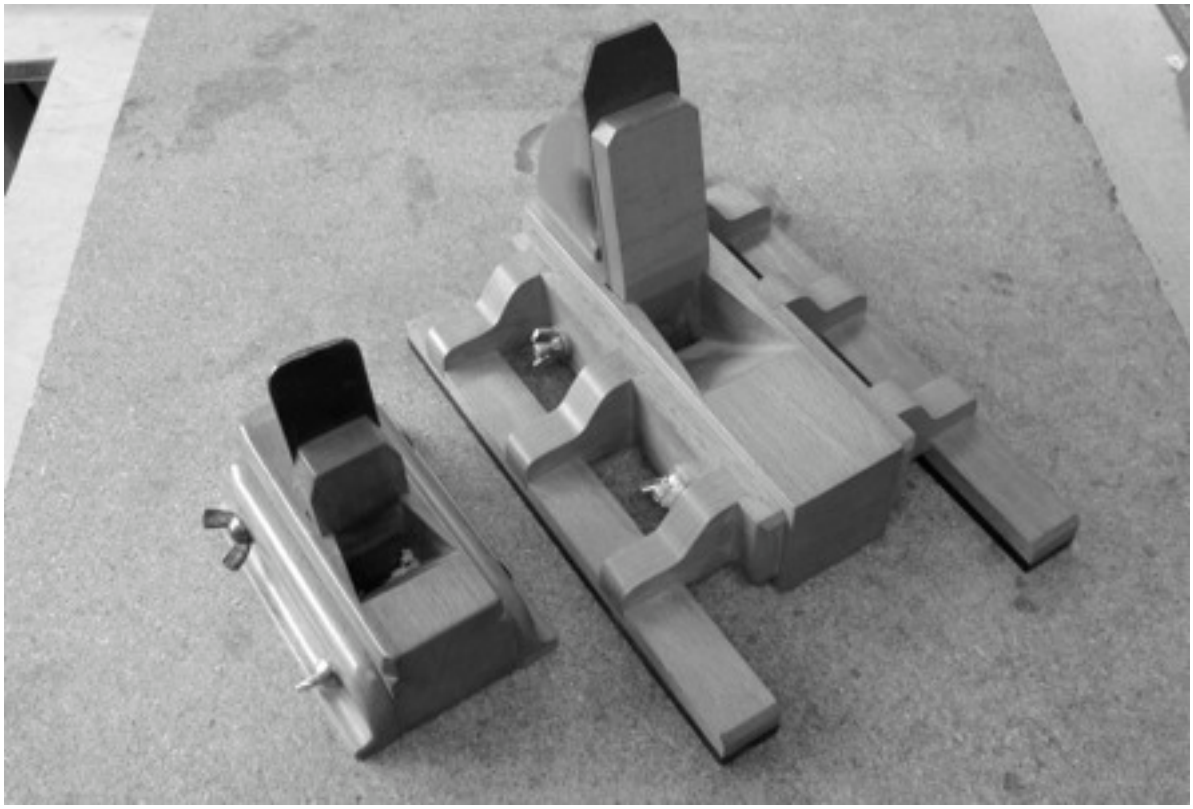
How I Build a Cittern, part 2 - the Back and Sides.

The first job is to rough-turn more pegs than will be needed. Because metal strings react to tightening and slackening several times quicker than gut or nylon, their pegs need to be as perfect as possible. If they are partly ready and hung in a warmish area of the workshop, hopefully any movements that the wood wants to make will occur before they are finished and fitted.



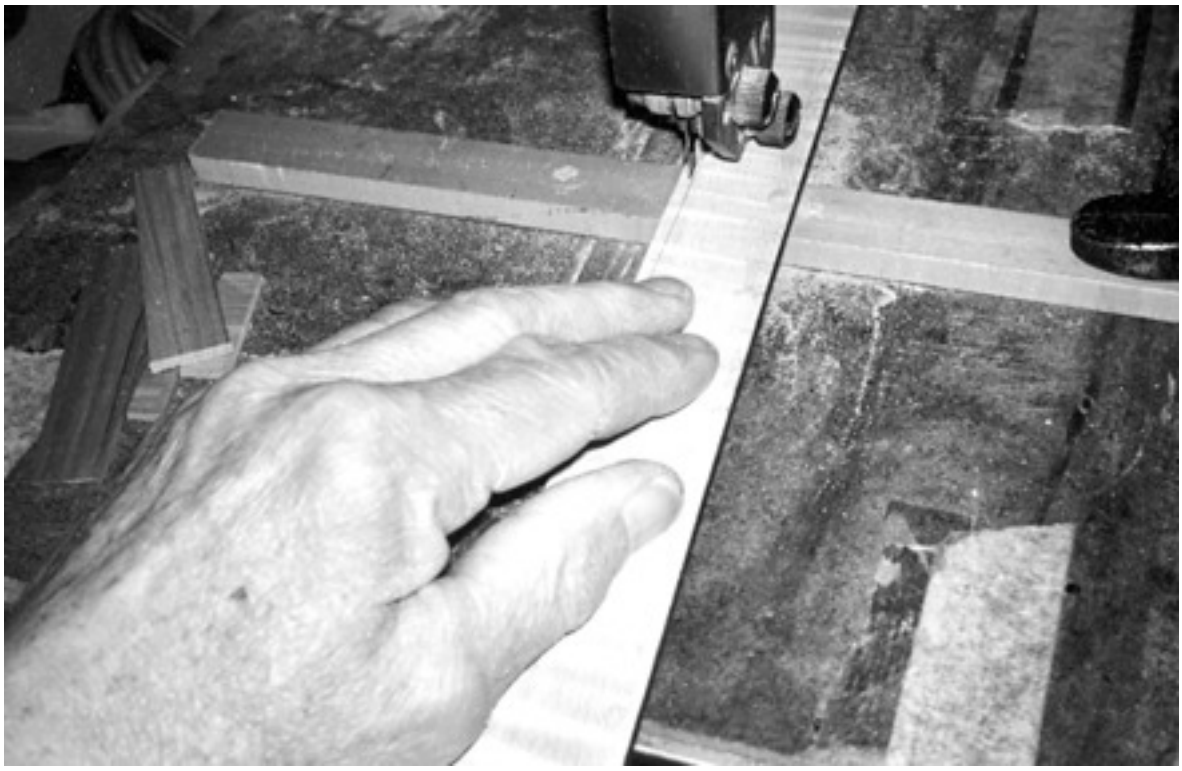
The staves or strakes for the back, and the sides are thicknessed using the smaller of the planes above. The other is merely a larger version used for bandora sides, etc. The blades are toothed. Their rationale and use are described in Fomrhi comm. 1469, July 1996. After writing the article I found a very similar plane, although without the toothed blade, a 'reglet' plane described by Holtzapffel, and used in type making. In use, the 'best' side of the work is prepared using a scraper. It is then reversed and the thickness reduced from the back, using the plane and a scraper alternately. It is especially useful on figured wood, and can be accurate to around .05 mm. Best used with the work sideways to the light. I thickness most backs to 3 mm or slightly less, and sides to 1.5 mm or very slightly more, depending on the wood.

