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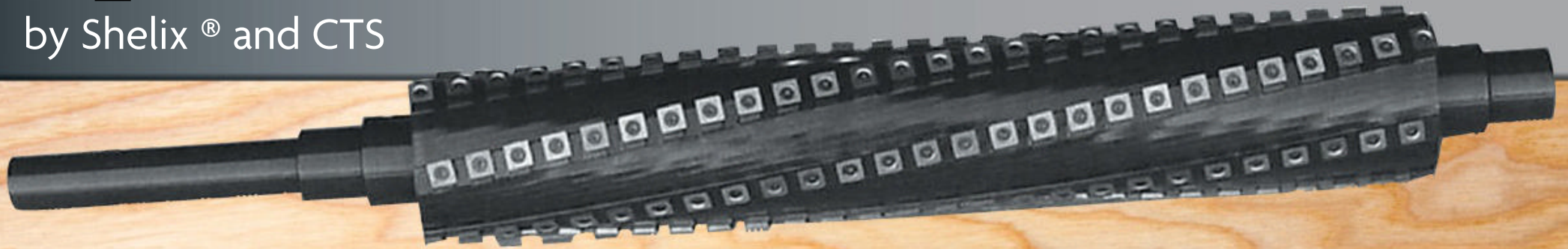
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**WOOD
CRAFT
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contents

No. 173

January 2023



52

Departments

from our readers

Tips & Techniques..... 6

what's new

Boys' Toys, Books and Gear.....12

Apron squares & levels, Fiskars carpenter's knife & scissors, Hafco morticing machine & *Chip Carving*.

all about

Steam Bent Boxes.....16

woodwork techniques

Quick & Easy Construction 20

Hand Sawing Techniques 24

tips from our workshop

Workshop Notebook & Short Cuts ... 59

details of craftsmanship

Coppice or Pollard 66

Q&A

Hinging Heavy Doors..... 72

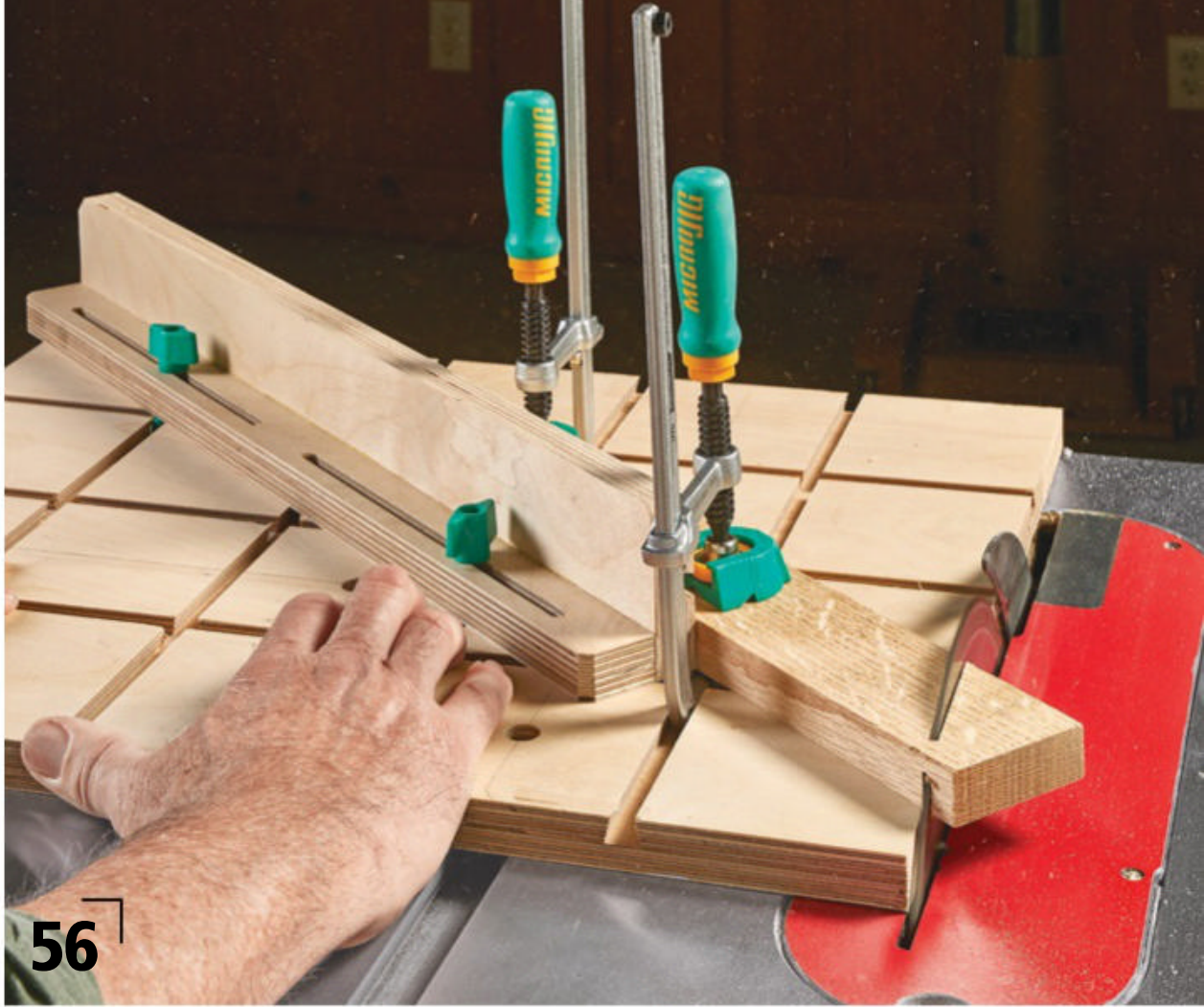
competition

Tiny Treasures DoveTails.....74

Subscribe & Win 68

Sources 73

Final Details..... 75



56



30



36



60



42

Projects

weekend project

Square Chip Carving 30

Carving the sampler is just the start.

designer series project

Small-Scale Home Office 36

Working from home is an option for some.

heirloom project

Arts & Crafts Chest of Drawers and Mirror 42

The next parts of the bedroom suite.

workshop project

ZeroPlay 360 Sled Kit 56

Locking it down with ease.

woodturning

Rustic Beaded Box 60

What a clever use of a balloon!



Go to www.australianwoodsmith.com.au and follow the prompts to register. Each week you'll receive a new e-tip directly to your inbox. It's free, but don't worry, we won't bombard you with advertising or pass your details on to anyone else. We just hope you'll tell your friends about *Australian Woodsmith*.



from the editor Sawdust

The highlight of the last couple of months has been a trip to Vancouver Island BC and spending time with a clever Canadian craftsman named John Noble. John and I did

a teacher exchange twenty years ago. His family moved to Sydney, lived in our house and learnt to surf. We moved to Canada, lived in his Nanaimo home and learnt to ski. Of course, I took over his school workshop and John took over mine. It was a fruitful exchange that introduced me to the magic of dado blades and John to an amazing variety of Australian hardwoods. The jigs John built in my workshop and those I built in his are still being used. My kids got Canadian accents and I got to sail *The Inside Passage*. Sailing is my second most favourite thing to do after woodwork.

In this issue you can read about the trip north to Haida Gwaii and the unique method the First Nations people of the west coast of BC and the USA developed to bend planks of wood into watertight boxes to both store food and goods, but also to use as mortuary boxes. Also, you can read about how the Haida in the North Pacific and the Māori from the south developed the same method for making oceangoing canoes. Amazing that the Māori and the Haida both used jade and obsidian to make chisels, axes and adze-like tools. And that they both used fire to remove the bulk of the waste and hot rocks and water to make the craft pliable so it could be widened. All without the internet! Those guys were insightful, they worked hard and knew what they were doing.

Happy Woodworking!

Chris

Chris Clark, Editor

Australian Woodsmith acknowledges the Cammeraygal people, Traditional Custodians of the land on which this publication is produced, and pay our respects to their Elders past and present. We extend that respect to all Aboriginal and Torres Strait Islander peoples today.



This symbol lets you know there's information online at: www.australianwoodsmith.com.au. There you'll see bonus cutting diagrams, articles on techniques, jigs and a lot more. If you don't have access to the internet, contact us on (02) 9439 1955.



Tips & Techniques

THREADED KNOB RISER

I loved the threaded knobs featured in *Australian Woodsmith* tips so much that I had to make some for myself. I decided to make them as part of a set of hold-down clamps, but I did make a small change. As you can see in the photos at right and above, I created a riser under the knob to give my fingers more room when using it.

After making the hold-down, I made a riser from a 25mm dowel. I drilled a hole to accept the coach bolt and made a recess in the threaded knob for a T-nut. The coach bolt feeds up through the riser and into the bolt. To ensure the riser wouldn't slip around, I glued it securely to the knob.

Jim Fox



▲ These knobs follow a similar style to the one above, however the riser gives it a little extra wiggle room.



Riser

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SAFETY IN THE WORKSHOP

Safety devices, such as riving knives, guards on table saws and guards over router bits have been deliberately left out of the line drawings in *Australian Woodsmith* projects in order to make them easier to follow. It goes without saying that where safety devices have been supplied by the manufacturers you should use them. We encourage the use of push sticks as good work practice.

Exercise vigilance and the greatest of care when using power tools, whether stationary or portable. Keep all your tools sharp and well maintained. Wear protective eyewear, a dust mask and a hearing protector when appropriate. By limiting distractions and developing safe work practices you will go a long way to avoiding workshop accidents. So, work safe fellow woodworkers. -Editor



PLANE HANGER

I decided one day that I wanted my planes accessible from a rack, alongside my chisels. Here was my solution: plane hangers.

I started with a dowel that was larger in diameter than the width of the slot on my rack. From there, I headed to the

drill press to bore a few holes, then to the mitre saw to cut these hangers free. Next I fed a length of cord through the hole and back to make a loop, then I cut it off and knotted it to complete the hanger.

