

Practical Restoration Handbook

Towing Paths

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1. TOWING PATHS (commonly known as towpaths)

Traditionally, a towpath was designed to allow two horses to pass, and for a hedge to grow on company land to provide a stockproof barrier to the adjacent land. Thus the width of a typical towpath would vary between 1.8 and 3.6 metres, depending on usage. Since the introduction of motorised boats, coupled with the lack of maintenance, hedges have become wider, and the canalside banks have subsided, consequently the towpath widths have been considerably reduced.

Tools and Equipment Needed

- (a) Hand tools: mattocks, shovels, pickaxes, sledgehammer, hand roller, wheelbarrow, spirit level, length of timber to use as straight edge
- (b) Machine tools: mini-excavators, small dumper trucks, rollers (either pedestrian-operated or ride on), vibrating plates

Materials

Timber used for edging (100mm x 25mm) must be pressure treated with preservative.
Semi-permanent membrane/geotextile, e.g. Terram; Puddling clay; Bentonite.
Select from: cobblestones; paving blocks; crushed stone 20mm down; concrete; tarmac.

Health and Safety

- Wear steel-capped footwear, hard hat and strong gloves.
- Wear eye protection when splitting or shaping stones, cobbles or paving blocks.
- Ensure operators of mechanical equipment and dumper trucks have received the appropriate training. If they are working close to the canal, they should receive particular site briefing and instruction.
- When swinging a mattock or pickaxe, ensure that no-one is within 2 metres of the user. Make sure that feet are balanced and firmly placed.
- Where weedkillers are to be used, suitable protective clothing must be worn, together with face masks and eye shields. The herbicide should be used strictly in accordance with the manufacturer's instructions.

Terms Used

- Campshedding** The protection and retention of a canalbank with timber, steel piling, concrete blocks, sand-bagging or stone-filled gabions.
- Gabions** Rectangular woven heavy gauged galvanised steel wire container filled with quarried stone, gravel rejects or similar.

- Membranes** Semi-permeable lining of matting or filter cloth, which allows the passage of water whilst retaining particles of solid matter.

- Piling** Cantilevered sections of solid steel with interlocking clutches, driven into the canal bed to provide firm strengthened edges to canal and towpath. Timber can also be used for piling, e.g. elm, oak, greenheart, pitch pine.

- Revetment** A facing of masonry, concrete, steel piling, or gabions, to support a canal bank.

Towpath Construction/Restoration

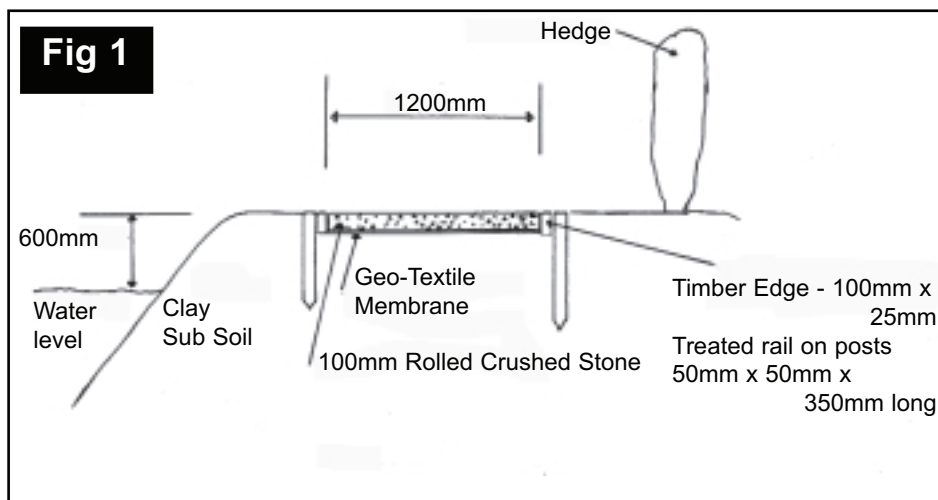
With today's permitted access to the canal network, towpaths have been subjected to intense usage compared to their original designation. Accordingly, their construction and maintenance needs to reflect this. For instance, the towpath is often used now by anglers and cyclists as well as walkers, and also by wheelchairs, pushchairs, etc., and the width will need to be sufficient to allow for these. In rare cases, the towpath is also a bridle path, so horse riding is permitted, and in other areas horse-drawn boats are still in operation. A locally distinctive solution should always be sought and a thorough survey and analysis of the site should be undertaken to derive an acceptable solution. Towpath construction will vary according to the location and usage of the canal, e.g. stonechippings and grass on a rural canal, to the cobbled towpaths of a busy industrial canal.

In areas where the towpath has collapsed into the canal bed, then the bank must be reinstated by campshedding. Details of the various methods of bank protection are given in other sections of the I.W.A. Practical Restoration Handbook.

The offside of the towpath will usually be protected by a brick or stone wall or a fence in urban areas. In rural areas, a hedge, a dry stone wall or stone faced retaining wall, or a fence could be used.

(A) Rural Towpath

A typical rural towpath is shown in *Fig 1*.



Method

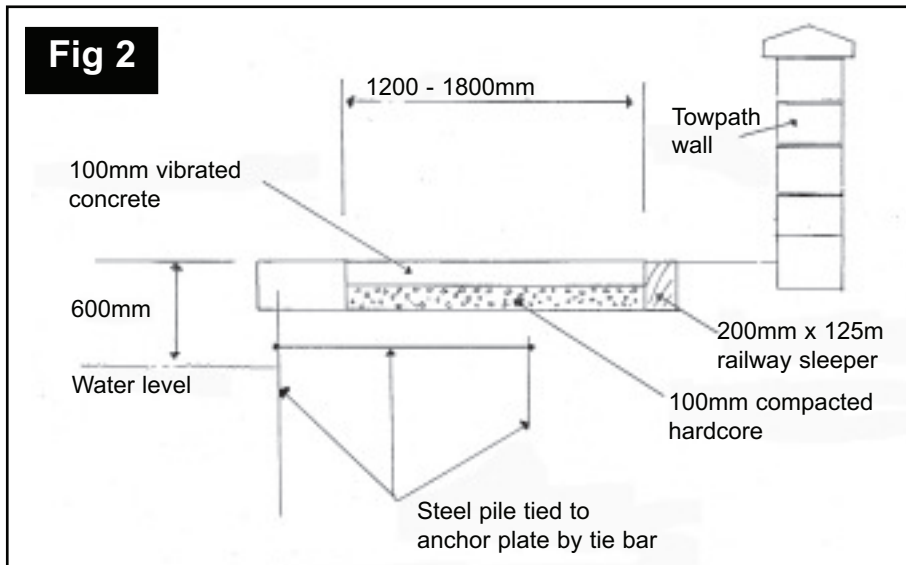
- 1.1 Scrub-bash/clear vegetation back to original line of the hedge.
- 1.2 Remove any stumps, and fill in holes with puddling clay if path is level or below water storage.
- 1.3 Fill any breaches in the towpath by clearing back to original clay and puddling up to the correct height. The finished towpath level is normally 600mm above water level.
- 1.4 Dig down and fill in rabbit holes. In the case of an extensive warren, it may be necessary to dig a trench along the length of the warren, and fill with bentonite to reseal the bank.
- 1.5 Scrape away the topsoil, either using mattocks, spades/shovels, and a wheelbarrow, or a mini-excavator to remove excess. The aim should be to produce a level sub-surface 1200mm wide and 100mm below finished towpath level. It may be necessary to treat the area with systemic weedkiller.
- 1.6 Set in edge boards, consisting of 100mm x 25mm of treated timber, held in place by wooden pegs.
- 1.7 The sub-surface is now ready for the finished surface to be laid. First lay a geotextile semi-permeable membrane, such as Terram, over the area. This helps to prevent weed growth up through the towpath, and also allows water to drain through, to prevent the path becoming waterlogged.
- 1.8 Spread a bed of 20mm down aggregate with sufficient fine material to fill the interstices. Level this and compact it to a depth of 100mm, using either a vibrating plate or a 300-500kg vibrating roller.

