Sweet sound PART 1

Belonging to the zither family and described by luthiers as one of the easiest instruments both to make and play, the Appalachian dulcimer certainly has a beautiful voice – **Shaun Newman** takes us through the first part of its build here

The dulcimer featured in this article has been described by luthiers as one of the easiest instruments to both make and play. I hope the text and photos that follow will prove this to be true. There are many variations on the shape of the body, and I have gone with one of the simplest as it requires no specialised bending apparatus. It has a very beautiful voice, hence the meaning of its name: 'sweet sound'.

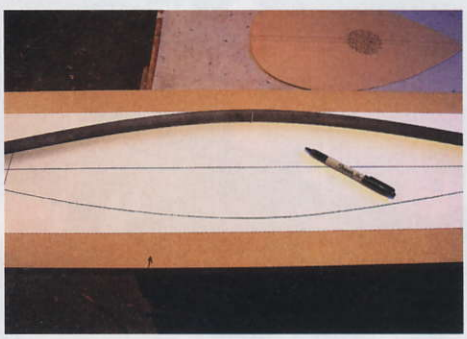
Origins & history

The dulcimer belongs to the zither family, which is very broad in the types of instrument belonging to that group. Essentially it is a sound box with strings stretched across a fretted area. The modern dulcimer is based on some ancient instruments that came out of both Europe and Scandinavia. The Scheitholt from Germany, the langeleik from Norway, the hummel from Sweden, and the épinette des vosages are ancestors, some of which date back to before the 1700s. It was, however, in America that the instrument grew in popularity, particularly around the Appalachian region. The reasons for its growth are not clear but probably ease of manufacture and availability of local timbers were factors. Some also believe that they were originally taken to the USA by immigrants who were limited for space, so left any larger instruments behind. A key factor may also have been that, as the frets are usually set out in a diatonic scale, the instruments suited traditional folk music.

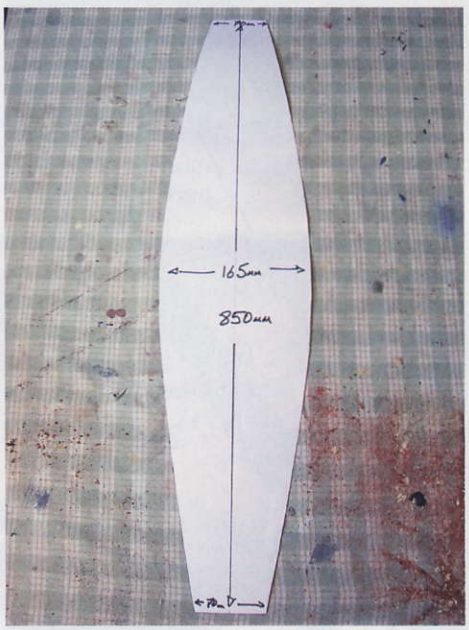
The workboard & body plan

The first stage is to make a firm, flat workboard on which to build the instrument. This can be made from 22mm chipboard or MDF. It should be 880mm long and 220mm wide. On the underside, place a block at each corner to raise the workboard from the bench; this enables clamps to reach in during later stages of the project. The centre support helps to keep the board flat and allows it to be held in a vice (**Pic.1**). Once made, mark a centreline along its entire length, then the outline of the dulcimer can be marked onto a piece of card. To gain the correct curve, use a steel metre rule bent to shape and pin it to the card, which will allow the form to be scribed with a bold felt-tipped marker pen (**Pic.2**). The dimensions of the instrument are shown in **Pic.3**, giving the dulcimer a width of 165mm >

STEP 1. The workboard under preparation



STEP 2. Marking the outline onto card using a steel ruler



STEP 3. The dimensions transferred onto card

STEP 4. Marking the outline onto the face of the workboard

STEP 5. Cams are used to hold the instrument's shape

STEP 6. Planing the edges of the ribs...

at the waist, with an overall length to the body of 850mm with a 75mm width at the narrowest points. Using the centreline on the face of the workboard as a guide, you can then transfer the body shape from the card template (**Pic.4**).

To help hold the body of the dulcimer in place and to keep the profile even, you need to make a series of cams. These are screwed to the workboard and with their elliptical ends they can be turned to offer even the slightest change in the shape to get it exactly right (**Pic.5**). Once the ribs (i.e. the sides) are on the workboard, tighten the cam screws to hold the work firmly in position.

Making the ribs

The ribs and the back of dulcimers can be made from almost any resonant timber such as maple, walnut, mahogany, rosewood, koa or cherry. The Appalachian dulcimer was often made from local mountain timbers, but I chose rosewood because of the rich colour and high level of resonance. Each rib needs to be made to a width of 54mm and must have exactly parallel sides, and the length should initially be cut oversize to around 765mm. When fitted to the end blocks you need to trim these overlaps off with a flush cutting saw. It is best to prepare both ribs at the same time, first with the plane (**Pic.6**) and then with a sanding stick to ensure the edges are at right angles. The sanding stick I use is made from an old 600mm spirit level with abrasive attached to the edges with double-sided tape; this guarantees a true 90° edge (**Pic.7**).