Lewis Peters

NEWS FLASH!



GREAT NEWS!

Australian Woodsmith will now be published 8 times per year.

If you are a subscriber, you will still receive the same number of issues that you paid for.

We also now have online access to our back issues - go to page 68 for details.



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QUICK TIPS



NO DRIFT BANDSAW

When I tried to take the drift out my bandsaw I had a eureka moment. I snapped a 150mm ruler to a rare-earth magnet, then to the blade. The ruler exaggerated the alignment of the blade, helping me to adjust the tracking and make sure the blade was parallel to the mitre slot.

Antonio Torres

DRILL GUIDE

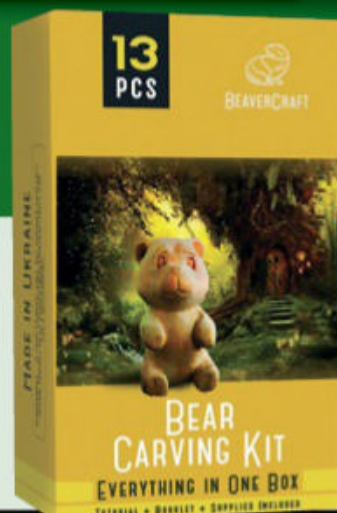
I came up with this way of drilling fool-proof pin holes. By attaching a cleat to one side of a small piece of pegboard, I had an instant drilling guide. After drilling the first hole, I used a dowel as a spacer, then drilled the rest of the holes using the pegboard as a guide.

Quinten Long



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CIRCULAR SAW CROSSCUT JIG

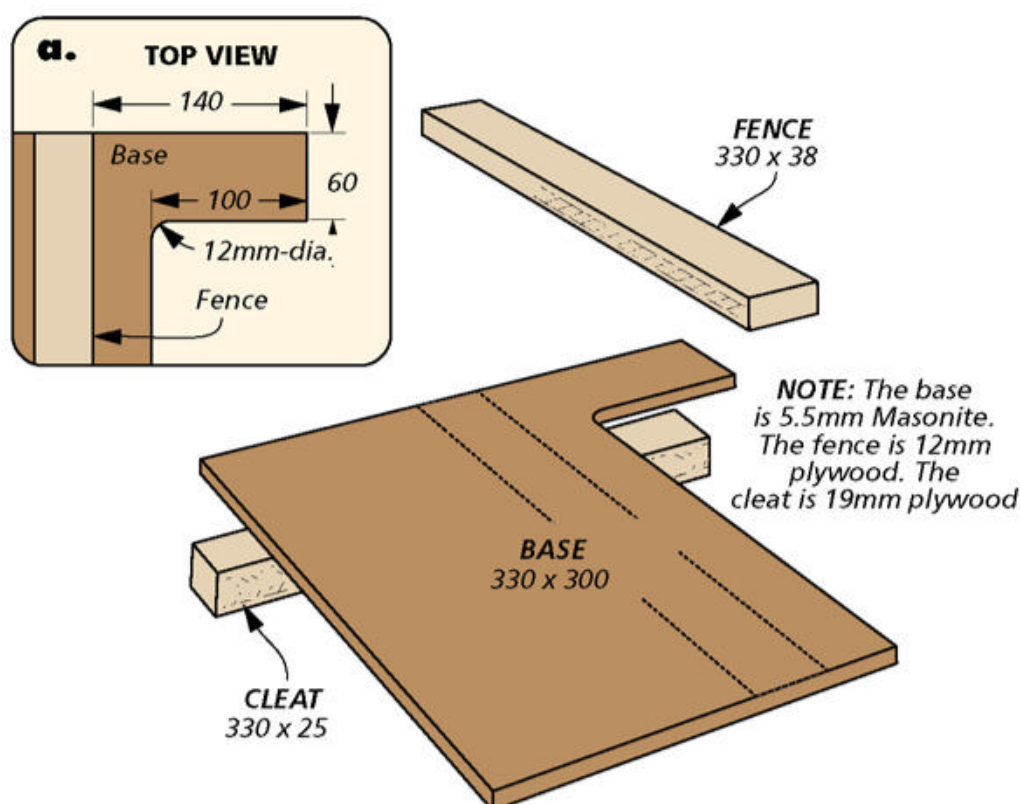
When making a crosscut with a circular saw, I always use a jig to ensure clean, square cuts. The one shown here is a combination of Masonite and plywood. The dimensions are listed at right, but I recommend leaving the Masonite extra wide to begin with. Use your circular saw to cut the jig to final width. This creates a reference edge you can use to align your cuts.

After marking your layout line on the workpiece it's a simple matter to make a clean, square cut (photos above).

William Faris



▲ Lay out the location of the cut, then set the jig over the piece and align the edge of the base to the layout line.



▲ Hold the jig firmly in place and run your circular saw across. The jig will ensure the cut stays straight and square.

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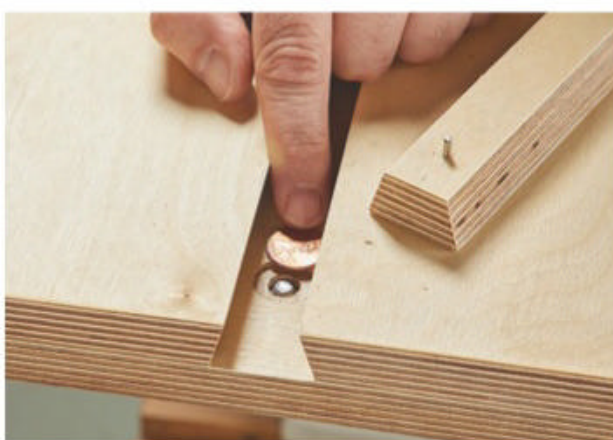
BANDSAW CIRCLE JIG

All you need to cut a circle on the bandsaw is a piece of plywood with a nail driven in to act as a pivot. While simple, with just a little work you can make something more versatile. This jig is adjustable and easy to attach to your bandsaw.

The jig is made of two base pieces bevel ripped apart to form a tongue. The base pieces attach to a backboard, holding the tongue between them while still allowing it to slide. The sliding tongue has a nail driven in one end and trimmed to act as a pivot point. To adjust the pivot, move the tongue and lock it in place by tightening the thumb screw in the backboard.

The jig is held to the table with a pair of turnbuckles and blocks. To use the jig, mount it on your bandsaw with the pivot nail aligned to the front of the blade. Adjust the tongue so the distance from the blade to the centrepoint of the nail matches the radius of your piece. Lock the tongue in place and you're ready to cut.

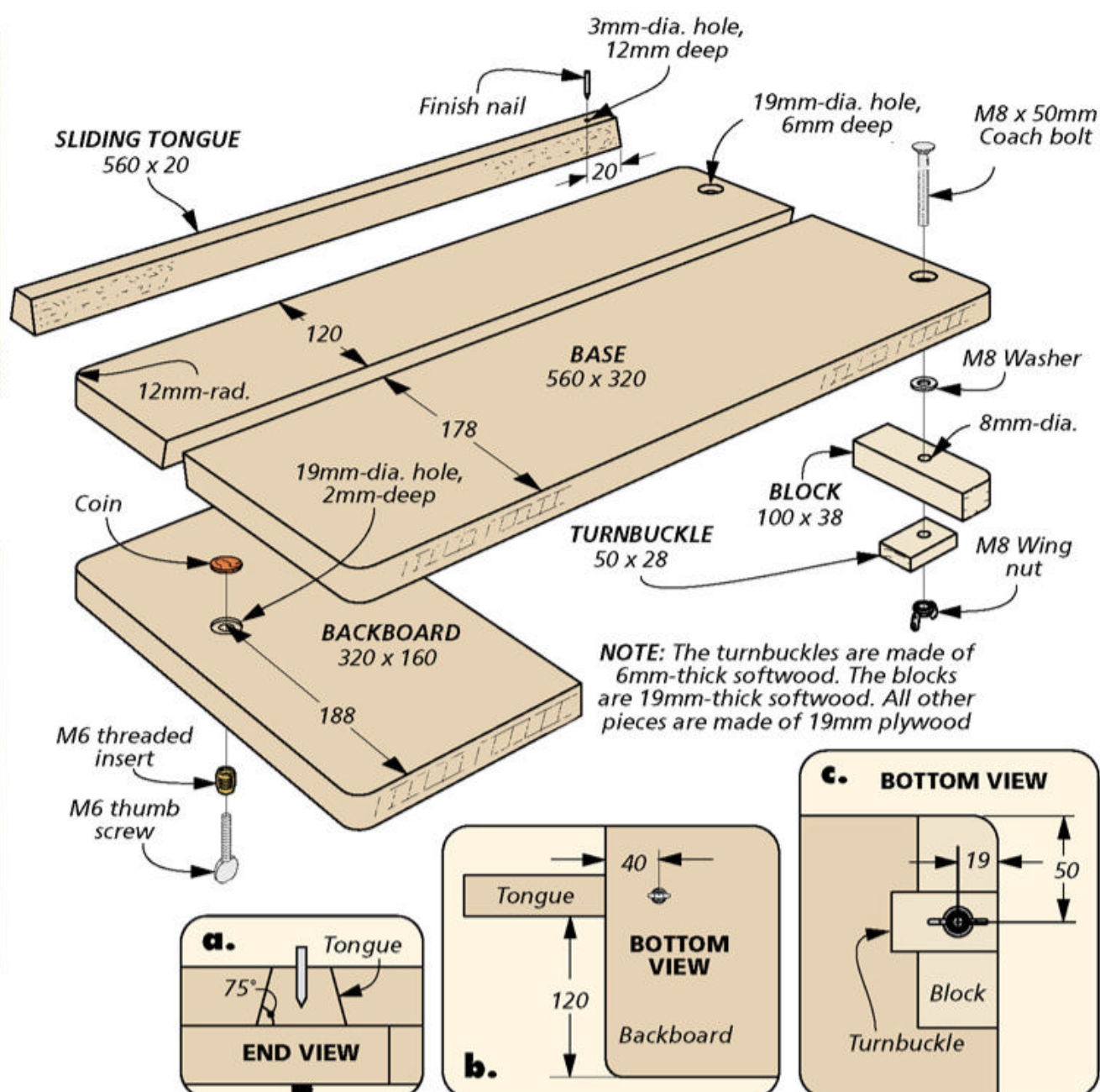
Magnus Cline



- ▲ A counterbored hole allows a coin to act as a pressure plate against the tongue.



