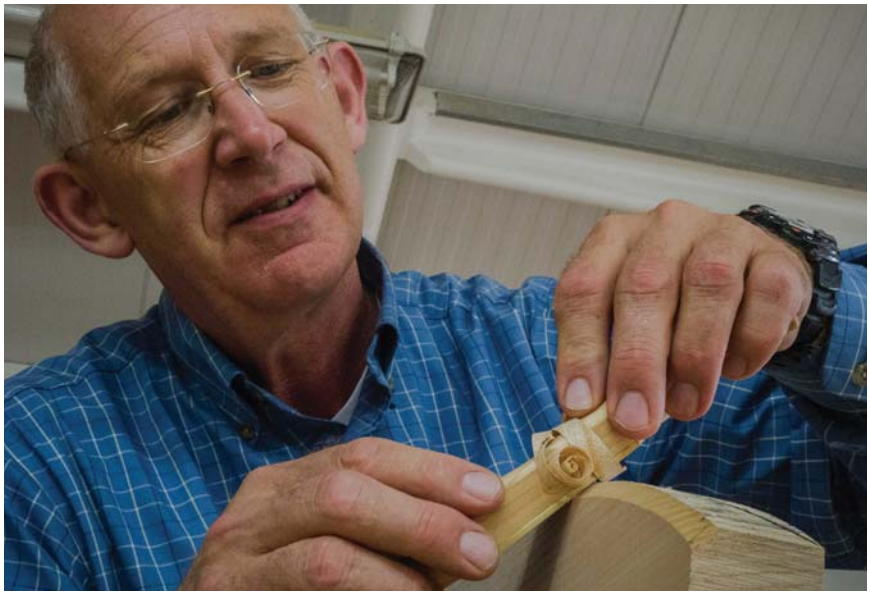
Steam Bending

Chairmaker James Mursell teaches steam bending regularly, and uses special jigs to make his own chairs



James Mursell is well known for the tools he produces and sells, including spokeshaves and travishers, the courses he runs in West Sussex, and the chairs he makes. You can find out more by visiting his website, thewindsorworkshop.co.uk

Steam bending is one of those woodworking activities that everyone has heard about, but most have not attempted. It is a little mysterious and foreign to our everyday experience but when everything comes together correctly, steam bending wood is incredibly easy. In this article I will attempt to demystify the process and identify the key ingredients for success.

What are the key ingredients and tools? Obviously you need steam, plus a container in which to heat the wood, the timber itself, a bending former and time. There are other things that you may add such as straps, winches, jacks, stopwatches and so on, but these are not the bare essentials.

The most popular method of making steam is with a wallpaper stripper. These can be quite inexpensive and produce lots of steam, but they are limited by the size of water reservoir. If you are going to bend more than one piece of wood, you may need to replenish the water. In order to keep the steam coming, refill with boiling water from a kettle so that you don't have periods of no steam! Alternatively, I use a 20litre tea urn which will produce steam for about four hours, which is quite enough for most bending sessions. The golden rule is that you can't have too much steam, but you can easily have too little.

The container, otherwise known as a steam box, can be made of almost anything. Many people use plastic pipe with bungs in the end and the hose from the steam generator fed through one end. If you can get heavy-duty pipe that will be best, with 6in water or gas main pipe ideal, but probably hard to source. Soil pipe will work fine, but it may become soft after a while and begin to sag, so attaching it to a board is sensible.