The top & bottom blocks

These blocks should be made from spruce or cedar to help reduce weight. They should be as high as the width of the ribs at 54mm and approximately 25mm in length. They need to taper to conform to the inside profile of the body shape and are easily cut out on the bandsaw (**Pic.8**).

Once prepared, screw them to the workboard from above to hold them firmly in place ready for the next stage. Before doing this it is a good idea to attach a layer of parcel tape to the workboard where the blocks will sit as glue squeeze out can cause the ribs and blocks to get stubbornly attached to the board.

Fitting the ribs to the end blocks

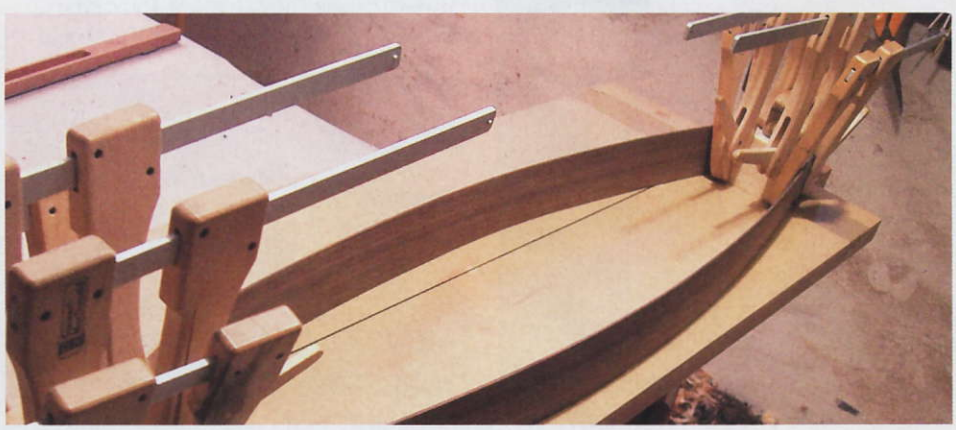
As the blocks cannot move once screwed down, it is easy to attach the ribs using clamps. Long elastic bands can also do a good job if luthier style clamps are not available.

The ribs are first moved into the correct profile by the cams and then the glue is applied just before moving the cams nearest the ends into place and putting the clamps on (**Pic.9**). Once the ribs are secure, the glue has dried and the

STEP 9. The ribs are attached to the end blocks

STEP 7. ... and sanding them dead square

STEP 8. Cutting end blocks on the bandsaw



STEP 10. Rosewood end caps are fitted

STEP 11. The inside edges of the soundboard are planed square...

STEP 12. ... and sanded to a perfect 90° angle

overhanging ends have been trimmed flush, caps can be fitted on either end to cover that part of each block that is still visible (**Pic.10**).

Preparing the soundboard & cutting the soundholes

Most luthiers agree that the soundboard is the most important part of any stringed instrument, and this thought does not exclude the dulcimer. I used first grade Sitka spruce with an extremely fine grain bought as two bookmatched halves. The rough timber I used measured 200 × 750mm. The two halves can be joined once the edges that meet have been planed (**Pic.11**) and sanded exactly square (**Pic.12**). The jig used to join the two halves is from an ancient pattern used for example by lute makers hundreds of years ago. It is made from building timber and has a central spine measuring 180 × 50mm and cross beams of 50 × 25mm. The cords are nylon string and are around 2.7m long. I use this jig mainly for guitar making, but it is also useful for narrower soundboards and instrument backs (**Pic.13**).

Once out of the jig, the soundboard must be reduced in thickness to around 2mm; this can be done with a plane or a power sander. At 2mm the soundboard is now very delicate, and will have no internal bracing to give it strength, so must be handled with great care. The outline of the instrument can then be marked onto the soundboard (**Pic.14**) before being cut out at roughly 5mm or so oversize all around on the bandsaw.

The soundboard is now ready for its soundholes. There are many designs for these, some of which include intricate scalpel work with inlays. I decided to keep it simple and go with the 'weeping heart' shape found on many early instruments. As these holes are at the centre of the instrument's length, a standard fretsaw is not long enough to reach in. I therefore made one fretsaw out of two by cutting the frames with a hacksaw and making the reach longer. The frame metal from both saws can then be bolted together to give the whole tool that extra length. It's handy to have long arms to get the fretwork right on this job! (**Pic.15**).

Though it's not necessary, the sound can be improved if the neck is hollowed out and a strip can be cut from the centre of the soundboard to match. Once again, the long reach fretsaw can be used, or a scalpel, following the edge of a steel ruler (**Pic.16**).

