strain the main hawser fiddle-string tight with blocks and tackle, while the two handrail ropes are hand-strained only. This means that, once off-balance, the traveller has no effective support and can quite easily capsize the entire system.

In the third instance, the handrails are too low in relation to the hawser, and too far apart, so that the tendency is to press down on them, as well as sideways. They should be at least shoulder-height, and perhaps closer together than is suggested in the illustration (Chart XXIV).

The fourth fault is that the sheerlegs themselves may be unstable. This might well be because the butts have not been heeled into the ground, because the sheerlegs have been pinned down by the main hawser only as it passes over the crutches—a dangerous practice—or that one guyline only has been fitted to each leg of the sheers, so that in shock conditions there is nothing to prevent it from kicking up, leaving the sheers to spin on the axis of the other leg, with the usual calamitous results.

With these points in view and a hypothetical Patrol of six to cater for, let us decide on our order of priorities, the assumption being that the project has been studied, discussed and understood by all hands, the site has been visited and surveyed and the appropriate gear obtained, the necessary training has been given, and every man knows what he has to do, and how to do it.

Let us assume that the Patrol has arrived on the scene with all the gear they need and an agreed plan of campaign. The distance between the intended position of the two sheerlegs has already been measured with a tape and their precise position marked out on the ground with skewers and sisal, to ensure that they are in direct parallel.

Our Patrol Leader would sort out his gear and allocate each spar, picket, lashing, and rope to its specific purpose. Failure to do this, as we have heard, used to cause endless trouble and frustration on

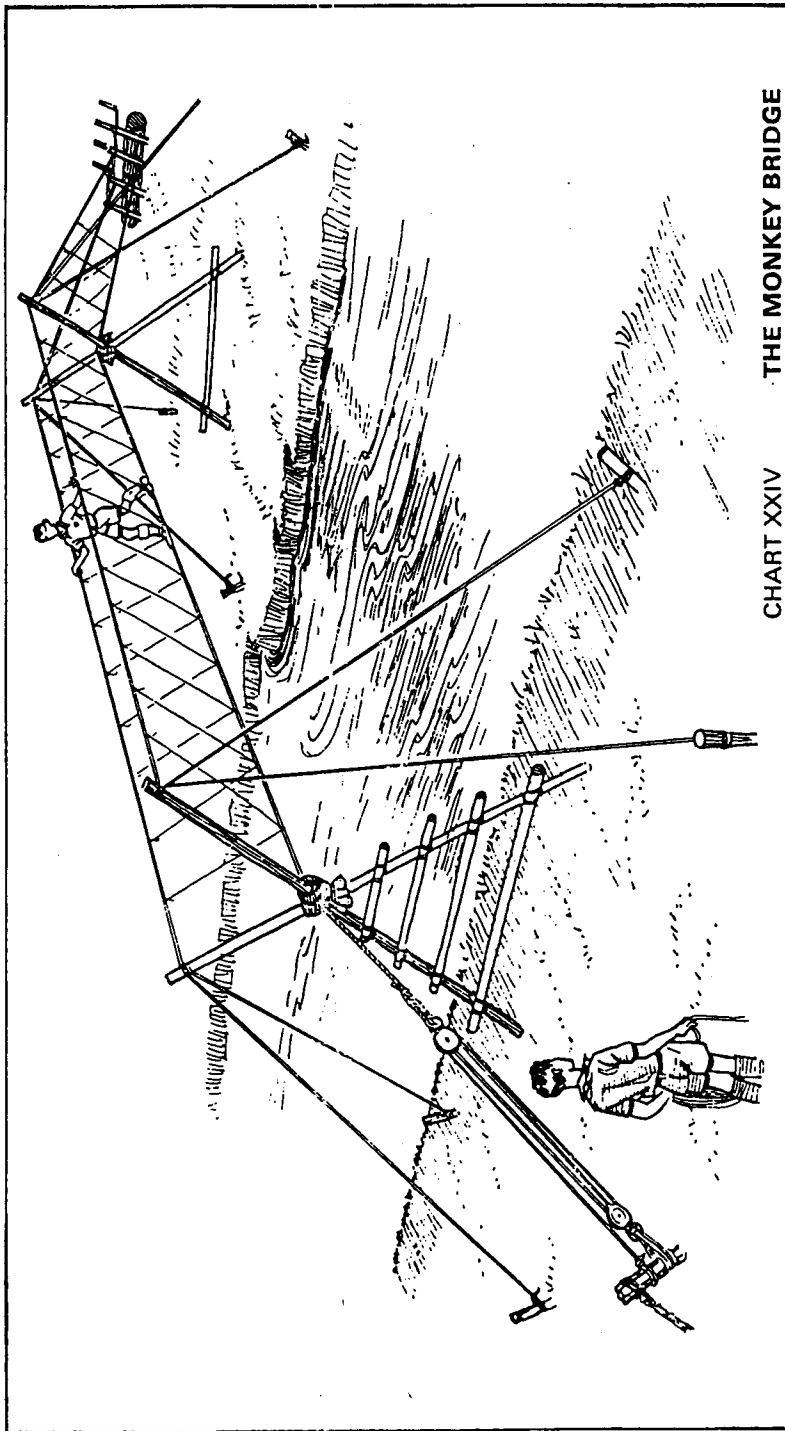


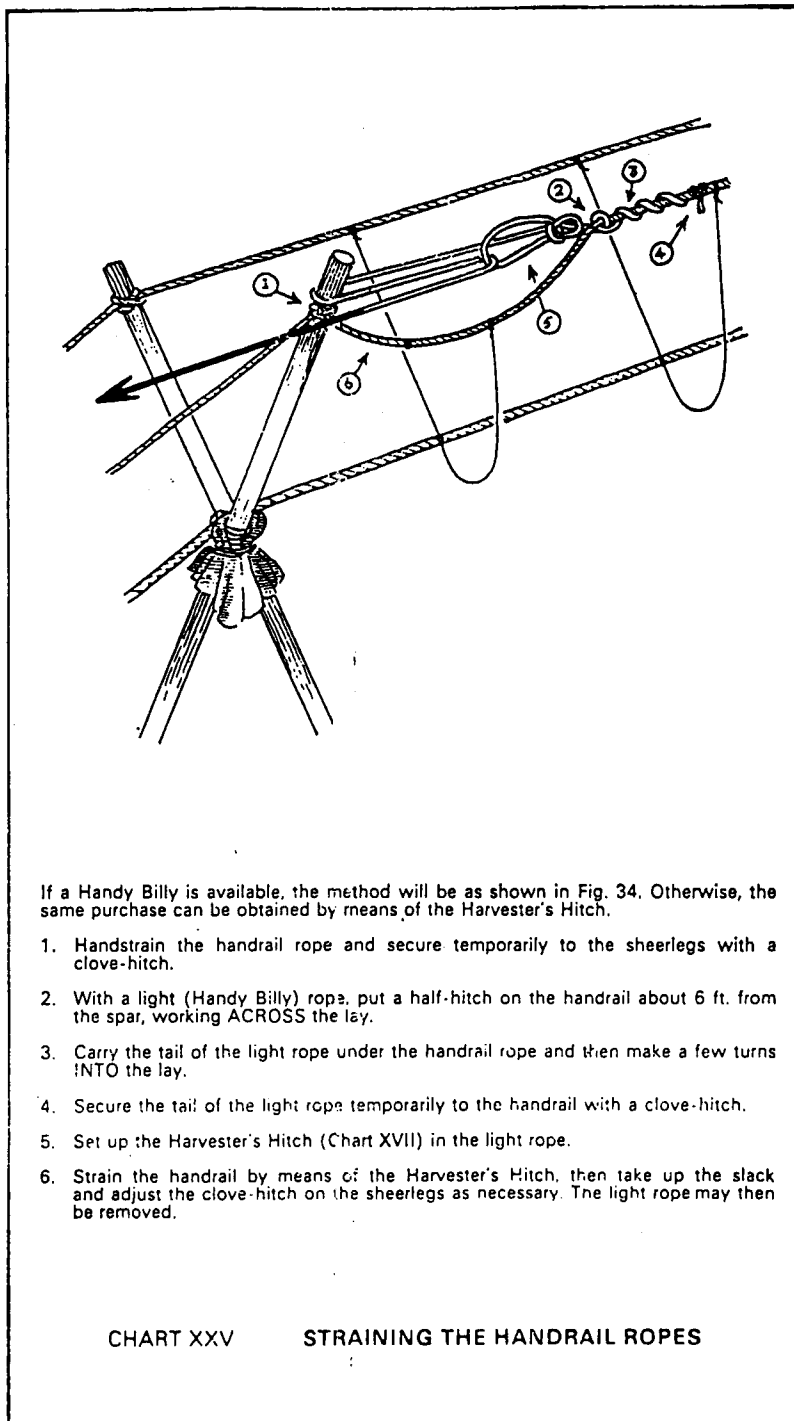
CHART XXIV

THE MONKEY BRIDGE

Pioneering Day at Gilwell, and one can only hope that the lesson went home then! The Patrol would then split into three pairs—one pair to prepare the ropeway, the other two to build and erect the sheerlegs. The standard pattern for all sheerlegs will be found in 'The Aerial Runway Code', but in this case the top sheer lashing should be not less than 5 ft. 6 in. from the tips of the spars to accommodate the handrail ropes. The pair preparing the ropeway would lay out the main hawser on flat ground, and the precise measurement between the two sheerlegs would be marked with metal skewers—perhaps one at each side to pin the hawser down and prevent it from moving when it is being handled. The two handrail ropes would be similarly pegged down at either side, equidistant from the hawser, with a total spread of ten feet, and the sisal stringers (all cut into lengths of 11 ft. beforehand) middled round the hawser at intervals of 3 ft. *with round-turns only*, and tied off to the handrail ropes with round-turns and two half-hitches, care being taken to keep the three ropes parallel throughout the operation.

Meanwhile the sheerleg experts would have lashed saddles of hessian, old tent canvas, or even plastic material, into the crutches, and assembled pickets, lashings, tools, and whatever else may be required, preparatory to laying down the two anchorages. Before the anchorages are built, however, the completed roadway should be hauled over the stream—perhaps by means of a light messenger line—and passed through the sheers with the hawser lying in the crutches and the two handrail ropes hand-strained and secured temporarily to the tips of the sheers. The main hawser can then be hand-strained at both ends to determine the exact position of the anchorages—a matter of supreme importance which is dealt with in some detail in 'The Aerial Runway Code'. In Chart XXIV, two types of anchorage are shown, but this is entirely a matter of choice to suit the terrain. The important point to remember is that the hawser must run in a true line throughout its length: the slightest deviation from truth will unbalance the entire structure. The second important matter is to determine the distance from the base of the sheerlegs to the front line of the anchorage. An easily remembered formula is to treble the measurement from ground-level to the crutch of the sheers and start the anchorage at that point.

With the anchorages down, the tackle can be mounted and the hawser strained. At this stage in the proceedings it will certainly be found that the sisal stringers have gone a little, or perhaps more than a little, askew. Not to worry. The first thing you must now do is to strain the two handrail ropes, either with a Handy Billy, or by using the same non-lock method of attachment to set up an improvised tackle by means of the Harvester's Hitch as shown in Chart XXV. The stringers can then be tidied up by adjusting the round-turns on the hawser, or the round-turns and two half-hitches on the handrails *without untying them*. This may be found difficult with your full weight bearing down on them, but it can be done,



If a Handy Billy is available, the method will be as shown in Fig. 34. Otherwise, the same purchase can be obtained by means of the Harvester's Hitch.

1. Handstrain the handrail rope and secure temporarily to the sheerlegs with a clove-hitch.
2. With a light (Handy Billy) rope, put a half-hitch on the handrail about 6 ft. from the spar, working ACROSS the lay.
3. Carry the tail of the light rope under the handrail rope and then make a few turns INTO the lay.
4. Secure the tail of the light rope temporarily to the handrail with a clove-hitch.
5. Set up the Harvester's Hitch (Chart XVII) in the light rope.
6. Strain the handrail by means of the Harvester's Hitch, then take up the slack and adjust the clove-hitch on the sheerlegs as necessary. The light rope may then be removed.

CHART XXV STRAINING THE HANDRAIL ROPES

and it should be borne in mind that if the stringers are to do their necessary work, the distance between them and the hawser must be kept constant throughout.

Now, after all that, anyone who imagines that the building of the simple Monkey Bridge is child's play obviously has another think coming. Neither is it beyond the capability of any *trained* Scout Patrol, working under trained boy-leadership. Consider the effect on *morale* within the Patrol when the job is completed and the boys can say with truth—"WE DID IT OURSELVES!"

There will undoubtedly have been times when, from your bird-watching position you have viewed the proceeding with your heart in your mouth and an overpowering desire to rush in and advise or help. All the more credit to you that you denied yourself the luxury of interfering. Let it be said again that this book is written in the conviction that if you train your Patrol Leaders and encourage them to train their own boys, then throw down a challenge—"Off you go and build yourselves a Monkey Bridge across the Taff!"—you may safely leave the rest on trust, confident in the knowledge that your boys will rarely, if ever, let you down.

What more can you ask?

#### 4. THE DRAW BRIDGE

This bridge will present few difficulties to any Patrol which has already tackled the Monkey Bridge successfully, but as shown in the illustration (Chart XXVI) it would entail an inordinate number of square lashings, all of which must be guaranteed. We must try to devise a method of fitting the cross-members to the footway which will avoid all that repetitive ropework.

The intention, of course, is that the butt-end of the footway should be lashed to a pivot log which will turn freely in the A-frames at the foot of the sheers. (Incidentally, saddles of hessian have been omitted from the drawing and would obviously facilitate the turning process by reducing the friction of wood on wood.) You will notice that the draw-ropes come up from the far end of the footway and pass over the sheaves of a double block before being brought together and hitched to the tackle with a catspaw. The theory is that this would ensure a straight haul, but if there is any taper on the heavy hinge-bar you may discover that it has a tendency to slide in one direction or another until the butt-end of the footway grinds against the leg of the sheers. (Adventurous pioneering is fraught with these incidental problems!) It might help to drive restraining pickets into the ground at either end of the hinge-bar, allowing it just a couple of inches clearance. Alternatively, you could replace the double block with two single blocks at either end of the transom to give you a wider spread. Lots of scope for further research, in fact!

As for all those irritating square-lashings along the footway, how would it be to use marlinespike hitches, as for a rope-ladder? The

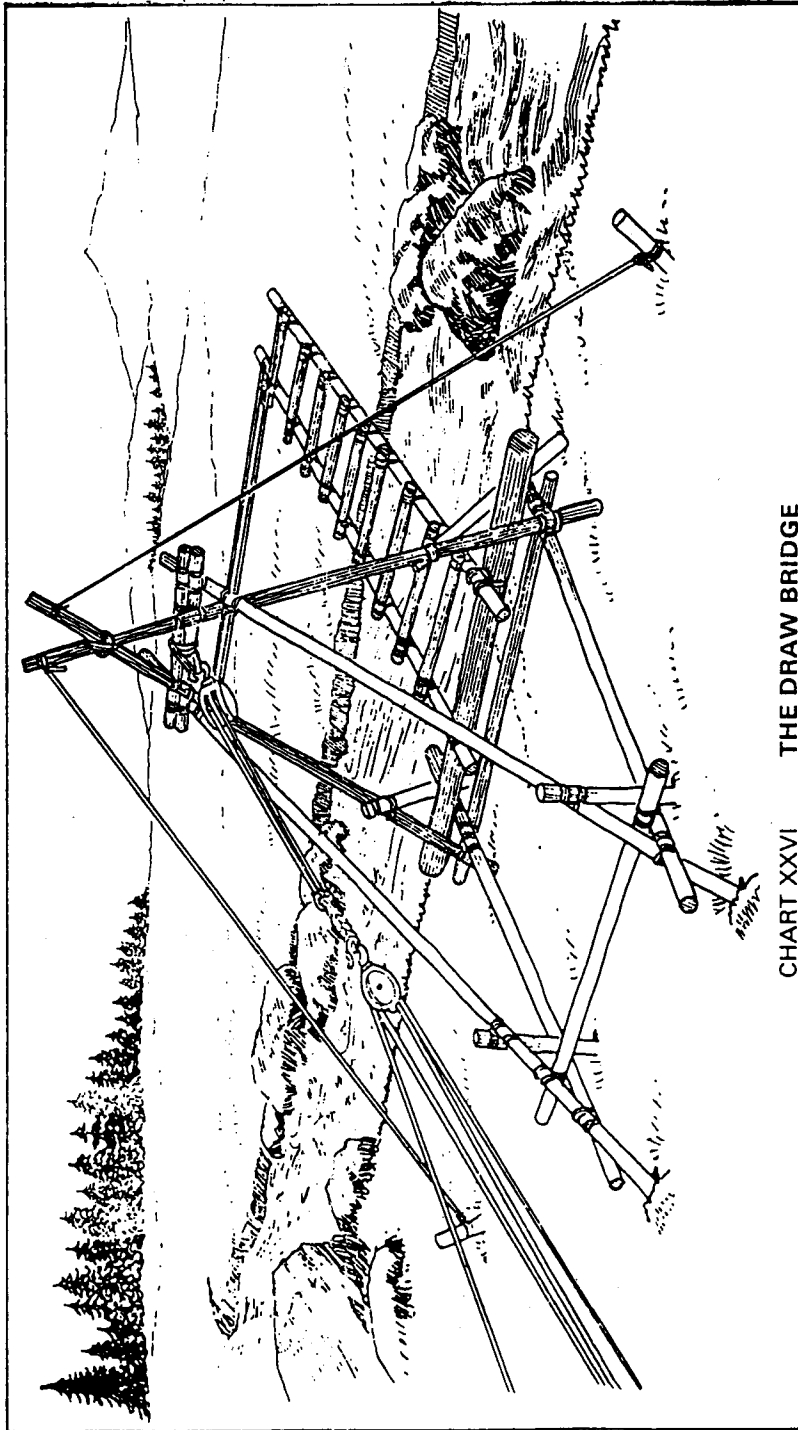


CHART XXVI THE DRAW BRIDGE

idea, as I see it, would be to lash the top and bottom treads in position, as shown in the chart, then make a rope ladder, using the other treads as rungs, and stretch it along the top of the bearers. A quick Japanese square lashing here and there would prevent the ladder from moving, or the ropes could be sheerlashed at intervals to the outsides of the bearers. The labour-saving would be enormous.

However, we must designate this project 'FOR EXPERIMENT ONLY' at the moment, and leave it to your boys to find out the hard way whether or not it works.

#### 5. THE ABINGTON SPRING BRIDGE

Our original intention had been to put this bridge forward as a suspension bridge, of the type seen on the Severn and the Menai Straits (built by Thos. Telford, 1757-1834, son of an Eskdale shepherd) but although it qualifies in principle we feel that springiness is its most endearing characteristic, so 'Spring Bridge' it shall be—the first of its class ever built.

It was invented and built with outstanding success (admittedly on flat ground) by a Wood Badge Patrol at the Cambridgeshire Training Ground at Abington some years ago. Again it involves a good deal of precision pioneering, but will present few problems if the ropeway is tailored to fit the spread between the two sets of sheerlegs. It will be seen that some movement is not only inevitable but essential to absorb some of the strain; also that whereas in other bridges most of the strain falls on the footway, here the hand-rail ropes bear the greater burden, while the stringers should be of light rope, rather than the usual sisal twine.

Two points occur to us. It will be seen that the footway is merely a rope ladder, using Scout staves as rungs. As shown in the Chart the ropes are widely spaced, and the breaking strain on the rungs would probably have caused some of them to snap like carrots under the weight of the average Group Scout Leader. It might be wiser, therefore, either to double-up on the staves (two to a rung) or make the bridge much narrower in order to reduce the bending-breaking moment. Our other after-thought is that we should have passed the suspension ropes through blocks at both ends of the bridge. Perhaps your own pioneers would like to discuss these matters before they get to work on their own version of this fine bit of backwoods civil engineering.