The back has a more subtle curve than bowl-shaped instruments. It is distressingly easy to produce irregularity and I have sometimes been dissatisfied, although the sound is not affected, and the unevenness can be disguised though not eradicated. The simplest means of making the joints between staves is, after bending, to start with straight edges for the central strake and use a simple (school?) compass to mark the slightly convex curve on the adjacent strakes. These in turn will have their outside edge as a straight line to which the next pair will be fitted. Obtaining a good joint

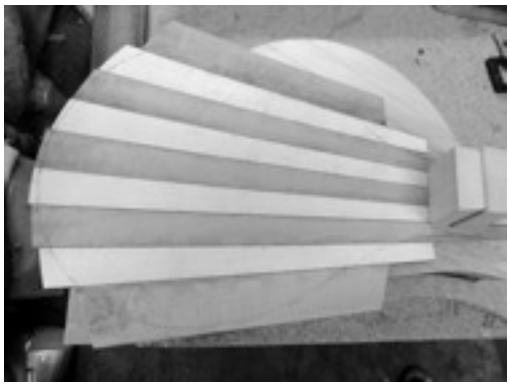
probably needs an inverted large plane used as in lute-making, which I supplement with metal sanding plates. These measure 6 x 22.5 cm and were made by Sandvik in three grades, but may no longer be obtainable. A sanding board would be a useful

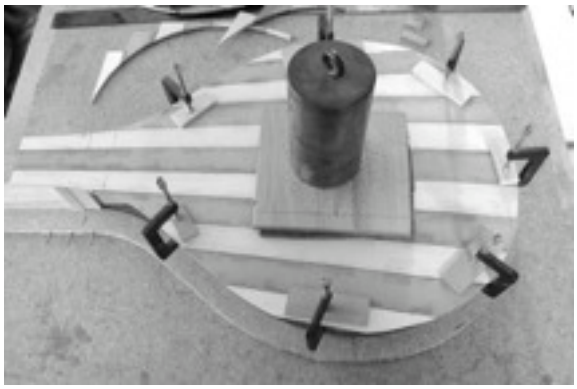
substitute. A bendable straight-edge - a metal rule or strip of formica - will be necessary. How accurate the joint will be can be judged by holding the strakes up to a strip-light or a window. The thickness of the back means that ornamental lines, if

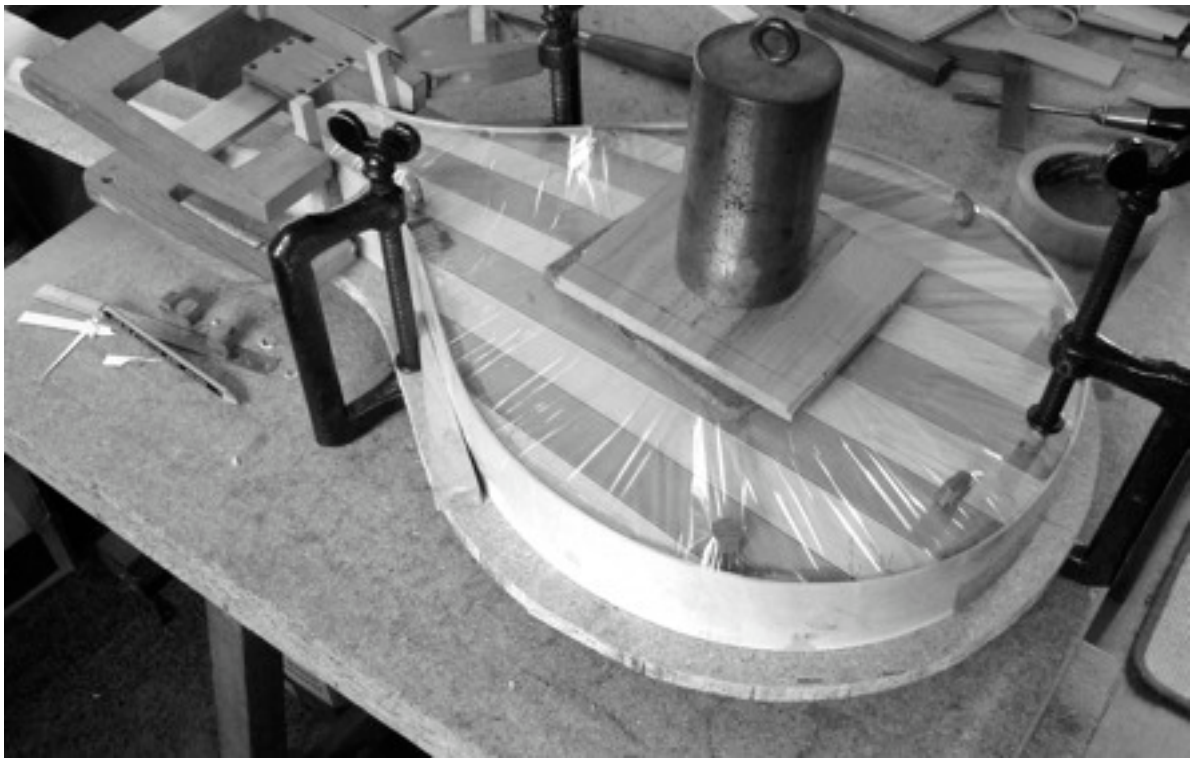
used, need to be cut from sheet veneer and glued to each strake before the latter are glued to the neck-block. After checking that these lines have not altered the fit between strakes, the central strake is glued to the block. The photo above shows a simple clamping method which is quicker and easier than G-cramps. If there is more