Urban Towpaths

In urban or industrial areas, the towpath is subjected to a great deal of use, often with vehicular access, and therefore the towpath must be constructed to take the impact. Canal sides will probably be either concrete capped steel piling or brick/stone walls topped with large coping stones. To encourage pedestrian use, there should be provision for bench seating, picnic tables, litter bins and dog excrement bins. Notices should be erected at access points requesting dog owners to remove their dog excrement and dispose of it in the nearest bin provided, and for walkers to use the litter bins. Both types of bin will need to be emptied on at least a weekly basis. The towpath foundation should consist of at least 100mm of well compacted hardcore.

The surface finish can be a choice of:

- (a) 75 - 100mm Tarmac.
- (b) 100mm of concrete (well vibrated).
- (c) Stone setts placed on a 25mm bed of sharp sand.



- (d) Precast interlocking grass/concrete system. The concrete provides the load bearing surface, while the network of holes filled with soil and grass seed give a more natural appearance.
- (e) Clay bricks.
- (f) Aggregate/hoggin.
- (g) Clinker/ash.

Method

- 1.9 Clear any vegetation and accumulated top soil from surface and coping stones. If vegetation is extensive, the roots may cause the coping stones to dislodge and old surface of the towpath to lift. Remove the coping stones and eradicate the roots if possible before reseating the stones and resurfacing. Treat if necessary with systemic weed killer. Advice should be sort as to the most appropriate systemic weedkiller to control particular weeds at each location.
- 1.10 If surface is uneven, it will have to be raised to level off any bumps or hollows. In cases of serious neglect, it will almost always be necessary to lift the existing surface, and ensure that the sub-surface is level.
- 1.11 If possible, re-use existing material to match previous surface.
- 1.12 Ensure that the path remains parallel with the canal (except the run off to turn pike bridges, etc.) and parallel within itself. The profile of the surface should be maintained, with a slight slope downwards towards the canal to provide run-off [see also 'Drainage' (b) below].

Mooring and Landing Places

- (i) At designated and other regularly used moorings (for shops, pubs, etc.) and at lock or moving bridge landing points, the grass should be mown to the water's edge.

- (ii) Mooring rings or bollards should be provided at all designated or popular mooring sites and at official landing points, and these should be attached to a firm concrete foundation.

Drainage

All towpaths need to allow surface water to run off, either into the canal or into a side ditch. Sometimes it may be necessary to collect the water into a side ditch and then feed it into the canal via pipes running under the towpath. Where the banks have been piled, 50mm holes should be drilled in every fifth pile above maximum water level at a height of 100mm.

Likely problems that could be encountered include:

- (a) Canals in a cutting. Some form of drainage will be necessary for the run-off from the slope above the towpath. This could be in the form of a ditch alongside the path, which could drain into a stream at the end, or pipes could be incorporated from the ditch underneath the towpath, with a fall of approximately 1 in 30, to drain excess water into the canal.
- (b) Canals on level ground. A slight slope of 1:30 needs to be incorporated into the towpath to drain any excess water into the canal. (British Waterways, 1972).
- (c) Canals on embankment. The slope should be towards the hedge or drainage ditch.

Where drainage is a problem, it is essential that the area be thoroughly surveyed, to draw up a drainage plan prior to commencement of work.

Maintenance

On rural towpaths, the vegetation will have to be kept under control during the growing season by regular mowing, and the hedges kept trimmed back. If there is a gravel path, this must be repaired if erosion occurs. Any hedgerow trees must have overhanging branches kept trimmed back flush with the trunk, leaving an overhead clearance of 2.0 - 2.5 metres above the towpath, and any suckers or seedlings removed. Repeated cutting back by machinery of some tree species, e.g. elder, coppices them and can encourage vigorous growth. A regime for removal or poisoning of such roots should be an essential part of towpath maintenance for those growing between path and canal.

Urban towpaths should need minimum maintenance where there is regular normal usage. Annual spraying with systemic weedkillers might be advisable, and any surface damage needs to be repaired as soon as practicable to prevent further deterioration, and to avoid accidents to walkers, e.g. tripping on uneven surfaces. There is also a possibility of vandal damage, and therefore the urban towpath should be inspected regularly.

Access

Access to towpaths should be considered from all roads crossing the canal, either on bridges over, or (in the case of aqueducts) under the canal. What type of access will depend on several factors:

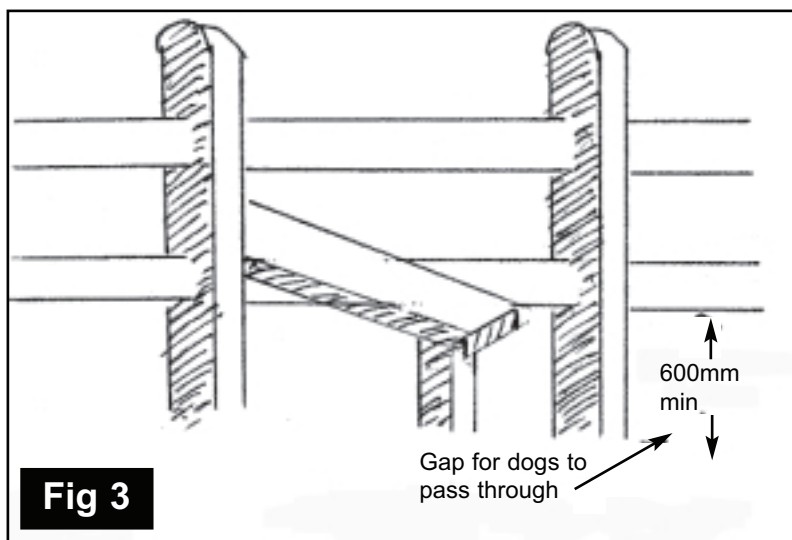
- (a) In an urban situation, it may be necessary to provide access for vehicles for maintenance purposes. The entrance would need to be at least 3.2 metres to allow sufficient space for turning