#### 6. THE SINGLE LOCK TRESTLE BRIDGE

This is yet another example of precision pioneering, to the extent that it must be tailored to suit the gap it is intended to bridge, while the trestle and footway units must be designed to fit snugly into each other. A spot of pegging out of spars on the ground is clearly indicated, and of course the distance across the

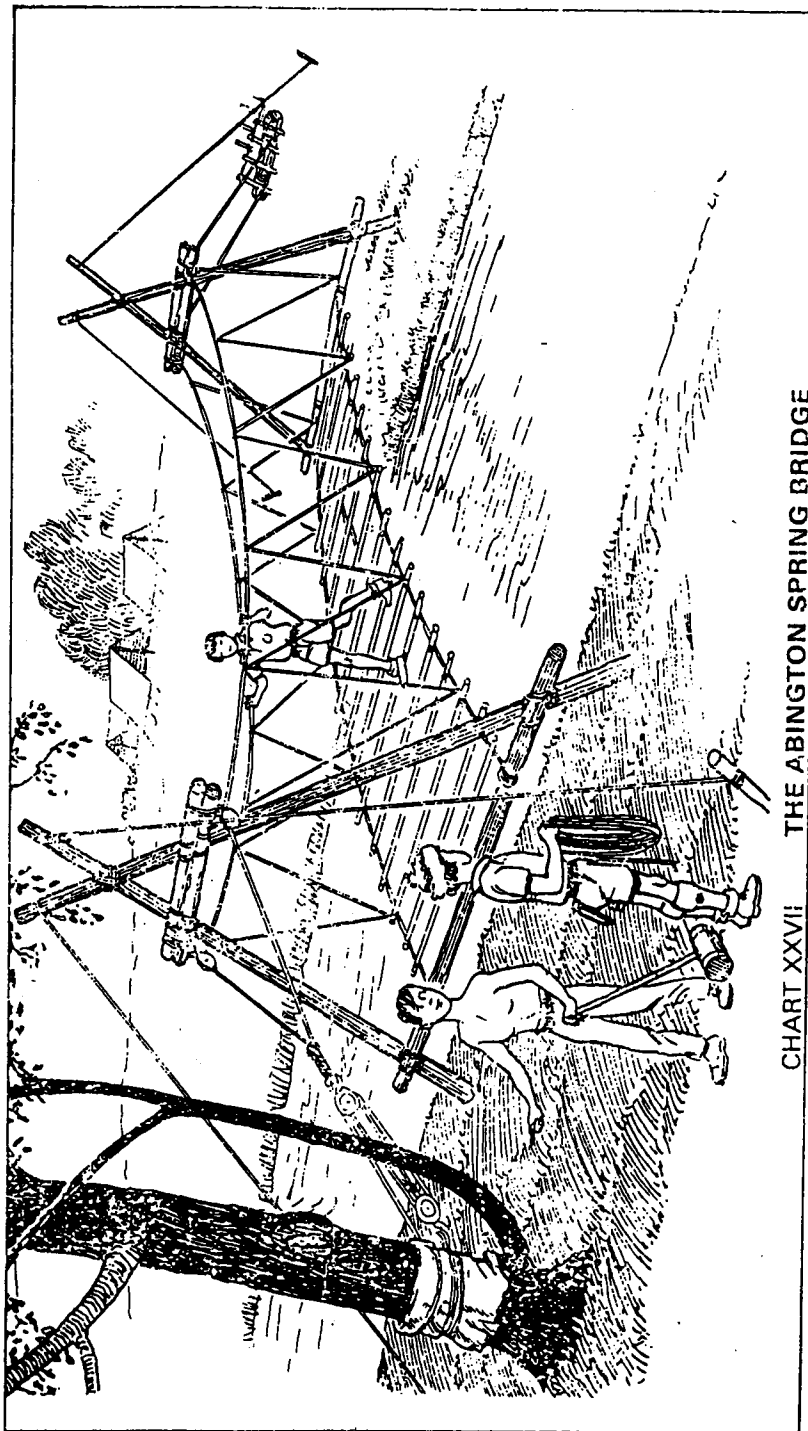


CHART XXVII THE ABINGTON SPRING BRIDGE

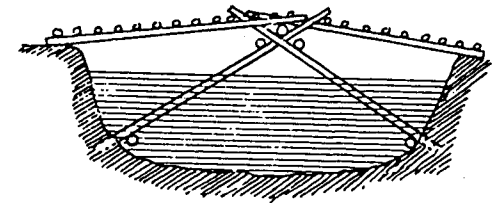
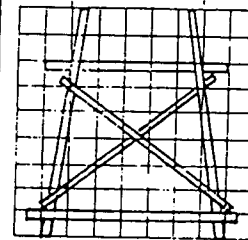
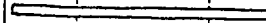
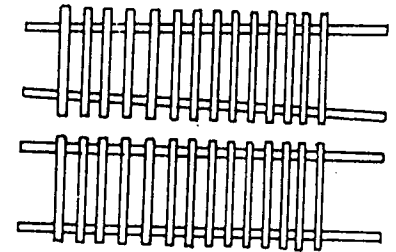
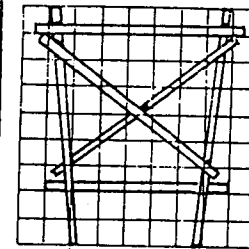
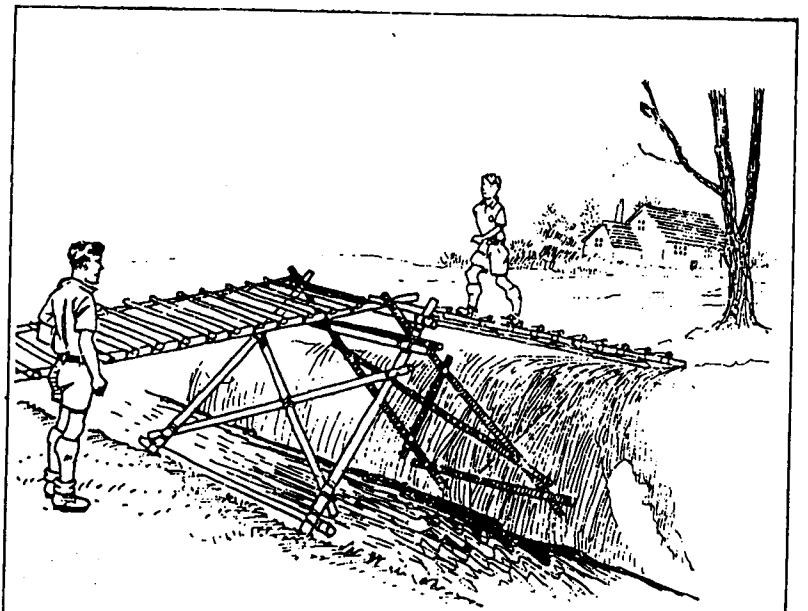


CHART XXVIII THE SINGLE LOCK TRESTLE BRIDGE

gap must be measured accurately.

It is of the greatest importance that the butts of the trestles should be well heeled into the ground, and that they should lean inwards at an angle not greater than 45 degrees. If the gap is too wide to be bridged by the single lock (as shown in the chart) the two trestles can be separated by another length of footway, which would make this a 'double lock' bridge.

Again we are faced with the prospect of laying on one boring square-lashing after another in the construction of the footway. Perhaps this might be as good a time as any to introduce you to the so-called 'SWIL' lashing, which can be applied in a matter of seconds and has been found quite suitable for short-lived pioneering structures where no great strain on the lashing is involved.

To prepare the lashing take a 36 ft. length of 3-strand sisal twine and use a fisherman's knot to turn it into a strop. Bend a strong rubber band on one end of the strop with a larkshead knot made in the twine (not the band). Loop the other end of the strop round any convenient spar and square-lash in the Japanese style with both parts of the twine together. Apply two or three frapping turns—enough to use up the end of the twine—then simply hook the band once or twice round any convenient spar.

#### 7. THE ROCKER BRIDGE

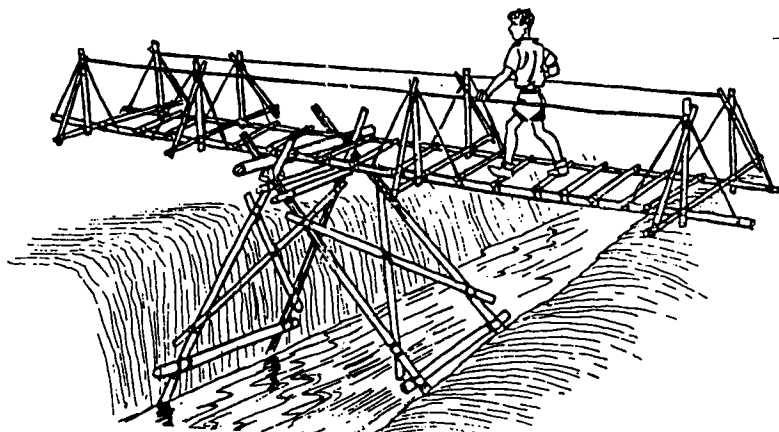


Fig. 36.

This bridge first saw the light of day at Thriftwood, the Essex County Training Ground near Brentwood, many years ago. Our only problem then was that the long bearers for the footway *would* twist, however securely the treads were lashed on to them. Perhaps we were too ambitious. I cannot now remember how long those spars were, but I do know that the highly-experienced Venture Scouts of the 14th Lowestoft had the same trouble when they tried to use over-long spars (24 footers, I think) for some other pioneering purpose. My own impression is that the problem is

insoluble, even if, as is rarely the case, cross-ties are possible, but it may be that there is a way round it by lap-jointing a number of shorter spars together to obtain the required length.

Over, as they say, to you!

Leaving aside the spar problem, this is merely a simple single-lock trestle bridge with the footway in a state of constant imbalance so that it returns automatically to the take-off side. No problem about that, but if necessary the take-off end can be weighted with an extra log.

For obvious reasons handrails are essential. The problem here is to keep the posts rigid. The method shown in the illustration is reasonably effective but unlovely. A better idea—passed to you for experiment—would be to use Scout staves as posts, with overhead crossbars between them and guy-lines from the top corners in place of the short struts shown in the diagram. The extension of the treads on each side of the footway would still be necessary, but at the moment we can see no way of avoiding this. Can you?

#### 8. THE PYLON BRIDGE

The history of this next project might have a special interest in that it illustrates the heroic efforts that have been made in past years to relate the superficial activities of scoutcraft to the deeper aims and purposes of Scouting as an approach to life in terms of the Promise and Law.

The Pylon Bridge had its baptism (literally) in the Bomb Hole at Gilwell some years ago. The Venture Scouts of Essex, led by that great Scout His Honour Judge Gerald Hines, Q.C., were in the throes of a 'Promise and Law Course', and the technique adopted was to illustrate every philosophical point by practical activity, so that the obligation of duty to one's neighbour was driven home by a fairly hard-slogging job of work for the Camp Chief; 'kindness to animals', which in those days was prescribed by law, by the setting up of nesting-boxes in selected trees. The building of the bridge was linked in a rather obscure way with the spirit of brotherhood. The argument was that team-work as such was a practical exposition of this spirit which might easily be understood by boys of Venture Scout age, but in any case it seemed to us of equal importance that we, as their temporary leaders, ought to display the spirit of brotherhood by letting them off the hook for a spell of adventurous activity after they had been sitting good as gold for hours on end while someone on the wrong side of the generation gap sounded off about matters of the spirit.

In practical terms, the idea behind the building of this bridge was to break new ground by using the so-called 'Ten-Minute Tower' to provide pylons for an exceptionally long footbridge across the widest part of the Bomb Hole. In preparation for this activity (for time was strictly limited) a very strong fore-and-aft runway had been set up across the Bomb Hole and the footway had been prepared in sections so that they could be dropped in place the

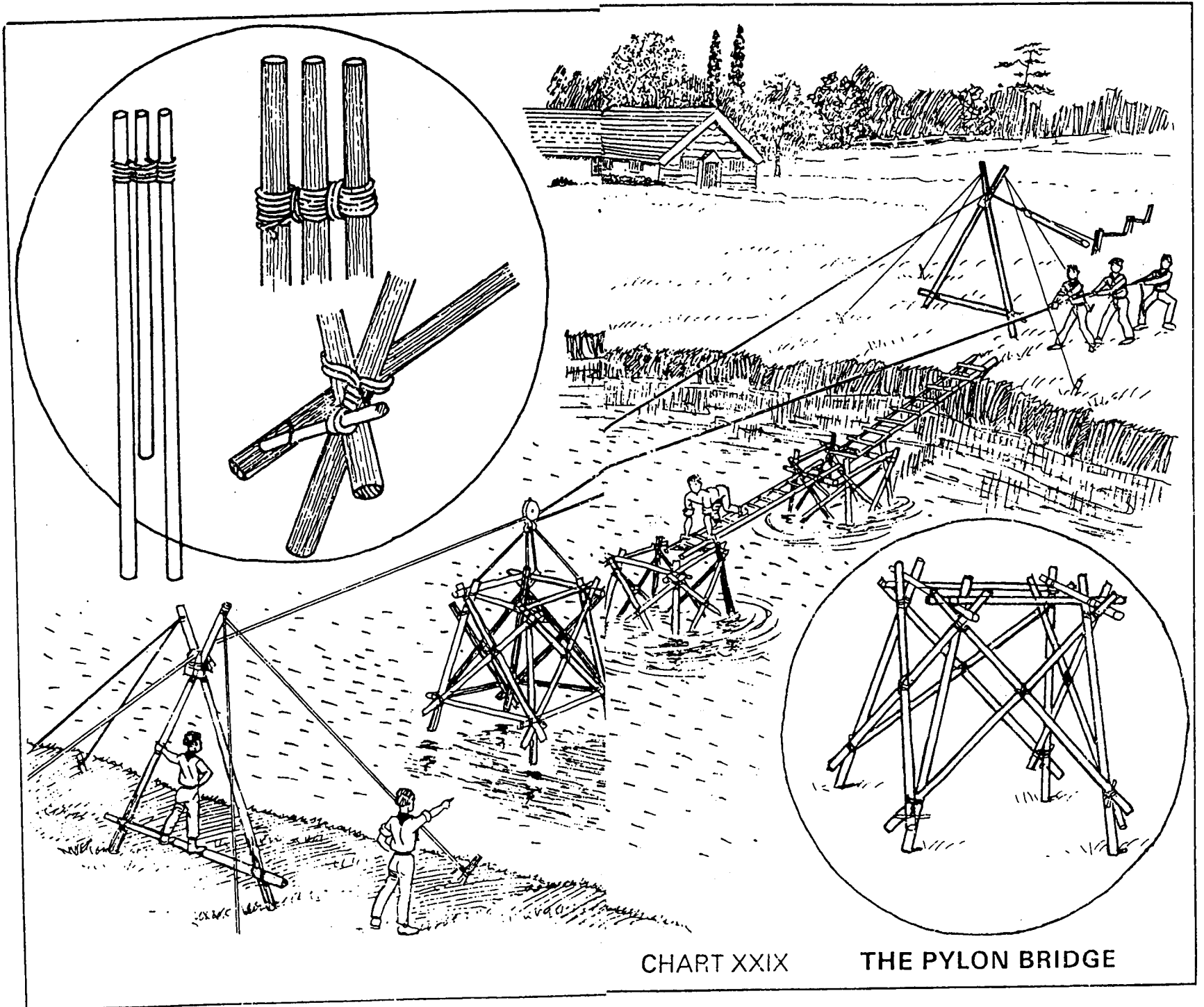
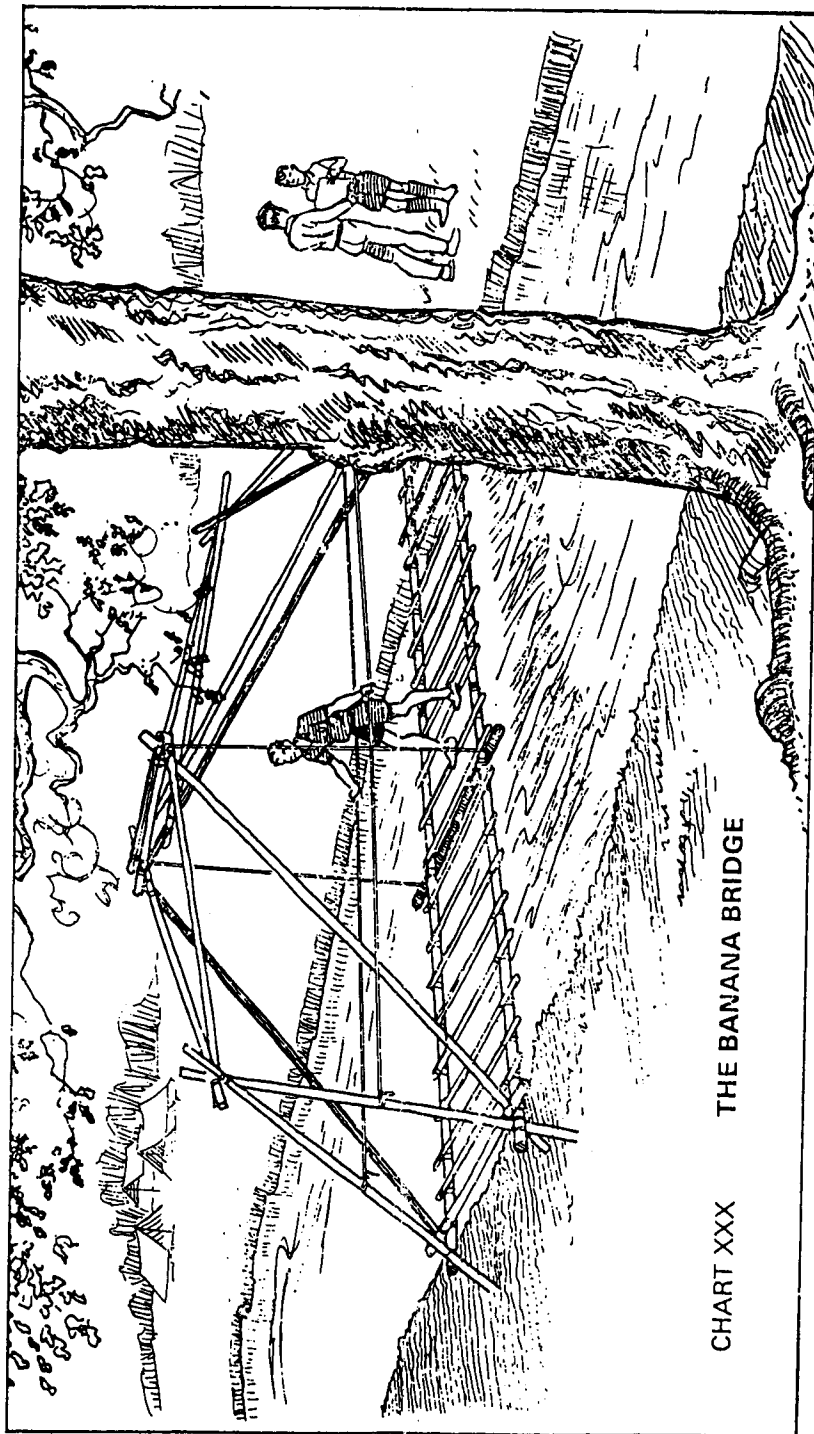


CHART XXIX

THE PYLON BRIDGE



moment each pair of pylons were in position. Luckily we had access to a pile of builders' planks which made the job easy.

The project, I may say, was a howling success, despite—or perhaps because of—the need for some frantic on-the-spot improvisation. One thing we had not realised, for instance, was that the Ten-Minute Tower, though reasonably stable when standing on its own four legs, is apt to fold up at the base when lifted clear of the ground. This difficulty was quickly overcome by lashing a few extra struts to keep the legs apart until the pylons were safely embedded in the mud. The climax came when the entire course lined up across the bridge to have their photographs taken. All would have been well had not one of the Gilwell spars turned out to be rotten at the heart (something that would have been discovered in time if the spars had all been submitted to the ringing test, as instructed.) But it's an ill wind . . . and to this day I treasure the spectacle of a cataract of boys diving headlong into the muddy waters of the Bomb Hole and laughing their heads off in the process. I doubt if Gilwell has ever seen a finer sight.