Fitting the soundboard

It is now time to take the skeleton body out of the cams on the workboard and to unscrew the end blocks, then the top surface of the workboard >

STEP 13. The soundboard halves in the wedge and lace jig

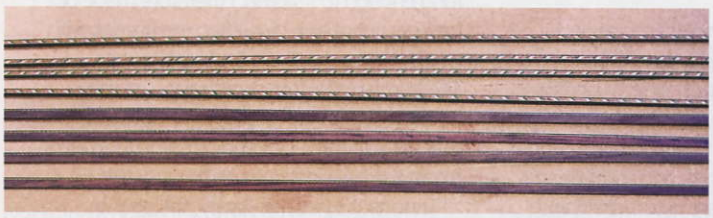
STEP 14. The outline of the dulcimer is transferred onto the soundboard

STEP 15. The soundholes are cut out with a long reach fretsaw

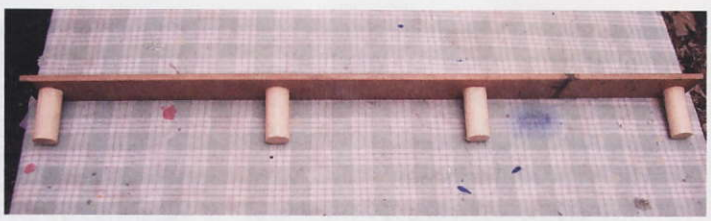
STEP 16. To aid resonance a strip of spruce is removed from the centre of the soundboard

STEP 17. Tentellones to hold the soundboard in place

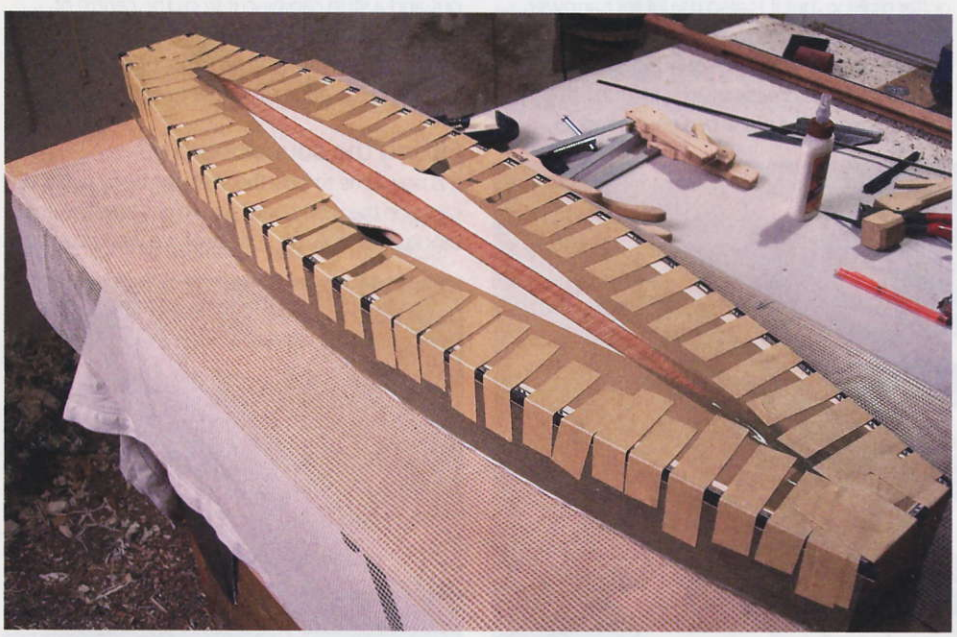
STEP 18. Tweezers are used to put the tentellones into position



STEP 19. Home-made bindings and purflings



STEP 20. The jig made to support the underside of the soundboard



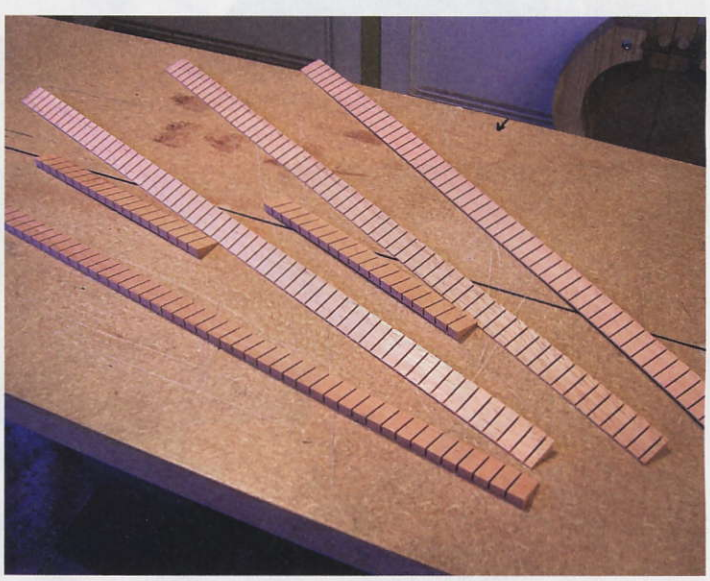
STEP 21. Bindings and purflings are held in place using masking tape

should be checked for flatness. When the screws for the cams are tightened they can cause ridges around the drilled holes, which need to be removed, otherwise they will cause irritating dents in the soft spruce of the soundboard.