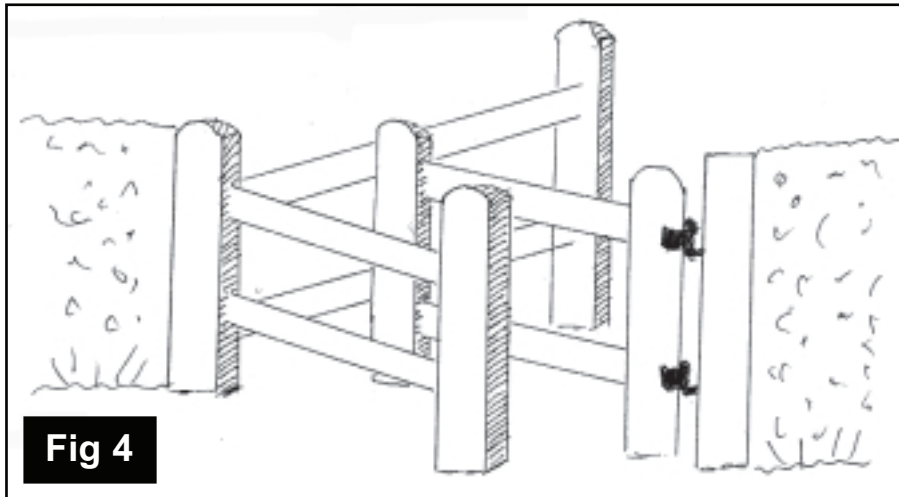
into the access. Vehicular access could only be provided where sufficient land was available. A slope would need to be constructed, with hard surface, at a gradient no steeper than 1:14.

- (b) Disabled access should be taken into consideration on all rural or urban access points, but British Waterways advise that there are towpaths that are unsuitable for wheelchairs and disabled walkers, on the grounds of safety. Some urban towpaths are unavoidably narrow, due to the proximity of walls and buildings. Rural towpaths are also sometimes narrow, as no more land is available to increase their width; they can also be unstable and unsuitable for all wheeled vehicles, including wheelchairs, due to local soil conditions, e.g. clay or peaty soil, which quickly becomes rutted and waterlogged (Department of the Environment, 1997). In such cases, a notice should be erected at the access point explaining the dangers. Where the towpath surface is suitable for wheelchairs and disabled walkers, a slope with hard surface from the access point would be necessary, and it is recommended that this should be no steeper than 1:12. If a gate is set in at the top of the slope, it must be remembered that this should have low set catches to be reachable from a seated position, and should close automatically.

Stiles or kissing gates should not be positioned where disabled access is to be permitted. This also applies to access for perambulators, bicycles, etc.

- (c) Local byelaws may decree that the towpath is for pedestrian use only (Department of the Environment, 1997). In this case, to discourage use by bicycles, horses, wheeled vehicles (including wheelchairs), a stile or kissing gate (Figs. 3 and 4) is advisable at the top of the slope. A further discouragement to non-permitted users would be to build steps instead of a slope. These should be constructed of timber risers - either railway sleepers or similar size treated timber, or straight logs, cut to 2 metre lengths. Half-round fencing stakes, 100-150mm width, and at least 500-600mm length, should be driven in at either end of the risers, with the top level with the top of the step, and bevelled downwards 45 degrees. The treads should be filled with gravel or crushed stone to a depth of 25-50mm. A handrail should be provided on the exposed edge of the steps. If the steps are placed at right angles to the towpath, it will also be necessary to provide a guard rail along the outside of the path opposite the bottom of the steps to prevent accidents.





In popular areas, and where space permits, seats can be provided beside the towpath at intervals.

2. STONE WALLING/STONE-FACING AN EARTH BANK

Stone is often used to face and strengthen an earth bank above or below a towpath, or the wing walls above and/or below a lock, particularly on the towpath side. This can also be referred to as a retaining wall or structure. This is *not* a dry stone wall (see next section). The following methodology is suitable for use when repairing/restoring existing structures. However, if a new structure is to be built from scratch, it is advisable to seek the advice of a structural engineer.

The following advice is suitable for rural areas. In urban areas, to prevent vandalism, it might be advisable to use mortar in the construction process. See also chapter on 'Brickwork' by John Park.

Tools Needed

Digger (like a one-sided mattock - if not available, use mattock); shovel; crow bar; wrecking bar; lump or club hammer; stone walling or brick hammer; strong chisel; bolster.

Health and Safety

- Wear steel-capped boots, hard hat, strong gloves
- Wear goggles when cutting or shaping stones
- Keep stone to be used in wall back from working area to avoid tripping
- Spread large stones in front (smaller stones behind) to shorten distance for carrying/lifting
- Never leave tools lying in hazardous positions
- If wall is to rise higher than 1.5 - 2 metre, scaffolding rather than a ladder is safer
- Lifting - correct position for lifting is very important. With knees bent, and back straight, lift carefully. Never strain - if stone is too heavy, obtain help to lift.

- Be careful not to trap fingers when lowering stone into place

Terms Used

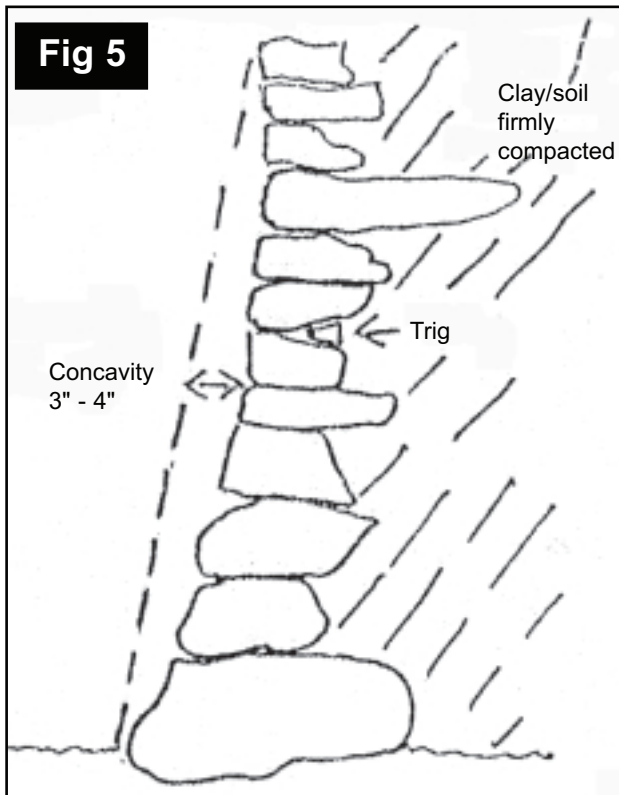
Foundation stones	Large, heavy stones used at base of wall to provide solid foundation
Faces	The 'best' side (and the only visible side) of stones used in the wall, the face preferably being flat
Tie stones	The longest stones used at intervals in the wall, running lengthwise into the bank, to provide stability and strength, and to tie the wall to the bank
Trigs	Small stones used to wedge behind a larger stone with an uneven base, to ensure that it 'sits' securely
Coping stones	Large stones used along top of wall, preferably with flat top as well as flat face, to be used particularly where it is anticipated that walkers and boaters will want to walk along the top
Pitchers	A line of smallish stones, usually upright (but can be placed at 45 degrees), packed securely along top of wall to form a castellated finish, where it is not anticipated that people will walk/stand on top.
Batter	The vertical shape of the wall, preferably concave in the middle, with no bulges
Infill	If stone-facing tow path wall above water level, this will consist mainly of soil, but for below water level (as in wing walls of lock), clay should be the main infill material to provide the puddle or water-tight seal between and behind the stones. Never use loose stones and rubble between or immediately behind the stones (as in a dry stone wall), as this will not provide the necessary watertight seal required. Water can wash in between the front stones and loosen them, and in winter may freeze, the ice swells, and the front stones are actually pushed out.
Quoin	A wall corner or end