### 9. THE BANANA BRIDGE

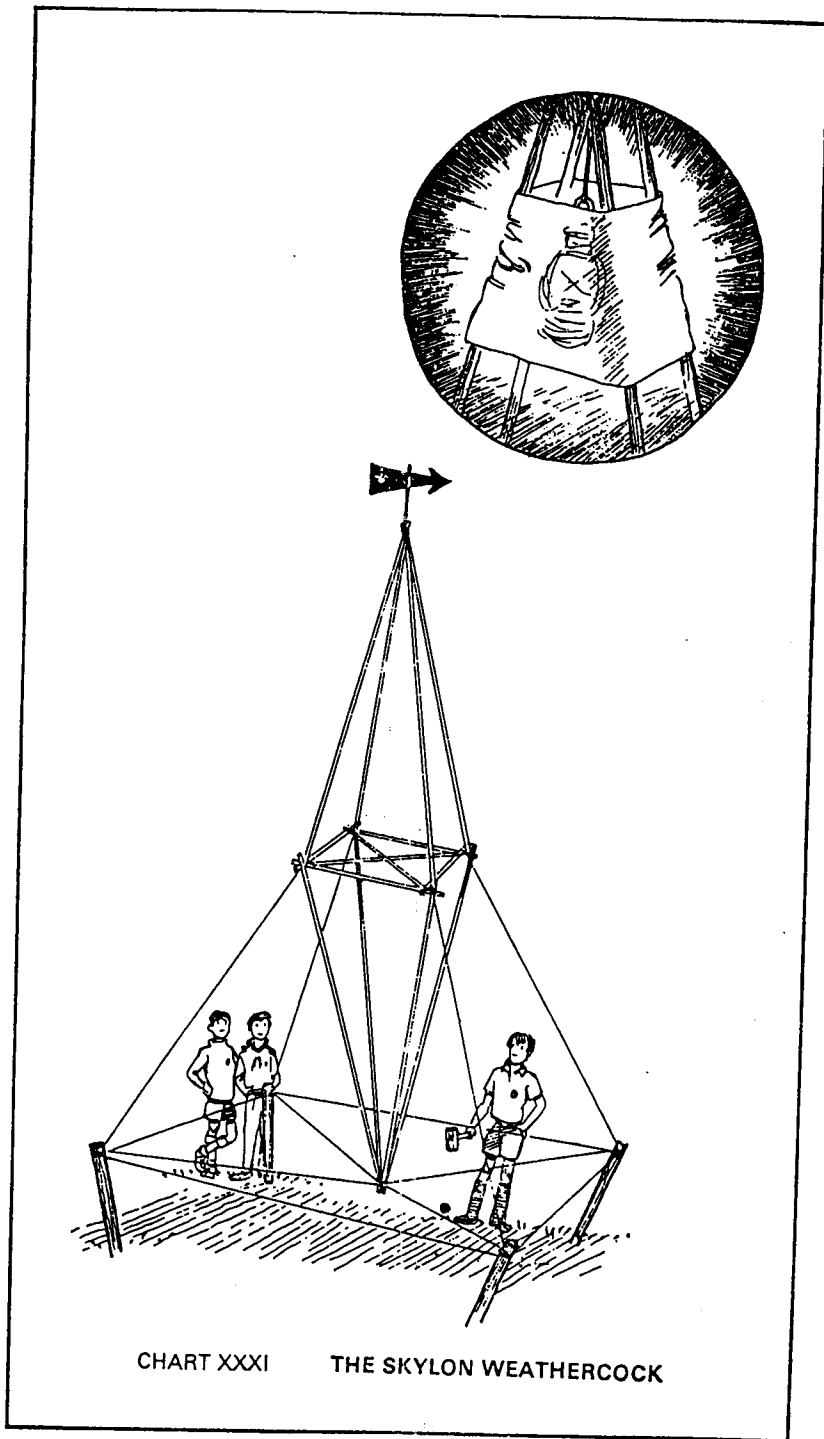
Here we have another example of a bridge that found its own name. It came off the drawing board as 'The Thriftwood Unilock Bridge', but when we were giving it a trial run on a Wood Badge Course in Essex a lady-member of the County Training Team shimmered by and, mistaking it for a Monkey Bridge, tossed us a banana. So the Banana Bridge it became from that moment, and by that name it shall be known for ever more.

The unique feature of this structure is that the main arch is built in two separate but identical sections which lock together and need no other anchorage. Each section consists of two sheerlegs lashed together at their crutches to form a long, low pyramid, with two ledgers stretched between the butts. At Thriftwood we built it on flat ground and found no difficulty in marrying the two units, simply by heeling their butts into the turf and then raising the other ends with ropes so that they pawed the air like mettlesome steeds and then fell into a firm clinch. Erecting this bridge over a fast-flowing stream might not be quite so easy. Clearly some careful measurement will have to be done in advance to ensure that the two units lock at the right angle. If the butts are too far apart, they will simply collapse upon each other and be borne away on the torrent; if too close together, they might cartwheel backwards with calamitous results. It is altogether a sporting effort and well worth a few hours of anybody's time.

### 10. THE SKYLON WEATHERCOCK

We were indebted to the boys of the 29th Norwich *circa* 1965 for this attractive design. As you will observe it is soundly based on the eternal triangle and is therefore structurally impeccable. When





viewed from afar the supporting ropes are practically invisible and the air-borne effect is striking. The 29th used their skylon to mount a weathervane and had the cardinal points of the compass marked out with tent pegs round the base. Another idea would be to suspend a hurricane lamp inside the upper cone and wrap a sheet of opaque polythene sheeting round the outside. (Old fertilizer bags would be ideal for this purpose). This would shed a ghostly radiance at night and keep evil spirits away from the sleeping camp, or at least help some hard-pressed tent-dweller to find his own way to the lat in case of emergency.

### 11. THE BRYNBACH TOWER

For several happy years I was privileged to serve as Field Commissioner in North Wales. One of my jobs was to give occasional pep talks to captive audiences of parents and supporters. Whether or not my flights of oratory achieved anything but boredom I shall never know, but certainly I learned a good deal in return.

On one occasion, at question time in Llangollen, a stout father in the middle of the front row (there were only two) rose portentously to his feet and pointed an accusing finger at me. "What," he demanded, "have you been doing to my boy? No use saying you haven't done anything," he went on, before I could utter a word, "because you had him on some training course at Brynbach the other weekend and ever since then he's been getting up at six in the morning to flash morse signals to his friend across the Vale."

"But that was a *pioneer* badge course," I protested—and then the penny dropped.

One of the patrols had built themselves a signalling tower on the heathered crown of Bryn Ocyn.

"Told you, didn't I?" said the stout parent triumphantly. "That's it! That's what we've got to do to set Scouting alight in Llangollen. Build a few more signalling towers." And on that note of high inspiration the meeting went into session to discuss the nature of the 'signalling towers' they could build to help Scouting along in their native town.

A true story. It could only have happened in Wales, and the moral is clear.

Turning to more practical matters, you will notice that the Brynbach Tower is based on sound pioneering principles, with triangles everywhere to ensure rigidity, not least in the important matter of the handrails. (Unsupported handrails are a menace and should be ruled out entirely.) This has been achieved by extending the main platform spars for 18 in. or so beyond the point where they are square-lashed to the legs, so that each rail post can be brought in at an angle and lashed in two places to form a triangle at the base.

As shown in the chart, three 15 ft. spars would be needed, but if none are available two shorter spars can be lap-jointed to give you the required length. The overlap should be not less than one-third

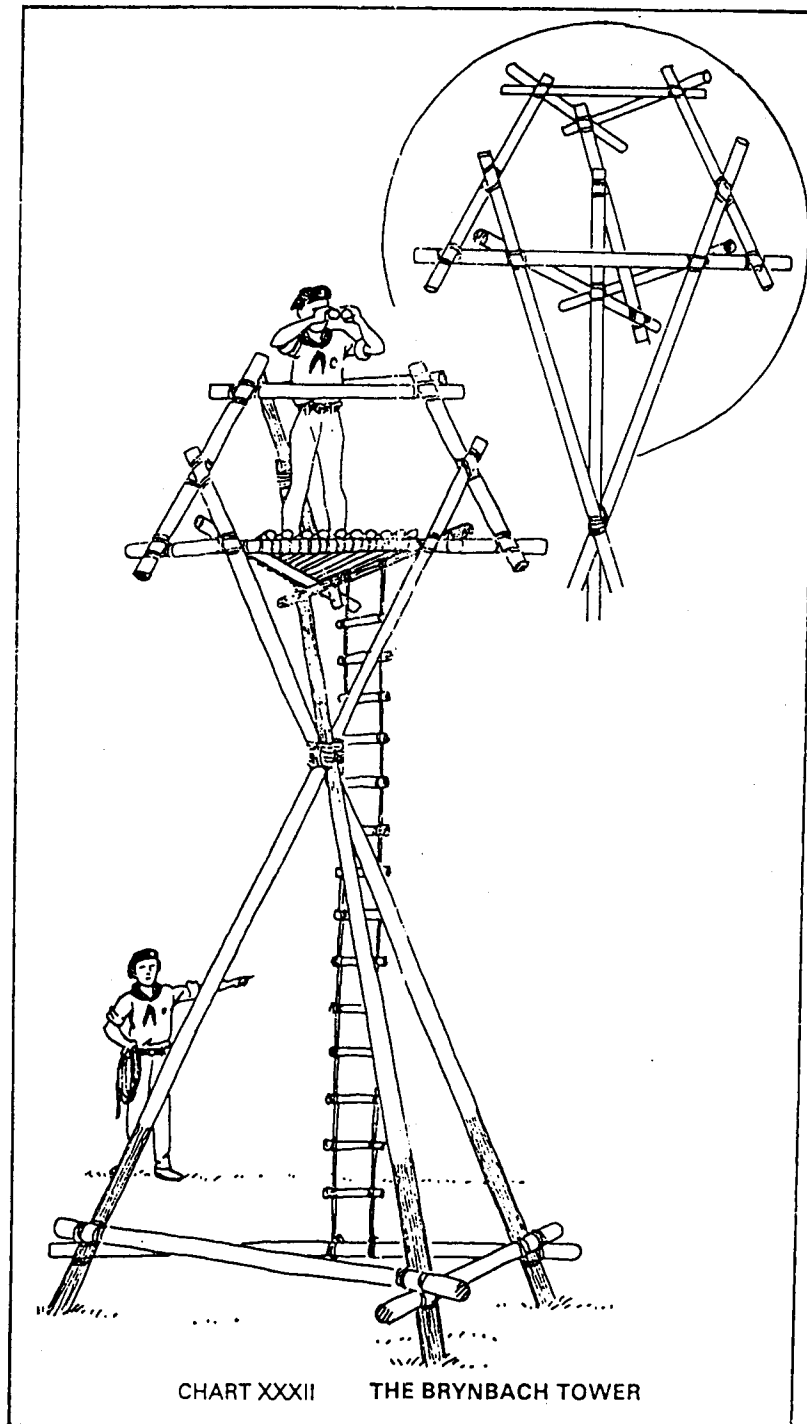


CHART XXXII THE BRYNBACH TOWER

the length of the longer spar, with sheer lashings at each end of the joint. If this is done, your pioneers must bear in mind that no part of the lashing should separate the two spars, so frapping turns are out. Start with a clove-hitch round both spars, lock it, then bind tightly and finish with another locked clove-hitch—if necessary driving small softwood wedges between the lashing and the spar at both ends of the lap-joint for extra tightness.

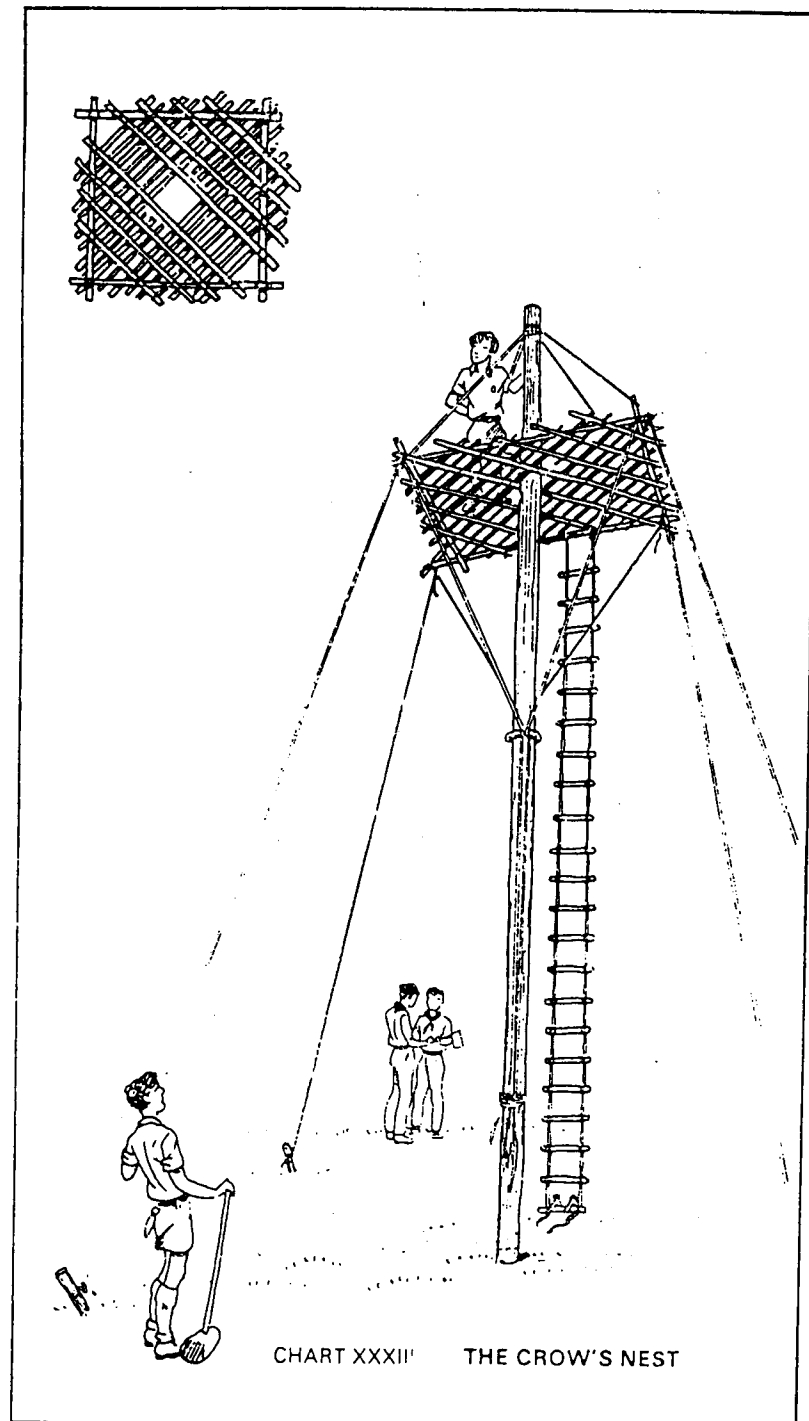
In this and all other towers in this section, the main part of the structure will be built on the ground and then raised by means of a lever spar. The figure-of-eight lashing should be applied two-thirds of the way from the butts to give a reasonable spread to the feet of the tower and maintain a low centre of gravity, and the rope-ladder should be fitted before the structure is raised. It is of the greatest importance that the foundations of the tower should be both level and secure. This is best done by heeling the butts into the ground for 12 in. or more. At this point the man in charge should stand well back from the job to make sure that the tower is erect and the platform level. If need be, any unevenness at ground-level can be rectified by sinking the butts to varying depths, and your pioneers may find that, in order to preserve symmetry, this is best done *before* the ledgers are lashed across the butts.

The first man up the ladder should test the balance of the tower by bouncing on the third rung before climbing to the platform, and it might be prudent to have a couple of men standing on the ledger at the opposite side until the reliability of the pioneering can be proved. This is a matter for the Patrol Leader and once more has a training value far above the importance of the technical training involved in the building of the tower.

## 12. THE CROW'S NEST

Let no-one be deceived by the apparent simplicity of this structure. The truth is that a reasonable degree of safety can only be guaranteed if both materials and workmanship are up to the job. It is definitely not a project which should be on offer to inexperienced pioneers.

One of the great problems in all towers built at ground-level and then raised to the vertical position is to ensure that the platform is level. In the case of the Crow's Nest it will be seen that the platform is suspended on four ropes from the top of the mast to the four corners, after which the same ropes are carried down to pickets placed equidistant from the foot of the mast. Great care should be taken to see that the suspension ropes are exactly the same length and that the hole in the centre of the platform (formed by the four cross-members, two on each face) is tailored to fit snugly round the mast. If necessary the mast can be padded with sacking at this point to make all tight, and any possible tilt can then be adjusted by the four rope struts below the platform. These, as you see, run down to a rope grommet, to which they are secured *with half turns only* before being strained and tied off with rolling-hitches at the foot of the mast.



The preparatory work can be spread evenly over the work-force, leaving the Patrol Leader free to direct and supervise at every stage. One man should be deputed to dig a hole at least 18 in. deep to take the butt of the mast, with a ramp running down to it for easy passage when the mast is raised. Two others would lash the mast temporarily between two convenient trees, or otherwise raise it in the horizontal position 5 ft. clear of the ground, with the tip of the spar protruding some 6 ft. beyond the support so that the grommet and the platform (in that order) can be slipped over the end. The same two men would then use a length of sisal to determine the position of the four pickets at equal radius from the centre of the hole, and drive them in at the correct angle to take the main guys. Ultimate safety will depend on these pickets and they should be at least 4 ft. by 4 in. butt driven in for two-thirds their own length.

Perhaps the most boring task will be the fabrication of the platform. Four spars of about 6 ft. will be needed for the square frame, and four of 8 ft. for the cross-members, plus a number of shorter spars for the flooring. Orthodox square lashings should be used for the main timbers, but elsewhere the 'rapido' lashing can be applied. This job should be entrusted to the Assistant Patrol Leader and one other, while two others concentrate on the manufacture of the rope ladder. The Patrol Leader will lend a hand where assistance is needed—always bearing in mind that his main responsibility is to co-ordinate the work and make sure that all his men are happily employed. This might involve a 'general post' from time to time, so that no one has any excuse to complain of boredom; but if boredom does threaten, the well-trained Patrol Leader will be quick to act as relief man at that point *first*.

When the preparatory work is completed (not forgetting the rope ladder) the mast can be carried to the spot chosen for its erection and the butt placed at the top of the ramp while the tip is held clear of the ground so that no undue strain is imposed on the platform. If necessary, a lever spar can be used to raise it. All guy-ropes should be manned. If all goes well, the butt should slide down the ramp and drop into the socket hole, after which it will be a simple matter to strain the guy-ropes (perhaps with harvester's hitches) and tie off to the pickets. The ramp and socket can then be filled in and the soil well tamped down all round to make a snug fit.

The Patrol Leader, having doubtless received training in the important matter of the responsibility of leadership, will naturally submit the structure to a fair bashing from ground-level to ensure a reasonable factor of safety before allowing the first man, probably his Assistant, to climb to the Crow's Nest. Maximum strain will fall on the platform when the ladder is in use, and during this period the guy-ropes aft of the mast should be manned reliably while the Patrol Leader stands well back so that he can watch the behaviour of the platform and call a halt if any undue movement occurs.

Let me repeat that this project is certainly *not* for inexperienced

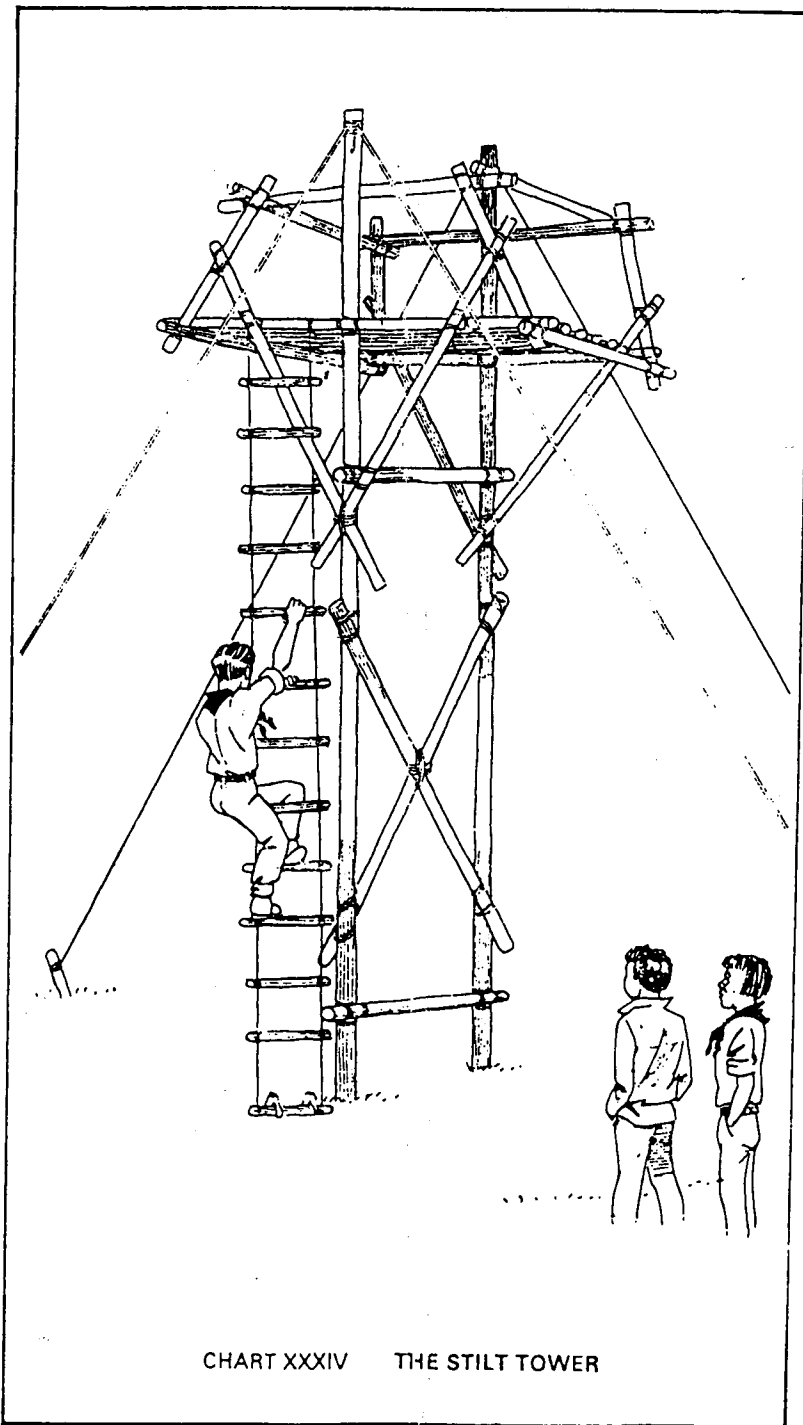


CHART XXXIV THE STILT TOWER

pioneers, but under trained leadership there is no reason why it should not be in the repertoire of any Patrol which has already proved its technical efficiency in, say, the building of a small Monkey Bridge and the successful completion of a few 'limbering up' exercises as suggested in this book.

