The Larvic Rehabilitation Lathe Mark II

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DH/8/15

LARVIC LATHE BOOKLET

Page	Errata
3	Diagram. Add '18-Tailstock Locking Arm immediately below 16.'
4	Line 9. 'on page 13' not 20.
4	Line 14. '(fig 1,18)' not 15.
6	Sec. 8, Line 14. '(fig 1,15)' not 16.'
7	Sec. 10, Line 5. delete 'and instructions are given below.'
11	Sec. 2, delete, 'at the points shown in the oiling diagram below.'
14	Line 13. 'caliper gauge'.

FOREWORD

The Larvic Rehabilitation Lathe has been used extensively in this country and abroad for many years and during this time has proved to be an essential piece of equipment in the rehabilitation of the lower extremities.

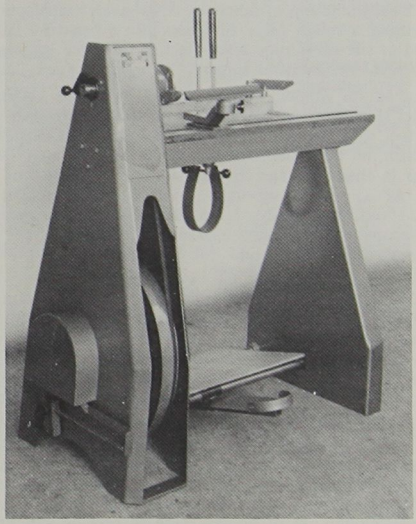
Following a policy of development the Larvic Lathe has recently been re-evaluated by a team of experienced occupational therapists, technicians and engineers. As a result of their deliberations NOMEQ are now pleased to introduce the Larvic Rehabilitation Lathe Mark II which they feel confident will continue to provide a valuable contribution to the rehabilitation of lower limbs.

This booklet describes in detail the construction and use of the Larvic Lathe Mark II, referring specially to a number of new features incorporated in the design of this machine.

In the last few pages there is a section on simple centre turning. Here one has a step by step set of instructions designed to supplement the occupational therapist's basic knowledge of woodturning and to ensure success with safety.

Special thanks are due to Mr. F.J. Large of Acres Ltd., whose valuable advice and effort has led to the introduction of this New Lathe.

Crawley, England
April, 1975.



WOODTURNING AS A TREATMENT MEDIUM

A high level of performance in the lower extremities must, of necessity, be the goal for all patients who have a reduction of function following surgery, trauma or illness. Without good lower limb function there will be impairment in both standing, walking and general mobility. Posture is greatly influenced by effective use of the musculature of the lower extremities, particularly the quadriceps extensor group. Occupational therapists should therefore pay particular attention to the restoration of maximum function in the lower limbs. There are several different treatment techniques available to the occupational therapist. Some of these may be considered particularly appropriate to certain phases of treatment but it seems to be fairly widely accepted now that treatment on the Larvic lathe can be given throughout the treatment programme, provided that correct clinical principles are observed. The main contra-indications are :—

(a) inflammatory conditions affecting joints of lower limb;
(b) effusion of knee joint (when knee flexion should be very strictly controlled);
(c) marked ataxia;
(d) severely impaired neuro-muscular co-ordination of the upper extremity;
(e) hypertension; (f) dyspnoea

Treatment on the Larvic Lathe is particularly suitable for the majority of patients because the actual technique of woodturning is exceptionally absorbing. Consequently the patient is primarily concerned with the work and not with the limitation of function. What greater satisfaction could one have? Converting a rough piece of wood into a beautiful table lamp, for instance, and at the same time restoring function in a leg impaired by the results of an accident, illness or surgery.

Although the author would, perhaps, wish it otherwise, he has to acknowledge the fact that many female patients prove to be superior woodturners. Men often feel that they ought to have a knowledge of such a practical subject. Women, on the other hand, are forced to admit that they have never seen a gouge in their lives and they are absolutely terrified of this piece of machinery! As a result they listen most carefully, follow instructions precisely and turn beautifully. I mention this point in order to impress upon the occupational therapist reading this booklet that woodturning, as a treatment technique, should not be regarded as a purely masculine activity.