When the body is taken from the board it will spring into a slightly narrower form than before, so to avoid the instrument losing its shape it is best to make a few struts that can temporarily be held in place with masking tape to keep the outline true.

To fit the soundboard, first place it onto the workboard upside down along its centre. The skeleton body can then be placed on top with an equal distance from the edges and the ends. At this point the Spanish guitar makers' method of attaching a soundboard can be used; this involves making 'tentellones', which are small triangular blocks of spruce measuring 14mm high and 6mm at the base (**Pic.17**). Each tentellone is between 6mm and 7mm wide; these should be glued in using tweezers (**Pic.18**) and do not require clamps

STEP 22. The edges of the bindings are brought flush with a small plane



STEP 23. Examples of kerfed linings in light mahogany

STEP 24. Kerfed linings held in place with mini clamps

STEP 25. The edges of the linings are trimmed to the edge of the ribs...

as long as they are firmly pushed into place. It is as well to anchor the developing instrument down during this operation to prevent unwanted movement. It also helps to work on one side for a dozen or so tentellones, and then switch to the other to avoid accidentally losing the overall symmetry.

Bindings & purflings for the soundboard

Once the soundboard has been fitted the instrument is beginning to take shape as it moves more recognisably into three dimensions. The soundboard is made of soft timber so needs the edges bound. The bindings are normally made from a hardwood and on this occasion I chose ebony with a holly trim for contrast. The ebony looks good against the pale spruce, and the holly shows up nicely next to the rosewood. Between the binding and the edge of the soundboard is a strip of slant check purfling. It is possible to make this yourself and from time to time I make batches for a couple of weeks on end that will last me for a few years (**Pic.19**). If, however, you only intend to make one dulcimer, I would recommend buying some bindings and purflings from a supplier (see list at the end of this article).

To fit the bindings and purflings, rout a rebate around the upward facing edges. As the soundboard is very fragile, it needs to be supported from underneath during this task.

STEP 26. ... and are then sanded exactly flat

For this I made a simple jig with a strip of 5mm plywood on stilts made from 19mm dowel pieces (**Pic.20**) so that when the router is moved around the instrument, there is no risk of the soundboard becoming cracked.

Once the channels are cut, the bindings and purflings need to be held in place with masking tape as the glue dries (**Pic.21**). It looks good if each corner has mitred bindings and purflings although this is not necessary. When the glue has dried, scrape the edges and/or plane flush before the next task (**Pic.22**).

Fitting kerfed linings to help hold the back in place

If the back, which is just 2mm-thick, were simply glued onto the ribs then the join would be weak, so linings need to be inserted to increase the surface area for the adhesive.

It is difficult to fit tentellones in a line just a fraction proud of the top edges of the ribs to support the back, so the solution is to make kerfed linings. These are made from strips of mahogany planed into a triangular shape along their length – 14mm high and 6mm wide – at the widest point of the triangle. Once planed into the correct dimensions, or cut to shape by the bandsaw, the kerfs need to be sawn in. These can be sawn using a mitre block with a 90° cutting facility. Each cut must go through to around 1mm from the edge of the lining and 6mm or 7mm apart, which is tricky, but possible with care. If a piece accidentally gets cut through it can still be used, but there is always a sense of pride in getting a full length cut with all the slots at more or less an equal depth (**Pic.23**).

The linings must be glued in place and I use mini clamps bought from Poundland (**Pic.24**). Clothes pegs also do a good job, especially if you wrap elastic bands around the jaws to add to their bite. When the glue is dry, plane the tops of the linings (**Pic.25**), then sand flush with the edges of the ribs – for this I use a flat piece of 19mm MDF with 120 grit abrasive attached to one side with double-sided tape (**Pic.26**). **GW**

USEFUL READING

- *Making Wood Folk Instruments*, Dennis Waring, Sterling Publishing, 1990. ISBN: 0-8069-7482-6 – has chapter on making a simple dulcimer
- *Making Early Stringed Instruments*, Ronald Zachary Taylor, Stobart Davies Ltd, 1991. ISBN: 0-85442-051-7 – also has a chapter on making a dulcimer, this one having an 'hourglass' shape
- *Make and Play the Dulcimer*, John Pearse, Wise Publications, 1970 – less information on making, but extensive explanation of tunings and modes
- For songs and playing guidance, see Jean Ritchie: *The Dulcimer Book*, 1992 and *Traditional Mountain Dulcimer*, 2003

NEXT TIME

In *GW*320, Shaun makes the neck, headstock and fingerboard, fits the fingerboard, back and strings, tells you how to tune and play the instrument, as well as taking you through the steps for making your own custom case

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- **www.earlymusicshop.com** – for gut strings, pegs and early instrument supplies
- **www.smallwonder-music.co.uk** – for decorative back strips and inlay materials
- **www.earlymusicshop.com** – for gut strings, pegs and early instrument supplies

Sweet sound PART 2

Completing his Appalachian dulcimer build, in part 2, **Shaun Newman** makes the neck, headstock and fingerboard, then fits the fingerboard, back and strings, all before showing you how to make your own custom case

In part 1 we saw a little of the history of this lovely instrument and how we feel it may have become popular, and I showed you how the outline structure of the dulcimer was created ready to receive the soundboard and back. In part 2, we'll look at how to fit both the back and front, then the tuning pegs and strings, and once finished, I'll take you through the steps for tuning your instrument and making a simple case.