### 13. THE STILT TOWER

Little need be said about this structure, except to state the obvious—that it will only pass muster if the lashings are sound.

The relaxed attitude of the two spectators in the illustration indicates either that they have every reason to feel confident, having already been to the top themselves, or are over-confident without reason (otherwise they would be manning the guy-ropes on the far side of the tower to balance the weight of the climber), or perhaps that they don't much care what happens to their friend. Such situations are not unknown in Scouting.

It may be that the method of climbing a ropeladder is not as clear from the drawing as the artist had hoped. The idea is to straddle one of the ropes and go up sideways, with hands and feet using the rungs from both sides. It is an awkward business at first, but you soon get the hang of it.

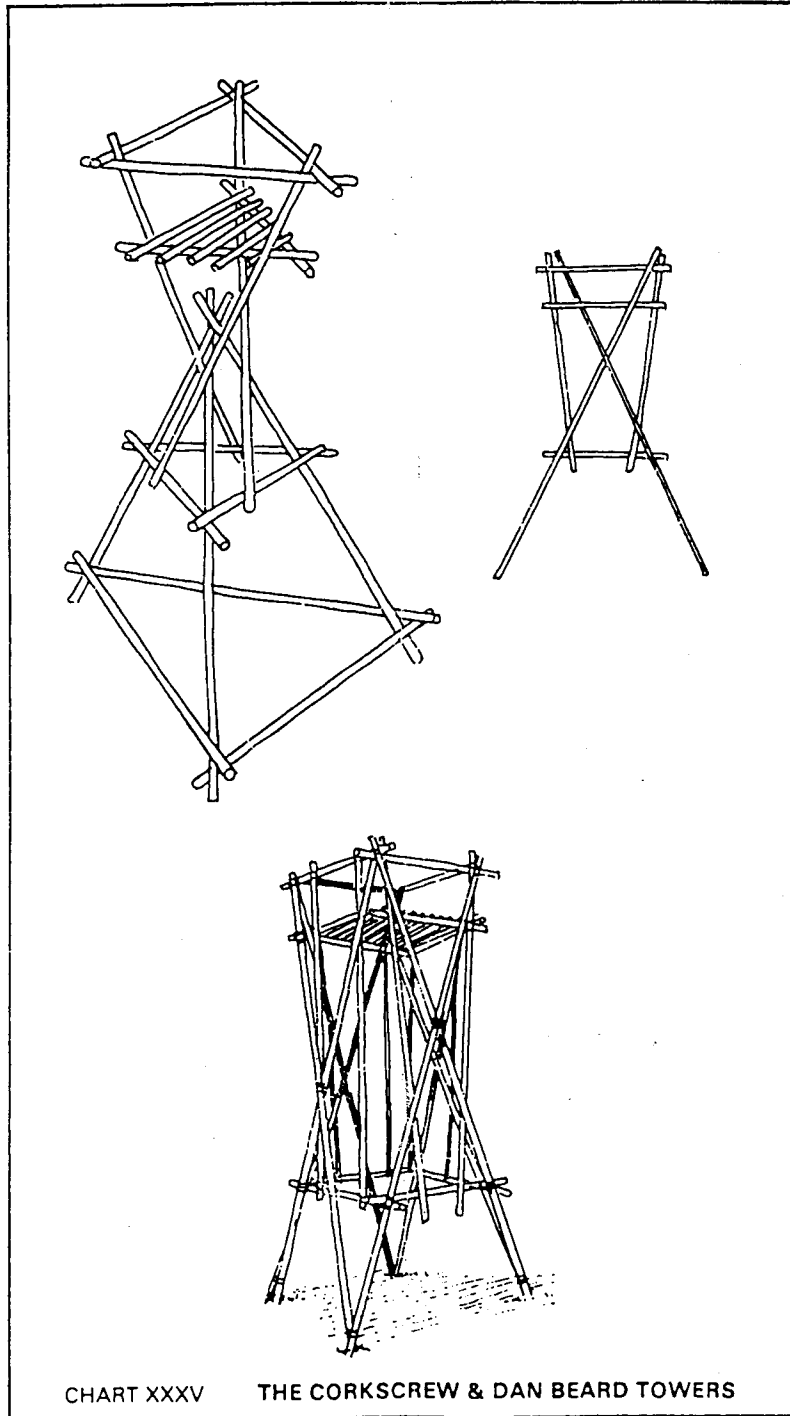
### 14. THE CORKSCREW TOWER

I have to admit that at the time of writing this tower has not really got off the drawing board. On the other hand, my poor illustration does less than justice to the model I have made with split canes and grey thread elastic bands, where the charming corkscrew effect is much more apparent. Anyhow, I feel modestly confident that there is a great future for the Corkscrew Tower and that in time it will even rival in popularity the Gilwell Pyramid (Hourglass) Tower—not least because it is so much easier to build.

For clarity I have omitted all but the six square lashings concerned with the corkscrew. The figure-of-eight lashing, will of course, be applied at the apex of the tripod. Elsewhere square or Japanese lashings will be needed, and as always the butts of the tripod should be well heeled into the ground.

### 15. THE DAN BEARD TOWER

Dan Beard, the famous American writer and illustrator, was turning out books about backwoodsmanship and primitive pioneering several years before B.-P. entered the field by way of Brownsea Island and that windmill on Wimbledon Common where he wrote *SCOUTING FOR BOYS*. Dan Beard's books are long out of print. His ideas were imaginative in the extreme, and often quite practical, but frequently called for materials which might have been plentiful in the backwoods of North America but are in short supply elsewhere.



This tower is based on one of his ideas as described by our own Gilcraft in his book *PREPARING THE WAY: PIONEERING* published in 1931 and also, regrettably, long out of print. The tower calls for a large number of fairly long spars, but Gilcraft avers that "it is not so difficult to build as may be imagined; a schoolmasters' training course achieved a very good result in quite a short time!" The guarded nature of that statement should be noted!

One possible criticism of the design is that it seems to lack cross-ties in the horizontal plane, so that in theory there would be nothing to stop this lofty structure from emulating our own Corkscrew Tower (minus the same built-in guarantee of stability) but perhaps this point is academic rather than realistic.

#### 16. THE HOURGLASS TOWER

This extremely popular tower was originally christened 'The Pyramid', although clearly it is no such thing. It consists of two tetrahedrons, the larger forming the base unit with the second mounted above it in reverse to provide a foundation for the platform. We have considered calling it 'The Tetra Tower', a name which trips nicely off the tongue, but have decided instead to re-christen it 'The Hourglass Tower' and hope this will be accepted.

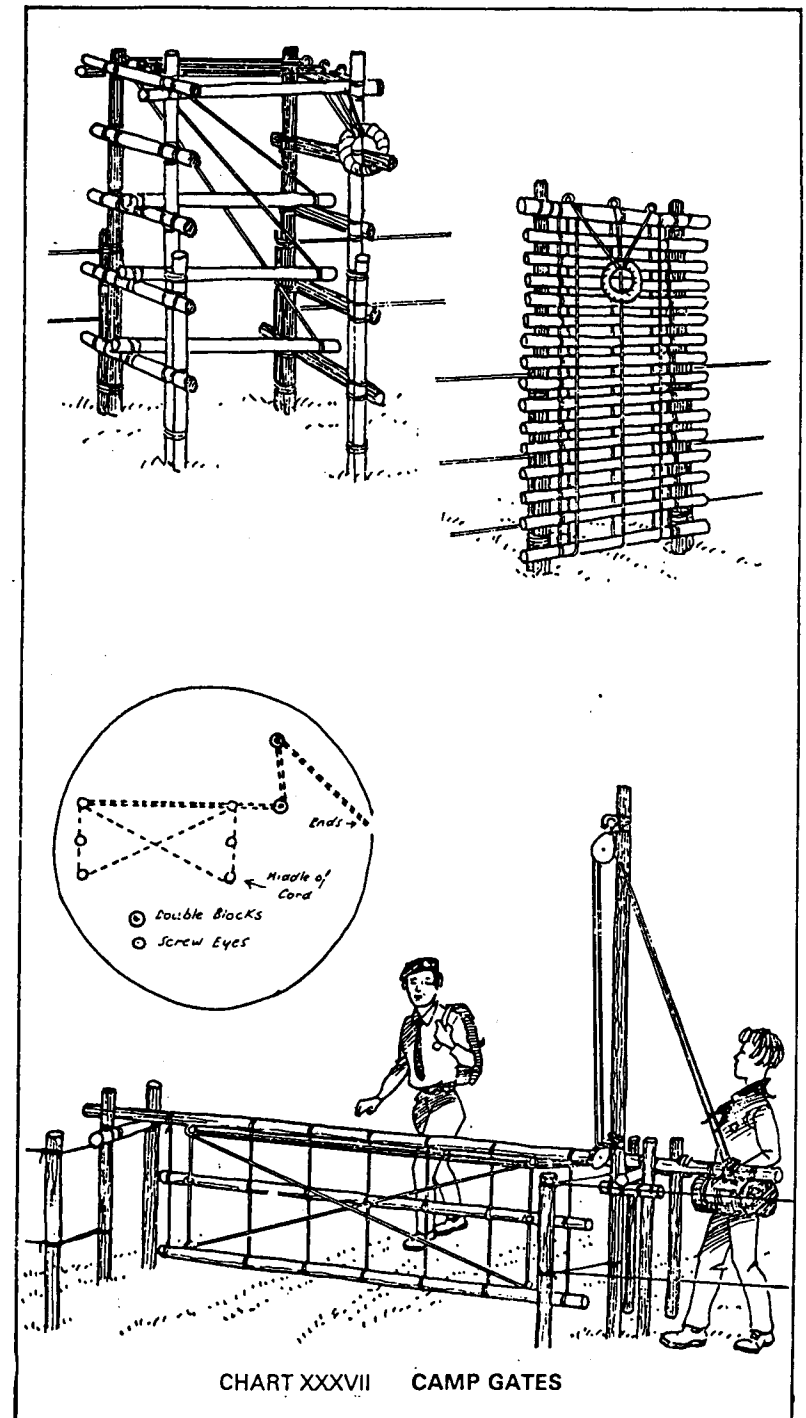
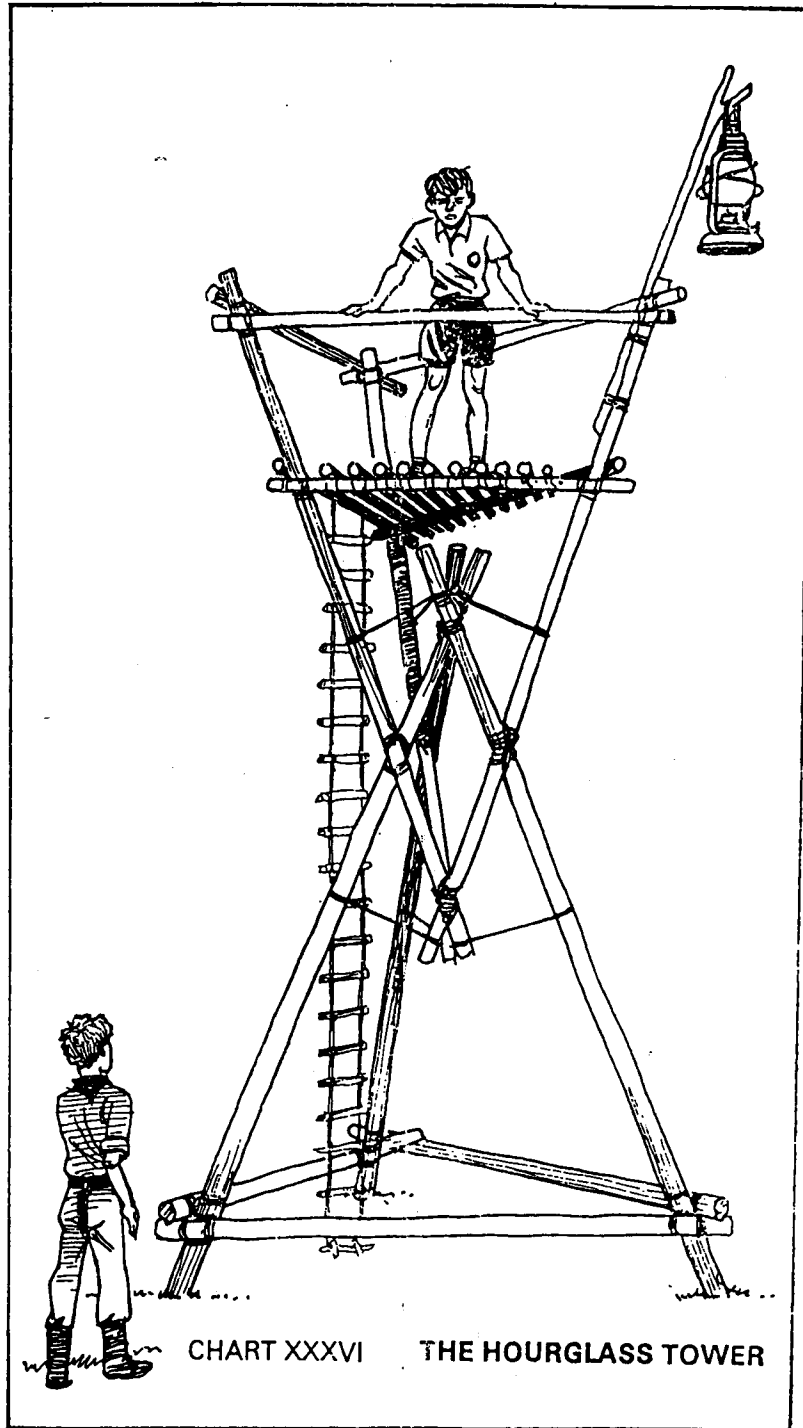
The great problem has always been to get the platform level and great care should be taken in measuring off and marking on the spars the precise position of the lashings at the points where the tripods are married. Even when this has been done it will be appreciated that the slightest inaccuracy here will be exaggerated at the top. The only cure is to have a 'trial run', while the man in charge stands back and takes a reading with an improvised plumb-bob, then lower the tower again and adjust one of the lashings as may be necessary before re-erecting the tower in its final position. The butts, of course, should be well heeled into the ground.

One thing that will be obvious is that although the two tetrahedrons are built independently of each other, one spar of the upper unit must be left unlashd until after they are married.

#### 17. CAMP GATES

Long experience has taught us that if you leave the laying out of the Patrol camp kitchen to an uninstructed Patrol Leader he will almost invariably start with the gate. In the field of psychology it is all of a piece with the child who plucks the cherry from the top of the birthday cake. The ever-watchful Scout Leader, studying the natural behaviour pattern of his boys from a reasonable distance, will perhaps learn a little more about them from this before way-laying the Patrol Leader concerned and helping him to sort out his order of priorities.

It may be that in the mind of a boy a splendid gateway to the camp kitchen is a sort of status symbol. A bit of one-upmanship, if you



like. And why not? I learned my own lesson long ago at the *Jamboree de la Paix* at Moisson in France when in my capacity as Assistant Scout Leader to one of the troops from Hertfordshire I personally designed and supervised the erection of a magnificent gateway, and then had the mortification of watching the boys of our gallant neighbours from Essex going one better, without benefit of adult advice or know-how, by putting up a much better, battlemented gate with twin, man-carrying towers at each side.

In Chart XXXVII the first and second gates are definitely 'One Way Only', although gate No. 1 can be changed from In-to-Out and Out-to-In merely by switching the rope grommet from one side to the other. It will be seen that the three bars of this gate are hinged with loose square-lashings and can be held in the raised position by slipping the grommet over the end of the lowermost side-bar on the opposite wall.

In the original conception gate No. 2 was intended as a 'Modesty Screen' for latrine-shy first-time campers, the idea being to make a sort of venetian blind with garden canes which could only be operated by the sitting tenant, thereby ensuring absolute privacy. A tent peg was driven into the ground below the screen to hold the grommet when vacant possession was available. Built as shown in the chart the gate posts will be under considerable strain when the screen is being raised and will need to be well supported at the base. Perhaps it would be as well to use lighter material than the artist has indicated; this would make it possible for anyone other than an olympic weight-lifter to raise the screen and would reduce the danger of being felled to the ground by a dead-weight of timber in the event of a fumble.

The third gate in Chart XXXVII is based on the Brynbach model designed by the Founder during a visit to the West Cheshire camping ground in North Wales many, many years ago. We are told that B.-P. made his sketch on the spot, and that the men of Cheshire then went to considerable trouble to find a tree which would provide a gatepost in exact accordance with his design. There's devotion for you! All I can tell you from first hand knowledge is that the mechanism of the thing worked like a dream. So finely balanced was the gate, in fact, that although chains were used in place of the light cordage shown in our own diagram, a Cub Scout in his first year could have worked it—and no doubt often did.

Is B.-P.'s gate still there? I do not know, but there is nothing to prevent your boys from reproducing it—and thus re-establishing a lively link with the Founder—whenever you are in a position to provide them with the opportunity, the materials, and (here we come to the nub of the matter) the incentive which only you, their leader, can give.

Little need be said about the Star of David Gateway, except perhaps to suggest that it might be interesting to sling it between rubber bands at top and bottom and see how it behaves. The gate itself is a featherweight arrangement of light garden canes and