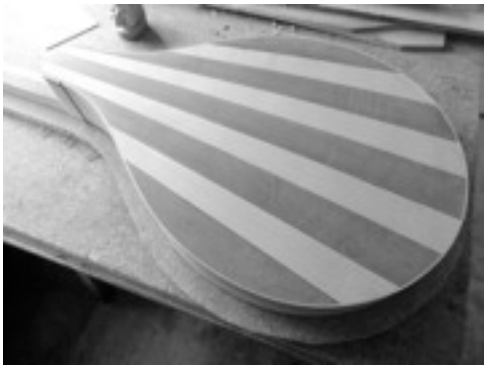


excess than can be conveniently planed off the next two strakes, allowing for any ‘inlay’, the simple jig above will enable a previously bent strake to be safely passed through the bandsaw. (It can also be used later for the outline of the back on the sides.) Subsequent strakes are glued to the first, or previous one, ‘in the air’ - off the mould - using sellotape. My method is to initially attach the tape loosely and use a small electric fire, perhaps with a brush-load of water, to remelt the glue whilst checking against my strip-lighting that no light is showing between the strakes, then re-tightening the tapes and replacing the assembly on the mould for the glue to set. When all the strakes of the back are glued up, it is sensible to do other work - the belly, the rose, carve a head? - to allow the glue to shrink before cutting the outline of the back down to the mould. Although individually thin, the possibly thirty or so glue lines add up. The back will be best kept clamped and/or weighted in contact with the mould.









When ready to continue, the back is cleaned up with a scraper and perhaps thinned towards the sides. It then needs trimming as close as possible to the outline of the mould. The grosser excess can be removed on the bandsaw, and a block plane can ride on the backboard to ensure that the outline remains vertical around the convex part. A curved plane, or sanding with a curved surface will be necessary for the concave areas near the neck. It is essential not to allow it to become too small, which could happen because there will inevitably be a very small 'give' in the attachment between the neck and the mould. The ideal would be a paper-thin excess, and certainly no more than 0.5 mm. There needs to be a continuous curve between the back and the rebates in the neck block. The smaller photograph shows that a small gap is left in these rebates when the side is fitted. Ideally of course this would not exist, but because the side needs to be pulled around the back and glue squeezed out, it is impossible to judge the exact length required. Worse would be to have too much when it is being glued. The gap will be covered by the ornamental balusters later.

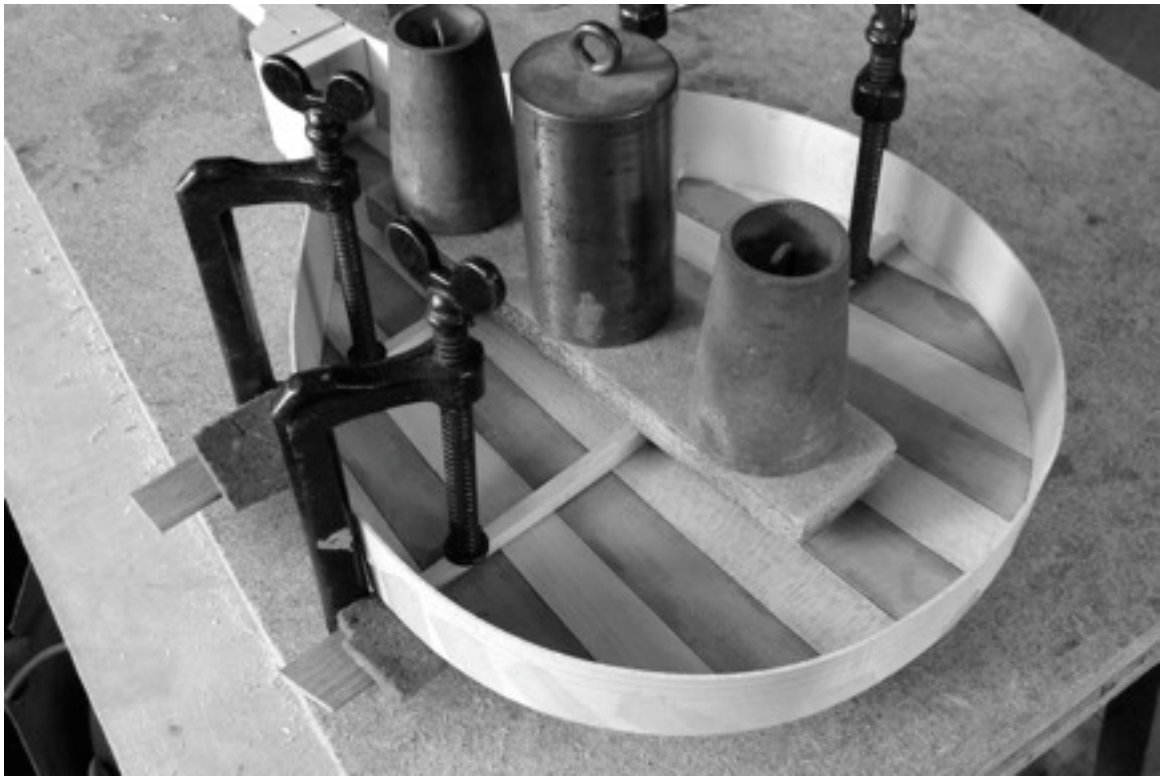
The side is tested for fit and length and lightly fastened in place so that the shape of the back can be outlined upon it, and its exact position marked. The pressure of the tapes during gluing causes the back to rise in the end-block area and perhaps at the sides, so the excess wood is cut away, leaving around 2 mm to be trimmed later. This will help, but a clamp or taping to the backboard may be necessary. End-grain areas are sized with dilute glue, dried and smoothed. The mould is lightly wax polished. Assembly commences at the end-block position after glue has been applied to all the areas to be glued on both the side, and the back and rebates. It may need refreshing