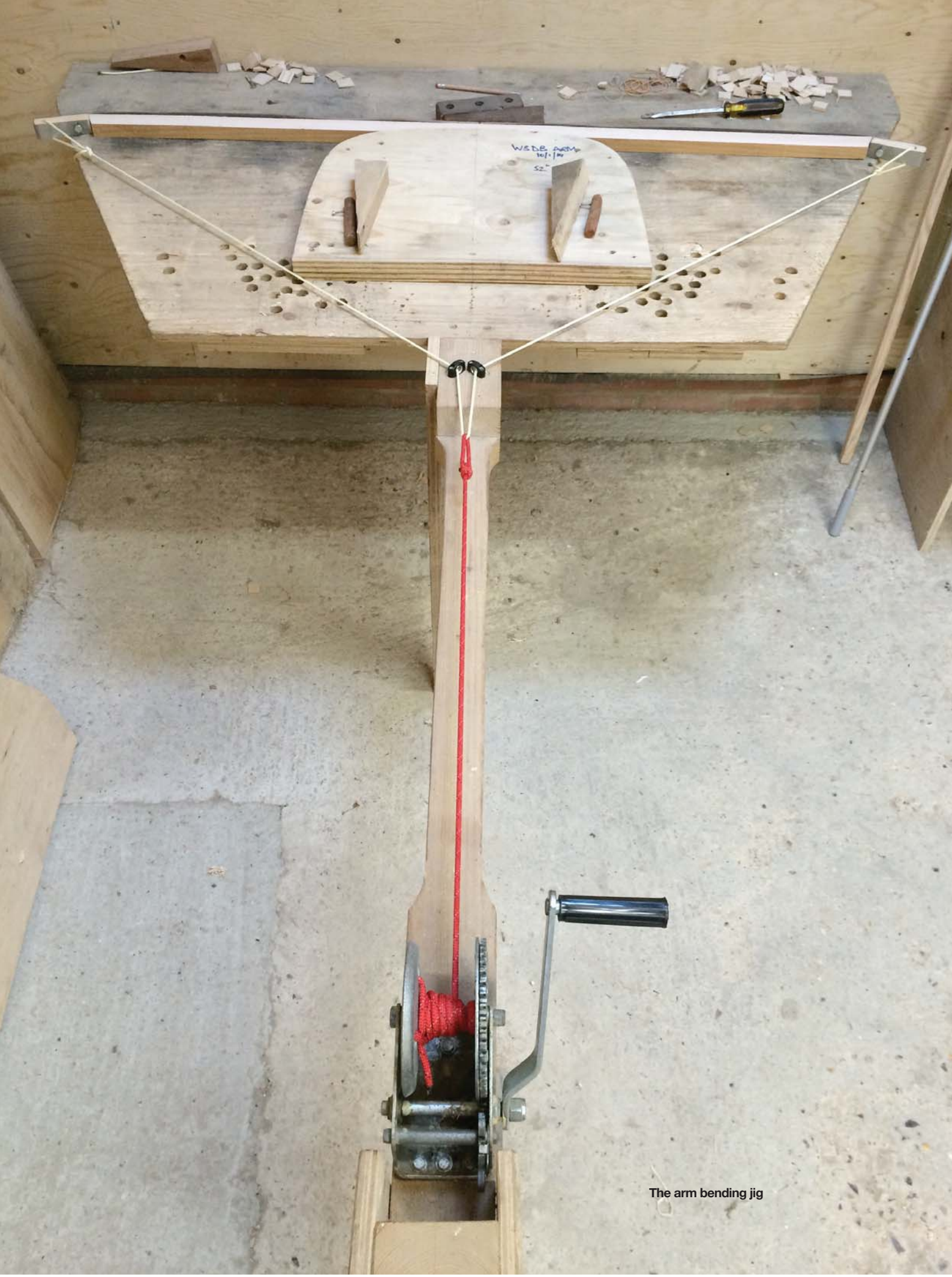
The temperature inside the 'box' needs to be as close to 100°C as possible. Therefore insulation is a great idea. It could be a blanket, loft insulation or any other material which will cut down heat loss from the box. My box is made from 12mm ply, foil-backed insulation and batten. The walls are made up of panels, with the insulation sandwiched between two layers of plywood, and these are screwed together. Even after three hours of steaming there is no discernible heat loss through the walls. My box (with a hole in the bottom) sits on top of the tea urn so that the steam feeds directly into the box.