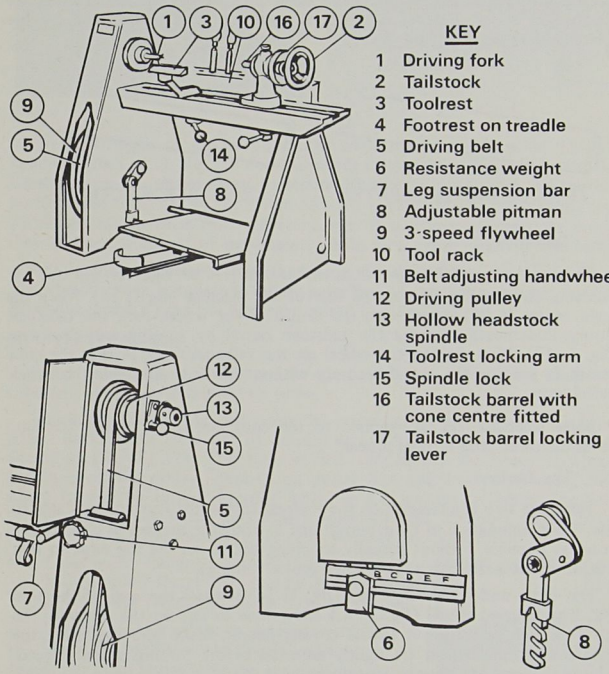
The type of woodturning executed will of course depend upon the duration and intensity of the treatment programme. In departments where there is a preponderance of young male patients undergoing intensive rehabilitation it will be possible to make a variety of turned objects, including face-plate work such as bowls. In other departments somewhat less ambitious projects would be safer and I would suggest that a well-finished table lamp provides a good incentive for most patients. Furthermore centre-turning is somewhat easier to learn in a short time and is certainly safer.

Although this booklet is not intended as a mini-textbook on woodturning, a later section gives full details (to supplement the therapist's knowledge) of a method of centre-turning which can be carried out safely and at the same time makes maximum use of woodturning to provide various treatments.

THE LARVIC LATHE MARK II

It will be immediately apparent that the Mark II version has retained many of the details which helped the earlier model to become such an established feature in modern occupational therapy departments.

The length of the bed has been slightly reduced (a valuable contribution to space saving), a greatly improved system of belt changing has been introduced and the resistance circuit has been updated, to mention just three of the new features.



KEY

1 Driving fork
2 Tailstock
3 Toolrest
4 Footrest on treadle
5 Driving belt
6 Resistance weight
7 Leg suspension bar
8 Adjustable pitman
9 3-speed flywheel
10 Tool rack
11 Belt adjusting handwheel
12 Driving pulley
13 Hollow headstock spindle
14 Toolrest locking arm
15 Spindle lock
16 Tailstock barrel with cone centre fitted
17 Tailstock barrel locking lever

An Explanation of the Component Parts of the Larvic Lathe.

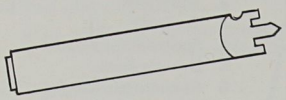
In the following section the different parts of the Larvic Rehabilitation Lathe Mark II are described in detail. Particular note should be taken of the methods used when carrying out adjustments, as these will help the occupational therapist to use the lathe with maximum efficiency as well as safety.

(1) **Centres**

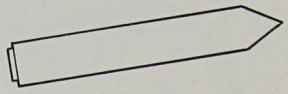
The driving fork (fig.1, 1) is removed from the headstock spindle by knocking it out with a length of mild steel rod passed through the hollow spindle. (fig.1, 13)

A piece of rod, 12mm x 300mm inserted into a suitable handle can be kept on the tool shelf specially for this job.

In order that the driving fork can always be put into the wood in the same position it is necessary to file a small 'nick' on one side as shown in the illustration below. Further reference is made to this on page 20 under the heading 'inserting fork into wood'.



FORK OR DRIVING CENTRE



CONE OR SOFT CENTRE

(2) **Tail-stock**

The tailstock can be moved to either the left or right of the bed by releasing the locking arm on the rear of the machine (fig 1, 15). When the cone centre is in contact with the centre of the wood, lock the tailstock firmly underneath. Release the tailstock barrel by turning anti-clockwise (fig. 1, 17). Next tighten the wheel on the tailstock unit so that the cone centre is holding the wood securely without binding. Re-tighten tailstock barrel lever.

Some beeswax can be applied to the cone centre to reduce friction. **Never use oil** to cure turning squeak!