as work progresses. The glue will need remelting with a domestic iron and a wet brush. The aim of the taping is is to squeeze the glue-line, so some of its direction when commencing is at an angle, pulling the side towards the neck as well as against the back. Short sections are worked on alternate sides. As well as much tape to pull the side to the back, a cramping arrangement will be needed at the rebates, and support for the straighter part of the sides between the convex and concave curves. The photograph above will give a good idea of what may be necessary. (The photographs in these articles will be of several instruments, of different sizes, and purposes.)

After trimming the side to the back, strips of tape are stretched laterally across the back against the possibility of glue being weakened when fitting the lining and bars. As the thin cittern sides surround the thicker back a stronger joint is obtained than if the reverse was used, especially helpful to strengthen the shallow cittern body against the bowing strain of the strings. No linings between the back and sides are used, although some citterns, and my own, add fabric patches.

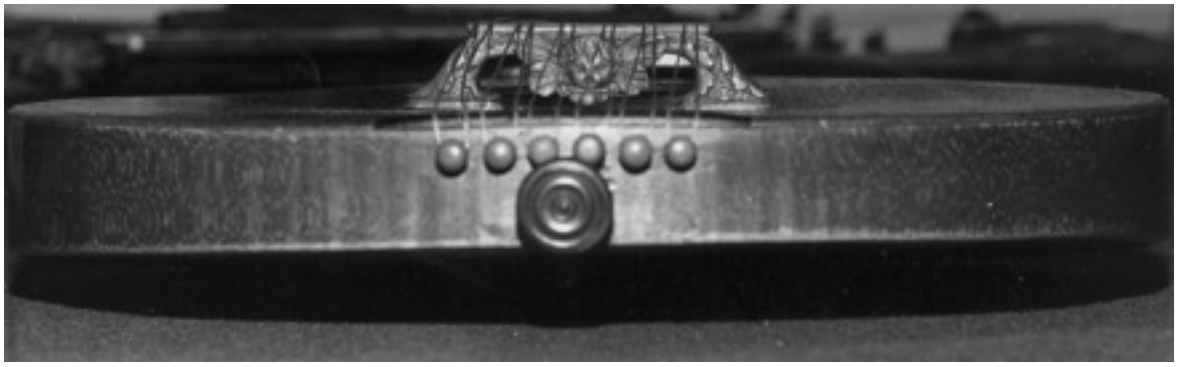
I usually, though not always, fit the end or bottom block first, usually using lime or sycamore. Then the bars, followed by paper linings on the back and fabric on the back/side joint - not as in the photo! Using the compasses as a measuring gauge, mark and cut the outline of the block which will contact the ‘side’. Next place it in place inside the cittern and mark and cut the outline against the back. Lastly use an adjustable square to measure the angle between back and side at the centre of the end-block position, and plane the end-block to match it. This operation should be straightforward if taken one step at a time. Two problems may occur. There may be a small amount of glue fillet between the back and ‘side’ which is best avoided by a

small chamfer on the edge of the block. Be sure that the block is sufficiently deep on its inside surface. Gluing and cramping up should be straightforward. Cramp to the side first, then to the back.