- ▲ Turnbuckles make this jig easy to attach to and remove from your band-saw table.



Next issue of *Australian Woodsmith* on sale 19th January 2023 - Issue 174



In our next issue we detail how to cut bridle joints on a table saw and how to make a jig to make it easier. The focus woodworking technique is installing skirting boards and cutting the cope to create a seamless joint in challenging corners. Our weekend project is a sea chest that can be used as a toybox to store tools (grown up toys). The designer project is a valet chair where you can hang your coat, store your boot polish and even sit on in the bedroom. The heirloom project is the last piece of the Arts & Crafts bedroom suite: a bedside table. In keeping with the focus on cutting copes, our workshop project is a coping saw made with laminates of aluminium and ash and crafted with standard woodworking tools. As usual we feature clever tips and techniques from our generous readers.



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CHIP CARVING

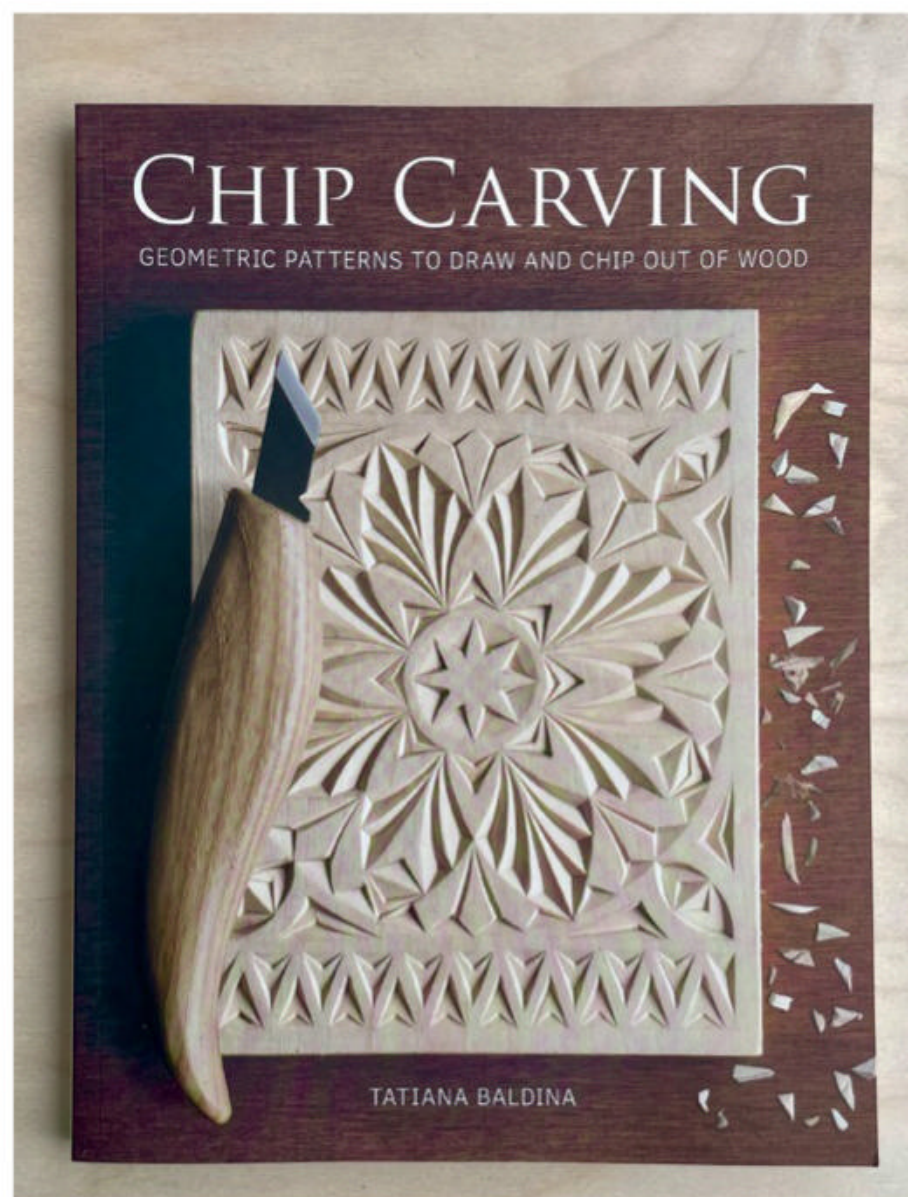
Our weekend project in this issue is a chip carving exercise that will open the doors to a very rewarding and contemplative craft. Tatiana Baldina has distilled her deep fascination with chip carving into an encyclopaedic 175-page tome. The book itself takes you on a journey through 14 classic chip carving patterns, each one more complex than the one before, building skills and confidence.

The first chapter introduces you to a simple and clever method of honing your blade so it is always sharp. It consists of a small sheet of glass with four strips of abrasive glued down on the plate edges. Like all carving, you never want to lose the geometry of the cutting edge, this is done by constant honing, as soon as the edge feels dull you hone it!

The second chapter has you enlarging a sampler from the index and then developing your muscle memory as you slice chips away and practise your honing skills.

The index itself is a treasure trove of templates that you can use to embellish whatever it is that you carve. Pattern 1 is a traditional triangle chip cut and has you using a mechanical pencil and a compass to lay out your design. The journey continues with petals, sharp corners, flower heads, asymmetrical carving etc, until you get to the

final sunflower challenge. Tatiana herself creates a new pattern each day and has so far carved more than 1000 unique designs. *Chip Carving, Geometric Patterns to Draw and Chip out of Wood* is bound to become a classic textbook in the art of chip carving. Published by GMC Books (booktopia.com.au).



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HAFCO WOODMASTER M16 CHISEL MORTICE

Chisel morticing machines are robustly made and are designed to quickly remove waste in a mortice. A hollow square chisel accommodates a matching auger that drills a round hole while the blades of the chisel shear the sides square. One mistake a novice makes with a morticing machine is that they are often too timid to take advantage of the leverage the driving handle gives you. It is long so you can lean into it and stab away at the stock (imagine hitting a mortice chisel with a mallet). The second mistake is, once the first square mortice is made, best practice is to overlap the following cuts to reduce friction. When it comes to friction I place a tea-light candle nearby so I can lubricate the cutting edge after a couple of cuts.

This Hafco morticing machine has a small footprint but still packs a powerful punch. As you can see, the table slides on the X and Y axis, giving you the capacity to cut 165mm-long mortices in stock up to 125mm wide.

Eagle eyes will notice the stops on the stem and to the right and left of the table. These allow you to set up the machine for repetitive work. The M16 in the name relates to the maximum chisel size of $\frac{5}{8}$ " (16mm). A set of five mortice chisels (CMB-5) should also be purchased to complement the 9.5mm chisel that

comes standard with the machine. Weighing in at 45kg, this cast iron wonder needs to be bolted down in the middle of a bench and complemented with some outrigger supports so long stock can be processed with ease.

The large hand wheel on the 125mm-wide vice is angled to lock down the stock while it is machined. If you are making chair or table legs you can match them perfectly by sitting them side-by-side and machining the mortices in the one sitting.

Lots of thought has gone into the design and manufacture of this little beast. There is a gas strut that connects the driving head to the column. This strut returns the chisel to its start position so you can then tweak the cross slide and make another cut.

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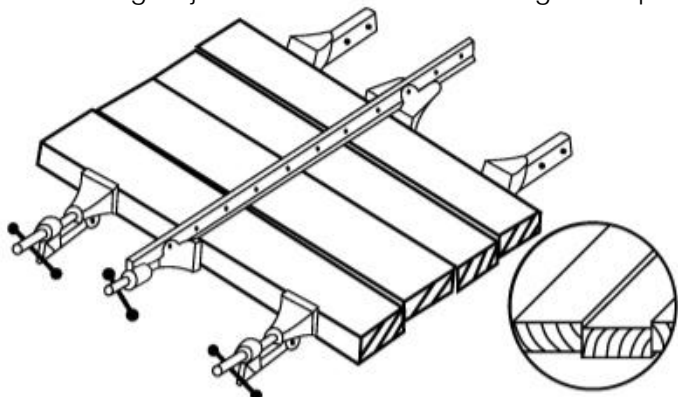
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FISKARS CARPENTER'S KNIFE AND SCISSORS

The new Fiskars carpenter's knife is an upgrade of a traditional baton chisel. As you can see, the scabbard incorporates a knife sharpener that keeps the long blade keen each time it is withdrawn. Baton chisels are designed to be struck with a hammer or a mallet but can also be used as a knife. The pommel on the end of the handle is shatterproof and is connected directly to the stainless-steel blade that runs through the handle. The top edge of the blade is flat, allowing it to be struck and driven home. Baton chisels are meant to be worn on a belt and are robustly built to survive a hard day's work slicing and dicing cables as well as trimming joints.

The Fiskars Pro scissors are really heavy-duty stainless-steel shears. The curved design of the serrated cutting edge not only gives 30% more power, it also allows the blade to efficiently cut all the way to the tip of the blade. It is a mistake to borrow the scissors from the kitchen and use them in the workshop. These scissors are designed to cut through the toughest of materials and are bound to put a smile on your dial. Fiskars has been making blades

since 1649. Taking tools back to the drawing board and making them the best they can possibly be is one reason why this Finnish company is the oldest in Scandinavia. Fiskars tools can be found at Bunnings (bunnings.com.au).