(3) **The Toolrest**

There are two adjustments on the toolrest backwards/forwards and side to side. The combination of these permit one to bring the toolrest as close to the wood as possible without actually touching and to set the top edge so that it is 3mm below the centres (i.e. when centre turning).

The lever under the lathe bed (fig. 1, 14) releases the arm of the tool rest. The knurled wheel (fig. 2, A.) allows one to line up the rest with the wood as well as getting it to the correct height. Make sure that both the lever and knurled wheel are tightly adjusted before turning is commenced. A loose tool rest can be very dangerous.

(4) **Treadle**

(a) The footrest on the treadle can easily be moved to right or left. The knurled plastic wheel on the underside of the treadle (fig.3, A.) is turned anti-clockwise, the footrest placed in the selected position and the wheel re-tightened.

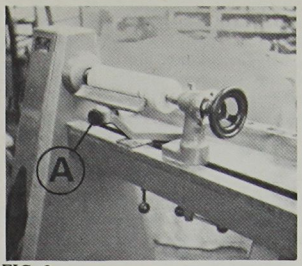


FIG. 2

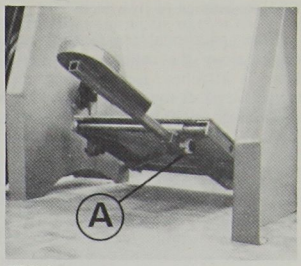


FIG 3.

(b) The height of the treadle can be adjusted at the pitman on the left-hand side (fig.1, 8. .). Slip the sleeve upwards to reposition the Pitman and the treadle, drop the sleeve down to secure. This adjustment alters the starting position and, ipso facto, the range of joint movements in the working leg. Although this provides three different arcs of movement it must be noted that the actual extent of movement within each arc is virtually the same.

(c) It will be observed that there is a non-slip surface on the footrest. This should prove adequate to secure most feet or prosthetic rockers. For the exceptional case a strap can be placed round foot and footrest.

(5) **The Driving Belt**

The Flywheel has three flanges. So too has the vee-pulley in the headstock although, of course, in the reverse order.

To change the driving belt open the doors on the headstock end of the lathe. Slacken belt tensioner by turning knurled wheel in an anti-clockwise direction. (fig. 1, 11). The belt is first slipped off the heavy flywheel and then off the pulley. Replace on pulley first and then on flywheel. Re-adjust tension by turning knurled wheel in a clockwise direction. The belt between the pulley wheel and jockey wheel on belt tensioner should have about 12mm play backwards or forwards when correctly adjusted.

N.B. Large pulley flange . to . small flywheel flange
Middle pulley flange . to . middle flywheel flange
Small pulley flange . to . large flywheel flange

(i) Usually the belt will be in the mid-position.
(ii) When the belt is on the **large** flywheel flange (to small pulley), for the same effort and speed of treadling.
  (a) The wood will revolve more quickly.
  (b) Slightly more effort will be required.
(iii) When the belt is on the **small** flywheel flange (to large pulley)
  (a) The wood will revolve more slowly.
  (b) Slightly less effort will be required.

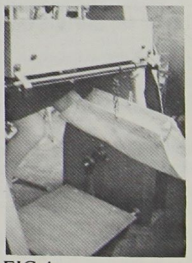


FIG.4

(6) **Resistance to flywheel**

When additional resistance is required this is achieved by moving the weight along the calibrated bar (fig.1, 6). The friction belt to which the latter is attached applies resistance to the flywheel spindle. Sliding the weight forwards towards the operator increases resistance. The letters indicate position of weight when recording this information.

(7) **Leg Suspension Bar**

Static quadriceps treatment for patients requiring non-weightbearing knee extension exercise has been well described elsewhere*. The bar for suspending the leg being treated (fig.1, 7 & fig.4) can be placed in one of three different positions according to the length of the patient's leg. The wide canvas sling should give support from above the knee to the heel.

(8) **Face-Plate**

A face plate is provided with the Larvic Lathe and is screwed onto the threaded portion of the driving shaft. To prevent damage to the face plate it is recommended that the wood to be turned is glued securely to a piece of 18mm blockboard with a layer of good quality brown paper or thin card between. (This facilitates separation when the job is completed.)
See fig.5 .

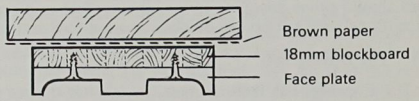


FIG 5.