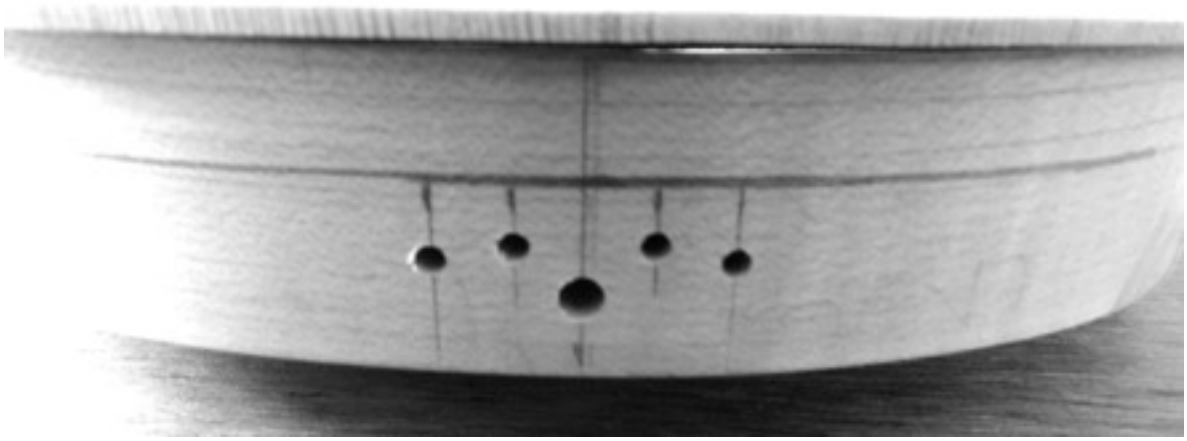


The bars are planed to width, 5 - 6 mm, and cut to length. Using the compasses again, mark and form the curved and flatted shape that fits to the back. It may be easiest to do this on the outside rather than the interior. Reduce each to the depth required. Gluing will be fiddly. Something like the photo will be necessary. The outside cramping uses foam padding and flexible strips of plywood. This will be insufficient for the centre of the bars so they are weighted from the inside whilst still contacting the bench surface. An alternative would be an outside template and joy-bars as used for belly-barring. Or rebates in the mould to take the bars as the back staves are assembled. I find it necessary to remelt the glue with a small electric soldering-iron.

The back is lined with a strong but not too thick paper. I use a watercolour paper which uses cotton or linen fibres in its construction. Quite expensive, but one sheet will be enough for a lot of instruments. Cotton tape will accept animal glue best for the back/side joint.



The belly/side shape cannot be cut until the belly has been prepared. Nor the reinforcements on the sides supporting the bars. One task which is most easily done now is to drill pilot holes for an end pin if required, and the hitch-pins, while the body can still be conveniently clamped to the bench.
This detail of a Virchi cittern in Paris will give an idea of the problem, in this case for six double courses. The hitch-pins are dangerously close to the surface of the block,

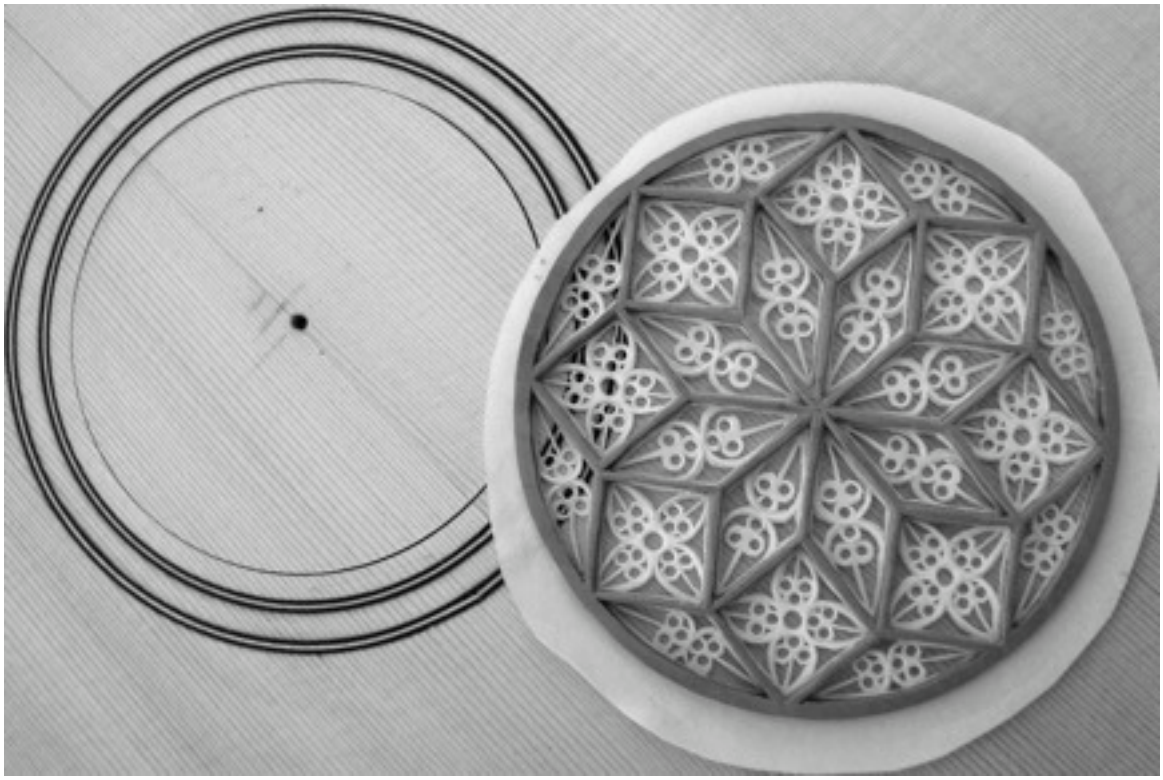


and a crack has started to form, whilst the end-pin over-hangs the edge of the back. Four courses are easier and the following photo shows my own, inauthentic, solution. The dark pencil line is of course the projected edge to which the belly will be glued. Although neat little brassed pins are available commercially, it will be best if the hitch-pins are quite thick so that a sharp bend does not cause string breakage here. Bone pins are ideal provided they are clean and dry - any trace of fat will become fatally acidic.

The interior of the back ready for closure when the belly is completed.