Method

- 2.1 Using digger or mattock and shovel, dig out bank to firm sub-soil at base of bank to be faced. Any stones removed for re-use (or brought in from elsewhere) should be spread at least six feet back from working area (makes it easier and safer to work), with the larger stones nearest to the working area, smaller stones behind. Any soil or clay dug out should be piled either on top of the bank, or nearby, for use later as infill.
- 2.2 Lay foundation course, using largest and heaviest stones - not only are these difficult to lift up onto higher courses, but they give a firmer base. They should be placed lengthwise into the wall to give added strength, with the face (best end) at the front. If they have an "ugly" (misshapen)

bottom, try to dig the shape in the sub-soil first, so they sit firmly. The face should have a slight slope outwards to assist drainage, so that the upper edge of the face is 6-8cm further back than the base (see "batter"). The stones should be placed as close as possible to the earth bank behind, if necessary cutting holes in the bank to run the point of the stone back in.

- 2.3 Infill should then be used to fill all the gaps behind and between the foundation stones, using some pointed tool, e.g. a strong chisel, to poke as much infill as possible between the stones and fill every gap. The infill should then be rammed down very firmly, using the head of a club hammer or the top of the chisel, until it is no longer possible to move the stones by hand. The infill should then be loosely banked on top of the stones, and slightly higher than the stones at the back. This provides a good bed for seating the next course.
- 2.4 Proceed with next course of stones, taking care to break the joints as in bricklaying. Small trigs or wedge-shaped stones can be used if necessary behind the stones in the face of the wall, only behind, and they should be firmed in securely with infill.
- 2.5 The batter of the face is very important; it should never be convex, and a concave batter should be the aim (see Fig 5). However firmly the infill has been packed, some settlement of the bank will occur over the years, which may push the face out slightly, but if sufficient concavity has been allowed, the bank should not be weakened. Any bulge in the face of the wall is a potential weakness. The batter will be most pronounced on the foundation course, and each successive course should then have a slightly decreasing degree of batter, with the top layer being set with perpendicular faces.

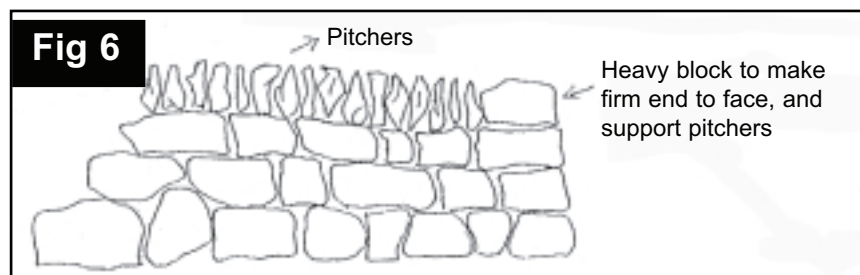


2.6 After each course of stones is laid, repeat the soil/clay infill, and hammer down securely, always leaving the level of the infill slightly higher at the back. If every third or fourth stone placed is a long one, running well back into the bank, this will strengthen the wall. With a long narrow stone with a nice flat side, it is always tempting to use it along the face, both for appearance sake and to make the wall-building faster, but this does weaken the wall. Try to avoid using any stone that is less than 24cm long running back into the bank. Where a shortish stone has to be used, try to use longer ones either side to wedge it in securely.

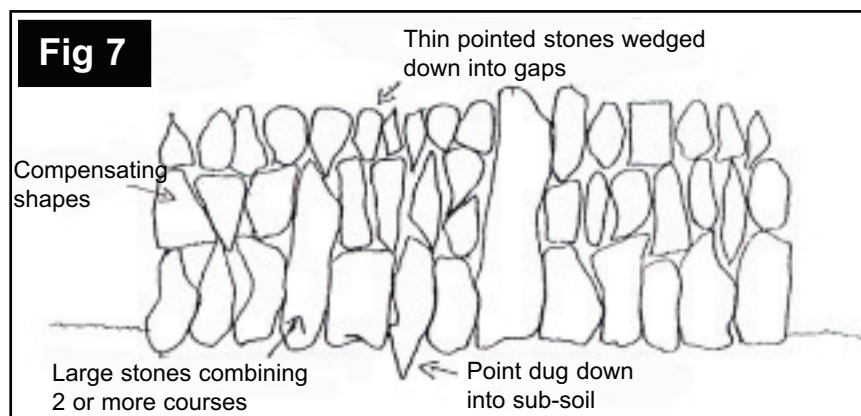
- 2.7 If the face of the stone is not absolutely flat, or has a corner missing, never use small stones pushed into the gap in the front of the stone bank. Small gaps do not matter in the face, provided the infill is puddled well between and behind the stones to form a watertight seal, but if necessary

(and section is below water-line), a ball of clay can be pushed firmly into bigger holes in the front. A point sticking out of the face may be "dressed", or re-shaped, using brick hammer or club hammer with chisel/bolster. Remember that some stones are quite soft and/or brittle, so if requiring to re-shape, tap gently at first, otherwise a good stone may shatter and be unusable.

- 2.8 The top course of the wall can be finished by using one of two methods. If it is necessary to walk along the top of the bank, e.g. for boaters mooring at one end of a lock, large flat coping stones are the most appropriate. A second method, which could be used along the top of a towpath bank or round the edge of a side pond with stone-faced sides, is to use pitchers (see terms used and Fig. 6). This is also a practical method of using up irregular shaped stones that cannot be used in the wall, and it helps to retain the soil along the top, as it can be packed down securely between the pitchers. However, if repairing a section of bank where neither method has been used, it is obviously important to try to match the sections either side.