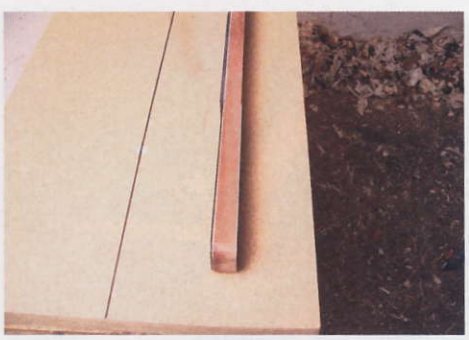
Making the neck, headstock & fingerboard

The neck can be made from almost any hardwood timber and the headstock is simply a continuation of the neck. I chose mahogany with the intention of fitting an ebony face and back to the headstock. This whole part of the dulcimer measures around 880mm long with the headstock having a length of 160mm. It has a width of 32mm, which is enough to accommodate four strings. Some dulcimers have just three strings, requiring a neck width of 30mm or so, and very occasionally some are made with five strings, which require a correspondingly wider neck. Four stringed dulcimers are the most common. The mahogany needs to be first planed to a thickness of 16mm along its entire length (**Pic.27**) before routing a slot from the underside to match the distance between the insides of the end blocks, which is 670mm. This measurement corresponds to where the neck will fit over the soundboard so it doesn't extend into the underside of the headstock. This needs to be routed to a depth of 11mm and should leave the outer edges of the slot at around 4mm each (**Pic.28**). The headstock veneers can then be applied to the face and back. I used 1.5mm ebony veneer with standard sycamore veneer against the mahogany (**Pic.29**).

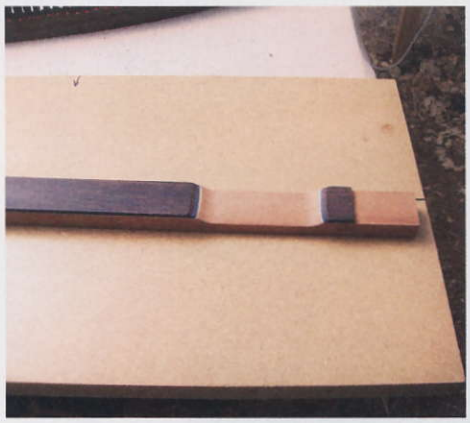
The fingerboard can now be fitted and is in two parts. The longer length should receive the frets (17 in all) and the much shorter length at the tail end of the instrument holds the bridge in place. The fingerboard is made from rosewood, which is a sufficiently hard timber to resist wear. It also balances well with the back and ribs. Ebony is also a favourite for this part of the instrument. The billet needs to be planed to the same width as the neck and just 3mm-thick. It is 580mm long. The small piece at the tail is 20mm long and requires a 2.5mm slot cut into it to accommodate the string bridge. To add to the appearance of the overall piece, I decided to place a veneer of dyed tulipwood and one of sycamore between the fingerboard and neck, which looks very effective. At the tail end of the neck, you need to cut a shallow trough; this is the area over which the strings will be played with a pick, or traditionally a piece of goose quill with a sharpened end. This area, called the 'scoop' (**Pic.30**), will normally have a depth of 2mm or 3mm below the thickness of the fingerboard and veneers. Care should be taken not to cut it so deep that you meet the routed slot running along the underside. Once made to size, it can then be glued onto the neck ready for the frets. >

STEP 27. The neck is planed to dimension from a billet of mahogany

STEP 28. The neck is then hollowed out below the fingerboard



STEP 29. The headstock has ebony veneers facing the front and back



STEP 30. The scoop cut into the lower end of the neck

STEP 31. Frets being cut from straight lengths of wire

STEP 32. A pinprick made with a scriber is a guide to the exact fret position

Fretting the dulcimer

The frets fitted here are standard acoustic guitar ones made from nickel silver; these come either in coils or single straight strands. It is best to use straight ones for this job as the fingerboard has no curve to it (**Pic.31**). Follow the string spacing guide at the end of the article and carefully mark the position of each fret. A pinprick onto the fingerboard with a scribing needle in the right axis will help to locate the exact position required (**Pic.32**). The fret slots need to be cut with a good quality dovetail saw and should be at right angles to the edges of the neck (**Pic.33**). The depth is determined by that of the tang on the underside edge of the fretwire. A thin piece of metal taken from a tin can is useful in this task. Provided one edge is cut square a strip of masking tape can be attached showing how deep the slot should be, and whether the depth is even (**Pic.34**). Attention needs to be paid to the layout of the frets as they do not conform to the pattern commonly seen on a guitar where each one raises the pitch by a semitone. The layout allows for the drone strings almost always to sing in harmony with the melody ones. Typically, then, we have a full tone between the nut and fret one, then another full tone at fret two, but then a semitone. This is followed by a further full tone, etc. (commonly referred to as a diatonic layout). It is far easier to do the fretting before fitting the neck as tapping them into place later always threatens to crack the body of the dulcimer.