The wood is likely to be the weakest link in the chain. You need a species that is prepared to bend. Ash, oak, yew, elm and beech are a few that will co-operate. I am sure there are others, but I do not have experience of them. The wood has to be straight grained. Any knots or short grain will be likely to cause problems when you begin bending. A knot will concentrate the compression and stretching forces and will likely lead to failure, while short grain may fail along the grain lines as the wood is bent. You must be aware that you will be subjecting the wood to stresses that it is not designed for and so you need the best quality material that you can find for success.

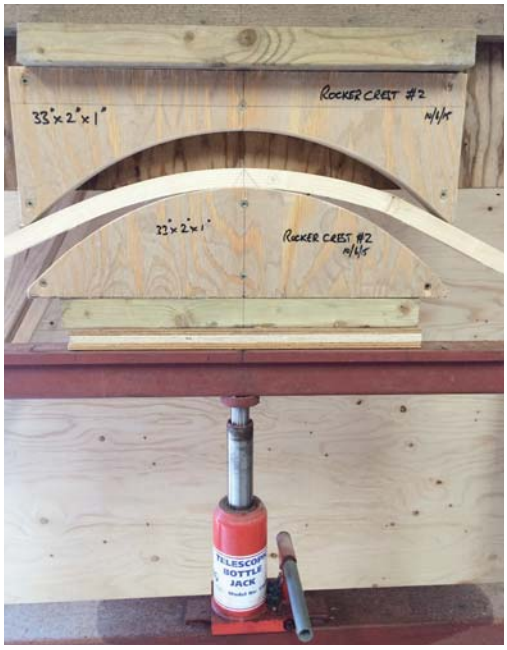
Speed of growth

What is 'best'? Straightness and freedom from knots have already been mentioned. Equally, if not more important is the speed of growth of the wood. The faster it is grown, the greater the proportion of summer growth to winter growth. It is the summer growth that is strong and that will put up with being bent, while the winter growth is relatively weak. Wood with say three growth rings per inch will bend far more successfully than wood with 10 rings per inch.

The other consideration is the moisture content of the wood. Firstly, do not waste time trying to bend wood that has been kiln dried. It has been cooked and altered and is unlikely to