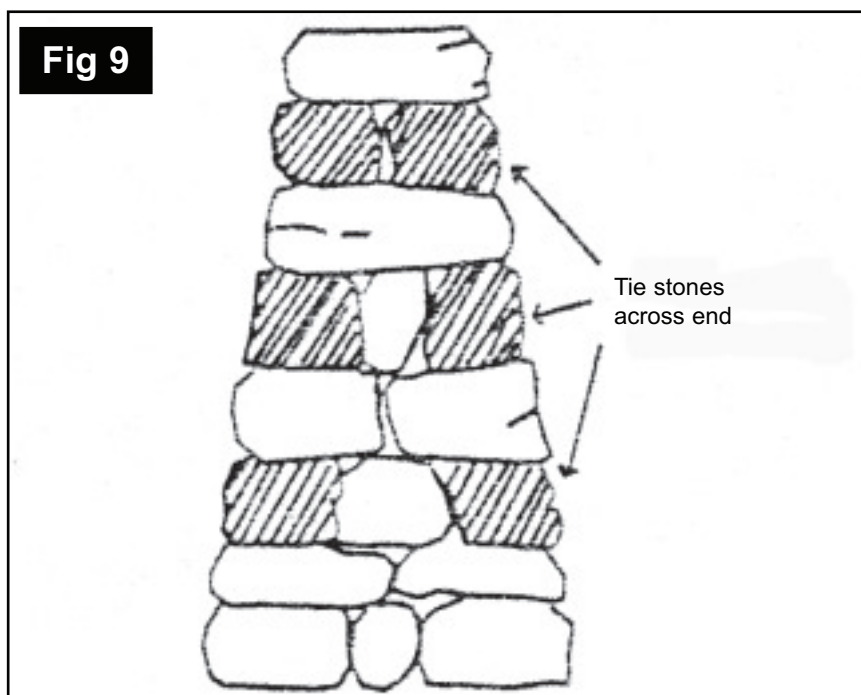
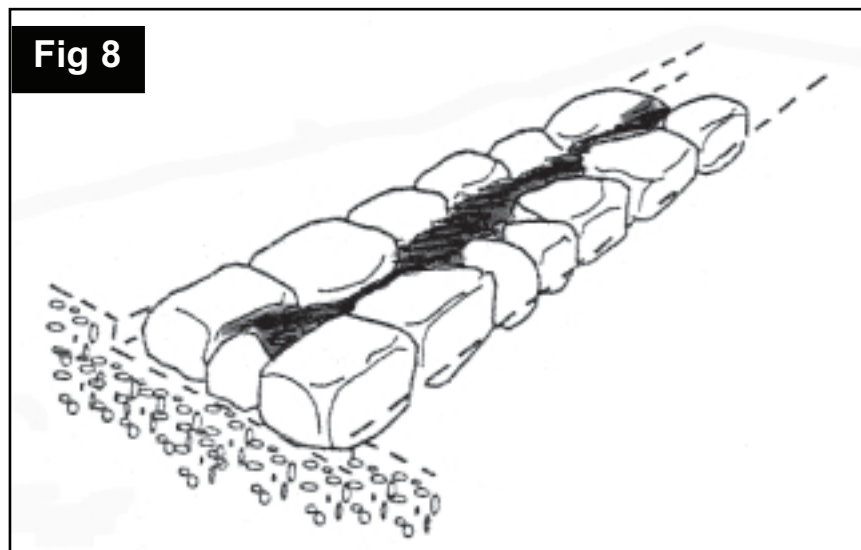
- 2.9 An alternative method of construction, which is particularly useful if most of the stone available is rough and misshapen, is to place the stones on edge in the wall (rather than flat), again with the stones running back lengthwise into the bank. Using this method, the courses do not have to be level, but stones of greater depth can be used, as these will combine two or even three courses to give greater tying effect. (see Fig. 7). If large rounded stones are to be used, this method is the strongest, as the stones obviously do not lie flat on the courses below as they would with the horizontal method.

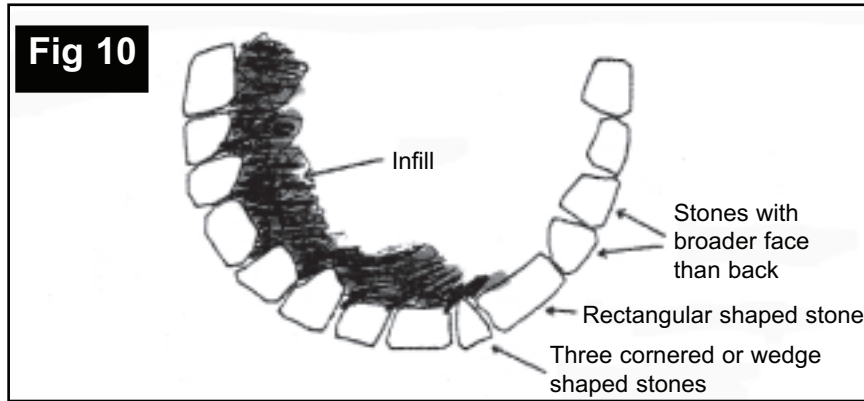


Whilst most walls will be built into the bank at either end, it may be necessary to construct a quoin (or corner) at the end of a length of wall, e.g. at either side of a stile or gateway. The quoin can take either square or round forms.

- (a) For a square end, select large slab type stones, preferably rectangular in shape, with at least two faces at right angles. To lay the foundation course, place a rectangular stone on either side of end and infill any gap between (narrow face) with a stone of similar depth (see Fig 8). Next course, lay two stones with inside ends meeting and long edge to wall end. Continue laying stones as in brickwork, alternating long and short faces, thus enabling the builder to maintain the bond and have no straight joints, in order to retain maximum strength (see Figs 8 and 9).
- (b) A round end can be softer and more natural looking. Select slab type stones whose width is not more than 25cm, unless dressed to curve. If none available, select stones with broader face than back. This will maintain the wall end curve while keeping stones butted tightly together (see fig 10 - page 20).