APRON SQUARES & LEVELS

The latest addition to my apron pocket is a cute Empire spirit level and a 45mm Penguin square. I couldn't resist buying both the 90mm and the 45mm squares last time I visited Japanese Tools Australia. The 45mm square is perfect for setting out dovetails and tenon joints, plus checking to make sure the table saw blade is perfectly vertical. It sits comfortably in my apron pocket and is so light I hardly notice it.

The 90mm square is also excellent, however it is just that tiny bit too big for the apron pocket and now swings on the shadow board (the hole on the rule seems made for a screw head to pivot off). Most of my end grain marking is on stock with a maximum thickness of 32mm. The brass butt of the square registers easily against boards and can be held in place with just single-handed thumb pressure.

The Empire spirit level caught my eye last time I walked the aisles of Bunnings. It is perfect for setting the table of the pedestal drill horizontal and making sure that the cross slide on the table saw is set square. It is also small enough to tuck into a box and help correct angles so the box sets at 90°. Apron appropriate tools earn their stripes by being handy, they need to be accurate, reliable, light and able to multi-task. These two make a good team and are priced right. Available at Japanese Tools Australia (japanesetools.com.au).



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Steam Bent Boxes

The First Nations peoples of the Canadian North Pacific have developed a unique way of folding boxes out of planks of cedar.

Haida Gwaii is an island group in the north pacific 60 nautical miles to the west of the Canadian mainland. The shallow Hecate Strait that runs between the Haida Gwaii and British Columbia is dangerous to navigate and required the Haida who live in the archipelago to develop oceangoing canoes that could cut through the waves and sharp oars that could slice through kelp beds.

The Haida became experts in the craft of building canoes and developed a reputation for being fierce raiders who pillaged coastal communities to the north and the south.



▲ Waterproof steam-bent boxes were used to store all manner of things. Some became mortuary boxes.



CANOES

All along the coast of Western Canada (wherever coastal red cedars grew) old growth cedars were felled in winter when the sap was dormant and then carved out with the use of fire, axes and the careful application of an adze, into huge canoes.

Fire was used to burn away the bulk of the inside material. When the hull was carved to the correct thickness it was filled with water. Very hot stones were then added to the water, heating it and making the hull pliable. Thwarts were then inserted to open the hull to produce an oceangoing canoe that could transport up to twenty male and female warriors and their provisions.

It was not only the Haida who designed and built oceangoing canoes. The Heiltsuk and other First Nations groups who needed access to the ocean also developed their own canoes.

Trade routes to the interior allowed the First Nations peoples from the Inside Passage to trade oolichan (high calorie preserved fish grease) and other goods for jade and obsidian. These precious stones were then used to make spear points as well as chisel, axe and adze heads.

The cedar trees not only supplied the trunks for the canoes to be fashioned from, they also supplied fibrous bark for rope making and a pliable cambium layer for the weaving of hats, baskets and waterproof cloaks.

STEAM-BENT BOXES

Somewhere in the mists of time a clever Coastal First Nations craftsman applied his mind to the challenge of making a square waterproof cauldron for cooking soup and storing food. A red cedar plank (hewn by hand from a log) was cleverly carved with obsidian or



- ▲ In the past obsidian and jade would have been used as the cutting edge, in this case it is hardened steel.

jade tools so it could fold. The grooves were steamed until the thin membrane became pliable and then folded like origami to form a box.

The fibrous bark of the cedar would have been woven into yarn to lock the box shape closed while the timber cooled. The rebated edge (and a base) was then locked in position with wooden pins.

Fish, herbs and water would then be added to the cauldron before hot rocks were added to cook the soup and preserve the fish.

These waterproof boxes preserved the abundant food collected in summer and autumn (most salmon spawn in autumn) and allowed the First Nations communities to survive through the cold and wet winters. Steam-bent boxes were made in a variety of sizes. Larger boxes were decorated with family motifs and used to store cloaks and other important regalia. Some boxes were used as mortuary boxes and placed reverently onto the top of totem poles.

It is interesting to note that the trees along the Inside Passage are mostly softwoods. They don't burn hot so are not able to be used to fire a kiln and create pottery. Clay beds can be found in the regions; however, it could not be fired to form ceramics in the way other cultures could, therefore the development of a steam-bent box was not only a necessity, it was pure genius!

WESTERN RED CEDAR

The hero of the story is the mighty western red cedar. It is easily carved and is really the backbone of Inside Passage First Nations cultures. It fed them (via steam-bent boxes), kept them dry and allowed them to navigate the waters as well as giving them a canvas to carve their stories on.



- ▲ The western red cedar that grew all along the Inside Passage were huge. This one is on Moresby island.



- ▲ A Haida canoe high and dry on the shore just outside the Haida Gwaii Museum on Graham Island. The mighty bow allows the canoe to navigate through heavy seas.



▲ Tom Kero's modern variation on a traditional woodworking technique. Very clever indeed.

BELLA BELLA

In 2017 I had the pleasure of visiting Bella Bella Community School Museum and got to tour the woodwork rooms. The steam-bent box above was sitting on the table saw waiting to be finished. It was summer break so the kids and the teacher were off campus. I took photographs of the boxes and then filed them away, hoping one day to chat with the teacher and find out how he replicated the old craft with modern tools. We then donned our wet weather gear and made the 16-hour crossing of Hecate Strait to Rose Harbour at the bottom of the Haida Gwaii archipelago.

The trip up the coast visiting the abandoned villages and talking to the Watchmen who interpreted them to us was a profound experience.



▲ Bella Bella Community School is doing an excellent job preparing young citizens to know and celebrate Heiltsuk culture. The eagle motif on the building is stunning.

MOA

When international travel opened up again this year, I was keen to return to Canada and continue sailing the Inside Passage.

In Vancouver we spent a day visiting the Museum of Anthropology (MOA) at the University of British Columbia and were awestruck by the steam-bent boxes on display. For the first time I got to see how the clever kerf joint was cut. In no time I was on the phone to Bella Bella Community School and got to chat with Tom Kero.

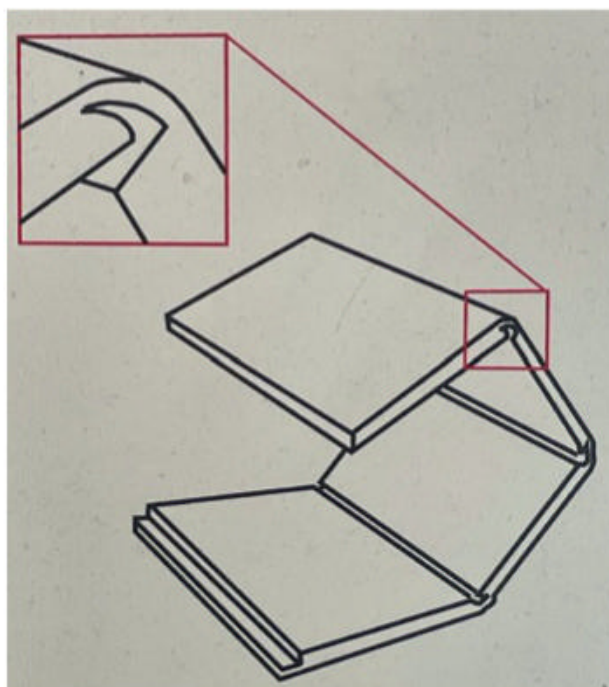
Tom explained that the steam-bent box I photographed was similar (but larger) than the 60 made by the school to reinter the bones of Heiltsuk ancestors that had languished in storage at

Simon Fraser University. In the 1970s and 80s a Simon Fraser University archaeological dig at an ancient Heiltsuk village site at Namu had uncovered the bones. The University was approached by the Heiltsuk elders and was keen to return the bones to Namu so they could be respectfully reinterred. One of the benefits of the dig was proof that the Heiltsuk had lived in the region for more than 4000 years. Proving their right to own and control their unceded lands for future generations.

Tom pointed out that there is a broad cultural overlap in dances, songs and technology between the Heiltsuk, Haida, Haisla, Kwa'wa'kwa, Git'ksan and other coastal peoples who call the Inside Passage home.



▲ An icon of coastal craftsmanship. The folded kerf joint can clearly be seen in this box.



▲ The diagram from the MOA exhibition that finally communicated the clever techniques.



▲ The rebate and butt joint locks the box together and incorporates wooden pins.



▲ The steaming jig set up and ready for action. The piped steam was focused on the kerf joint.



▲ Much to my surprise I noticed that the Bella Bella workshop was equipped with an Australian-made VICMARC lathe. My Nanaimo workshop had a bank of Woodfast lathes.

MODERN MORTUARY BOXES

Tom explained to me that returning the bones to the ancient village of Namu took a couple of years to achieve and that the bones were finally laid to rest with deep feelings in 2011.

The first step was for the then woodwork teacher Chris Williamson to get his senior woodwork class to make a modern version of the cedar mortuary box. Traditionally a body would be folded into a box and then placed on a totem pole or some other place of reverence. The bones that were recovered from the dig were of more than 160 individuals, mostly not complete skeletons. The box design that was settled on was one that was 300mm x 300mm square. In order to fit larger bones some boxes were made 600mm high, however most of the ancient bones fitted neatly into 300mm-tall boxes.

Once the design was resolved and trial joints tweaked it was time to machine locally-milled western red cedar into 16mm-thick boards to start mass producing the steam-bent boxes.

Chris Williamson built a steamer from an old keg, used a gas ring to boil the water and PVC tubing to channel the steam to the joints. It took the senior class a whole year to make the 60 boxes and then another year for Tom Kero's art class to silkscreen print the boxes. This process saw the class design and make wolf, killer whale, eagle and raven

silkscreens so these cultural motifs could be printed on the boxes. Bringing their ancestors home to Namu brought the community together and resurrected the old craft of making bentwood boxes.