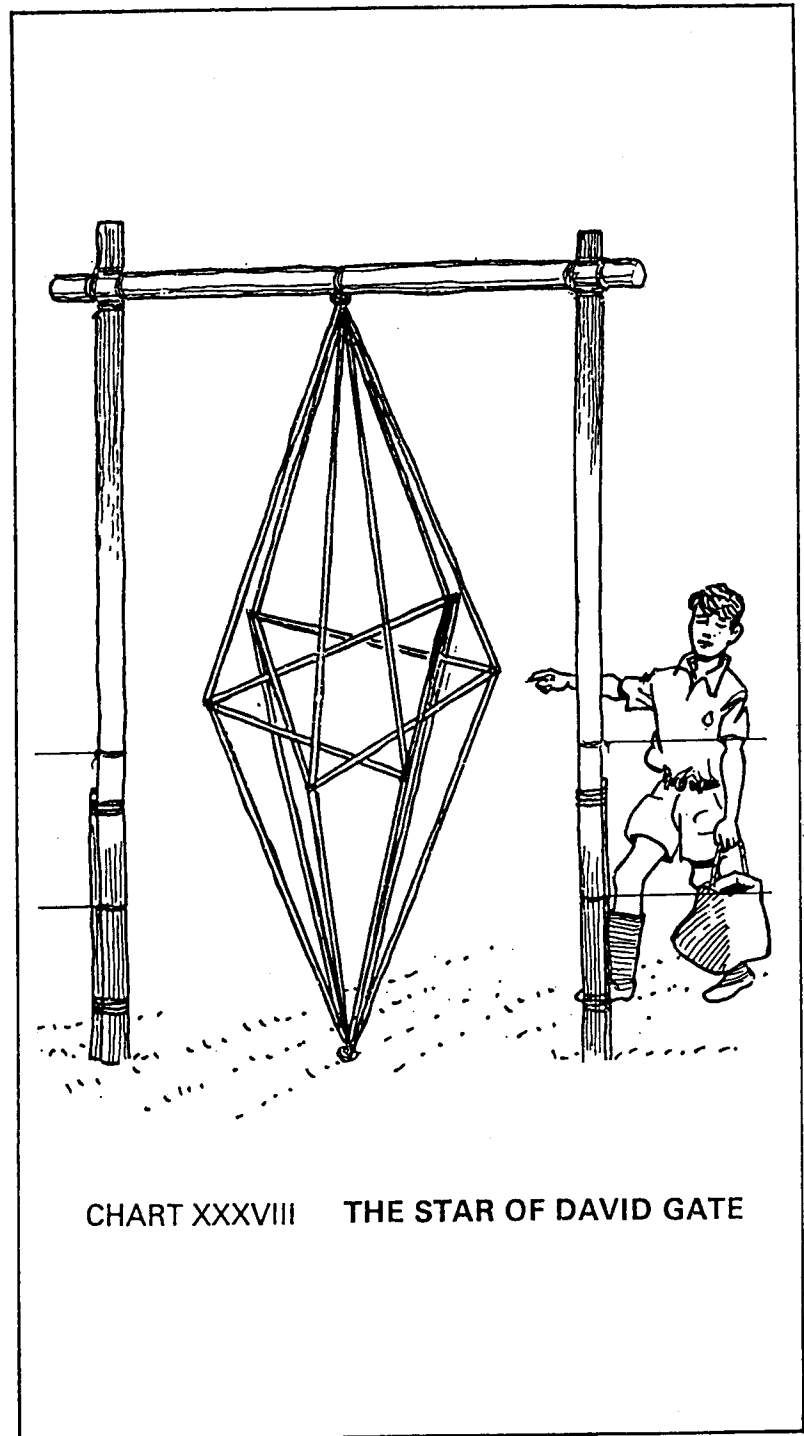
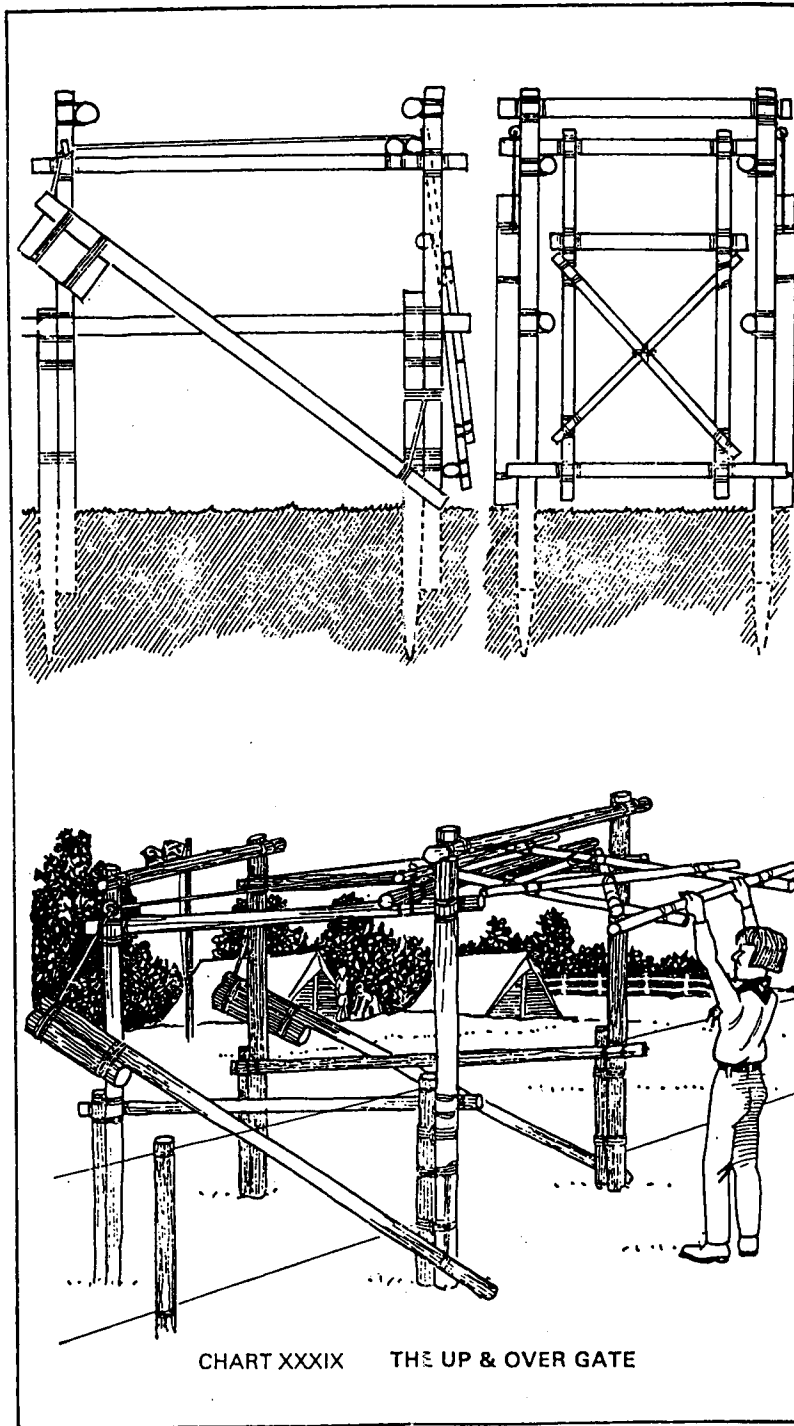


CHART XXXVIII THE STAR OF DAVID GATE



rubber bands, carefully tailored to fit between the posts with the minimum of clearance so that it has to be operated like a turnstile.

Chart XXXIX portrays our own attempt to design a gateway based on the up-and-over principle of many privately owned garages. The general idea will be clear from the diagram and it might be as well to get your Patrol Leaders' Council to discuss it *in theory* before deciding whether or not it would be worth their while to have a go. For ourselves (though we may be prejudiced) we can see nothing wrong with it in general principle, although we are bound to admit that, as it stands, it will only work if treated as another exercise in precision pioneering in which everything will depend on the skill and careful co-ordination of the builders and the component parts of the gateway.

One thing is certain. This gateway breaks new ground in Scout pioneering, and whether you agree or not, is entitled to be field-tested and proved or disproved by your local pioneers.

#### 18. WATER-BORNE PIONEERING

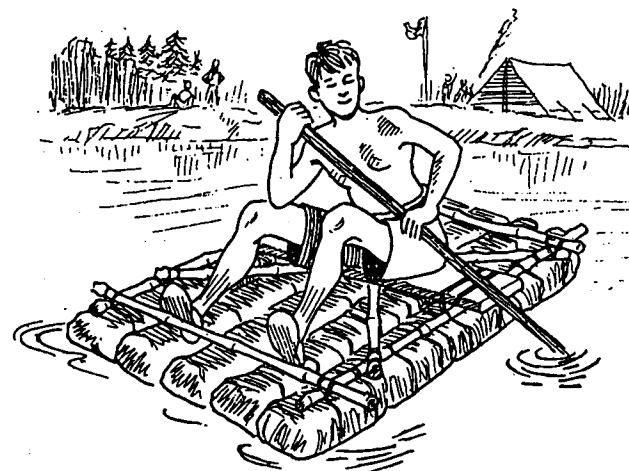


Fig. 37.

Plastic is not everyone's favourite material but there can be no doubt that it has facilitated greatly that key activity in Scoutcraft—the ability to improvise.

From the birth of the Scout Idea we have been told how easy it is to ride the waters by wrapping bundles of light foliage in ground-sheets and lashing them to frames of Scout staves. Indeed, it's all in *SCOUTING FOR BOYS*. Our own sad experience is that such rafts become waterlogged the moment they enter the wetness and we have yet to see a single sailor navigating the width of the Bomb Hole at Gilwell without getting his seat wet. In arable country discarded fertilizer bags may be found in every hedge or ditch: they make excellent buoyancy tanks when packed with straw and may even be inflated like toy balloons, simply by holding the open end and whirling it round your head, provided you seal them



securely. For shallow-water rafting use bamboo rods or even garden canes for the frame. If necessary the canes can be used 'on the double' for strength, but in point of fact the strain upon them will be minimal in the water.

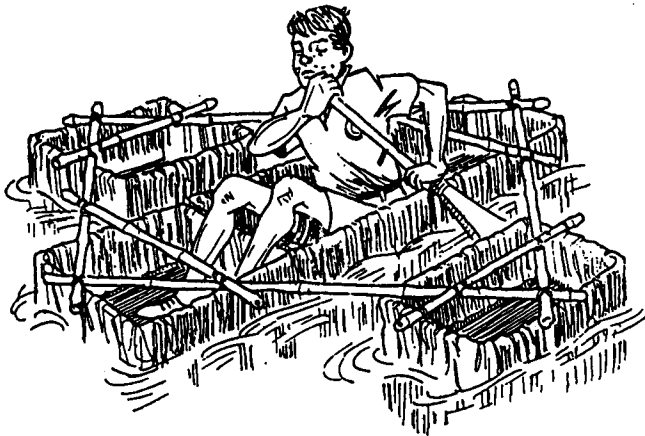


Fig. 38.

The trimaran shown in Fig. 38 was built and navigated with great success by a 14-stone Scouter on Wood Badge Course No. 348 at Gilwell in the merry month of May 1969. It consisted of five large cardboard cartons sheathed in polythene and sandwiched between two bamboo frames, the lowermost of which (not shown in the illustration) gave support to the main hull only, leaving the two outriggers to ride the waves in freedom. A later attempt to repeat this triumph at the National Cub Scouters' Weekend at Gilwell was rather less successful and proved, if it did nothing else, that Cub Scouts have only themselves to blame if they poach ideas from the Scout Section.

\* \* \*

Another good thing to come out of the Age of Polythene is the non-returnable plastic drum which has now replaced drums of steel or tin in the bulk delivery of certain commodities such as draft sherry, chloride and other non-toxic chemical substances. Plastic has the virtue of being extremely light, and as the drums are usually rectangular in shape they are ideal for raft-building. As in the case of the trimaran, however, it will usually be found worthwhile to fix a few extra bamboos under your raft to give the lashings something to grip under water. The rule should be that if it can be transported overland without any undue movement of the component parts, it can be accepted as shallow-water-worthy without more

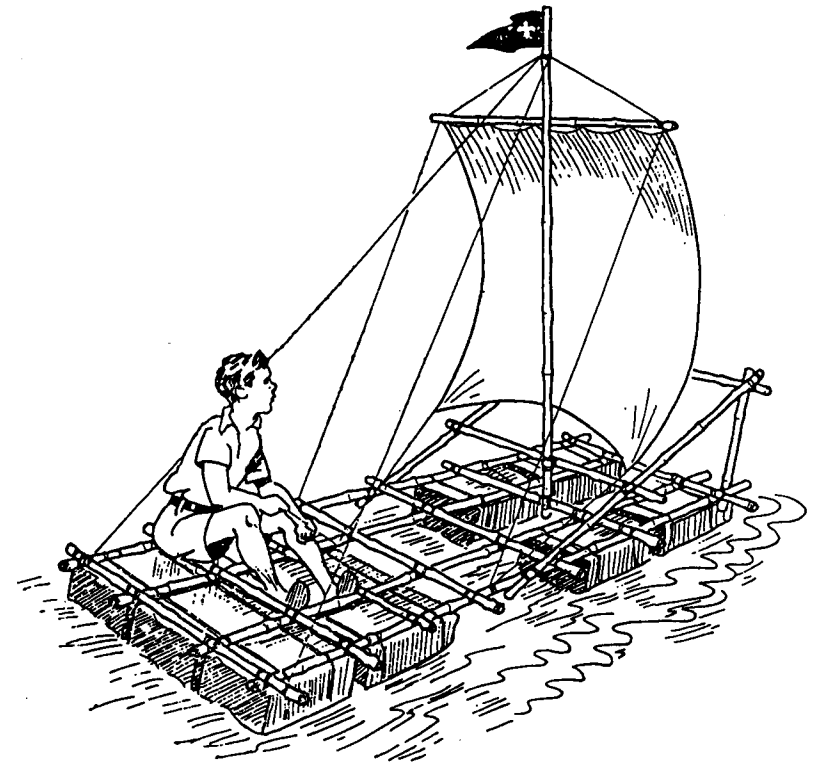


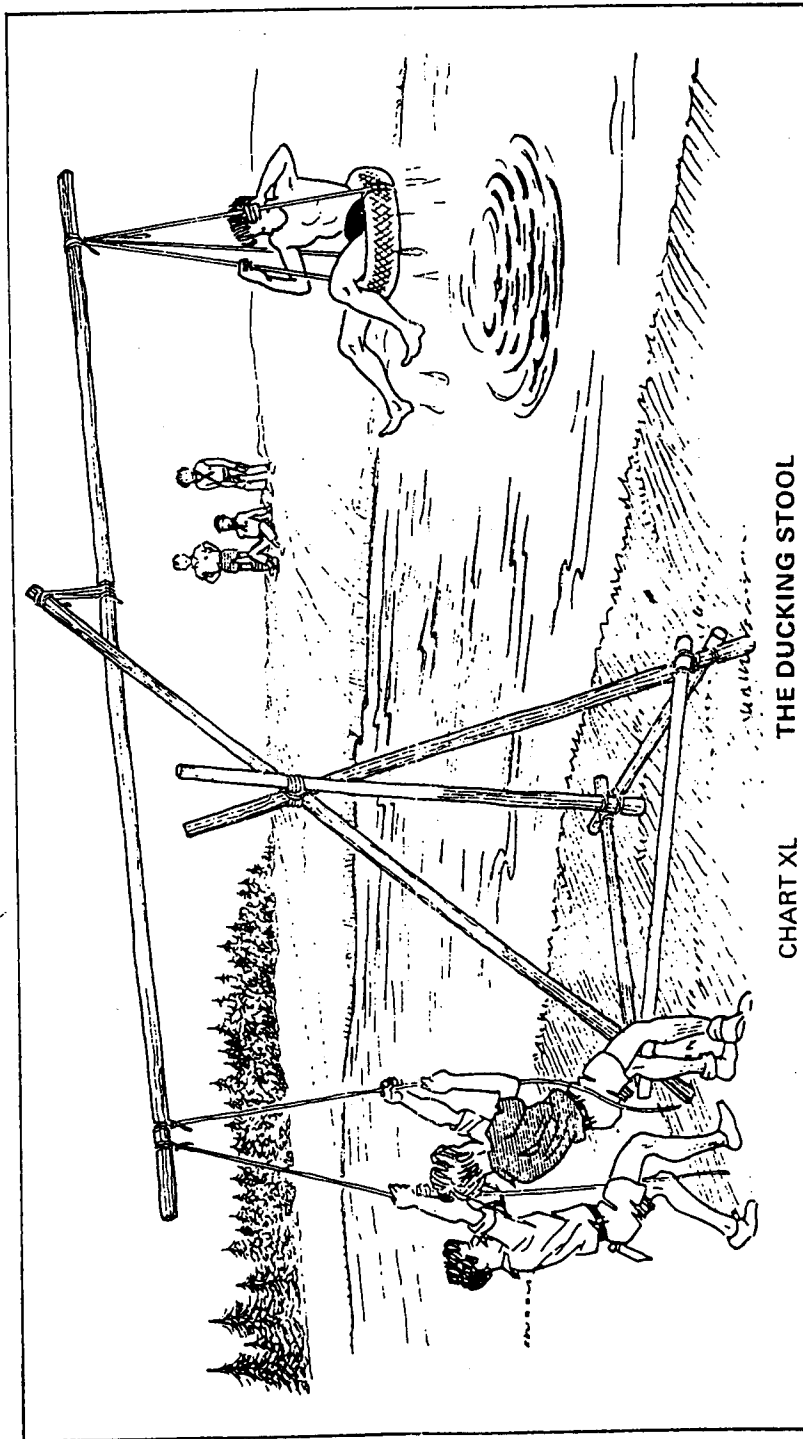
Fig. 39.

ado. In deeper water, of course, the boating rules will apply and life-jackets should be worn.

### 19. THE DUCKING STOOL

Spare a tear for Jenny Pipes who in the year 1809 was convicted by her peers in Leominster of being a shrew, a scold, or whatever the local term was for a nagging wife, and no doubt protesting both loud and long was strapped into the official Ducking Stool and ceremoniously cooled off in the clear waters of the River Lugg. She was the last (thank goodness) to undergo this traumatic experience in England's green and rather unpleasant land. True enough one Sarah Leeke was later sentenced to the same fate, but luckily for her the local duck pond had dried up and the penalty could not be exacted.

Rough justice indeed, if in fact justice came into it at all. One can only shudder at the thought of the sadistic pleasure the ladies of the Sewing Guild must have derived from the spectacle of one of their less popular members emerging gasping, furious, terrified from the chill waters of river, stream or pond. In other parts of the country the Ducking Stool was used to punish dishonest bakers



and brewers, but whether they were tried and found guilty by due process of law or merely judged arbitrarily by what we would now dub a kangaroo court, my encyclopedia does not say.

So much for Merry England and the good old days.

Our own version of the Ducking Stool bears little similarity to the early 19th century model, and in any case is definitely for volunteers only, even if, as may often be the case, a certain amount of gentle persuasion is required. The stool may also be used to enable bathers to enter the water cleanly, without the necessity of wading through inches of mud and slime near the bank.

As will be seen from Chart XL the structure will be subject to leverage as the long, heavily-loaded business end is swung out over the water, and the supporting framework will have to be securely footed into the turf and pinned down with guy ropes and pickets—not just tent pegs. It would be altogether too much of a good thing if the man in the stool was not only ducked but stunned as well. Even poor Mrs. Pipes' friends and neighbours would have drawn the line at that.

## 20. THE HIGH FORCE SHOWER

The original 'High Force' is a spectacular moorland waterfall which drops 70 feet over the escarpment of the Great Whin Sill in upper Teesdale and is well worth a visit if ever you find yourself back-packing through that part of County Durham, England.

Failing that, you might like to while away a happy hour in camp this summer by building and using our High Force Shower, as illustrated in Chart XLI. It might occur to you that there are easier ways of getting wet, but that, I need hardly tell you, is not the attitude of a true Scout pioneer.

The efficiency of this structure will depend entirely on the pulley blocks which must be in tip-top condition so that the loop rope which carries the can turns freely between the sheaves at either end. Care will also be needed in the placing of the join in the loop-rope, whether it is a crude fisherman's knot or an immaculate long splice. Obviously it should correspond with the point of attachment of the messenger line, one end of which (as you observe) is in the hands of 'control' at the foot of the run, while the other is reeved through the second sheave of the double block and loaded with a log of sufficient weight to build up a good turn of speed in the loop-rope. The trip line should be placed so that it catches the bottom of the bucket at just the right point to shoot its contents refreshingly over its intended target without at the same time drenching 'control'. Indeed we regard this as yet another example of the new Precision Pioneering and call upon all concerned to exercise the utmost care in piecing it together.

Note that the *Barrel Hitch* is used to sling the pendant log. To make this, simply middle the rope under the log, bring up the two ends and join them with a loose overhand knot (1); open this knot

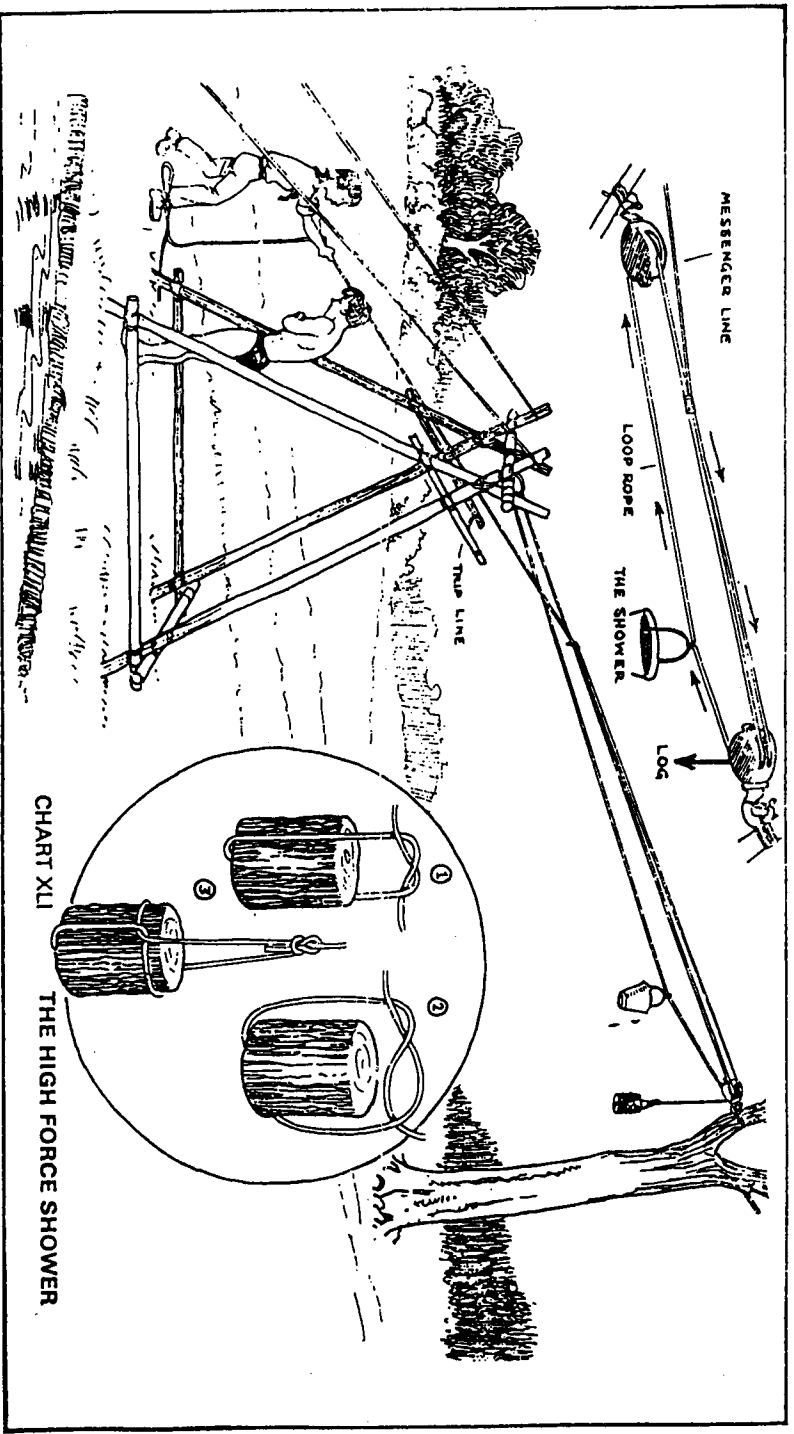


CHART XII

THE HIGH FORCE SHOWER.