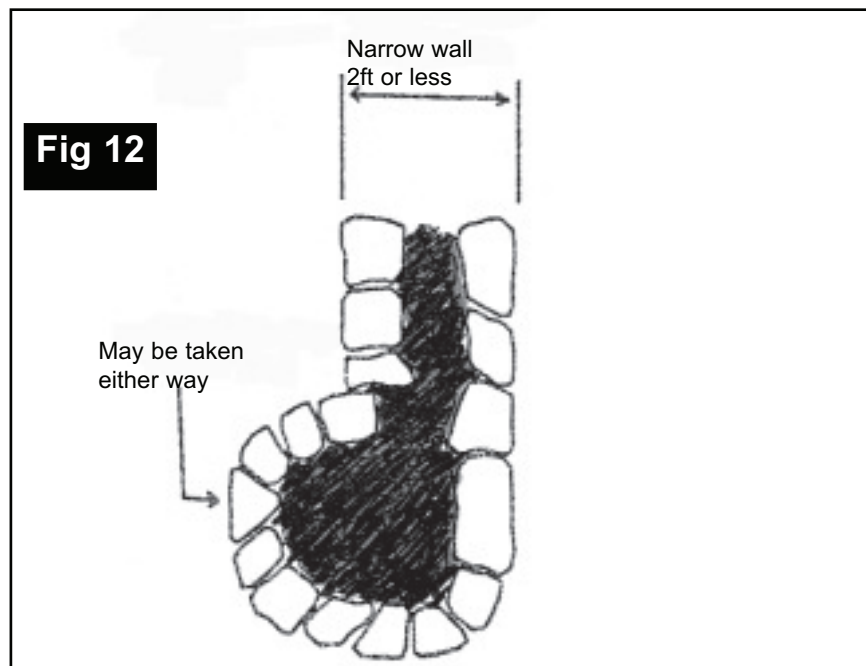
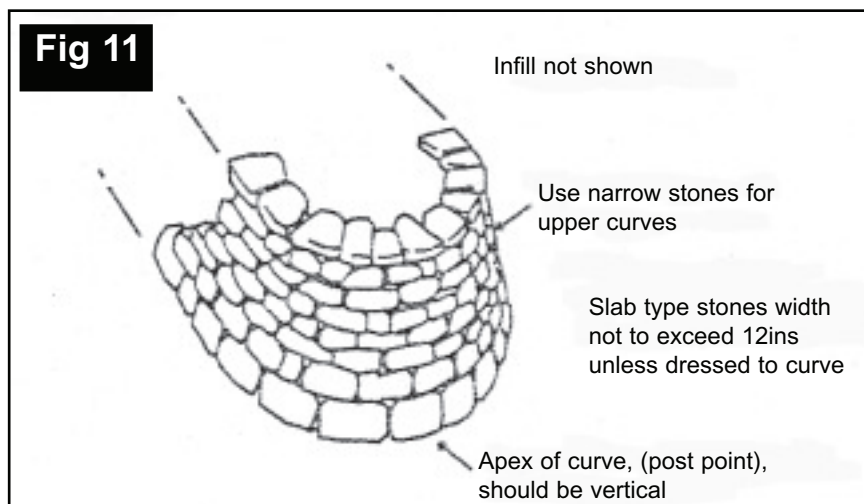
NOTE: Where rectangular shaped stones have to be incorporated, a few triangular or wedge shaped stones will help to accommodate them.





Maintain semi-circular shape of end as build proceeds and tie joints as in wall sides (see Fig. 11). Select narrower stones for the upper curves. Be careful to maintain batter as in wall sides, and keep up infill as each course progresses. This may leave a small gap between top of wall and gatepost/stile, but as infill settles this will reduce.

NOTE: If the wall is narrow in width, say 600mm or less, an extended pier type round end is advisable (see Fig. 12) (Devon Rural Skills Trust Code of Practice, 1995).



3. DRY STONE WALLING

This is not to be confused with stone-facing an earth bank. A dry stone wall is a stand-alone wall, using nothing but stone to construct (including infill), and is built to shed water or allow free drainage through the wall. It can sometimes be seen alongside a towpath where the ground is flat, as an alternative to a hedge.

There are two types of dry stone wall - single-skin and double-skin. The latter consists of two parallel walls, with a "face" on each side, and stone rubble infill. Where available, long stones are built into the wall to tie both sides together; the whole wall would be at least 750mm wide, and can be much wider.

A single-skin is narrower, and therefore not so strong, but takes less stone, so may be the only option. The waller concentrates on maintaining one good face, and the "off-side" may be quite rough. With no backing to the stones, it is less easy to build a firm, stable wall, and it may be necessary to use more trigs to maintain individual stones at the right angle, and to prevent rocking.

The tools needed will be as in section 2, and the health and safety advice also applied. The diagrams will also be similar.

The terms used are also similar, with the exception of the infill, which consists of small loose stones and rubble, and any stone that is unsuitable for use in building the faces of the wall.

Most dry stone walls are traditionally topped with a row of pitchers - sometimes two rows, which are with one row slanting one way, and the next the other, to give a herringbone effect. A single row of pitchers can be either built with upright stones tightly packed together, or a castellated effect can be achieved by building alternate upright and flat stones. However, the aim should be to use whatever method tends to be used locally to maintain tradition. In places where there is a problem with vandalism, with stones from the wall "disappearing" the pitchers are sometimes mortared together. The main wall will still be a dry stone wall, but at least it makes it harder for the odd stone to be removed.

4. HEDGELAYING

There are two main reasons for laying a hedge. One is to preserve the hedge, and encourage new growth, to prevent it dying back. The other reason is to provide a stock-proof barrier, particularly where stock are being kept in a field adjacent to the towpath - or even to prevent towpath users from straying into a field where crops may be planted.

Different styles of hedgelaying are adopted in different parts of the country, and the main one described here is a variation of the Midlands style, where the hedge is growing from ground level alongside the towpath.

Hedgelaying can only be done between October and March, when the sap is dormant, and the trunks less brittle, and more flexible.

The best species for laying are hawthorn, blackthorn, beech, hornbeam, hazel, holly. Others, e.g. oak, maple, spindle, elm and willow or even dog rose, can be used where there is nothing else suitable. Unsuitable species, e.g. elder, alder, ash and sycamore, are best cut out of the hedge if there are sufficient trees/saplings available, and should only be used as a last resort.

Tools Used

Bill hook

Felling axe

Bow saw/pruning saw

Chain saw (if necessary)

Wooden stakes or crooks

Mallet

Hethers, if available (long thin rods of hazel or willow)