TOM KERO

In 2011 Chris Williamson moved on from Bella Bella Community School and Tom took over the running of the woodwork room. A senior student of his decided to make an enlarged version of a steam-bent box for his graduation project. Jordan Wilson and Tom got together and built a larger version of the steamer used way back in 2009.

They then put their heads together and created a router jig to cut 12mm-deep trenches with a 12.7mm bit in 16mm-thick stock. The jig needed to accurately cut trenches 344mm apart. Another jig was then made that used a dovetail bit to undercut the trench so that it could fold into itself and form a rounded 90° angle.

The next step was to design the steamer so it could accept 400mm-wide boards and focus the steam on the 4mm base of the trenches. As you can see from the photo top right, this was done with PVC tubing and some 90 x 45mm framing stock that had a venting groove machined into it. The steam that was created in the keg made its way through the PVC pipes up to the three grooved frame sections. It then soaked into the trenches

and softened the 4mm web that was left in the board. After an hour of steaming the web was pliable enough to be bent without breaking and was then strapped in place until it set square. Jordan presented the box and the process he used to create it as his graduating exercise.

Bentwood boxes deserve to be better known in the wider world. They are novel to the North Pacific and have deep cultural significance for the First Nations peoples in that region. Bella Bella and the school are just awesome! Respecting ancestors and keeping a craft alive is a world heritage issue. **W**



▲ A modern variation on a cedar bentwood box. This laser embossed box measures 90 x 90 x 60mm.

Quick & Easy Construction

Building furniture breaks down into a series of components or mini-projects. Each of these requires their own set of skills and intricacies. In casework, one of those projects within a project is making frame and panel assemblies. These can be used for the main structure of the case as well as to make doors or even assemble large drawer fronts.

There are several approaches you can take to make these. One of our favourites uses stub tenon and groove joints to connect the stiles and rails. When combined with a plywood panel, the result is a strong, rigid construction that is also straightforward to make. (The dresser shown on page 42 shows a solid wood version of this method.)

In this article, I want to dig into the details of this construction, then offer a streamlined method to create it.

JOINERY OVERVIEW. In a stub tenon and groove assembly, a groove is cut on the inside edges of all the frame pieces. This does double duty. Not only does the groove house the panel, it also forms a shallow mortise for anchoring the horizontal rails to the vertical stiles.

The ends of the rails have a short tenon that matches the width and depth of the grooves. You can see this in the upper example in the left margin. This connection seems like the focus of the joint and may come across as a little lacking strength-wise. However, that ignores the help provided by a plywood panel. Gluing

▲ A plywood spline (bottom) takes the place of an integrated stub tenon.

the panel in place ups the glue surface area significantly.

The point of all this is to say that it's the thickness of the plywood panel that drives the success of the joinery. The width of the grooves needs to match to the thickness of the plywood in order to create a strong glue joint. Once that's achieved, you size the stub tenon to match the panel thickness.

These two steps, cutting the groove and forming the stub tenon, can take some time (and a bunch of test cuts) to dial in.

It turns out, there's a way to eliminate the second step. Replace the tenon with a spline. You can see this in the lower example in the photo on the previous page. All you have to do is cut a few additional grooves. This also simplifies sizing the parts since you don't need to account for the tenon.

CUTTING GROOVES

The first step is forming the grooves in the frame pieces. I'll show this on the table saw. Attach a tall auxiliary fence to the rip fence. (You'll need this for an upcoming step.) You can cut the grooves with a combination blade, however a flat-topped rip blade cuts more efficiently and leaves a cleaner groove. A groove depth of 9 or 12mm offers good glue surface.

Position the rip fence so that the blade is slightly off centre from the thickness of your



▲ Cutting the grooves using a blade narrower than the thickness of the plywood allows you to create a snug fit and centre the groove without a lot of complication. A featherboard increases consistency and safety.

frame stock. My preference is to have the blade to the left of the centre. This way if the workpiece should drift away from the fence during a cut, the piece isn't spoiled because it will be cutting into the area where the groove is formed.

The blade is narrower than the plywood thickness. So to create a groove, you'll make two passes. But you don't adjust the fence. Make a pass, as shown in the photo above. Then flip the workpiece around and make a second cut. You'll see this

widens the groove and centres it.

Compare the groove to your plywood (left photo below). You should have to ease the panel into the groove — not loose, but not something you have to force, either. Adjust the rip fence in small increments since each adjustment is doubled.

Then run a groove on the inside edges of all the stiles and rails. Here's where things change up. Grab the rails and hold them on end and cut grooves across the ends, as shown below.



▲ Cut and test is the name of the game during the set-up. Use a piece of the plywood you'll use for the panel. You should feel slight resistance as the plywood slips into the groove.



▲ Cutting a groove across the ends of the rails creates a pocket for the spline. A backer board keeps the workpiece from wobbling during the cut.

SIZING THE PANELS

Odd as it may sound, cutting grooves stands as the only real “joinery” step. From here on, it’s just a matter of cutting some plywood pieces to size.

This begins with the panel. Rather than rely on plans, I go from the real life frame. The photo at right shows what I mean. Clamp the stiles and rails together in their final configuration. Then measure the distance between the bottoms of the grooves in the stiles. I like to cut the panel a hair narrower so that the stiles and rails meet tightly.

For the length of the panel, I measure the opening and add the combined depths of the grooves (minus a hair), as shown in Photo 1 below. If you were to put the panel in place, you’d notice the open pockets (mortises) that the splines fit into.



- ▲ Assembling the frame without glue offers a reality check for sizing both the plywood centre panel and the plywood splines. Cutting these a hair short provides space for glue and ensures a gap-free assembly.



- ▲ Measure the depth of the groove to help determine the size of the plywood panel as well as the splines.



- ▲ Rip a strip of plywood to create a blank for the splines. Make sure you don’t cut the blank too wide.



- ▲ Slip the panel into a rail and measure the length of the groove on the end. This gives you the length of the spline you need.



- ▲ Mark the length of the spline on the blank and cut each one free with a backsaw. This is a safe, easy way to cut small parts.



- ▲ Squeeze some glue into the groove of one stile. Then fit a pair of splines and the panel into place. The position of the splines should help you centre the panel.



- ▲ The rails come next. Add glue to the edge grooves as well as the short grooves on the ends. Work quickly so that the glue doesn't run out of the groove and create a mess.



- ▲ Add the remaining two splines and glue on the last stile. You should be able to close up the joints with hand pressure. Then check that the assembly is flat and square.



- ▲ A pair of clamps across the stile and rail connection keep these critical joints tight as the glue dries. Centre the clamping pressure to avoid bowing the frame and panel.

MAKING THE SPLINES

The splines begin as a narrow strip cut from some leftover plywood, as shown in Photo 2. The width of the strip measures slightly less than the mating grooves (inset above on facing page).

Photo 3 above shows how to determine the length of the splines by using the rail and panel as a gauge.

Cutting short pieces like this is best approached with a backsaw, as you can see in Photo 4. Don't worry if the spline is a little long. You can always trim it flush after assembling the frame.

ASSEMBLING THE DOOR

At this point, it's real easy to grab the glue bottle and head for your clamp rack. But it pays big rewards if you fit all the pieces together without glue. This lets you sniff out any trouble spots before it's too late — and messy.

START WITH A STILE. The photos on this page show my assembly method. It begins

with running a bead of glue into a groove in one of the stiles (Photo 1). Since you have a snug fit, you don't need a lot of glue.

Slip the panel into place and add a spline on either end. The splines help you centre the panel.

ADD RAILS. Apply glue to the grooves on the rails and quickly fit them to the splines and panel (Photo 2). Don't forget to add glue to the end grooves.

FINAL STILE. The remaining stile is all that's left, as shown in Photo 3. Press the joints home and lay the assembly flat on the bench.

A clamp across each rail is all that you need, as in Photo 4. Then measure across the middle to make sure the rails aren't bowing out. Then wait.

Substituting splines for stub tenons doesn't change the appearance of the finished product or its strength. But what it does do is allow you to get from a stack of parts to final assembly with a little more

confidence.

Plywood casework has the intrinsic advantage of the panels always being stable. The ply veneers have already been seasoned and then glued in opposing directions. The material is rock solid and will not expand or contract with changes in humidity. The dresser on page 42-50 uses solid oak panels split from a board. The advantage of using solid stock is that you can create bookmatched panels that can be striking as well as beautiful. The downside of using solid stock to build your panels is that it will change shape with changes in humidity.

That is why you should only pop a spot of glue on the centre top and bottom of a solid wood panel. The panel will be locked in place and will not rattle, however it can also expand when the humidity rises. If the full panel rim is glued in place, then it would eventually crack to relieve the pressures of expansion or contraction. **W**

Hand Sawing Techniques



Saws come in all shapes and sizes, varying in form and the intended use. From top to bottom: a panel saw, hand saw (with thumb-hole handle), tenon saw, carcass saw and a dovetail saw.

Whenever someone tells me they are getting more involved with hand tools they inevitably have a bunch of questions about hand planes and which ones to get. I usually disappoint them when I tell them to buy a jack plane and move on to getting saws. I consider hand sawing to be the most important skill to master and the path to the most enjoyment and success. Maybe it's the same thing when using hand tools to build your projects. After all, there is no better feeling than sliding together a dovetail or mortise and tenon right off the saw. It's also pretty fast when you don't have to finesse the joint with a chisel or a plane. Hence my focus on saws.

So the next logical question I get is "what saws do I need?" Really any "what tool do I need" answer is highly dependent on the type of work you do. Moreover how much of your work is hand tool related. I'm a nut who does everything by hand so I put a lot of emphasis on full-sized hand saws. But for those of the more hybrid bent, the answer could be more focused on back saws for joinery. Let's start with some definitions and get you started with just a few saws.