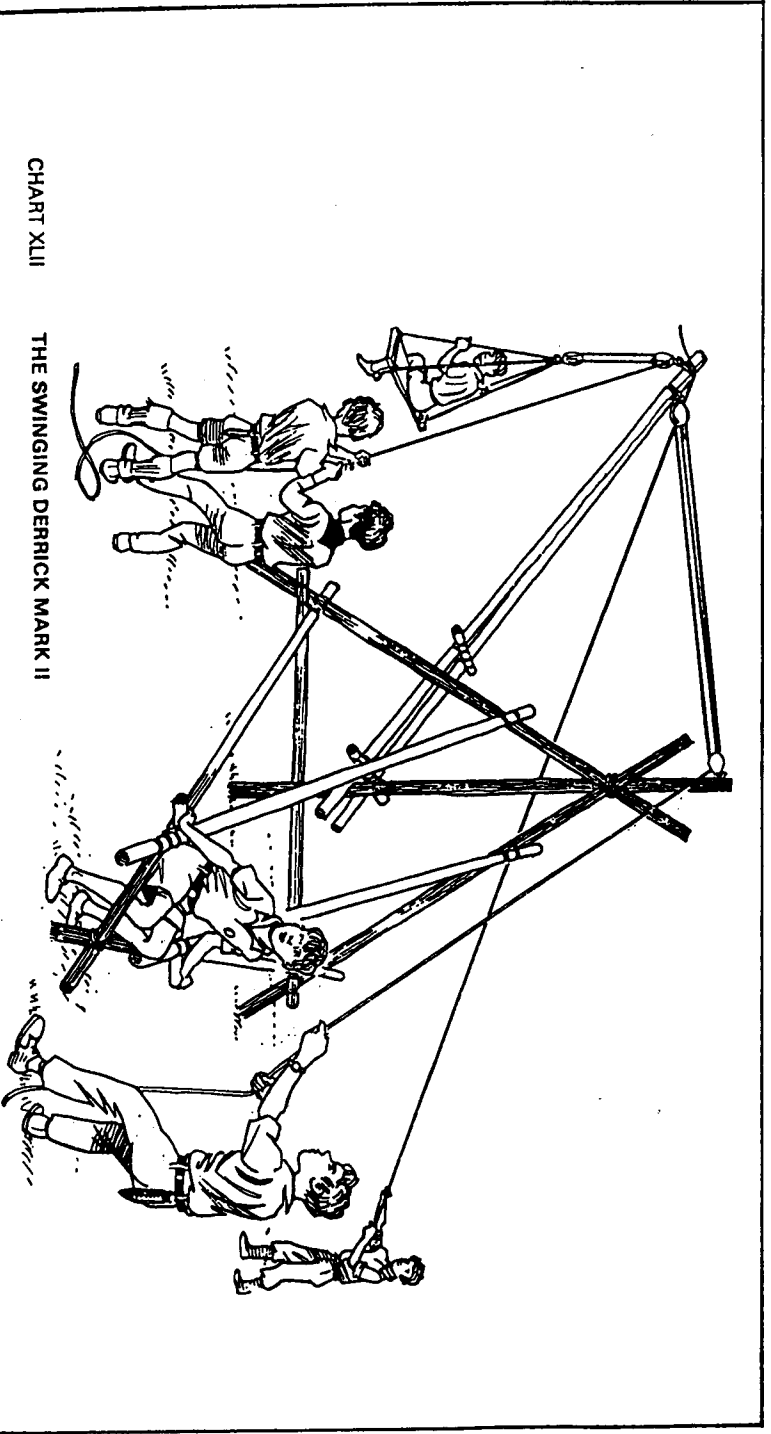


CHART XII

THE SWINGING DERRICK MARK II

(2) and slip the two parts round the log, then bring them up and join them with a bowline (3).

## 21. THE SWINGING DERRICK MARK II

The special feature of this model is that it is (in theory at least) self-sustaining, so that it need not be pinned to the ground with guyropes and pickets but can be lifted and carried from point to point as needed. The jib unit is detachable, which should make for ease of transport.

The official specification reads as follows:

"The derrick post is lashed to the face of a pair of wide-spreading sheerlegs which are supported by a second pair braced backwards to form an extended back leg with transoms lashed from the legs of the forward sheers to the rear end of the back leg to form a rigid structure.

"The jib unit is a third pair of sheerlegs fitting snugly round the derrick post from which it is slung on a loose rope, thus enabling it to be raised and lowered or turned freely through an arc of roughly 180 degrees.

"Note that the back leg should be at least twice as long as the jib. The theory of this structure, which you are invited to prove or disprove by trial and error, is that a considerable load on the jib can be balanced by manual pressure alone on the end of the back leg."

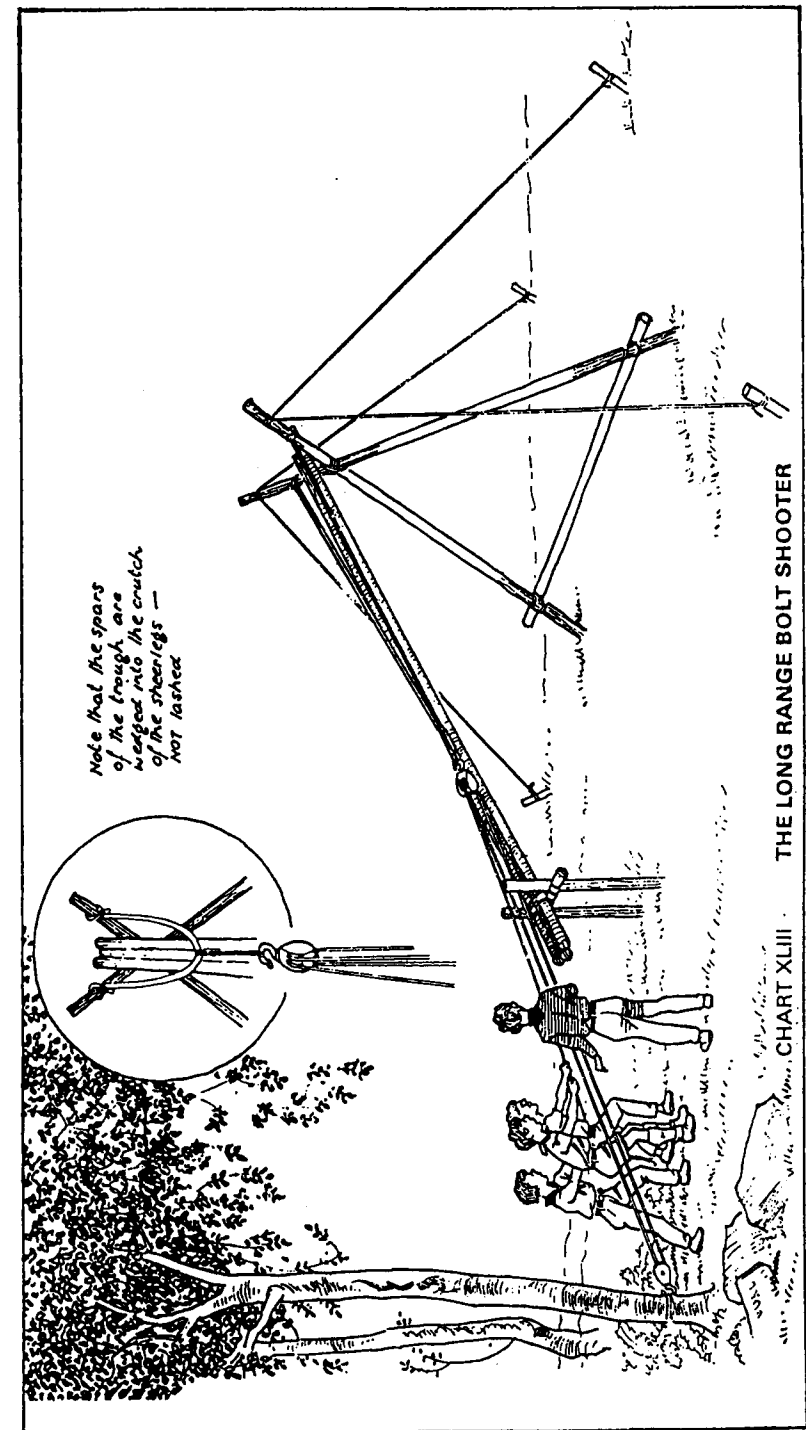
Fair enough. We leave the rest to your pioneers.

## 22. THE LONG RANGE BOLT SHOOTER

It is now a matter of history that some years ago a Patrol of six Scouts in the Isle of Ely built themselves a giant catapult, powered by the inner tube of a car tyre, and with it shot a Scout staff a measured distance of 99 yards. No one among those present at the time had anticipated this phenomenal success, but, of course, they had taken the precaution of keeping the range clear for as far ahead as the eye could see—which in the flat fenland of Cambridgeshire was pretty far on English standards.

It is only fair to tell you that when a party of Venture Scouts from Ipswich tried to repeat this performance at a place called Thorrington near Colchester, the Old King Cole town in Essex, the bolt shot off at a tangent and went clear through the window of the warden's cabin.

Be warned, therefore, that this excellent apparatus should only be attempted by experienced pioneers under responsible leadership and in situations where a huge factor of safety can be built into the project. The tundra of Scandinavia, the prairies of north-west Canada, or the backlands of the Australian bush to the north of Alice Springs might be suitable terrain for further experimentation, but even then the area would have to be cleared of grazing caribou, buffalo, kangaroo or sundowners.



The idea, as you will gather from Chart XLIII is to build a sloping trough of peeled spars to carry the bolt, and to draw back the propellant mechanism by means of a Handy Billy attached to the bight of the rubber tyre with a few strands of sisal twine. When maximum strain has been imposed, the sisal is severed with a sharp knife. The bolt should be loaded carefully into the tyre when the firing party has put sufficient tension on it to pinch the tip of the staff so that it can be drawn back even further. It is all a bit chancy, and, having warned you of the inherent dangers we can do no more than rely on your discretion and wish you the best of luck.

**23. THE ROMAN BALLISTA MARK IV**

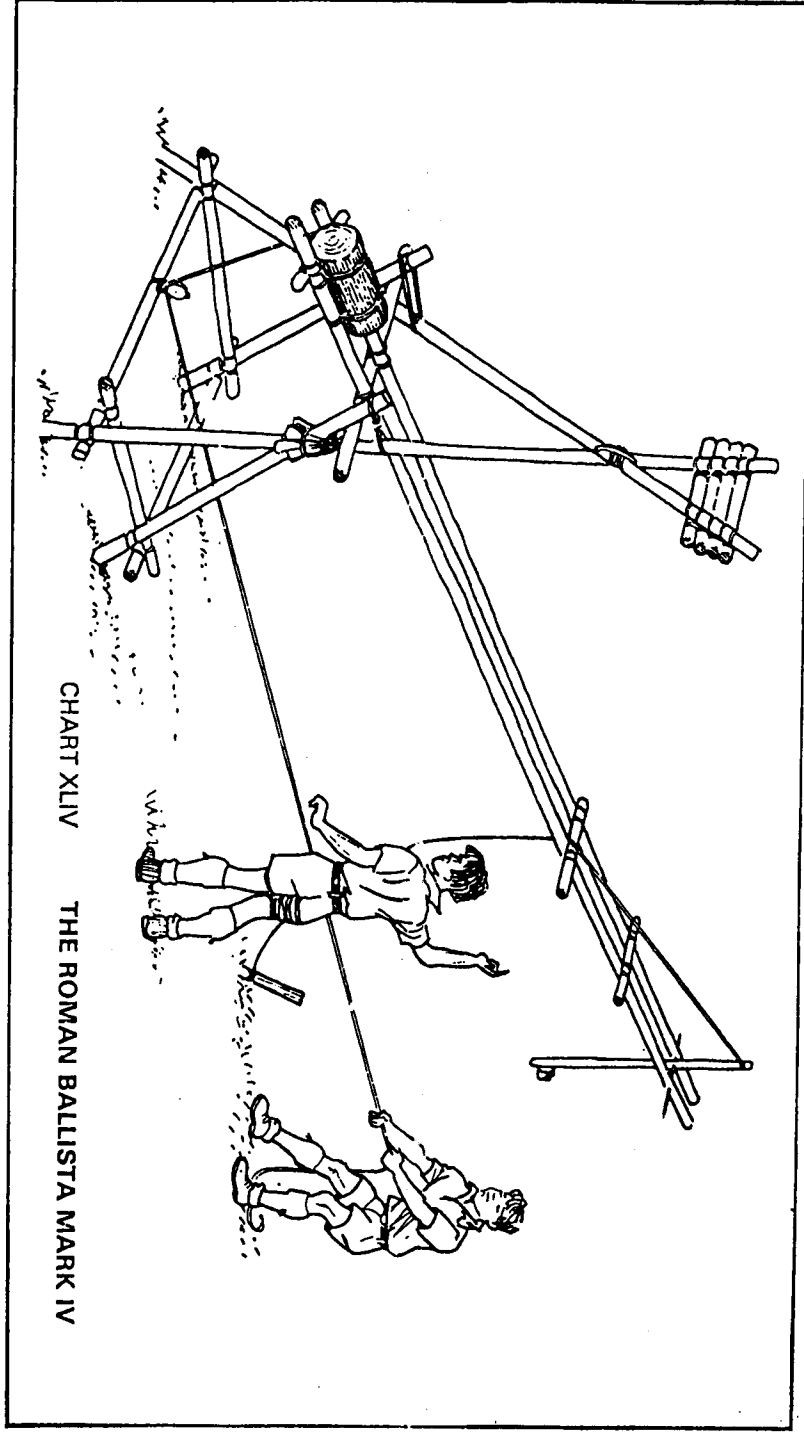
Whether Hadrian's Auxillaries would have acknowledged it or not, we shall never know, but though our twentieth century model differs to some extent from the prototype, the principle is much as it was when the Seventh Legion were operating in the Arabian Desert towards the end of the first century A.D.

In our earlier models of the ballista, the chief weakness was the terrific wrenching shock which was imposed on the firing arm at the moment of impact. Originally, the check came only at the butt-end of the spar, while the top whipped over with maximum velocity. This frequently caused the tip to snap like a carrot, to our considerable embarrassment and the sadistic joy of the spectators. Our latest design minimises this danger by checking the firing arm at both top and bottom simultaneously, so that the shock is spread throughout the length of the spars instead of being concentrated in one spot.

However, the truly novel feature of the Mark IV ballista is the hinged throwing arm at the end of the spar. Every rigger coil knows that when kicking for touch from inside the twenty-five, it is the snap-at-the-knee that does the trick. Here is our attempt to apply the same principle mechanically. The knee-joint is a steel pin on which the throwing arm turns freely. It is jerked over just a split second before the arm strikes the battle plate. To obtain the right trajectory, the arm should be arrested at an angle between 45 degrees and 60 degrees to the ground, but this is something that can be quite easily adjusted by altering the length of the check rope and the position of the batten nearest the end of the arm. Lots of scope for experiment and research, in fact, and none the worse perhaps for that.

**24. TREACHER'S FOLLY**

This climbing wall came off the drawing board just in time to be field-tested at the first National Scout Leaders' Weekend at Gilwell in 1969, and to everyone's astonishment, was built and used by a random group of semi-skilled pioneers all in the space of 45 minutes. Admittedly most of the donkey work in prefabricating the components had been done in advance, so that all that remained was to assemble the parts and do a bit of speedy lashing up. But it was undoubtedly a great achievement by all concerned and makes us all glow with satisfaction whenever we remember it.



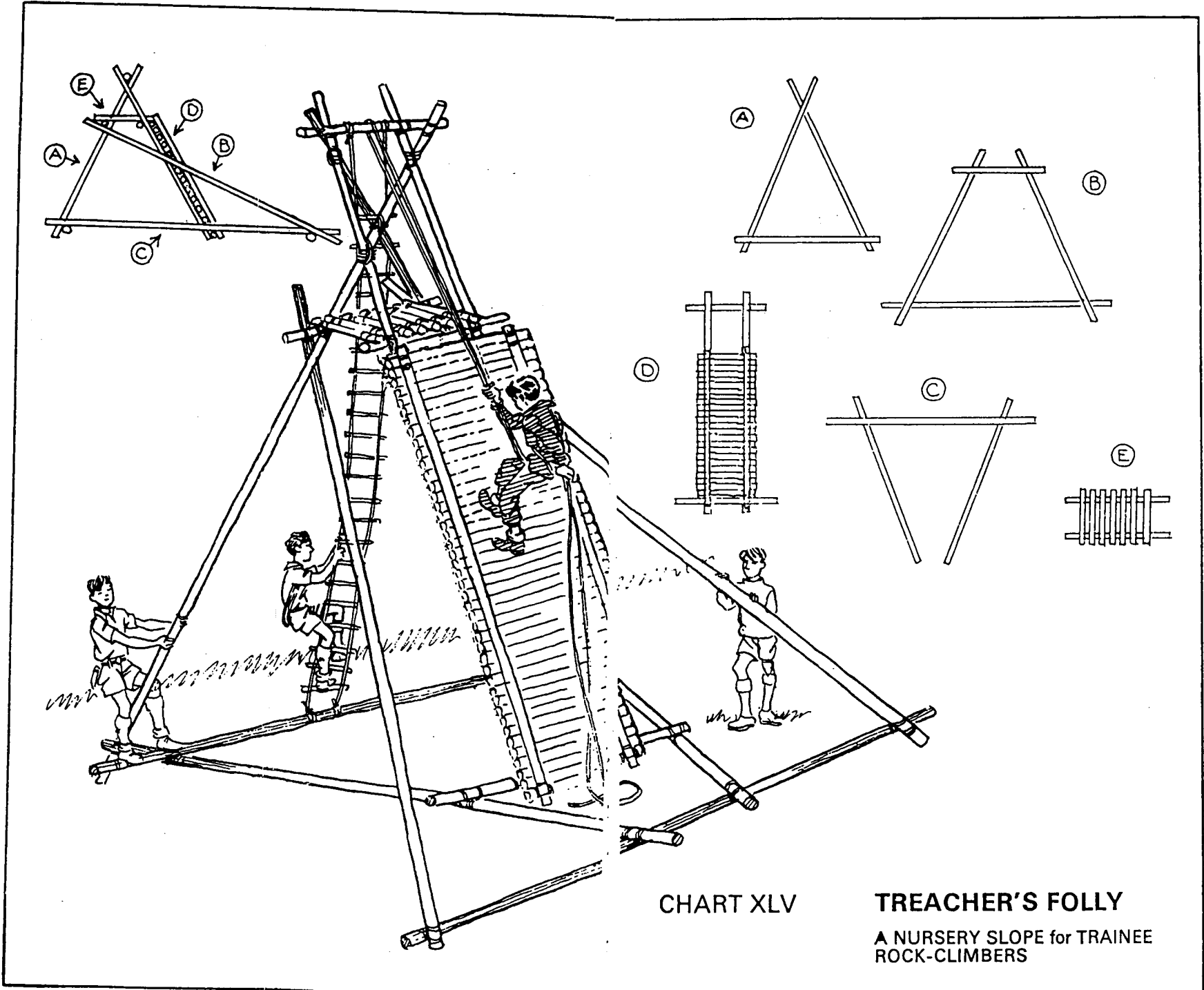


CHART XLV

**TREACHER'S FOLLY**  
 A NURSERY SLOPE for TRAINEE  
 ROCK-CLIMBERS

Note that the 'rock-face' (D) should be built on the ground and then raised into position on the supporting woodwork. Only the top and bottom crossbars are lashed. The others are laid across the bearers and pinned in position with the spars. The fact that they are inclined to move a little when the wall is in use only adds to the fun and excitement.

But perhaps the most interesting thing about this project was that it would never have been attempted in the first place if Messrs. Grout & Co., nylon fabric manufacturers of Great Yarmouth had not decided to re-organise their plant and in so doing had very kindly provided Gilwell with an unexpected windfall in the shape of a lorry load of unwanted whitewood rollers about 4 inches in diameter by four feet long. It was necessary to find some use for these rollers, and it was this that spurred us into action. As you see, Treacher's Climbing Wall was the result. (The name, in case you are wondering, belonged to the young Scouter from Essex who gave us the idea in the first place.) In this throw-away age, the resourceful quartermaster will always keep an eye and ear open and be ready to pick up any such unconsidered trifles before they reach the scrap heap.

## 25. THE CAMBRIDGE MERRY-GO-ROUND

This is the Mark I model of a light hearted pioneering project which was invented by the Cambridge University Rover Crew while on a visit to Gilwell many years ago, when Rovers were still in fashion. An original idea had been to crown the upright spar with an oil drum, which would certainly have caused its own problems, but would perhaps have eliminated the risk of jumping off the top of the mast when the roundabout was in full swing. However, the men of Cambridge would have none of this, and called upon the Gilwell Q.M. to provide them with the strongest pint-sized enamel mug he had in stock, plus a good dollop of axle grease from the estate tractor. They then middled the two supporting ropes over the top of the mug, opening the lay of one and passing the other through it, before binding the ropes to the sides of the mug by means of a very tight west country whipping. To our great astonishment, it worked like a dream—not just on this one occasion, but on many subsequent occasions. The fact that the whipping passed through the handle of the mug prevented it from slipping, and so long as reasonable care was taken in loading passengers into their seats, the roundabout proved to be self-adjusting and no bones were broken.