Health and Safety

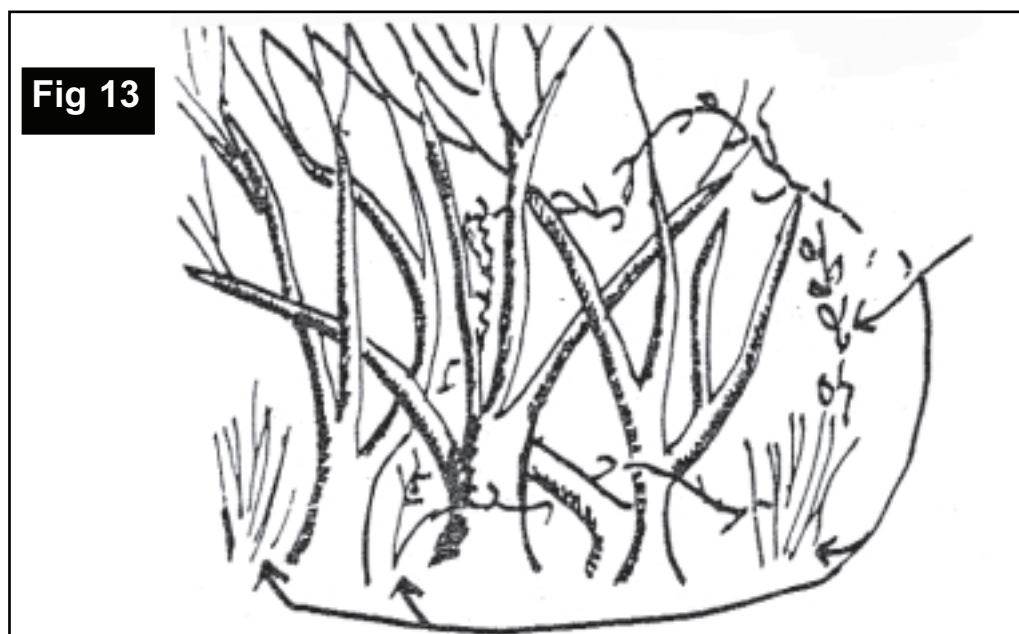
- Hard hats, steel-capped boots, stout thorn-proof gloves, and safety glasses are all advisable.
- It is not recommended that edge tools (bill hook, axe) are used in heavy rain, as they are liable to slip from the hand and cause an accident.
- When swinging an axe, ensure that no-one is within 2 metres of the user. Make sure that feet are balanced and firmly placed.
- When a tree is being either cut out of the hedge, or is being laid, due warning must be given to all people in the vicinity, and the only people closer than two lengths of the tree should be anyone giving direct assistance to the hedgelayer in lowering the trunk gently in line with the hedge (Health & Safety Executive).
- Edge tools should always be kept very sharp. It is a misconception to believe that blunt tools are less likely to cause an accident - apart from being harder work to use, they are more likely to bounce off the tree instead of cutting into it, and can still cut into flesh! A blunt tool will also make a messy wound rather than a clean cut one that would heal easier. Sharpen tools before and after every day's use, and during the day as well if necessary. Many mass-produced axes and bill hooks sold today have too thick a shoulder for efficient cutting, and it is advised that the blade is ground thinner if a grinding wheel is available.
- Many accidents are caused with bow saws, usually because they slip or catch on nearby twigs, and jump onto the user's other hand.
- Always cut or chop away from the body and limbs.
- Overhanging branches or brambles to be cleared to avoid arresting cutting action.
- Avoid wearing loose clothing, flapping jackets etc.
- If chain saws are necessary, (particularly with a very mature or neglected hedge), the user must have a valid chain saw certificate for cutting the width of trunk available, and must always wear at least the minimum safety clothing, i.e. chain saw helmet, visor, ear defenders, chain saw gloves, boots and trousers/leggings. As with axe work, ensure that feet are balanced and firmly placed.
- Check current immunisation against tetanus.

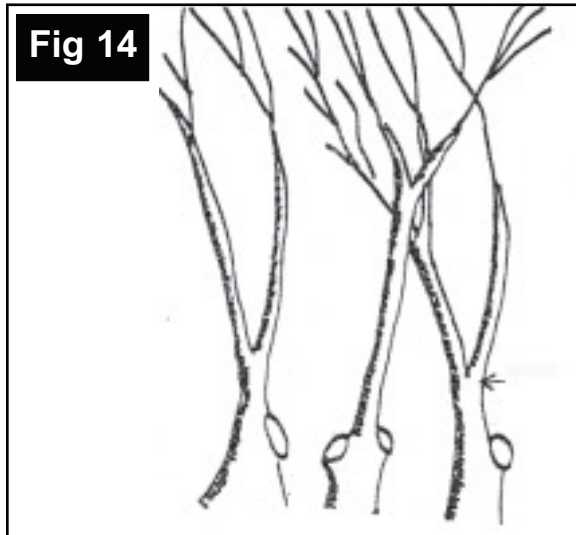
Terms Used

- Pleachers, plashers, steepers:** All terms used to describe the tree/sapling that is being laid in the hedge.
- Hethers:** Long thin rods, usually hazel or willow, that are woven along the top of the laid hedge between the stakes, to provide a neat and firm finish, and hold down the pleachers in position until they have become used to growing at their new angle.
- Hake's mouth:** If a pleacher is cut with too sharp an angle, it can split back up the trunk, (opening like a fish's mouth), and possibly causing the trunk to rot.

Method

- 4.1. Decide direction of laying. The general rule is in an uphill direction, but most canal towpaths are on level ground, so lay upstream, i.e. in the direction in which boats would lock up. In summit pounds, lay towards the east or south, to get most benefit from the morning sun.
- 4.2. Trim away unwanted growth, e.g. suckers or seedlings growing outside line of hedge, heavy bramble cover within hedge.
- 4.3. Cut out any rotten wood, and old pleachers if the hedge has been laid previously. Select the stems most suitable for laying, e.g. the straightest trunks, preferably no more than 15cm. diameter, unless only thicker ones are available. If there is sufficient growth in the hedge, the larger trees may be left as standards if desired. Remove unwanted side growths from those selected (see Figs 13 and 14). Initially, leave more in the hedge than you think you will need, but cut out most twisted and bent trunks, particularly those growing in the opposite direction from that in which you are intending to lay. With a large clump or stool of trunks, it is best to lay those at the front of the clump. As far as possible, any trees or stumps cut out of the hedge prior to laying should be reduced to ground level, as they will interfere with the angle of the new pleachers.

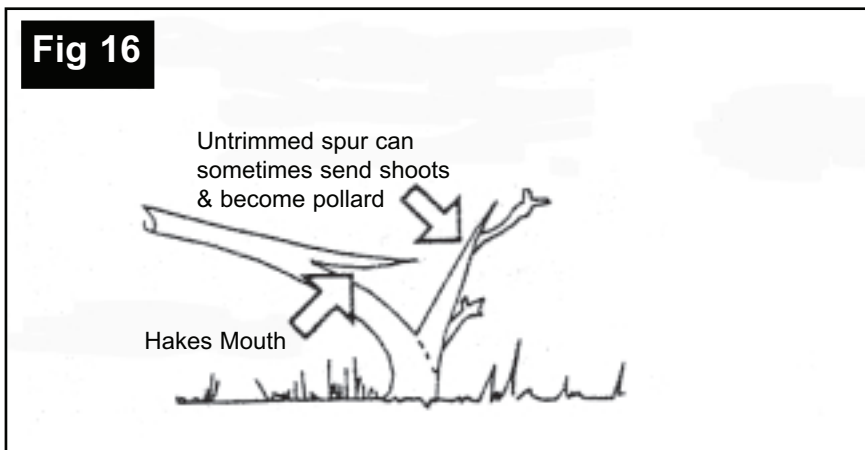
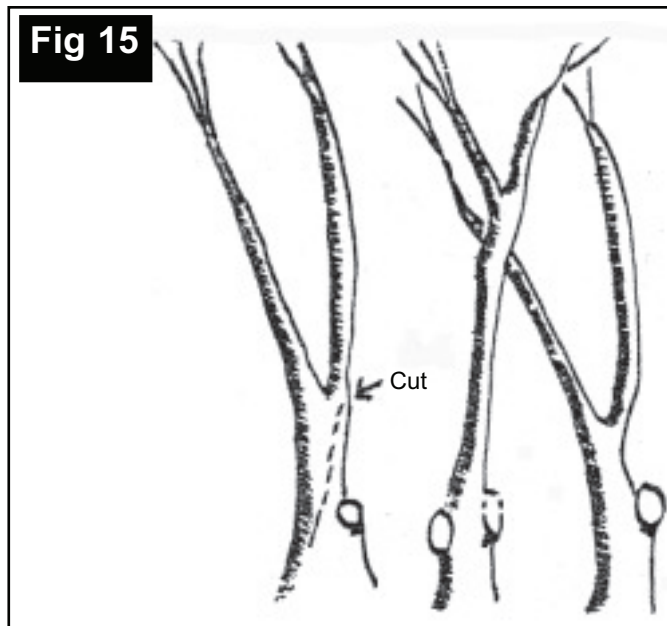