The blockboard is screwed to the faceplate.

The work should not be removed from the faceplate until completed but if it is unavoidable make a file mark on the side of the faceplate and a corresponding mark on the mounting block, so that the screws will go back into exactly the same hole. Attention to small details such as this will make accurate turning more likely.

When removing the faceplate lock the driving shaft with the spindle lock (fig.1, 16) and turn the faceplate in an anti-clockwise direction.

(9) **Knee Extension Block**

It will be necessary to provide a block on which a patient is to stand in order to obtain an almost full extension of the knee joint.

For this a wooden box will be required. This should be 5mm higher than the upper surface of the footpiece when in its 'in' position and when the Treadle pin is in the lowest notch of the pitman. It should be about 260mm x 300mm and have a non-slip material underneath or it can have pegs to fit into the toe block board described in paragraph 10.

**'An Approach to Occupational Therapy'* – *Mary S. Jones Butterworth & Co. Publishers) Ltd., 1960.*

When using the lathe to develop the extensors of the knee joint care should be taken that the patient uses his forefoot to treadle so that the knee does not quite extend fully. 'Locking' of the knee joint resisted by the momentum of the flywheel could cause a jerking movement in the knee joint which would be harmful.

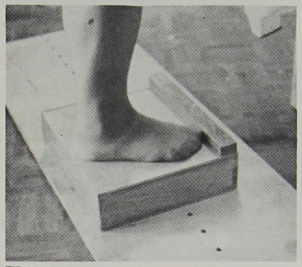


FIG 6.

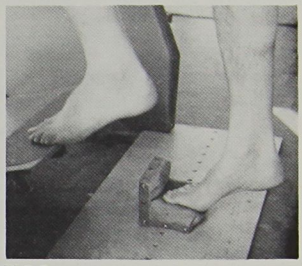


FIG 7.

(10) **The Toe Block**

A further valuable accessory is the 'toe block', (fig. 7). This is used in the latter stages of treatment when the patient needs to develop full weight-bearing of the forefoot; a vital component in the mechanism of walking when 'following through' with other foot. Both the toe block and knee extension block can be made in the department, and instructions are given below.

(11) **Turning Tools**

The turning tools are stored, blades downwards, in a rack at the back of the lathe bed. (fig.1, 10). The shelf is for glasspaper, polishing rags, the pattern and other items likely to be needed when turning.

The tools should be kept sharp. Blunt tools are dangerous.

The skilled craftsmen uses methods of sharpening gouges which look both simple and impressive but in point of fact are difficult techniques for most people to carry out. A very satisfactory way is to rest the gouge on the edge of the lathe bed (concavity pointing down) and then holding the 'stone' in the right hand move it forwards in steady strokes in one plane whilst twisting the gouge in order to sharpen around the whole cutting edge (see fig.8. .). Some people like to take off any burr formed inside the concave surface with a slip stone, but personally I sharpen lightly and frequently and retain any slight burr which may appear.

Turning chisels are sharpened on a 'stone' in a way similar to that employed when sharpening an ordinary wood chisel but of course in this case one has to preserve the point on one side and one also sharpens both edges of the chisel.

To avoid the possibility of accidents always ensure that the patient is correctly instructed in the use of tools during the early stages of wood turning.

When turning, remember –

(a) remove ties
(b) tie back long hair
(c) hold blade securely against tool rest
(d) keep the handle low
(e) use a small gouge for 'roughing out'
(f) use only 3mm of the obtuse end of the flat turning chisel blade for fine cutting. It is **not** a scraping tool.
(g) proceed through all the stages of turning methodically as described in the section on woodturning. By doing this one can achieve better results without the need for too much instruction. (See later section on woodturning for details).
(h) do not allow anyone to talk to person operating the lathe.

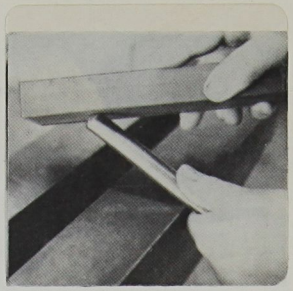


FIG 8.

THERAPEUTIC CONSIDERATIONS

The lathe is used particularly in the treatment of hip, knees and ankles. The therapist must accept the fact that the treadle cannot put all these joints through a full range of movement, so if this is considered essential it will be necessary to supplement the treatment by some other technique.