Each fret needs to be cut individually so it is around 10mm too long. This may seem wasteful, but it is necessary to ensure you have enough of an overhang to be able to hold the end firmly between a finger and the thumb as the fret is tapped into place with a soft-headed hammer, such as a dead blow hammer, with nylon faces, or an engineer's hammer with brass ones (**Pic.35**).

Once the frets are in place the ends need to be trimmed back to the edge of the fingerboard with a pair of flush cutting pincers (**Pic.36**). They then need to be filed flat to the edge with a file attached to a block at right angles with a 3mm overhang (**Pic.37**). The block in the one I made is maple as it is very hard and will still stay flat after many years of use. Once flat to the edges, it is customary to trim the fret ends at around 30° to the top of the fingerboard. This can also be done with a home-made tool with the file blade set at the correct angle (**Pic.38**). To achieve comfortably smooth fret ends, use pieces of 1,200 grit wet & dry abrasive to achieve the ultimate finish.

To allow the strings to be brought to the correct tension, you need to fit a set of tuners. These can come in the form of wooden pegs similar to those used on a violin, or friction pegs made for dulcimers and similar instruments. The top end friction pegs have planetary gears but these are expensive. A very simple alternative is to use acoustic or classical guitar tuners that come as singles. I was lucky to have a set leftover from some classical guitars I made several years ago, so chose to use them.

To be able to function, the tuners must be

STEP 33. A dovetail saw cuts fret slots well

STEP 34. Testing the depth of the slot

STEP 35. A dead blow hammer is good for fretting

STEP 36. The fret ends are trimmed so they are roughly flush...

STEP 37. ... before being filed exactly flush

STEP 38. They need to have their ends angled to around 30°

STEP 39. The string slots start with a hole at either end of the headstock

STEP 40. The slots are cut out with a coping saw

mounted horizontally into the sides of the headstock, and so that the strings can pass through the rollers, a slot needs to be cut right through the headstock. You can choose whether to drill the roller holes first and then cut the string slots, or vice versa. Whichever way you choose it is essential to support the inside edges of the second part of the job to avoid splitting. The method I have found easiest over the years is to drill a 16mm hole with a sawtoothed bit at either end of the string slot (**Pic.39**) and then tap in a well-fitting dowel. The roller holes can then be drilled and the inside edges will not split. The roller holes should not pass right through the headstock as that looks unsightly, but should just stop short of going all the way. They should also be staggered so as not to bump into each other. The distance between the rollers on either side should be determined by the size of the buttons. It should be comfortable to turn each button without your fingers and thumb knocking against the nearby one. The slots can then be cut out with a coping saw (**Pic.40**). Once the string slots and tuner barrel holes are all completed, the end of the slot nearest the body of the dulcimer needs to be angled into a ski slope shape so that the strings do not foul on the wood when they are fitted. Two saw cuts will guide where the slope should be chiselled out (**Pic.41**). Finally, the inside edges can be sanded smooth (**Pic.42**).

Fitting the fingerboard & neck to the body

Before this operation is possible it is necessary to make another simple jig. The soundboard needs to be supported while the neck is being fitted, so you'll need to prepare a strip of softwood that is just short of the two inside edges of the end blocks and a little higher than the width of the ribs. You need to place this under the soundboard while the neck is being fitted – it allows the clamps to be tightened without risking damage to the ribs. Firstly, the neck needs to be held in position with clamps at either end, and then the remaining ones can be put into place. Cover the edge of the jig, which will meet the underside of the soundboard, with parcel tape; this will avoid it becoming attached through glue squeeze out (**Pic.43**).

Preparing & fitting the back

The back needs to be prepared in a similar fashion to the soundboard in that it starts with two bookmatched pieces of timber. As with the ribs, I chose rosewood not only because of its look but its sound quality. The edges to be joined need to be planed true and sanded to a right angle using the spirit level sanding stick previously used on the soundboard. The two halves of the back can then be placed into the wedge and lace jig with a purfling centre strip for decoration. The coloured strip is not necessary but does add to the appearance (**Pic.44**).

Once the Titebond has cured, the back needs to be brought to a uniform thickness of just 2mm and, as the centre join is delicate, a strip of cross-banded spruce then needs to be glued along its length on the inside. The strip stops just short of the inside edges of the two end blocks.