BACK SAWS

Back saws have, well, a back. That folded or grooved metal spine stiffens

the saw and makes it more precise for joinery cuts. It also limits how deeply the saw will cut, however. Back saws come in all shapes, sizes and tooth geometry. This article is not the place to dive into tooth geometry but I will warn you it is a rabbit hole filled with joy and long hours of boring your non-woodworking friends. For now let's just say that more teeth means a finer but slower cut. Dovetail saws have a lot of teeth while an aggressive tenon saw will have fewer teeth. The length of the saw plate and the depth under the back will also dictate the type of saw. But here again we are perched on the edge of that aforementioned rabbit hole. I'm going to skip all of the details and suggest that the first back saw you pick up is called a carcass saw. This is about 300mm long with 50-75mm under the back and pitched around 12-14 points per inch (ppi). It is the jack plane of back saws and will let you do just about anything well.

HAND SAWS

Saws without a back are just called hand saws. More specifically, a backless saw that is 600mm and longer is called generically a hand saw. Backless saws under 660mm down to about 450mm are actually called panel

saws. I make this point because I hear too many people refer to all backless saws as panel saws. The panel saw is a specific saw designed for panels that are already planed thinner. This saw makes finer, more precise cuts because it assumes some work has already been done to the board you are sawing. A good example is sawing the panel of a frame and panel door to final size to fit into the frame. I recommend one starts with a 660mm hand saw pitched at 8 ppi and filed crosscut. This will allow you to break down rough timber to length quickly to get it in the car at the timber yard or just to allow it to acclimate faster to your workshop when you bring it home. You can also rip with this saw, albeit a bit slower. The finer pitch will also function as that finer panel saw for those already dressed all round or D2s bought stock.

One point I will add is some will tell you to size the hand saw based on your height and arm length. Personally I don't believe in this and have found that everyone from 4'10" to 6'7" tall will find a 660mm hand saw to be most efficient in use. There will always be outliers, but there is also a reason Disston Saw Works made literally millions of 660mm (26") long saws.



▲ Ripping at a saw bench utilises the sawing knee to hold the work down. Keep your body in position so that the saw plate is lined up with your hand, elbow and shoulder to ensure an accurate cut.

▲ Poor sawing form, shown here, is not only uncomfortable to saw with, but also will lead to an inaccurate cut and sawing that will leave you exhausted.

#1 SAWING TIP. The first and only thing you need to remember to saw accurately and efficiently is that you want to create a straight line from the saw plate to your shoulder. One geometric plane from

point to point and the saw will do what it does best: saw a straight line. Sawing should not be physically demanding. Getting your breath and heart rate up means that something is binding or the saw is dull. Certainly this doesn't mean that ripping 150mm of hardwood won't tire you out, but normal sawing operations shouldn't be overly strenuous.

HAND SAWING TECHNIQUE. The ideal place to use your hand saw is on a low sawing bench. One that is set to about knee-cap height. This puts your torso over the top of the work when you kneel on the bench. If a saw bench isn't part of your workshop then sawing at a regular height workbench will work too but the grip changes.

RIPPING ON A SAW BENCH. Start by placing your timber on the bench, then kneel on it with your sawing hand knee. This holds the board in place. I highly recommend you do not clamp the board to the bench. The ability for the board to move around will tell you a lot about whether or not you are creating that straight line from saw to shoulder. A straight line won't move the board but if you are leaning one way or the other the board will want to move under your knee.

The saw is going to pass down along the opposite side of the bench from where you are standing or even possibly out in front of the bench. This is why you will often see a V-shaped notch in saw benches.

Now take a step forward with your standing leg. You will feel like your balance is too far forward but honestly this step moves your torso forward of your arm and allows it to move freely in that straight line. Take a few strokes with the saw here then step back again so your feet are next to one another or within a distance of 50mm and you will quickly feel the saw bind and start to make a lot of noise as it vibrates.

In this position, your elbow is bumping into your side and forced out and around pulling the saw through an arc rather than a straight line. In fact I keep scooting that standing leg forward until I hear the saw get quiet in the cut and you can actually feel the force required to push it decrease. The optimal angle of the saw is about 60° here and this step forward will facilitate that.

CROSS CUTTING ON A SAW BENCH. Here we do everything opposite of the rip cut. Kneel on the wood on your bench with your



▲ An alternative to kneeling on a saw bench is using your weight and sitting on the workpiece. I find this is easier on the back and makes long rip cuts much easier.



- ▲ A loose grip on the saw, body weight holding the workpiece down, and a properly sharpened and set saw are keys to getting a smooth, accurate and easy cut with a hand saw.



- ▲ At a workbench, the hand saw must be held differently. Using a two-handed overhand grip allows the saw to cut very aggressively, but also allows you to see where the saw is in relation to the work.

opposite knee and your saw hand side leg you stand on. We still step forward with that leg until the knee is touching the saw bench. This prevents the board from sliding towards you as you saw and binding the saw. It also positions your shoulders and body in the right alignment to again allow the arm to pass by without deviating from that magical straight line.

The other knee is the most common issue I see. The step forward feels like you are losing leverage and stepping back feels better, but I guarantee it will throw your cut out of plumb and possibly off your layout line on the face of the board. That step back will also lower the saw and make it cut slower whereas the knee up against the bench raises the saw to about 45° which is the optimal angle for crosscut teeth.

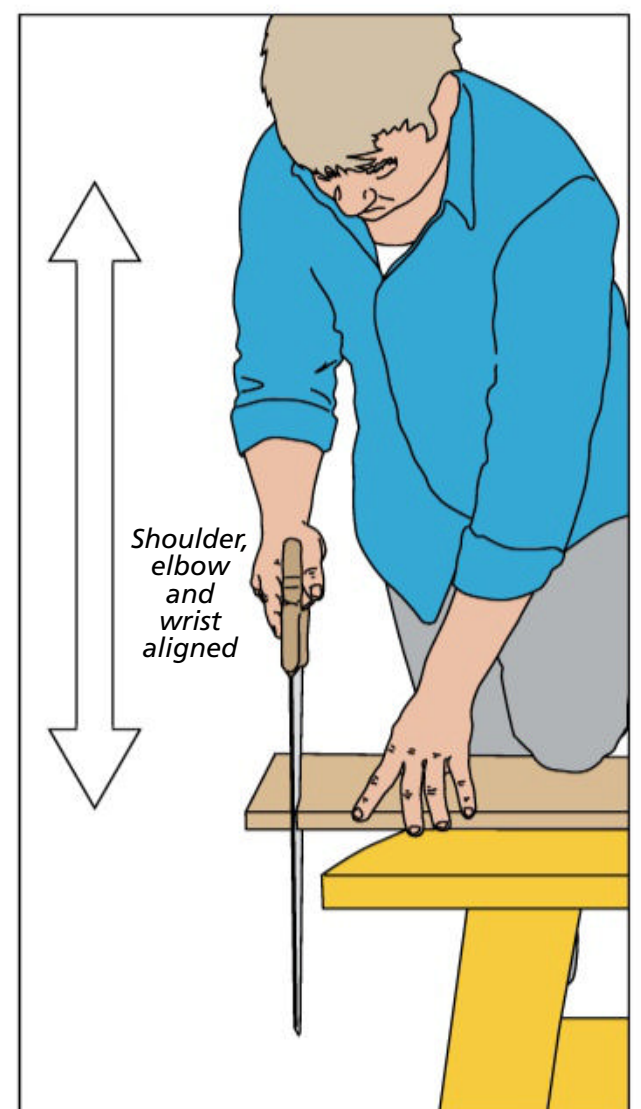
AT THE BENCH. Ripping and crosscutting at your workbench is done the same way. I secure the board to the top of the bench with a holdfast because now I can't rely on my own weight to hold the board in place. Place your sawing side hip right up against the bench and do your best to line up the kerf with the edge of the bench only allowing 25mm or so of

clearance. You start the cut with the traditional grip used at the saw bench but it will feel a bit awkward and you will have to drop the handle. Fortunately it is easier to start a cut and follow a line like this.

Once the cut is started, stand the saw up vertically and grasp the handle overhand with both hands. You can step back with both feet 50mm and very easily be able to see that your saw is standing plumb. From this position you have an aggressive sawing angle and a clear view of the saw in relation to your workpiece. Now your body is totally out of the way and you can let the saw do its thing. In many ways, this is the easier way to saw accurately.

The drawback is it is tiring because you are holding the saw out in front of you and you lose all leverage. You have to lift the saw up higher making your arms work and taking your back muscles completely out of the equation. It's accurate, but not sustainable for long periods of sawing.

In general with a hand saw, just relax. This is rough work in most cases that will be followed by a plane. If you deviate from the line a little, don't panic. You are not cutting joinery here.



Crosscut. Crosscutting can be accomplished by holding the work with your off knee, and keeping the saw aligned with your shoulder.



▲ At the bench, stepping back moves the torso out of the way, drops your centre of gravity and brings all of the wiggly parts into line creating a perfect line from saw to shoulder.

▲ Stepping too close to the bench with shoulders squared up naturally will push your sawing elbow outward and disrupt the perfect line from saw to shoulder.

BACK SAW TECHNIQUES

This work is done at the workbench either using a vice to hold the wood or up against the fence of a bench hook. Now we are still trying to make that straight line from saw plate to shoulder.

Here, you want a wide stance with your sawing leg back. Use your non-sawing hand and pinch your thumb and fore-

finger together along the line. Press the saw plate against those fingers (lower left photo). Notice as you pinch your fingers together or relax them they move the saw slightly left and right. This pinch can micro-adjust your saw right on your line while acting like a guide throughout the saw cut.

STARTING. Concentrate on the lower horn of

the saw handle. Pressure here takes weight off the toe of the saw and allows you to start the cut on a smooth push forward. None of those repeated back strokes that deform the wood and create problems for your saw tracking. Start on the push stroke. If the saw binds and sticks, press your palm into the lower horn more and relieve the weight from the saw toe. It's magic but with this idea, you can start even the coarsest pitched saw on a smooth push stroke.