When planning a treatment programme the patient should always be carefully examined and measured in order to assess his primary needs whilst being treated. Before each treatment session a good therapist will **always** carry out a quick examination to make sure that there are no abnormal clinical signs or symptoms and once a week (more if really necessary) further measurements will be taken to check progress.

Treatment, using the Larvic Lathe, will aim principally at –

(a) increasing the range of the movement of the knee, hip and ankle joint
(b) increasing the muscle power of knee extensors, plantar flexors and hip extensors
(c) improving co-ordination
(d) developing work tolerance.

HIP JOINT

Treatment of the hip joint is mainly aimed at increasing range of flexion and/or improving power in the extensors of the hip joint.

(a) **To increase hip flexion** the patient stands on his unaffected leg with the foot on the floor. The footrest is set in its 'in' position and the maximum height of the treadle is determined after examining the patient. The height of the treadle is adjusted by the pitman as described on page 4.

The need for careful clinical observation cannot be stressed too often. The momentum of the flywheel can force movements in an undesirable manner if the therapist has not examined the patient properly. The treadling action of the lathe is an excellent method for encouraging increased hip flexion, but it should rarely be used for passive flexion of the hip joint. As improvement is achieved the treadle can be raised by moving the treadle pin to a higher notch in the pitman.

(b) To develop power of hip extensors the patient stands on his unaffected leg with his foot on the Knee Extension Block described on page 6. The footrest is set in its 'in' position and the treadle is at its lowest point.

As soon as possible the driving belt should be moved over on to the large flange and resistance should be added according to the patient's needs. The duration of continuous working periods should be gradually increased.

KNEE JOINT

Treatment of the knee joint will be concerned with –

i) obtaining full extension

ii) developing strength of quadriceps extensors

iii) improving flexion of knee joint.

(i) obtaining full extension is achieved by working the affected leg with the foot placed on the footrest in its 'in' position. The foot of the unaffected leg is on the Knee Extension Block (fig.6). Resistance is not required; long periods of activity are more usually indicated.

(ii) developing strength of quadriceps extensors is probably the most vital aspect of treatment as far as the knee joint is concerned. Positioning of the patient will be as described in the previous paragraph. Resistance will be added as soon as possible by moving the weight along the calibrated bar (fig.1, 6) and the driving belt will be moved on to the large flange of the driving flywheel.

Treatment time should be progressed as indicated by the clinical condition. When treating a patient it is desirable to devote some of the time treadling with the unaffected leg so that the patient can be encouraged to stand on his affected leg with the knee well 'braced back'. This is good stabilising work for the quadriceps as well as providing exercise for the gluteii on that side.

(iii) improving flexion of the knee joint is not regarded as being of prime importance and when starting on this aspect of treatment it is most essential to examine the knee very carefully. Effusion, pain, or a hot joint must be regarded as being a complete contra indication. If necessary the patient can commence treatment in the same position as described in (i) and (ii) above, but he should proceed to the floor-standing position as soon as knee flexion permits it.

More flexion can gradually be achieved by releasing the knurled plastic wheel (fig.3, A.) and bringing the footpiece forward.

Always check the condition of the knee after each treatment as well as at the next visit prior to treatment.

NON-WEIGHTBEARING TREATMENT FOR THE KNEE JOINT

In a number of different conditions weightbearing may not be permitted, although there is a particular need to provide treatment for quadriceps in order to maintain tone or to assist venous return in an oedematous lower limb. For such cases 'static quadriceps' exercise is given. The patient sits on a Camden Multi-purpose Stool with affected limb in a long sling extending from above the knee to the heel. This sling is suspended from the Leg Suspension Bar (fig.1, 7) and the patient treadles the lathe with the other foot (fig.4).

The muscles around the hip joint and those of the thigh on the affected side (particularly quadriceps) contract rhythmically at the same rate as the leg which is treadling. This is so because of the stabilising effect which the musculature of the thigh has upon the pelvis.

Ideally the patient should treadle at approximately 90 strokes per minute. Sometimes a metronome will help to establish a good action.

The occupational therapist should always check the rate and intensity of the contractions by putting their hand **lightly** on the patient's thigh proximal to the patella.