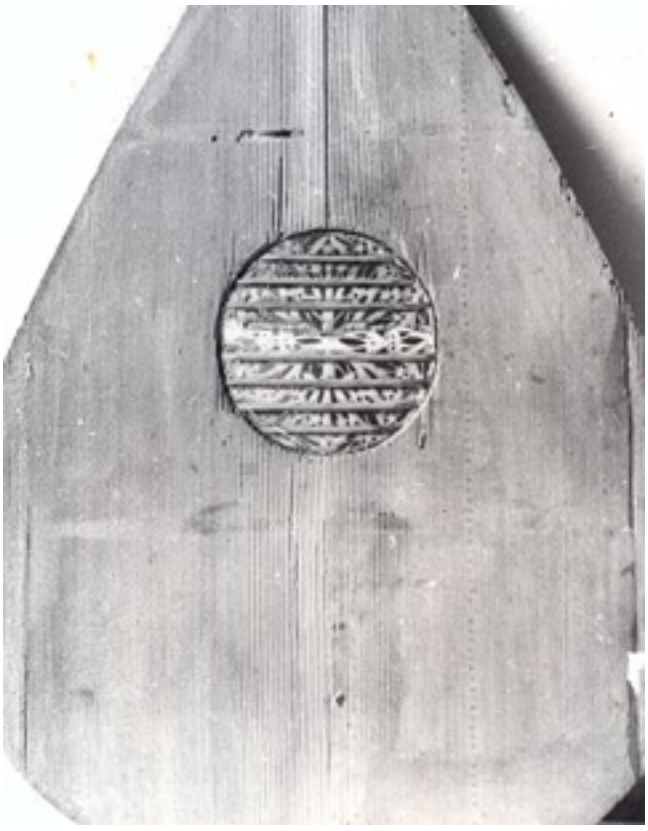
part 3 - the belly.

I have no information on the wood used for cittern bellies originally. My preference is for sitka spruce as it is reasonably loud, and sustain is provided by the wire stringing. Bellies can be made of two pieces in the usual way, but the shape and size of a cittern's belly also allows for producing it in three pieces - a central panel and two 'wings' - from one half of a pair intended for lute or guitar. Providing of course that the grain is suitable, and the 'wings' can be arranged with any 'run-out' matching the central section. Or a four piece front. Both of these occur on extant citterns. There are several ways of jointing and gluing bellies. I use wedges to apply pressure when gluing and check the joints beforehand by holding them against a window pane. The belly is then planed and finished to 2.8 mm or slightly less all over - for the present. It should match or be slightly thicker than its rebate in the neck block. It can be cut down to near its final size and the rose and bar positions marked.



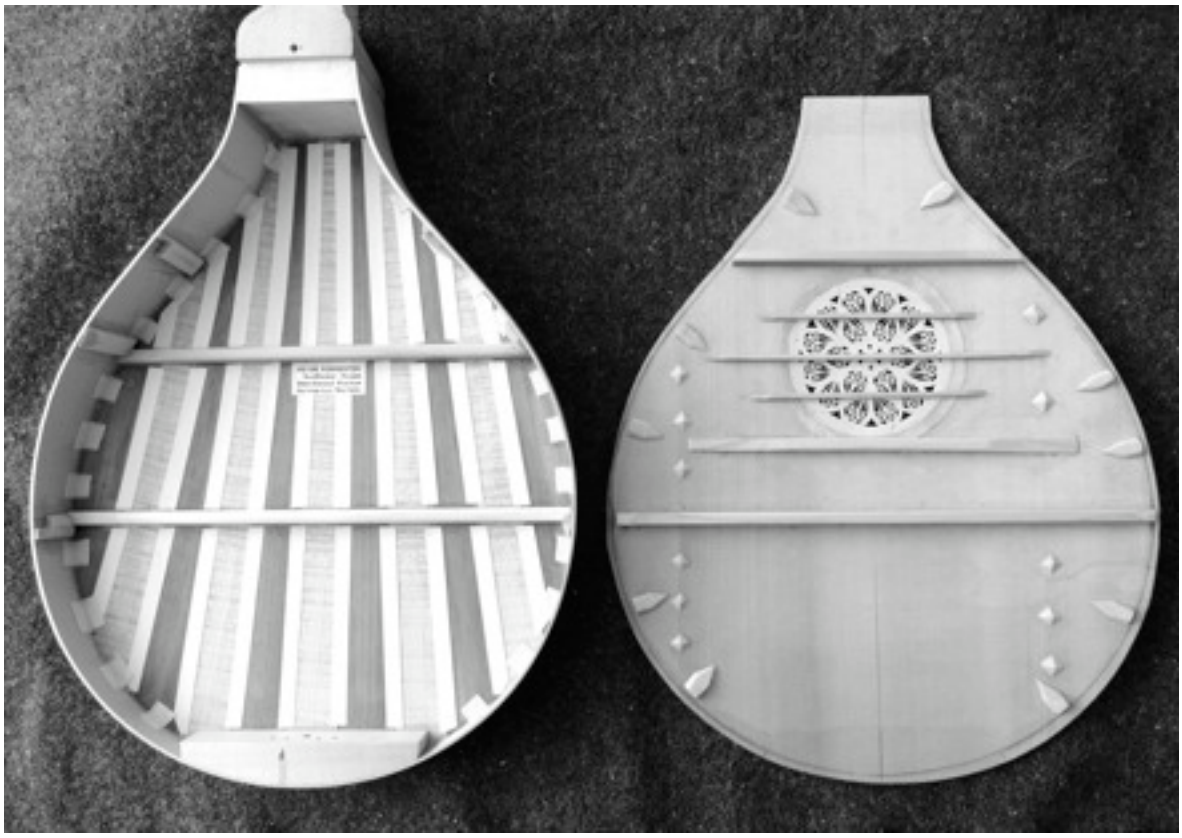
I cheat when making roses. Three sheets of pear-wood veneer are glued together to make a plywood. The photocopied design is glued in place and cut out using fine blades in a jeweller's fretsaw. Note that photocopiers sometimes stretch or shrink prints in one direction resulting in distorted circular shapes. Cow Gum used to be excellent for attaching the design, and rubbed off easily when required. It has been discontinued and more recent versions are less successful and need experimenting with. The wooden pattern is then glued to parchment, with an excess of perhaps 1 cm. This layer will give strength to the wood layer, and can have fine detail added to the design. I have used superglue in the past (the wood will need a sizing coat of perhaps varnish for the superglue to adhere to) but now use animal glue previously painted onto both surfaces, allowed to almost dry, and remelted with the domestic iron. Care is needed, and the parchment may need roughing with light sandpapering, and sizing on both sides whilst stretched flat. This parchment will be glued to the inner surface