Next resist the urge to run the saw's toothline parallel to the surface of the wood. This engages every tooth along the cut line making the work harder and increasing the chance the saw will skate out of the kerf. It also doesn't allow the sawdust to be removed from the kerf and the saw will essentially stop cutting.

Finally, focus on one line at a time. Joinery is not achieved just across the surface of the board but also through its thickness. A dovetail cut exactly on the angle line on the face of the board but out of square across the thickness will not fit together. Likewise with tenons. It won't work if you track the line across the end of the board but deviate along the edge creating a loose tenon cheek. To combat this, focus on one line at a time, as you see above.

DOVETAIL CUTS. For a tails-first dovetail, I start the cut with a smooth forward stroke



▲ Positioning the saw before making a cut is as easy as pinching your fingers together near your start point. By squeezing, you can finetune the position of the saw plate.



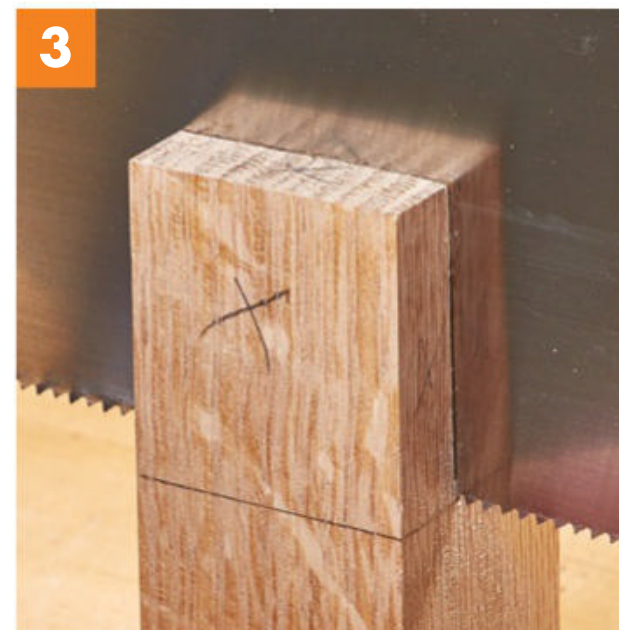
▲ Dropping the heel of the saw allows you to start the saw easier and steer the cut.



- ▲ A cut, such as sawing a tenon can be broken into three steps. First, saw down one line to define one edge of the tenon.



- ▲ Next, lift the heel of the saw and make the cut across the end grain, making sure to keep the saw along the line.



- ▲ Finally, create the tenon by continuing to saw down the far edge. The saw will naturally ride in the kerf made in step 1.

across the end of the board. My goal is to create a shallow kerf on my line on the end grain. With that established now I drop the handle and focus on the angled line on the face of the board. The kerf on the edge guides the saw keeping it square while my focus on the face steers down the dovetail. This is true many times over on longer tenons. Just saw one line at a time, multi-tasking is a myth unless your initials are IBM, so don't even try to track two lines at once.

PARTING TIPS

In conclusion let me say that you have to be able to see the line to saw to it. If you posi-

tion your body in a way that won't let you see the line, change it. Sawing is not set in motion with the initial seconds of a cut and you should always be micro-adjusting and steering the cut. You have to see the line to steer to it. Angles mean nothing to a hand saw. There is no bevel limit on a hand saw and no cut depth limit. So get it out of your head that dovetails are hard because of that angle. After all a 90° cut is still an angle.

Finally, wax is your friend. Keep a block of paraffin wax around and keep doodling smiley faces on your saw plate with it. That wax keeps the saw running smoothly with less effort.

This barely scrapes the surface of the things you need to know to saw well, but it puts you on the path to learn that stuff. If a cut is going wrong, stop and check the line from the saw to your shoulder. Keeping that foundation in place you will learn all the other stuff just by keeping at it. Practising with your saws will lead to huge rewards. The two photos below are good practice exercises and I bet 10-20 minutes of focused sawing will net you huge rewards. In fact, sometimes I warm up this way before I start on a project. Give it a shot and you will quickly realise how saws are the true MVPs in your workshop. **W**



- ▲ Marking lines across a workpiece and cutting them off is great crosscut practice.



- ▲ Practise dovetail cuts by marking several angled pin marks on a board and saw down each line, one after another.

Squares

In this extract from *Chip Carving: Geometric Patterns to Draw and Chip Out of Wood*, Tatiana Baldina provides a full guide to creating a dramatic twisting square pattern.



In this pattern there is no need to draw perpendicular and diagonal lines, since they are not needed here. The main motif of the pattern are triangles that form squares, twisting anticlockwise.

Drawing process

If you would prefer to transfer this pattern to the basswood board, use the template provided. Otherwise, if you prefer to draw the pattern directly onto the basswood board, follow the instructions below.

1 First, draw a square with 6cm sides.

2 Start marking the dots: first, 10mm on the left side of the square from the top left corner down to the left side of the square; second, 10mm from the bottom left corner to the right side, on the bottom side of the square; third, 10mm from the bottom right corner up, on the right side of the square; fourth, 10mm from the top right corner to the left side, on the bottom side of the square. All these steps – that is, the movement anticlockwise, only with different sizes – will need to be repeated several times.

3 Connect the resulting dots.

4 Next, on the resulting square, start to measure the following points: mark a dot 9mm from the top left corner down, on the left side of the previously drawn square.

5 Then repeat all the steps with this size on the other sides.

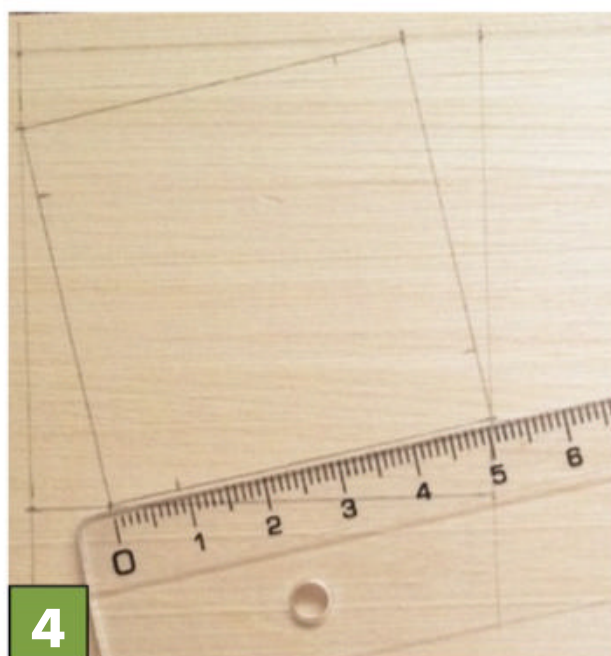
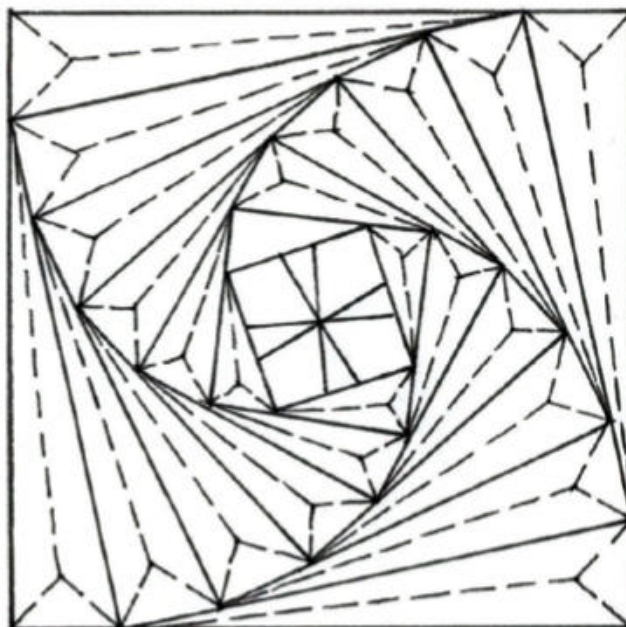
EQUIPMENT USED

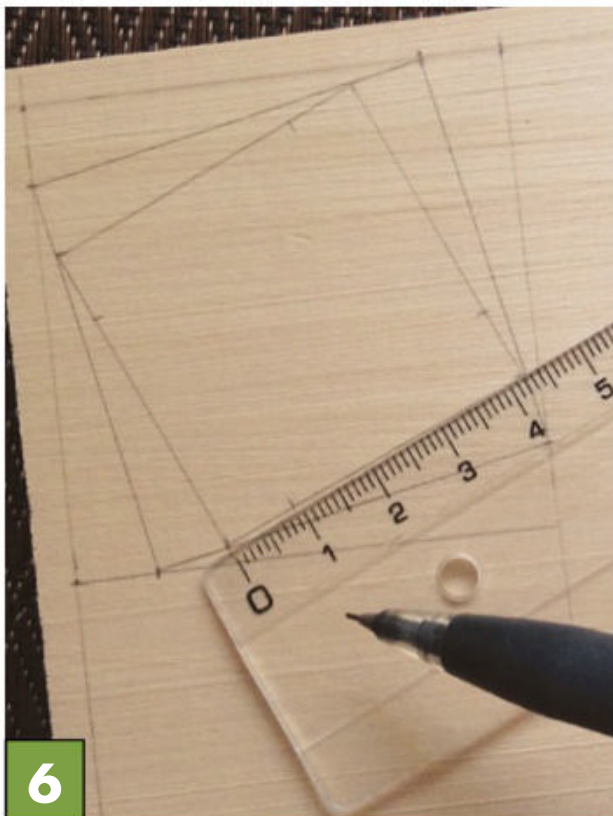
TOOLS

- 0.5mm mechanical pencil with H or HB lead
- Ruler
- Compass
- Skew knife
- Sandpaper or leather strips for sharpening