It is wise to recognise the fact that the majority of patients are, initially, a little sceptical of this form of treatment. There is no need to bombard them with 'science', but one can let them feel the contractions with their own hand. This will invariable result in full co-operation.

ANKLE JOINT

Well-controlled and powerful plantar-flexion of the ankle joint is a pre-requisite of a good walking pattern and the function of the ankle joint and foot should not be overlooked even though the primary conditions may not be in the lower part of the limb.

For initial development of plantar and dorsi-flexion of the ankle joint the footpiece can be removed and the forefoot placed on treadle platform for treadling.

Dorsi-flexion is largely passive but there is powerful active plantar-flexion as the patient pushes down on the treadle which provides some reciprocal ennervation in the dorsi-flexors.

Eventually the patient will need to transfer the entire body weight on to the forefoot in walking as the other leg 'follows through'. Here we need the Toe Block (fig.7).

As the unaffected limb treadles the posterior and anterior tibial muscle groups work rhythmically on the ankle joint whilst allowing the long flexors to exert a downward pressure on the Toe Block. It is important that the foot on the affected side is kept in plantar-flexion. At the same time the knee joint is being 'braced back' by the quadriceps extensor group.

To begin with this is a very strenuous exercise so the length of treatment should be very carefully graded. It is suggested that two minutes would be a suitable time to start with and increase according to the patient's performance.

As the patient may not at first be steady (and therefore safe) enough to carry out cutting it is a good idea to let him polish finished table lamps as he can do this one-handed whilst assisting his balance by holding the bed of the lathe.

OTHER USES FOR THE LARVIC LATHE

(a) General 'limbering-up' prior to resumpton of work or as a heavy activity required by psychiatric patients.

(b) Assessment for head injury cases who frequently cannot tolerate revolving machinery. Where their normal employment involves the use of such machinery, wood-turning can prove to be a valuable means of building up tolerance to this type of motion.

CARE OF THE LARVIC LATHE

Like all machinery the efficiency of the Larvic Lathe depends upon careful maintenance. Here are a few points which need to be observed.

(1) Wipe an oily rag over the lathe bed several times a day to counteract the damaging effect of perspiring hands on the steel bed.

(2) Oil lathe completely each week at the points shown in the oiling diagram below.

(3) Check all nuts and bolts regularly and if any unusual sounds are ever heard whilst the lathe is being used investigate without delay to avoid possible damage to any part of the machine.

SOME NOTES ON WOODTURNING

Woodturning is a valuable and very interesting therapeutic activity, but as it involves moving machinery and the use of sharp tools it is most important that every possible safety precaution is observed, particularly as the majority of patients will be operating the lathe at a time when their physical abilities are limited to some degree.

Selection of Wood

Sawn Beech, 100mm x 100mm is a good wood to select for centre turning. This is a close grain wood, which finishes well and does not splinter easily, so that it is a relatively safe wood to use.

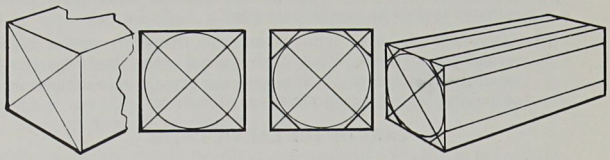
Finished Article

For the average beginner the turning of a table lamp, between centres, is probably the most satisfactory project. I would leave faceplate turning to the more experienced.

PREPARATION OF WOOD

1. Cut the 100mm x 100mm timber into 300mm lengths. The wood should be squared all round before cutting and care should be taken that the patients, who are actually carrying out the cutting, are quite competent enough to keep to the line.

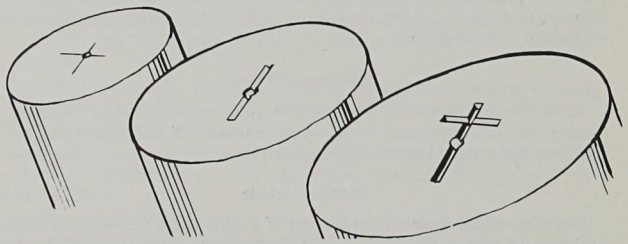
2. Mark diagonals on either end of the piece of wood in order to find the centre.
3. Describe a circle, as large as possible, at each end of the sawn timber.
4. Draw a tangent at each corner.
5. Join these lines down the full length of the wood.