As I remember, the Cambridge Rovers found some difficulty in getting their spar to remain upright under the severe strain imposed upon it when the roundabout was in full spin, particularly as guyropes of any kind were, for obvious reasons, out of the question. The only solution to the problem that occurs to us is to drill a couple of holes through the butt of the spar, and push the end of Scout staves, or better still, steel bars or lengths of iron pipe through them, after

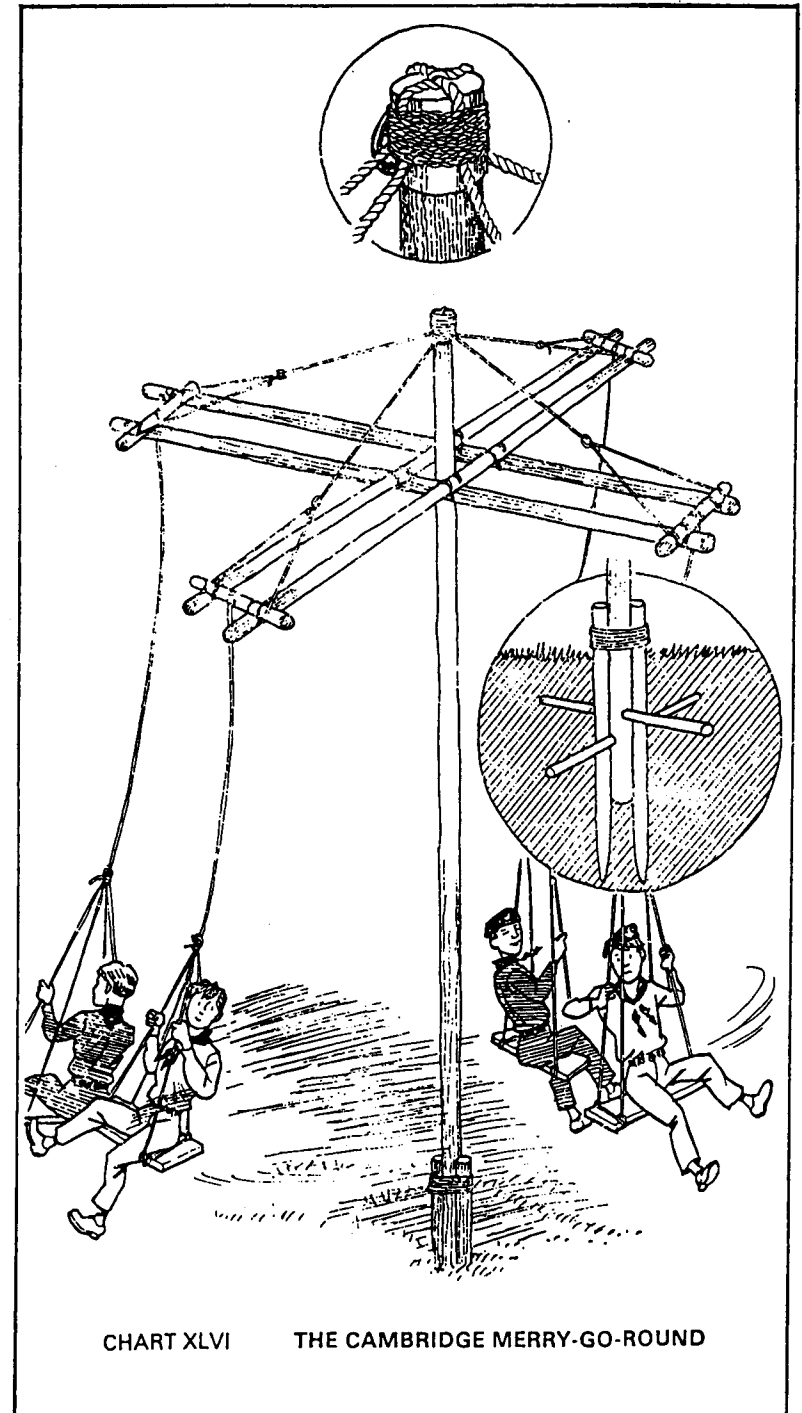


CHART XLVI

THE CAMBRIDGE MERRY-GO-ROUND

which the disturbed ground should be well trampled down and a couple of pickets driven home and lashed to the post to give additional support. The spar, of course, should be heeled in for at least three feet.

\* \* \*

Now, as we come toward the closure, let it be clearly understood that many of the structures we have described in this book involve some element of personal risk, and although they may be used for display purposes on public occasions, they are for *Scouts only*, and never, repeat *never* open to spectator participation, however game the spectators may be. It all has to do with the tedious matter of insurance, particularly the Scouters' Indemnity Policy, which will safeguard you from legal liability when it can be established that you have acted with reasonable responsibility in organising the activities of your boys, but becomes rather more complicated when outsiders are involved. Be warned, therefore, but do not be intimidated. Adult leadership in a boy-orientated Movement like our own depends on maintaining a nice balance between the spirit of adventure, so that our boys are stretched just a fraction beyond their known limits, and the compelling demands of responsibility for the safety and well-being of other people's children. Pioneering is, perhaps, the least hazardous of Scouting's traditional 'adventures' but risk there must occasionally be. At the end of what must be our last word on the subject, we can only ask that you exercise commonsense and adult responsibility without allowing it to cramp your style as a leader in the premier World Movement dedicated to the task of developing character through adventure.

## APPENDIX

### THE AERIAL RUNWAY CODE

Aerial Runways are potentially dangerous and remain so even when all reasonable precautions, both in their construction and use, have been taken. Indeed, without some apparent element of hazard, they would cease to be adventurous and half their appeal and training value would be lost. The aim should be, therefore, to eliminate all avoidable risk and thereafter to exercise the highest degree of responsibility in the use of the apparatus.

Recent claims for insurance compensation have drawn attention once more to the inherent dangers and have highlighted the need for a Code of guidance in the safe construction and operation of runways. Because of the wide variety of situations and circumstances in which runways are built no detailed and inflexible set of rules is possible but *Policy, Organisation and Rules*, requires that leaders must comply with the Code when building and using structures of this kind.

No part of an aerial runway can be said to be more important than another and all require an equal amount of attention. Failure of one part of the system will almost inevitably create a chain-reaction and might well bring about the collapse of the whole.

Nevertheless, experience has taught us that in almost every case where serious mishaps have occurred—and some have been very serious indeed—the fault lay in the seat itself and in the method of attachment to the travelling block. At the outset, therefore, let it be clearly understood that:—

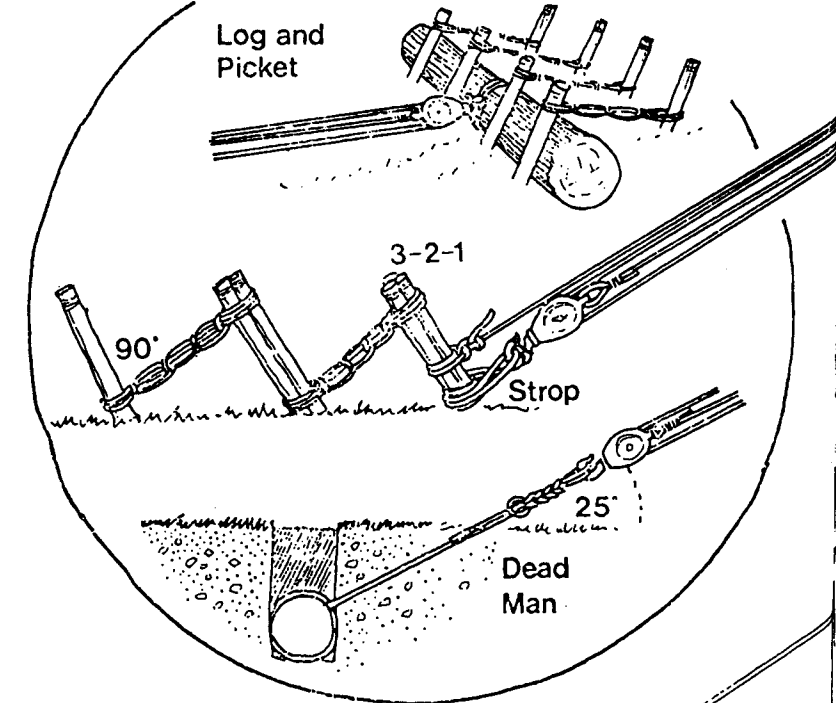
- (a) Only blocks with eyes or rings may be used. Hooked blocks, however carefully moused or 'doctored', are completely unacceptable for this purpose.
- (b) The seat must be constructed and fitted so that it is incapable of slipping or tilting, and must be secured to the eye or ring of the travelling block by the approved method described later in this Code. A purpose-built seat should be readily available.

The Code is based on long experience at Gilwell and elsewhere and should provide leaders with useful guide-lines for the training of their Scouts. No such Code, however, stands in the place of commonsense and responsible adult leadership, and the need for adult control will always be present when risk to the person is involved.

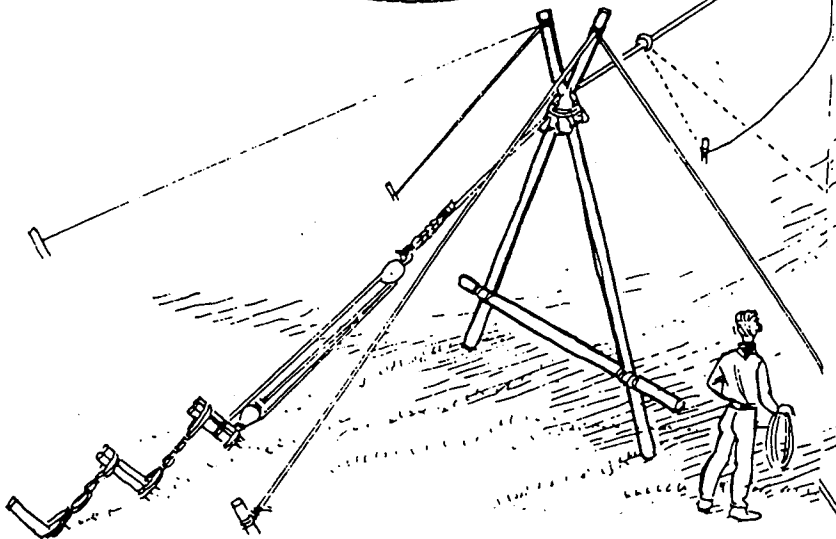
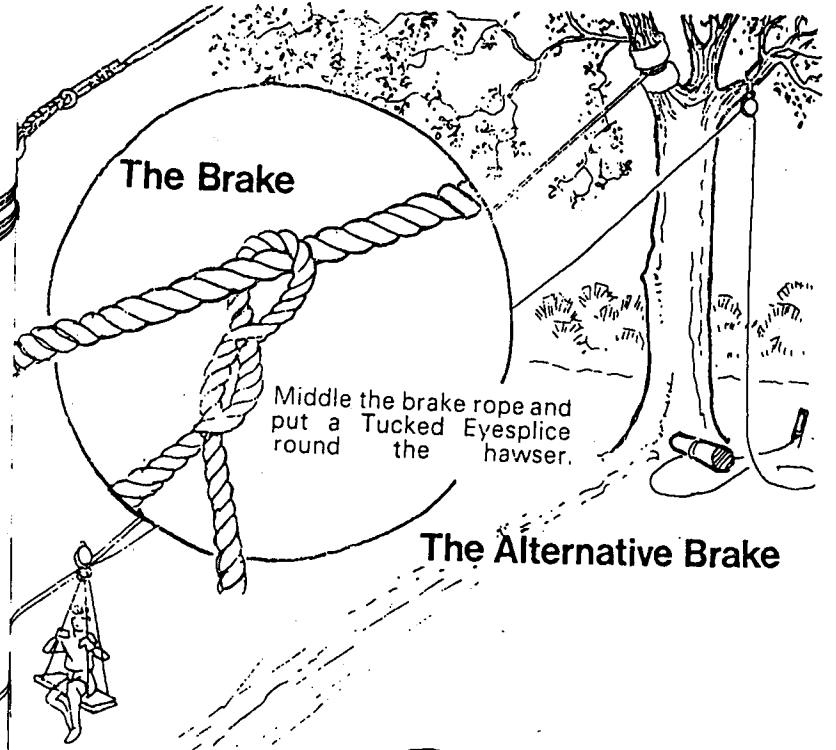
The illustration overleaf shows the most popular (aerial flight) type of runway, but the points raised apply equally to the horizontal manually operated runway or, indeed, to runways of any other kind.



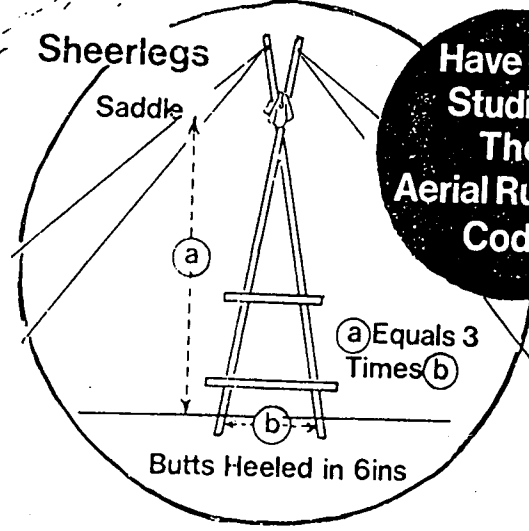
**Anchorage**



**The Brake**



**Sheerlegs**



**Have You Studied The Aerial Runways Code?**

a Equals 3 Times b

CHART XLVII

THE AERIAL RUNWAY

## 1. SUPERVISION

The planning, construction and use of an aerial runway must be under the direct and constant supervision of a responsible and competent adult.

## 2. EQUIPMENT

All equipment should be inspected before, during and after use. Apart from the important matter of security, this is in itself a valuable exercise in training in responsibility. Ideally it should be carried out by the boy-leader and the adult leader, together.

### (a) Main Hawser

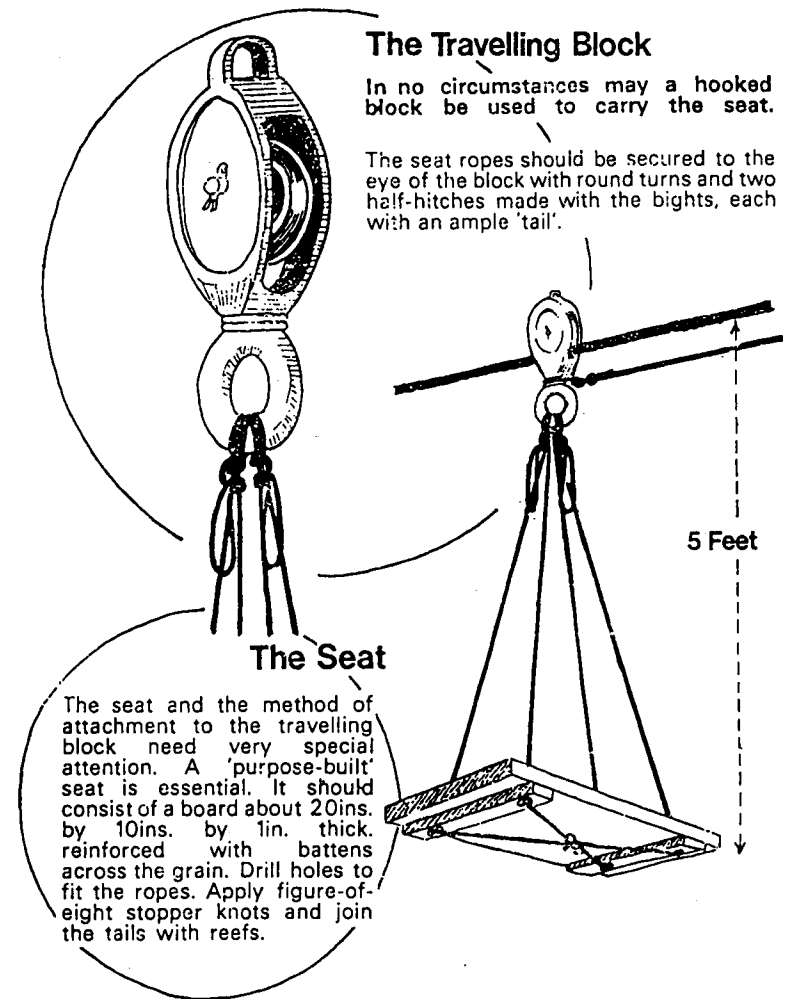
This should be hemp (manila or sisal) or polypropylene (under no circumstances should a wire hawser be used as this is considered unsafe). The recommended size is 3 in. circumference (24 mm. diameter) and in no case should a rope under  $2\frac{1}{2}$  in. be used. If the hawser has been out of use for any length of time—even when stored in ideal conditions in an even (cool) temperature—it should be checked for wear and tear along its entire length, and, if hemp rope is used, a spot check carried out by opening the lay at intervals to make sure that the fibres are free from mildew. This usually occurs in the heart of the rope and is not always immediately detectable. A suspect rope should *not* be used in this or any other pioneering activity where some element of risk is unavoidable.

### (b) Other Cordage

This will include lashings (18 ft. to 24 ft.), guy lines for the sheer-legs, a strop loop of 2 in. circumference (minimum) of sufficient length to secure the tackle to the anchorage, lighter hauling brake lines, twine for mousing the blocks in the tackle, etc., sisal-twine for general use, and rope of adequate length and size to suit your blocks (see also 'Blocks and Tackle' below). A safe working rule is to use nothing under  $1\frac{1}{2}$  in. circumference in the main structure. All should be of good quality and subject to inspection before use. If you are using a spliced strop, the splicing should receive special attention. A strop is best made by forming the length of rope into a loop with a Fisherman's knot with the tails tucked in.

### (c) Blocks and Tackle

A luff tackle, comprising one single and one double metal block (minimum size 6 in.) reeved up with a 2 in. circumference rope, will provide a purchase of four to one. (A block is designated by the length of the shell, which is roughly three times the circumference of the rope it will accommodate.) The travelling metal block must be a single-sheave block, *not* a 'snatch' block which could open, to suit the size of the hawser (i.e. for a 3 in. rope a 9 in. block will be needed) and—of the greatest importance—it must have a fixed or



swivel eye or ring, *never a hook*. If no such block is available the project must be abandoned. (In plain truth it should not have been allowed to get beyond the discussion stage in the first place!) In recent years several attempts have been made to 'convert' hooked blocks with brazed metal straps and jubilee clips, of various kinds, but none has been any more reliable than the conventional and unsafe 'mousing'. At least one other single eye-block will be needed to carry the towing line (note: not a hook because of the movement and strain imposed). Suitable tested blocks should be used and are available from Scout Shops Ltd.

All blocks should be free running, in good condition, oiled before use, and the correct size for the rope being used. All hooks must be firmly moused—preferably with tarred hemp spun yarn. It will be

found that not all blocks have sufficient lip on the hook to hold the mousing and, in any case, it is always sound practice to make a small file cut near the lip to prevent it slipping off the end. A good method of mousing is to make a clove hitch in the middle of the yarn round the neck of the hook. Separate the ends and take a number of turns in opposite directions to close the mouth of the hook; frap with overhand knots and secure with a reef.

#### (d) *Pickets and Spars*

Where wooden pickets are used they must be in good condition, free from shakes and rot, and of adequate length and thickness. A good deal depends on the nature of the ground and the anchorage selected (see 4 below) but pickets of 3 ft. by 3 ins. butt should be regarded as a minimum. In use they should be driven with a maul (not a sledge hammer) for two thirds their length at right-angles to the strain, which for obvious reasons should be secured close to the ground. (Note that if the strain is allowed to ride up the picket, it will be subject to leverage.)

Spars should be equally sound, free from shakes and be regularly tested by gripping the tip and 'ringing' the butt on any hard surface. 'Shakes' in timber are not always visible, but the false note of a faulty spar is easily detectable. 5 in. butts should be regarded as a minimum, irrespective of length.

#### (e) *The Seat*

Great care should be taken in the preparation of the passenger carrying seat. A stout board of about 24 ins. by 10 ins. by 1 in. thick will be needed, reinforced with bracing battens across the grain. Holes should be bored through the board to take the suspension ropes. The distance between the seat and hawser should be at least 5 ft. to avoid the possibility of a hand being placed on the hawser in front of the pulley.

#### (f) *Tools and Accessories*

Sacking or old canvas will be needed to act as a saddle in the crutch of the sheerlegs and for the protection of trees. Tools will include a heavy maul, a spade or entrenching tool, a clasp knife, plus—depending on circumstances—an extending ladder, or rope ladder and throwing line, to facilitate tree climbing.