of the belly, but I usually add a further parchment layer to the central pattern for elaboration. The hole in the belly for the rose is marked, but not cut out until the surrounding rings are purfled and finished. The wooden layer of the rose will measure 1.7 - 1.8 mm in thickness, so the rose will be recessed about 1 mm. Animal glue is used on both the wooden junction of rose and belly, and the parchment surround. Cramping pressure must be only on the parchment, and the glue is remelted using the iron after about one hour. When solid, I insert a contrasting ring to cover the slightly untidy fit. Many cittern roses are not recessed at all, which may be slightly better for sound projection? This particularly applies to the traditional carved citterns with their thicker soundboards. That in the Museo Bardini, Florence, in fact constructed to look carved, has its rose in a rebate in the soundboard. (Notice the soundboard '**wings**') Not infrequently the inner circle of purfling has been used to fill the junction between rose and belly.



Alexander Batov's website gives much information on original roses, including citterns. www.vihuelademano.com/rosesinvihuelas.htm

I always use a barring pattern shown in the Gasparo da Salo cittern in the Ashmolean museum, Oxford. This seems the most common although others exist. (*See below*.)

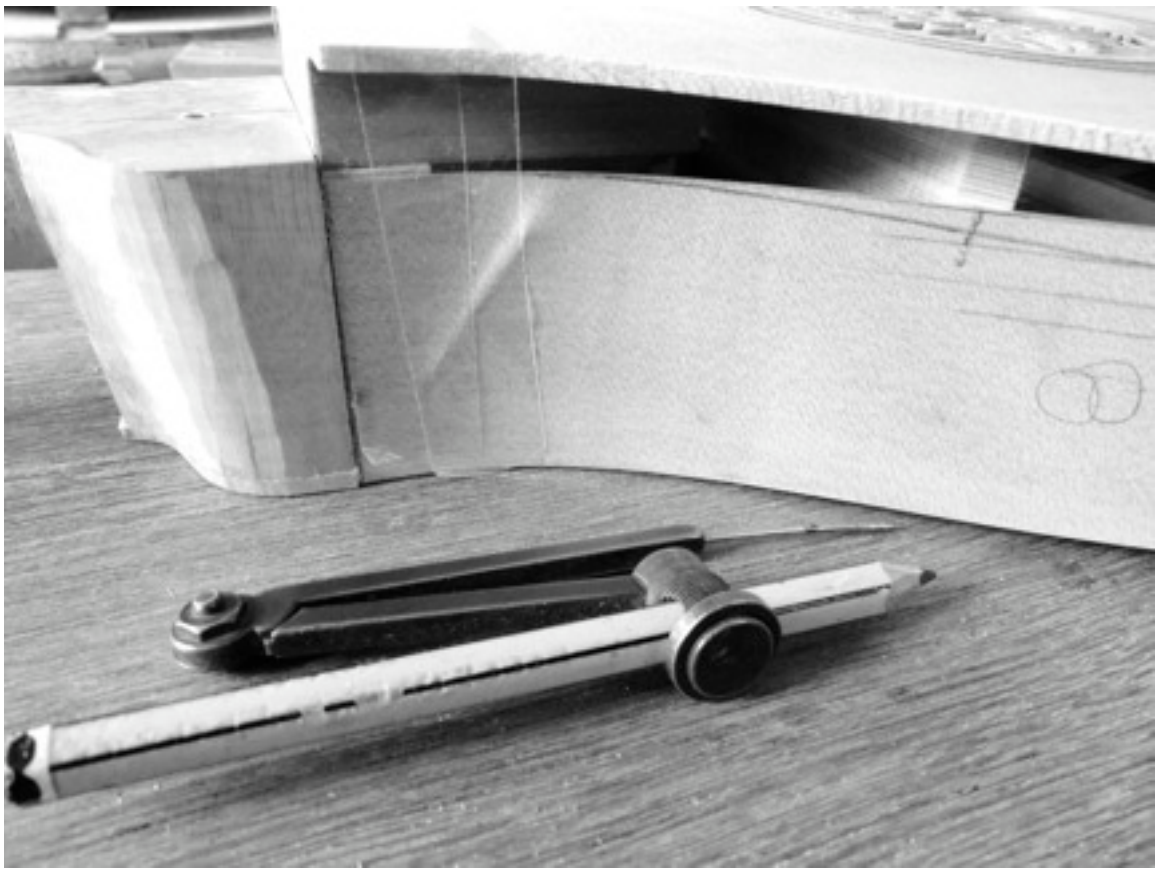


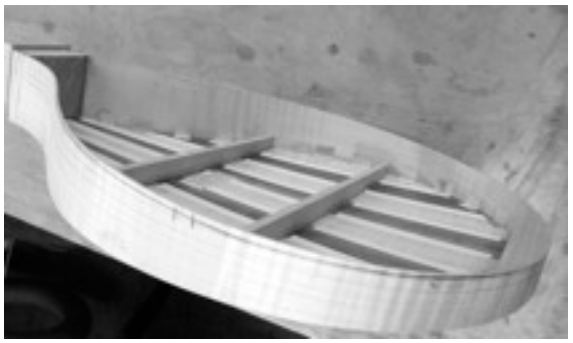
The two back bars are at the widest part of the body and below the centre of the rose. The main belly bar is above the back bar and is prevented from collapsing by small reinforcing supports which connect these bars. Further reinforcements are associated with the other back bar and with the belly bar above the rose. Their purpose is to strengthen the flattish areas of the sides against the downward pressure of the strings. The short bar between the main bar and the rose holds the belly down against this pressure around the fulcrum of the main bar. Some positioning blocks seem usual and useful. I also reinforce belly joints - a three part belly in this case.