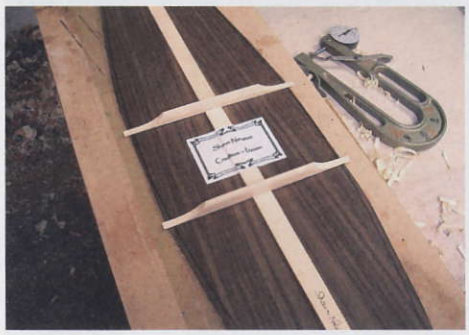
Further strength is offered to the back by the addition of two spruce braces, which should measure 6mm wide × 14mm high. They need to be gabled along their top edge when the glue has dried and the ends scalloped down to around 2.5mm deep (**Pic.45**). At first, the ends of the braces will overhang the edges of the back, so small housings need to be cut into the ribs and linings so that the back can lie flush with the edges of the ribs (**Pic.46**). The small area of the tip of the brace that can be seen once the back is in place will eventually be hidden by the ebony bindings. When the back is ready it can be glued in place by a variety of methods. I use cam clamps >

STEP 41. Two small saw cuts guide the chisel for the 'ski slope'

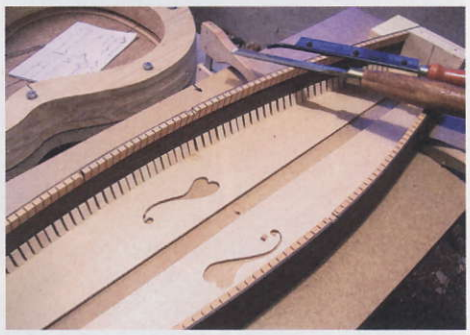
STEP 42. The insides of the string slots are cleaned up

STEP 43. The neck and fingerboard are then clamped into place

STEP 44. The two halves of the back and centre strip in the wedge and lace jig



STEP 45. The inside of the back is strengthened with cross-banding and struts



STEP 46. Small housings are cut into the linings to receive the ends of the struts

STEP 47. The back held in place with cam clamps

STEP 48. The bindings are trimmed roughly flush with the ribs...

STEP 49. ... before they are scraped clean

FRET SPACING

The overall string length of the dulcimer is 685mm, measured from the inside edge of the bone nut to the inside edge of the bone saddle. Each fret distance is measured from the inside edge of the nut. There are 17 frets in all:

Fret 1 – 74mm
Fret 2 – 141mm
Fret 3 – 171mm
Fret 4 – 228mm
Fret 5 – 277.5mm
Fret 6 – 301mm
Fret 7 – 342mm
Fret 8 – 38.5mm
Fret 9 – 414mm
Fret 10 – 428mm
Fret 11 – 456.5mm
Fret 12 – 482.5mm
Fret 13 – 495mm
Fret 14 – 513.5mm
Fret 15 – 532.5mm
Fret 16 – 55mm
Fret 17 – 557mm

SUPPLIERS OF TONEWOODS, TOOLS & ACCESSORIES

- **Stewart MacDonald** – for tools, timber, pegs, finishing supplies etc. USA-based **www.stewmac.com**
- **ToneTech Luthier Supplies** – as with Stewart MacDonald but based in the UK **www.tonetechluthiersupplies.co.uk**
- **Touchstone Tonewoods** – same as Tonetech **www.touchstonetonewoods.co.uk**
- **Capital Crispin Veneers** – possibly the largest collection of veneers in Europe. Sells by mail-order **www.capitalcrispin.com**
- **David Dyke Luthiers Supplies** – excellent for high quality timber. UK-based **www.daviddyke.co.uk**
- **www.earlymusicshop.com** – for gut strings, pegs and early instrument supplies
- **www.smallwonder-music.co.uk** – for decorative back strips and inlay materials
- **www.earlymusicshop.com** – for gut strings, pegs and early instrument supplies

but elastic bands, linen tape, string or simply weights can all be used with success (**Pic.47**).

When the glue has dried the bindings and purflings for the back need to be fitted in the same way as for the soundboard before they are planed and scraped flush (**Pics.48 & 49**).

It is now time to admire the almost completed instrument ready for its finish (**Pic.50**). There are several finishes that can be applied: urea formaldehyde resin, oil, shellac, nitrocellulose lacquer and so on. The finish I have used over the last five years or so with great success is made by General Finishes. It is their 'Satin' water-based high performance top coat and is available from Stewart Macdonald whose details can be found at the end of this article. It is water-based and environmentally friendly.

Fitting the strings

Steel strings are normally fitted to a dulcimer and there are two types, which will be familiar if you own an acoustic guitar. One type is 'ball ended' and has a small steel ring wound onto the end; the second is 'loop ended', which is self-explanatory. Sets of three, four or five strings can be bought. It is better to fit loop ends as all that is needed at the tail of the dulcimer is four steel hitch pins that can simply be hammered in leaving around 5mm protruding. They need to be carefully positioned as the two melody strings are just 4mm apart, while the middle drone is 11mm further along and the bass string another 11mm on. To help hold the pins in very firmly, glue a small 2mm-thick ebony plate to the tail of the dulcimer; this also helps to prevent the strings from fouling on the end of the neck (**Pic.51**). During this task it should be noted that the dulcimer is normally played with the scoop on the right and the headstock on the left, that is for a right-handed player. The first two strings (i.e. the two nearest the player) are the melody ones and, as mentioned earlier, sit just 4mm apart. The next two strings are drone strings though there are variations, which are explained below.