### 3. LOCATION

The actual site of your runway will depend largely on whatever natural features can be used to advantage, e.g. trees, slopes, etc. Where a tree is available, make sure that it is 'up to the job' and that, with adequate protection, it will suffer no ill effects. At the head of the run use the main trunk in preference to a branch, but if a branch is used, select the strongest within reach, and make fast with a round turn and two half-hitches and a long 'tail' close to the

trunk. If the hawser is passed over a suitable high fork and the end secured to a lower branch this makes it easier to examine the knot during use. Secure the padding (sacking or canvas) with sisal before making fast.

Ropework at ground level is one thing: handling a 3 in. hawser while sitting astride a branch some 25 ft. up a tree is another matter. In such circumstances it might be as well if the man in the tree belayed himself to a convenient branch with another rope. He should certainly be well drilled in ropework before being entrusted with this difficult and responsible task. If a rope ladder is used to get him into the lowermost branches from which he can start climbing, a lobstick with a light line attached will be found useful to draw it up into the tree, with a stronger rope attached to the top of the ladder so that it can be drawn over the branch and secured at ground-level.

If no suitable tree can be found when operating on flat ground, your pioneers will have to be content with a manually-operated fore-and-aft runway between two sets of sheerlegs, which can be excellent fun.

Full advantage should be taken of natural slopes to reduce the height hazard and/or increase the length of the run. Due allowance should be made for the inevitable sag in the hawser, which might be as much as 6 ft. It will be necessary to take up the slack from time to time, though some slack is necessary to control the rate of descent.

\* \* \*

### 4. ANCHORAGES

A well grown tree makes an excellent anchorage, but is seldom to be found in just the right spot to suit your runway. There are three other standard holdfasts, and boys should be trained to select the type best suited to the nature of the ground.

In all anchorages, their precise position in relation to the main structure is of the first importance, so that the hawser runs in a true line from end to end. The slightest deviation from true will impose an increasing strain on the sheerlegs and might well cause them to topple.

If a tree is used, make sure that it is secure, protect it near the base with a good pad of sacking, and prepare your tackle ready for use. Take in most—but not all—of the slack in the hawser and pass it through the hook of the fore block. Lay the sheerlegs on the ground with the butts at the correct distance from the anchorage (see diagram) and with the hawser lying over the crutch. Raise the sheerlegs and hold them in place while the slack is taken up on the hawser. Adjust the position of the sheerlegs as necessary to ensure a true line. Mark the position of the butts with tent pegs, so that foot-holes can be dug in exactly the right place. The sheerlegs can then be erected and the necessary strain applied on the tackle.

A different procedure is recommended when other types of anchorages are used.

The sheerlegs should be erected *first*, so that the hawser can be drawn over the crutch and hand-strained to pin-point the position of the anchorage, which will always be twice the height of the sheers away and, depending on the type, in line with, or at right-angles to, the line of the strain.

#### (a) 3-2-1 Anchorage

This consists of a line of six pickets in the order of three, two and one, running true to the line of the main hawser. It is usually first choice with most Patrol Leaders and is ideal in heavy, stone-free ground. The three groups of pickets should be so spaced that the lashings between them run at right-angles from the top of the forward to the base of the next in line. Lashings 24 ft. long will be needed. Start with a clove-hitch round one set, follow with a number of tight turns and frap with over-hand knots. No attempt should be made to 'firm up' the pickets with a few extra blows from the maul after the lashings are in position. This will merely loosen the turns and defeat the object of the exercise. It need hardly be said that this, and all other types of holdfast, should be kept under close observation when the strain is first applied and thereafter inspected at frequent intervals when the runway is in use.

#### (b) Log and Picket Anchorage

For this use eight pickets and a log of not less than 6 ins. in diameter and 3 ft. in length. The log must lie at right-angles to the line of the strain, and care must be taken to see that it bears equally on each of the forward pickets, and that the angle between the hawser and the ground is not more than 25 degrees.

#### (c) 'Dead Man' Anchorage

This is most suitable in lighter ground or where the presence of stones would make the driving of pickets difficult. The log should be not less than 6 ins. in diameter by 3 ft. in length and should lie at right-angles to the strain in a trench at least three times its own diameter in depth. A strop is secured to the exact middle of the log (or, where no strop is available, a rope equal in strength to the main hawser) and brought up a narrow channel cut in the soil in line with the strain, so that the single block of the tackle can be secured. Again the angle between hawser and ground should be about 25 degrees. Before the earth is returned to the trench, it is as well to complete the job and take up the strain on the tackle so that any undue movement of the 'dead man' (e.g. a tendency to ride up the side of the trench) can be corrected before final burial. The ground should then be trampled to make all firm.

### 5. STRAINING THE HAWSER

A tackle, mounted to advantage—that is with the single block

attached to the anchorage and the double block to the hawser—when operated by four or five Scouts or two or three adults—will give all the strain required. On no account should more forceful methods of straining the hawser be used, for these will drastically overstrain the system. Wherever possible the strain should be secured to the holding part of the anchorage, after which the slack in the free end of the main hawser can be taken up and, as an extra precaution, similarly secured.

In the case of the 'Dead Man', a second strop of equal strength should be secured to the log before it is buried, so that both the tackle and the free end of the hawser can be made fast.

### 6. ANGLE OF SLOPE OF THE RUNWAY

No exact formula is possible—so much depends on individual circumstances: location, natural slope of ground, materials (e.g. whether the hawser is of natural or synthetic fibres), the degree of tension (which is bound to vary), the performance of the running block, etc. The only safe plan, therefore, is to test your apparatus with considerable severity before it is used, to ensure a high factor of safety.

In no circumstances, however, will a runway be considered acceptable within the terms of this Code if the maximum height of the hawser at any point exceeds 25 ft.

### 7. FACTOR OF SAFETY: TESTING THE APPARATUS

When ready for use the apparatus must be subjected to a rigorous test along its entire length to ensure a high factor of safety before the first passenger is allowed to embark. In plain English, this means that the test must impose a much higher strain on all parts of the apparatus than it is likely to endure while in use.

A simple way of doing this would be to attach a temporary rope to the (empty) seat, which could then be drawn to the head of the run and subjected to an energetic bouncing strain from ground-level, before being dragged at speed and under strain the full length of the run. This would test the security of the seat, the degree of sag in the hawser (with its desirable braking effect), and the efficiency of the emergency braking system.

This, or any other test, must be carried out conscientiously under adult supervision, with Scout observers posted to watch every part of the apparatus (anchorages, pickets, sheerlegs, the running block and seat, the braking system, etc.) and to report any possible weaknesses.

## 8. BRAKING DEVICE

As an additional precaution a braking device should be fitted. Two methods of braking are shown in the illustration. The first consists of the pick-up device on the hawser itself—merely a fairly long rope with a running loop on the hawser and the two ends anchored to pickets at either side of the runway. The loop can be made in the middle of the anchor rope by means of a Tucked Eyesplice (sometimes called 'the Dockers Splice') which is in common use round the dollies of the main guylines on ridge tents. To make it, simply middle the rope round the hawser, open the lay and pull the free end through to make an eye not more than twice the diameter of the hawser. Now repeat the process by opening the lay below the first tuck and pulling the other end through. The eye should be pulled back up the hawser the full length of the anchor ropes, so that when the travelling block picks it up, the friction of rope on rope will exercise some braking effect before it is finally pulled up short at sufficient distance from the sheerlegs to allow for the inevitable forward swing of the seat due to momentum. (Passengers should be warned of this when they embark.)

An alternative braking device is provided by attaching a weight, such as a log, to the hauling line so that it is lifted clear of the ground and brings the chair smoothly to a halt a suitable (safe) distance from the sheerlegs. If this latter device is used, care should be taken to ensure that the rising weight is equal to its task, and that it will not be obstructed by branches, etc., before it has taken effect.

## 9. SHEERLEGS

Spars of 12 ft. are suitable for the sheerlegs. Several 18/24 ft. lashings of 1½ ins. circumference will be needed. The sheer lashing should be applied first about 18 ins. from the tops with the two spars in the 'closed' position. (They can be opened slightly like scissors when the frapping turns are put on.) They should then be opened out with the butts no further apart than one-third the height from the lashing to ground-level, and the third spar square-lashed between them about 12 ins. from the butts. A saddle of hessian or canvas should be lashed in the crutch with sisal-twine, and fore and aft guylines secured to the tips of both spars. To minimise the danger of 'keeling over'—ever present in an apparatus subject to variable stresses and strains—the feet of the two legs should be heeled into the ground to a depth of at least 6 ins. The lower ledger should then still be well clear of the ground. All this work should be done before the hawser is finally positioned. When the tackle is being operated the sheers may tend to move from the vertical position, but this can usually be corrected without difficulty if caught in time. Constant vigilance should be the keynote.

## 10. THE SEAT

A purpose-built seat must be provided. Such devices as battens or strops which require the passenger to dangle from his hands are *not* permissible (see also 2 (e)).

Ultimate safety will depend on the method of attachment to the ring or eye of the travelling block. A round turn and two half-hitches made in the bight with an ample 'tail' will meet the need adequately, but for greater safety the knots can be double-locked with west-country whippings. (This whipping is merely a number of over-hand knots made with sisal-twine round the ropes, locked with a final reef.)

The seat and travelling block are to be regarded as 'accident black spots' in any runway. They should be checked and double-checked as a matter of routine before the runway is declared operational and after each run.

And, finally, on this subject, let it be known—once more and for all time—that in no circumstances will a block with a moused hook be regarded as anything other than an indication of foolhardiness.

## 11. EMBARKING AND DISEMBARKING

When the take off at the head of the run is at some height above ground level (e.g. from the branches of a tree) passengers should embark at the foot of the run, where safety and comfort can easily be checked, before being drawn up by the towline. Additional ledgers on the sheerlegs will facilitate mounting and dismounting, which can be quite hazardous from a free-swinging bosun's chair. If the emergency log braking system is used, the chair should come to rest some 6 ft. from the sheerlegs; the emergency log can be raised or moved so that the seat can be brought down to the sheerlegs. If the braking device involving a pick-up on the hawser itself is used, the brake lines will arrest the seat some 6 ft. from the sheerlegs, but if the two restraining lines are looped with loose bowlines over the pickets, they can easily be slipped off to enable the seat to be brought to the sheerlegs for mounting.

Before each descent passengers should be well briefed, e.g. 'Sit well back in the middle of the seat. Hold on to the front supporting ropes. Relax and keep still. Remember that when the brake comes on at the bottom of the run, the seat will probably swing forward, so hang on won't you?' If young boys are using the runway a 'safety harness' could be strung at the back and sides to give a feeling of greater security. Only one passenger must use the runway at any one time.

## 12. TOWING LINES

On a horizontal runway fore and aft towing lines will be needed.

If the towing line is tied to the neck of the travelling block *below* the pulley there should be no tendency for the block to tilt and jam when the seat is being drawn along unloaded. As previously stated, an efficient braking device should be fitted at each end of the run.

On a sloping runway the towing line should be used as the safety rope and attached to arrest the travelling block 6 ft. or so short of the sheerlegs. The towing line should pass through a single block secured immediately below the main hawser.

\* \* \*

### 13. INSURANCE AND ALL THAT

'Accidents will happen' (usually to the other fellow!) but in a Movement which prides itself on being prepared the possibility of accidents must be reduced to the irreducible limit. It is vital that this Code should be studied, understood and implemented by all concerned.

The District Commissioner and his team have the responsibility to ensure that leaders are given adequate training in this matter and that Group Scouters are fully aware of their own special responsibilities in the field.

Runways may only be built and used under adult supervision. Frequent inspection is necessary. Leaders should note the dangers of leaving runways erected for long periods—e.g. at Summer Camp. In such circumstances, the system should be immobilised as far as possible by releasing the strain on the tackle and by removing or tying back the chair, and by whatever other method is appropriate to the conditions.

If an aerial runway is to be included as an attraction at a fund-raising event it should be used for purposes of demonstration only by fully-trained Scouts or Venture Scouts under Scouter supervision. On no account may an aerial runway be made available for use by members of the general public. When not in use the runway must be immobilised (as above) and must remain under constant adult supervision.

\* \* \*

### 14. CHECK LIST DURING USE

Even when the provisions of this Code have been closely observed in the erection of the structure, the runway will inevitably suffer severe stresses, strains and shocks while in operation, and constant vigilance will be needed. This is an adult responsibility, but again the boy-leader should be brought into full partnership for purposes of training.

The items in this check list, among others, should receive frequent attention:

1. *All knots and lashings.* If any are found in need of attention suspend operations until the work is completed.

2. *Pickets and anchorages*—have they moved unduly under strain?

3. *Blocks and tackle*—especially the mousing of hooked blocks.

4. *The chair*—every part of it, but especially at the point of attachment to the travelling block.

5. *The main hawser*—is it 100% secure at both ends? Is it time to take up the slack? Alternatively, should the strain be relieved slightly to slow down the rate of descent?

6. *The sheerlegs*—have they moved from the vertical position, or shown any signs of rocking or tilting?

7. *The braking system*—is it operating smoothly, without detriment to the hawser?

8. *Embarking and Disembarking*—can this tricky operation be made easier for the passengers (perhaps by the addition of an extra ledger on the sheerlegs)?

9. *Is the briefing of passengers* working satisfactorily?

None of this need be done with too much fuss and bother, but apart from the question of security full advantage should be taken of the exercise to alert the Scouts, and in particular the Patrol Leaders, to the dangers inherent in activities of this sort, and to increase their awareness of personal and corporate responsibility.

\* \* \*

### *Policy, Organisation and Rules, Part 2*

The following Rules governing the use of Aerial Runways are now effective:—

#### *Aerial Runways*

##### Rule 71 i

Aerial runways must only be constructed under the personal supervision of an experienced and responsible leader, who must also supervise the operation of the runway.

##### Rule 71 ii

That leader in charge of the activity must ensure that:

- (a) a hawser, tested for soundness, of 2½ to 3 inches in circumference, made of manilla, sisal or polypropylene, is used;
- (b) the seat is purpose-built and securely attached to the eye of a single sheave block. In no circumstances may a block with a hook be used.
- (c) all equipment is checked before use;
- (d) the height and the angle of the slope is such that a safe steady descent is possible;
- (e) the entire structure is checked regularly during the activity for safety.

##### Rule 71 iii

Aerial runways must not be used by members of the general public under any circumstances.

*Note: More details concerning the construction of aerial runways is contained in 'The Aerial Runway Code', obtainable from the Association's Headquarters.*

## GLOSSARY

<b>Anchorage</b>	A secure object which will hold a heavy strain without moving.
<b>Becket</b>	The fixed eye on the tail of a pulley-block.
<b>Belay</b>	To secure a rope under strain to some such fixture as a cleat or bollard.
<b>Bend</b>	A joining knot.
<b>Bight</b>	This word has two quite different meanings. A bight is a loop rope. <i>The</i> bight is the total length between the two ends.
<b>Bill</b>	The point or tip of the hook of a pulley-block.
<b>Block</b>	A pulley (or pulleys) mounted in a frame or 'shell' of wood, galvanised iron, or laminated steel.
<b>Blocks and Tackle</b>	A mechanical device comprising two or more blocks through which a rope has been reeved to increase pulling power.
<b>Brace</b>	A spar connecting two others to give support or strength.
<b>Butt</b>	The heavy end of a spar.
<b>Chock-a-block</b>	A term indicating that the blocks in a tackle have been drawn together so that no further pull is possible.
<b>Cleat</b>	A piece of wood or metal having two horns round which a halyard or line is belayed (as at the foot of a flagstaff).
<b>Cordage</b>	A generic term for all cords, lines, or ropes; sometimes taken as meaning only cords and lines below one inch in circumference.
<b>Derrick</b>	A simple form of crane consisting of a single spar, usually hinged at the butt so that it can be swung, raised or lowered.
<b>Falls</b>	The returns of rope in a block and tackle (e.g. a tackle comprising two single blocks would have three falls).
<b>Fid</b>	A pointed pin, usually of lignum vitae, used to open the strands of a rope when splicing.
<b>Frapping</b>	The last few turns of a lashing put on at right-angles to the others to draw them together.
<b>Free end</b>	The end of a rope which is being used, sometimes referred to as the running part.
<b>Grommet</b>	In Scouting parlance, a rope quoit.
<b>Gun Tackle</b>	A method of using a rope or stops to move a cylindrical object by rolling it.

<b>Guys</b> (or Guylines)	Ropes supporting a vertical object or structure (e.g. a flagstaff or derrick).
<b>Gyn</b>	A tripod used to raise weights vertically.
<b>Haft</b>	The wooden handle of an axe, adze, or similar tool.
<b>Halyard</b>	A light line for raising and lowering flags, sails, etc.
<b>Hawser</b>	A heavy three-stranded rope laid up right-handed, usually of 3 in. or more in circumference.
<b>Heel</b>	The butt, or heavy end, of a spar. ('To heel in' means to sink in the ground).
<b>Hew</b>	To cut with an axe.
<b>Hew and Score</b>	Flattening one side of a log by making a number of lateral saw cuts of equal depth and flaking out the chips with an axe.
<b>Hitch</b>	A knot used in making fast, or securing a rope to another rope or object. Will not hold its position by itself.
<b>Holdfast</b>	Another name for anchorage.
<b>Lash, to</b>	To bind together securely with rope or cord.
<b>Lashing</b>	A rope or cord by which two or more objects (e.g. spars) are bound tightly together.
<b>Lay</b>	The direction in which the strands of a rope are twisted up together (e.g. hawsers are laid up right-handed, in a clockwise direction, while cables are laid up left-handed, against the clock).
<b>Ledger</b>	In Scouting parlance, the horizontal spar across the legs of a trestle or sheerlegs near the butts.
<b>Luff</b>	The name given to a very strong tackle consisting of two blocks, one single, one double, carrying ropes of 2 in. thickness or more.
<b>Marline</b>	Light two-stranded string.
<b>Marlinspike</b>	A pointed steel pin used to open the strands of a wire rope when splicing.
<b>Maul</b>	A heavy wooden mallet, sometimes called a 'Beadle'.
<b>Marry</b>	To join two ropes together side by side so that they are handled as one, or to interlace the strands of two ropes alternately preparatory to splicing them together.
<b>Make fast</b>	To secure a rope so that it will hold when the strain comes on to it.
<b>Mousing</b>	To close the hook of a block with spunyarn or other thin, strong twine.
<b>Parbuckle</b>	A method of using a single rope to move

<b>Picket</b>	raise, or lower a cylindrical object by making use of the rolling moment.
<b>Purchase</b>	A pointed stake of wood or steel.
<b>Reeve</b>	A combination of blocks in a tackle where power is gained.
<b>Saddle</b>	The act of passing a rope through a block, or blocks, to form a tackle.
<b>Seizing</b>	In Scouting parlance, a piece of sacking or other material placed in the crutch of sheerlegs to enable the rope to run freely and to minimise chafing caused by friction.
<b>Shakes</b>	Binding with sailtwine, spunyarn or other light cordage to secure the end of a rope to the standing part after making a knot.
<b>Sheave</b>	Faults in the grain of spars and other timber, frequently unseen.
<b>Sheers, Sheerlegs</b>	The pulley-wheel of a block.
<b>Sisal</b>	A triangular structure of spars.
<b>Sling</b>	A species of hemp fibre used in the manufacture of ropes and light cordage. In Scouting parlance, the word is often taken to mean sisal twine of two or three strands.
<b>Snatch-block</b>	A band, loop, or other arrangement of rope or material for suspending, hoisting, or transferring a load.
<b>Spanish Windlass</b>	A single block with a hinged metal strap which can be opened to take the bight of the rope (i.e. without the necessity of reeving the end through the block).
<b>Spar</b>	A device to increase the strain on a rope by using a horizontal spar as a lever to wind the rope round an upright.
<b>Spunyarn</b>	A pole, or length of round timber.
<b>Stop, to</b>	Hemp string, usually tarred, used in whipping the ends of ropes and for mousing the hooks of blocks.
<b>Strop</b>	To tie down the coils of a rope; to seal the end of a laid rope (e.g. a backsplice can be used to stop the end of a rope) or to prevent a rope from running out through a block.
<b>Standing part</b>	A ring of rope made by splicing or tying the ends together.
<b>Shell</b>	The part of the rope which is not being handled.
<b>Swallow</b>	The wood or metal casing of a pulley-block.
<b>Tackle</b>	The space between the sheaves and the shell of a pulley-block through which the tackle is reeved.
	The apparatus of blocks and ropes for lifting, lowering, or pulling.



<b>Tail</b>	The extreme end of a rope beyond the knot or lashing. The end of a pulley-block which carries the fixed becket.
<b>Tip</b>	The lighter end of a spar, opposite to the butt.
<b>Toggle</b>	A pin, generally of wood, put through a loop or eye at the end of a rope.
<b>Transom</b>	In Scouting parlance, the spar across the top of a trestle.
<b>Trestle</b>	A rigid structure of six spars lashed together with two legs, two horizontal cross-members (the transom and the ledger) and two diagonal braces.
<b>Whipping</b>	Binding the end of a rope with twine to prevent it fraying or unlaying.

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