The belly needs a rise of around 6 mm in the centre. This is achieved by removing 1 mm from the exterior later and adding 5 mm to the centre of the main bar. The photo shows a method of marking this curve using a 2 foot rule and four G-cramps for the main bar and copying the curve to the others. Like the back bars, these for the belly need gluing in place with flexible strips and extra cramps for the centres. Finishing the bars is left until the outline of the belly/side joint has been made. They will need finishing to a rounded or chamfered surface, and tuned like lute bars although less easily. It is probably sufficient to get a good ‘ring’ when tapping the belly surface. But firstly, the belly is used to find the shape and

amount of the side(s) which needs to be removed.

Parallel lines drawn around the body with a marking gauge and perhaps 5 mm apart will show whether both sides of the body are similar. The main belly bar should fit temporarily, but happily, in place opposite the main back bar. Now the angle of the belly has to be fixed so that its distance from the neck rebate is equal to that between the belly and the finished height of the end-block. Some packing will be necessary and a minimum of adhesive tape. Some small wood blocks and 1 mm card offcuts will be useful. Using the compasses as a gauge, the required shape is drawn on the side(s). The earlier parallel lines will now be invaluable. Some of the waste might be removed





with a saw, but a plane is probably safer, and a sanding block will preserve the angle of the belly. The downward pressure of the bridge does have a damping effect on the sound. My experience has been that a certain amount of tension built into the belly balances this out, and makes the response between the pluck and the emergence of the sound quicker. At any rate, some of my customers think so. If some of the side is left and not cut away, as in the

photo, the belly will have to be pulled down the last 4 or 5 mm at the end-block to gain this. Something like pressing on a spring. Be careful that a smooth curve is preserved and no other gaps caused.

When this is satisfactory, the side reinforcements can be added. Some originals can be as simple as halved cylinders. After finishing the belly bars, the belly is glued in

place and trimmed to the body outline.
The belly is thinned to around 1.8 mm at its circumference and faired and levelled to the surface of the neck. An imagined cross-section would show a steady taper rather than abrupt steps. Some further thinning can be done later with the cittern finished and strung, before varnishing, if the sound seems too tight. Purfling is fitted as far as the joint with the neck.

Provisional Addenda.

1. When making instruments, solitary, with little contact with other builders, one learns how to make parts, what to do with them, and how they add up to a whole. It is not necessary to name them. The backs of my citterns are made up of strips of wood which I have called, I realise, staves or strakes. They could equally have been merely planks, or possibly following lute nomenclature, ribs. One piece of wood joins the back and the belly of a cittern. Should we refer to it as the side? the sides? And when it nears the end-pin? Perhaps Fomrhi should lay down some rules? International of course! Meanwhile I hope my intentions have been reasonably clear.

2. Observed alternative barring patterns, some of which may have been altered, include:
Virchi cittern, Paris. Back bars as above. Belly bars - two above the rose, one immediately below the rose, one between the bridge and end block. This weak barring

in the bridge area must account for the flattening of the belly observable in the photo above.

Diatonic cittern KM 1524, Brussels.
Marks of removed bars on the back below the rose and greatest width. Belly bars in the usual positions, but none reach as far as the sides. Several, rather arbitrarily placed, side supports approximately 10 mm wide and shaped as sections of a cylinder.

Cittern by Abraham Tilman, 1602, Berlin.
This has back bars at the greatest width and below the rose centre, with side supports connecting these bars to belly bars. There are in addition bars immediately above and below the rose, both of which finish well before reaching the sides. Two more small bars across the rose. There are no other side supports, but the sides are constructed of a sandwich involving a full lining with ebony strips and mother-of-pearl plates on the exterior, and a probably later wood lining between the sides and back.

3. The grain direction of the neck. Traditional carved citterns are made as though from a split trunk or branch with the belly adjacent to the split. This means that subsequent shrinkage will be least across the belly, and will tend to increase its curvature rather than the reverse. Constructed cittern necks seem to follow the same orientation. It is often not easy to see, but fingerboards seem to be similar or occasionally cut on the quarter.

4. Citterns seem almost always to have had carved heads attached separately, some quite crude, others well carved. The only exceptions are the scrolls on traditional citterns from Urbino(?), and a very few other scrolls in simpler images. The easiest way to produce a head is to use modelling clay, and copy it in wood. Alternatively it could be cast in resin and painted, although this would be heavier. It should be fun to do! Enjoy it.

5. Since Comm. 2073 on cittern bellies was published, I learn that the belly of the Vermillion treble cittern NMM13500 has been dendro-dated. The latest visible tree ring matches a date of 1610, suggesting that the instrument was built post around 1620, rather than the 1579 date previously claimed. The dendrochronologist was Peter Ratcliff who has worked on many important instruments. His half-hour video on dating Stradivari's 'Messiah' violin is viewable on YouTube.