6. The excess wood can now be removed by patients as part of their treatment programme.
   (a) By planing.
   (b) By tenon sawing at 10mm intervals and removing excess timber with chisel.
   (c) By sawing down the full length of the piece of wood.
7. Drill each end of the timber at the centre with a 6mm drill to the depth of approximately 10mm.

   Next cut a 'V' shaped groove on either side of this hole with a 20mm chisel as shown in this diagram.

   Next put a mark with the chisel at right-angles to one of these grooves as shown.



Removing Driving Fork from Lathe

The fork can be removed from the lathe by knocking it out with the 12mm steel rod which is kept on the lathe and which can be passed down the hollow head-stock.

You will notice that the fork has a nick cut out of one side. This is to identify the position that the fork should occupy in the wood and will make it easier to get it back in the right place.

Marking Wood

Put the patient's name on the end of the wood, which is going to be at the driving end.

Inserting Fork into Wood

The wood is held upright on the bench (over the leg), the fork is inserted into the hole so that the nick is on the same side as the chisel mark crossing the 'V' shaped groove. Drive the fork into the wood with the rawhide mallet **(please do not use a hammer for this job or a wooden mallet).**

The wood is now ready to go on to the lathe. The tailstock is released as described on page 4. The tapered end of the driving fork is now inserted into the hollow spindle in the headstock and the centre of the cone tailstock is brought over to the left so that it engages in the hole prepared at the end of the wood. The final adjustment of the tailstock is carried out as explained on page 4.

Tool Rest

The tool rest for centre turning should be as close to the work as possible and 3mm below the level of the centres.

It is important to observe this as the chisels and gouges have been ground and sharpened to operate from this position.

Safety Measures

Make sure patient is not wearing a tie.

Tie back long Hair

First Step in Turning

It is essential that patient is steady enough to be safe when actually cutting the wood so the first step is to check this particular point.

The tool rest is situated to the right of centre so that its righthand edge is a little beyond the level of the wood to be turned. The patient now places the outer border of the left hand on the tool rest. This and the left leg gives a stability to the standing position. Now he commences treading with the right leg with a steady rhythmical push. When turning the wood must always rotate towards the operator. **NB.** Do not allow the patient to start turning until he is quite stable when treadling.

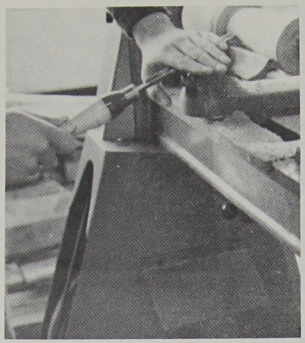
Preparing a Cylinder

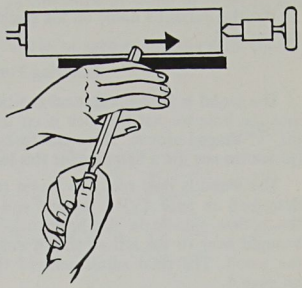
Making a cylinder can be likened to making a face side and face edge in carpentry: a means of familiarising the worker with some of the tools to be used later as well as giving practice in their manipulation.

A middle sized gouge (e.g. 12mm inch) is the tool to start with. Keep the outer border of the left hand firmly on the tool rest.

The fingers of this hand keep the gouge securely on the tool rest and the right hand holds the hand **at its end** with the handle low down.

The following diagrams will illustrate this point.





Please note that as the gouge is pushed to the right it should remain in the same plane, with concavity of the tool pointing in the direction in which it is travelling. Futhermore, it should be slightly off the right angle. It is possible to develop a technique of cutting whereby one cuts both backwards and forwards, changing the position of the gouge at each stroke, but this is a more advanced method and to start with it is probably advisable to teach the patient how to cut when 'travelling' from left to right only.

Care must be taken particularly during early stages of cutting as the roughly prepared wood is irregular so the tool will 'judder' a great deal. It is at this stage that it is most important to keep the handle of the gouge low and the cut light.

As soon as the flat parts of the prepared wood have been removed at the right hand end set a caliper gouge to the turned diameter.

The remaining part of the wood now has to be turned to this diameter so that as accurate a cylinder as possible is produced.

Patients should not be allowed to start **any** shaping of wood until this cylinder has been made. It is an excellent exercise in turning.

A useful tip when turning a cylinder – use the distal edge of the lathe bed to act as an 'horizon' to make the parallel cutting easier.