To help get the strings to the correct playing height, place a saddle made of bone into the slot at the tail end of the instrument. Small grooves can be cut into the saddle to help prevent the strings from moving sideways while the instrument is being played (**Pic.52**).

At the top end of the dulcimer, place a bone nut between the headstock veneer and the end of the fingerboard. The gap here is normally around 5mm. You'll need to file string grooves into the nut to a depth of approximately half the thickness of the string. The nut can be reduced on the underside if need be once the grooves have been filed, which will allow a string clearance of 3mm or 4mm above the fingerboard (**Pic.53**).

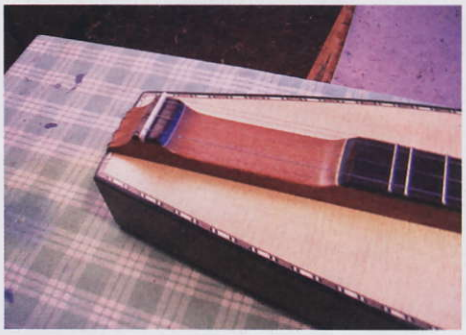
Tuning & playing

There is no single tuning regimen for the Appalachian dulcimer and this makes the instrument very versatile. Indeed, not all players use just the first two strings to bring out the melody, but you can use either or both of the other ones. One of the good things about the instrument is that you can play chords, individual notes and any manner of combinations of the two.

The dulcimer featured in this article has the two melody and the first drone tuned to C (i.e. 'middle' C, or the second string on a guitar held

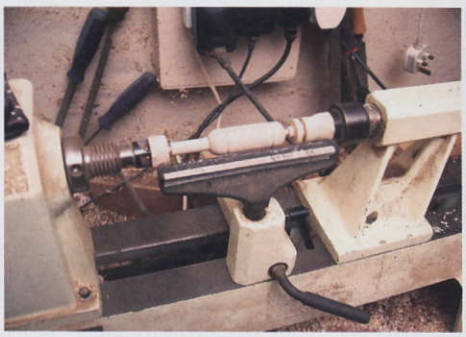
STEP 50. The instrument almost completed and ready for the finish

STEP 51. The hitch pins in the tail



STEP 52. The bone saddle is located at the tail end of the neck

STEP 53. The top nut is made from bone



STEP 54. Turning a noter on the lathe

down at the first fret). The second drone, which is normally a 'wound' string, is tuned to G below middle C (i.e. the third string on a guitar played unfretted). Other popular folk tunings are DDAA and DDAD. There are many variations and this also enters the realms of modes as well as tunings. The subject is too wide for this article: some musicologists have written whole books on the subject. However, there are four main modes: Mixolydian, Aeolian, Ionian and Dorian. A browse on the internet will offer a great deal of useful information on how to tune your dulcimer. One thing I particularly like about this instrument, apart from its melodic voice, is that because of the non-chromatic fret layout, almost every note you play will harmonise with almost every other. A bonus indeed!

Originally it seems, as mentioned earlier, the dulcimer was played with a goose quill, whereas nowadays a plectrum is more often used. Some players use a 'noter' and this can easily be made from a small length of hardwood turned on the lathe (**Pic.54**). In the absence of a lathe the handle from a small wooden spoon cut to a comfortable length will do a good job when the bowl of the spoon is held in the hand. One great advantage of the noter is that you can play the dulcimer in similar fashion to a slide guitar, and you don't get sore fingertips after a lengthy session (**Pic.55**).

Making a case

The case is just a box with a small rest for the headstock at one end. The sides are made from pine and measure around 19mm thick, and the top and bottom are 4mm plywood. The inside is lined with thin foam rubber that is covered in crushed velvet and held in place with carpet fitter's double-sided adhesive tape and a few gimp pins. Care must be taken to ensure a snug fit to avoid the instrument moving around inside the box (**Pic.56**). All that remains now is to hear the wonderfully haunting sound of the beautiful Appalachian dulcimer. Enjoy! **GW**

STEP 55. Two examples of noters made in maple

STEP 56. The finished instrument in its case

USEFUL READING

- *Making Wood Folk Instruments*, Dennis Waring, Sterling Publishing, 1990. ISBN: 0-8069-7482-6 – has chapter on making a simple dulcimer
- *Making Early Stringed Instruments*, Ronald Zachary Taylor, Stobart Davies Ltd, 1991. ISBN: 0-85442-051-7 – also has a chapter on making a dulcimer, this one having an 'hourglass' shape
- *Make and Play the Dulcimer*, John Pearse, Wise Publications, 1970 – less information on making, but extensive explanation of tunings and modes
- For songs and playing guidance, see Jean Ritchie: *The Dulcimer Book*, 1992 and *Traditional Mountain Dulcimer*, 2003