The arm bending jig



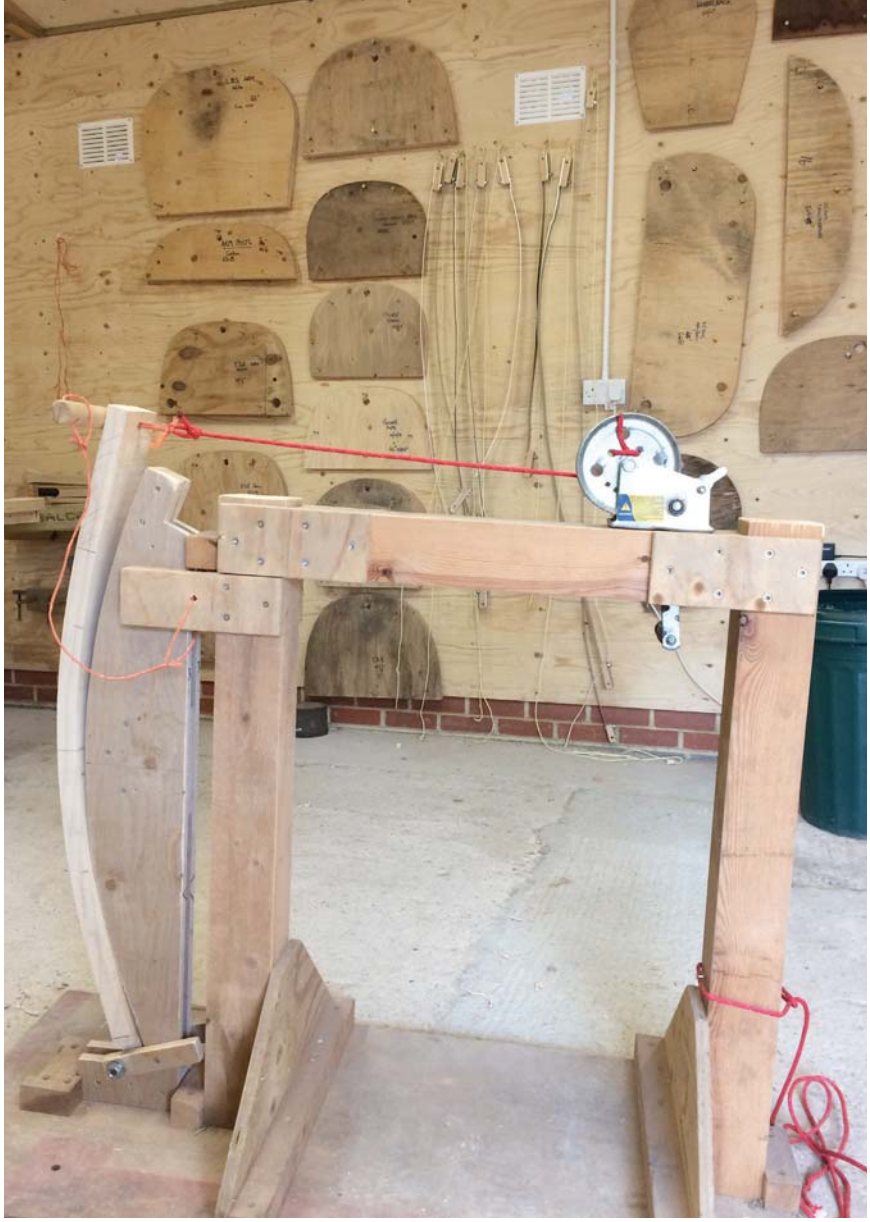
bend successfully. Otherwise, the wood should not be dry. In my experience you can cut down an oak tree and bend the wood five minutes later, but ash does not like that. Ash bends better when air dried. I store my ash for bending as 1¼in thick boards under cover, but in an open-fronted shed. The moisture content stabilises at around 20% and the wool will remain bendable for years.

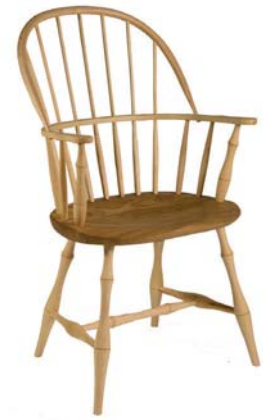
Almost any material can be used to make a former. I use 18mm plywood. Make the former to exactly the shape that you need the bent piece to be. Do not worry about spring-back as you might for laminating. Once the wood has been bent it needs to be held in that shape until it is dry, usually with a clamp or by tying the ends together with string. In fact steam bent wood is never actually fixed. As you dry the bent piece the bend tightens up so that when it is dry the string will become loose, or the clamp may drop off – this is a good indication that it is dry. Conversely if the bend becomes damp then it will open up again!

There is a rule of thumb that has caused me no end of trouble, that you should steam the wood for one hour for every inch of thickness. Ignore this maxim. For bending air-dried ash my starting point would be to steam for 12-15 minutes per square inch of cross-section. If the wood is fast grown and dense then give it more and less it slow grown. Also as the cross-section increases over 1sq.in then slowly increase the time per square inch.

The length of time to steam the wood is one of judgement rather than science. If the wood is fast grown then it will be far more tolerant of over-steaming, while if it is slow grown the timing will be far more critical. Whatever you do, I would try to steam for the shortest possible time. Steam bending can be a most frustrating experience, but if you get the basic ingredients right it is incredibly rewarding and quick. I wish you luck!

Details *Visit thewindsorworkshop.co.uk for details of James's courses and tools.*





James Mursell's crest-bending jig (above left), and the rocker bending jig (above). The chairs he makes himself and puts on courses include a double bow Windsor (left), and he makes an sells travishers (above), which are also available in kit form. Fast-grown ash (on left, below) is easier to bend the slow-grown ash (on right, below)