Boring the hole

If a table lamp is being produced, it is at this stage that the hole through the centre should be bored.

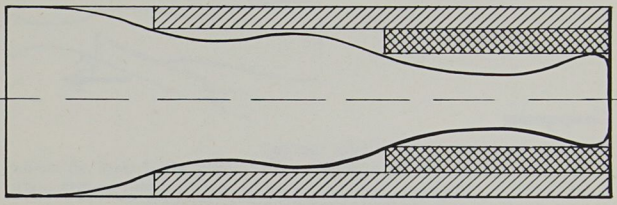
Designing the table lamp

Designs for table lamps should be as aesthetically pleasing as possible and members of staff are urged to study examples of table lamps on sale in the shops in order to get some idea of the type of standard which should be achieved. The making of bizarre shapes is not to be encouraged as those are virtually impossible to sell if the patient should leave before they have completed their turning.

It is recommended that a piece of paper, 300mm long, is folded in half, and cut to half the width of the diameter of the wood being turned. With a pair of scissors one can cut out a shape in the paper and if it is opened up the patient can get some idea as to whether they like the shape that you have designed. Furthermore, the therapist can decide whether or not this design can be successfully accomplished by the patient.

Mounting the pattern

The pattern is stuck onto a piece of cardboard with its centre line parallel to the edge of the card. The card is marked in such a way as to indicate the levels of turning which will be described later, but which is illustrated in the following diagram.



N.B. Put the patients name and date onto the pattern piece.

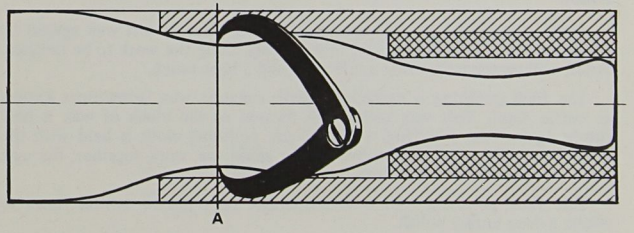
More cylinders! Still using a 12mm gouge, waste wood is cleared away in cylinders as shown in diagram above. First take a caliper reading of highest point in design and remove wood down to this point ▨ in diagram.

Take further caliper readings of other high points and remove waste wood ▩ in this diagram.

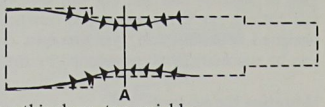
This is all necessary work and carrying out the processes in this methodical manner helps to improve use of tool.

Now for the concavities

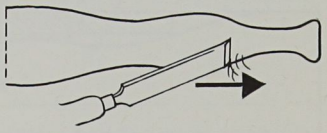
Take a caliper reading of the 'neck' and cut down to an appropriate point so that the caliper just fits.



Using the 12mm gouge, shape down, to this caliper point, first from one side and then the other until a pleasing shape has more or less been obtained.



It is important not to try to achieve this shape too quickly.
All other concavities are dealt with in a similar manner. Finish off with a large gouge and finally with a 25mm inch flat turning chisel using just 3mm inch of the blade.



Glasspapering

Glasspapering is **not** a substitute for turning!

No glasspaper should be applied to the turned wood until all cutting is satisfactorily completed. Therapists must be most insistent on this matter or poor standards of workmanship will become commonplace.

When glasspapering remove tool rest for safety sake and have wood rotating away from lathe operator (obviously this cannot apply if resistance is being added).

Start with medium 2 and then go on to Fine 2 and 1½, moving glasspaper slowly along whole length of wood.

A final burnishing can be obtained by holding a handful of wood swarf firmly against the revolving work which has been turned.

Sealing

Apply one coat of button polish and allow to dry. When completely dry (overnight) rub over with grade 0 steel wool whilst work is rotating on lathe.

Polish

Apply **one light coat** of beeswax. Hold the piece of soft wax against the revolving work, very lightly, and move slowly along the work to be finished. Polish well on the lathe using a soft cloth and a light touch.

The final polishing is carried out with canauba wax (sometimes known as coffin wax). This wax melts with friction so the block of wax is held firmly against the revolving work and the polishing cloth is held with the other hand. Wax and cloth move slowly along the work together; the wax just a fraction ahead of the cloth.

This final polishing can, with advantage, be repeated several times to obtain a deep lasting polish.

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