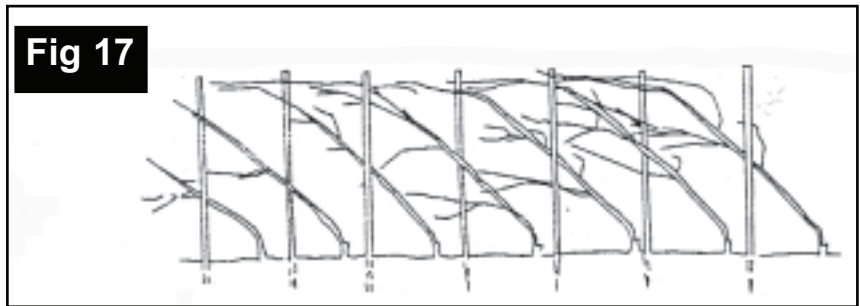
4.4 The pleachers should always be laid using an edge tool, i.e. axe or bill hook, and not with a saw. A saw damages the grain of the wood, and cannot give as smooth a finish, so the scar will take longer to heal. If the trunk is very thick, a chunk can be taken out first with a chain saw, but the cut should always be finished with an edge tool.

4.5 First ensure that the intended pleacher is not caught up or entangled with any other stems or brambles growing in and around the hedge. To lay the stems, make a downward cut on the side that will be uppermost when the pleacher is laid. The cut should be at an angle of up to 45 degrees, cutting 2/3 - 3/4 through the stem - the thicker the trunk, the longer should be the

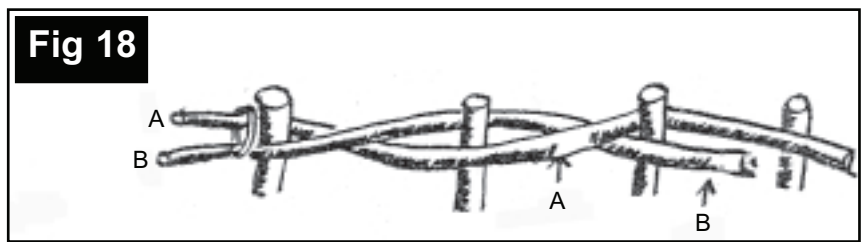
cut - and should finish as near ground level as possible i.e. between 500mm and 1500mm (see Fig 15). The cut should never be at too sharp an angle, otherwise a "hake's mouth" could form (see terms used, and Fig 16).



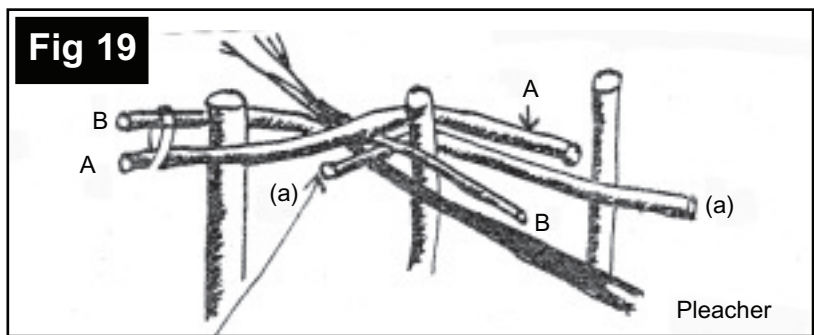
- 4.6 Gently bend the stem away from the cut, to the required height, usually - 1 metre. Particularly if the pleacher is heavy, it can easily twist round and break off, so it is advisable to obtain help with lowering it into position if in doubt.
- 4.7 Cut off the projecting stump.
- 4.8 Stakes can either be driven in before or after the pleacher is laid. If hethering or binding is to be used, the stakes will have to be placed every half metre along the hedge. Trace or weave the pleachers alternately through the stakes (see Fig. 17). Ideally, the brush end of the stem should finish on the field side of the hedge after the pleachers have been woven through the stakes, leaving the towpath side clear for walkers.

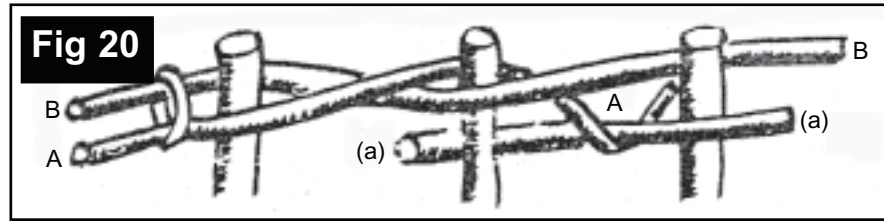


- 4.9 The use of hethers or binders is optional, but it does help to keep the pleachers in place, and provides a neat, firm finish to the laid hedge. The hethers are long thin hazel, willow or ash stems. Most hedgers anchor the first two binders among the pleachers, or alternatively, the ends can be tied together, as in Fig 18. Bring B over A, behind the second stake, and in front of the third stake. Next bring A over B, behind the third stake and in front of the fourth stake.



Continue these two moves until reaching the end of the hether, when you add a new one as in Fig 19. Put the thick end of the new hether (a) between stake and pleacher, at the back of the hedge. Bring alongside A, and bring both in front of the next stake. Twist A's end round (a) where it will cross under B when B is moved. Push the thin end of A out among the brush. Continue to use (a) as if it were A, and do the same when joining B to (b). (Fig 20).





- 4.10 Trim the stakes level with the top of the hethering.
- 4.11 If hethers are not available, the top of the hedge can still be made fairly firm by twisting and weaving the tops of the pleachers together.
- 4.12 Finally, with a billhook or loppers, trim off any twigs or side branches sticking out, particularly on the towpath side of the hedge.

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Figs 8-12 and 16-17 are taken from Devon Rural Skills Trust Codes of Practice, and Figs 13-15, 18-20 from Hedgelaying Explained by Valerie Greaves, by kind permission from the copyright holders, to whom we are grateful. All other diagrams are hand-drawn by the authors of this chapter.