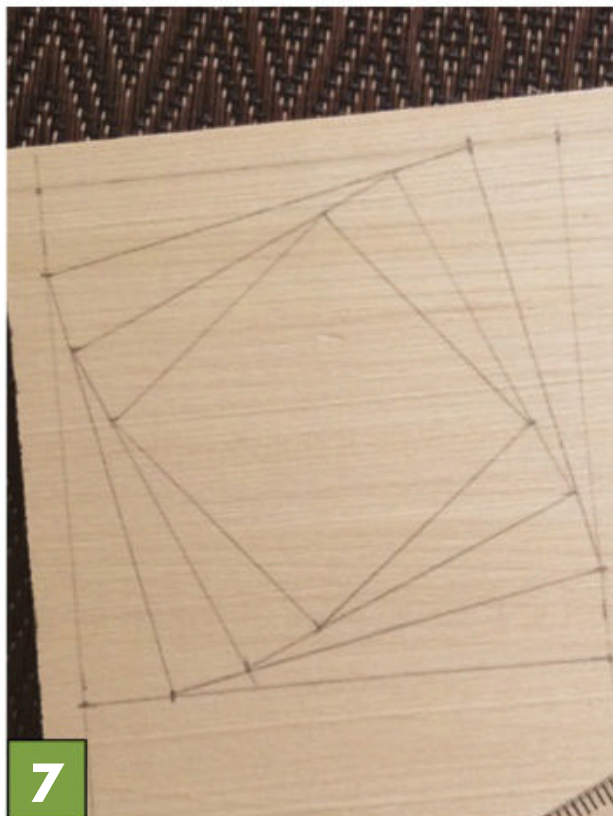
MATERIALS

- Basswood or Huon pine board (at least 100–120mm square and 15mm thick)





6



7

Drawing process

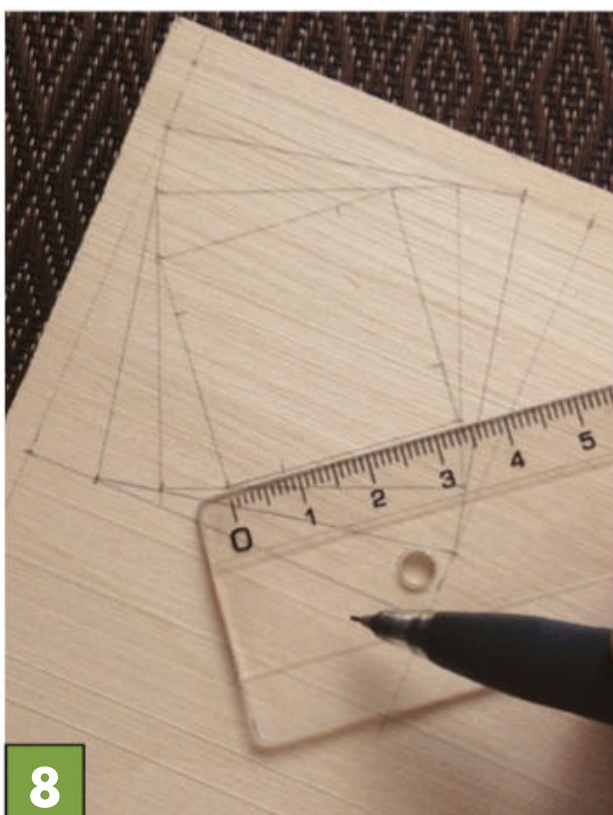
6 Three squares are now ready and you can begin the fourth. On the last square you drew, mark a dot 9mm starting from the top left corner down to its left side. Repeat all the steps on the other sides of the square.

7 Then connect the dots together. Now start the fifth square.

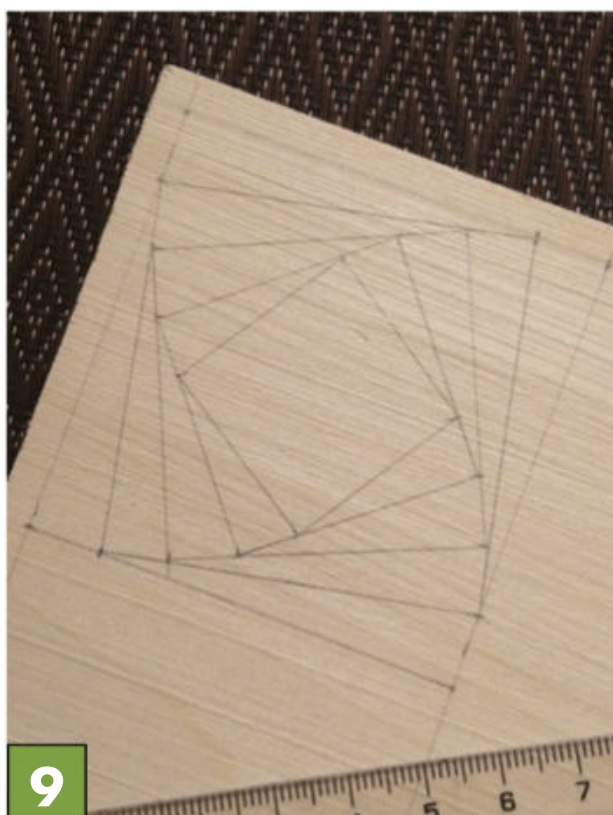
8 On the square just drawn, mark all the dots 8mm anticlockwise from the corners.

9 Then connect them together.

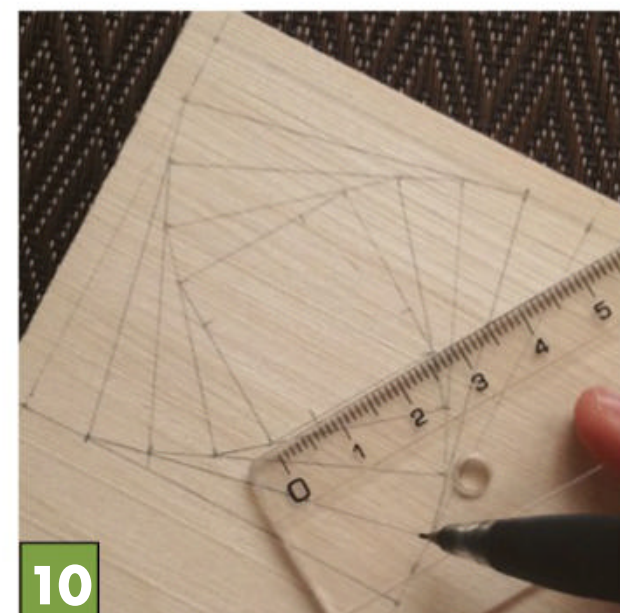
10 For the sixth square, mark all the dots 7mm anticlockwise from the corners of the square on the square just drawn and connect them together.



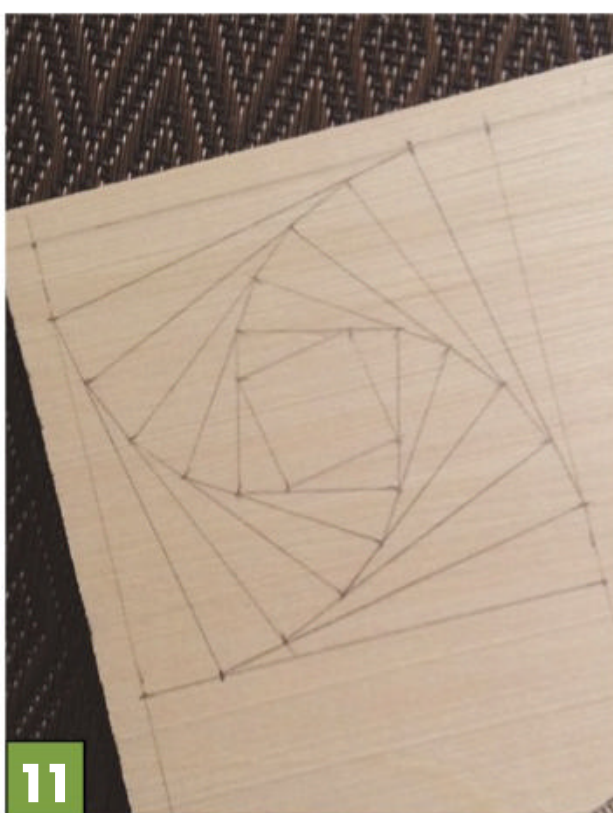
8



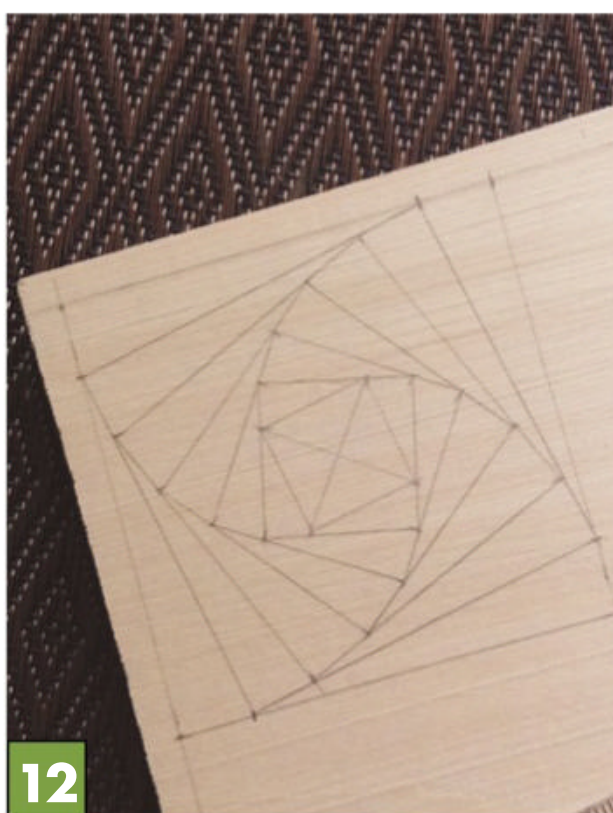
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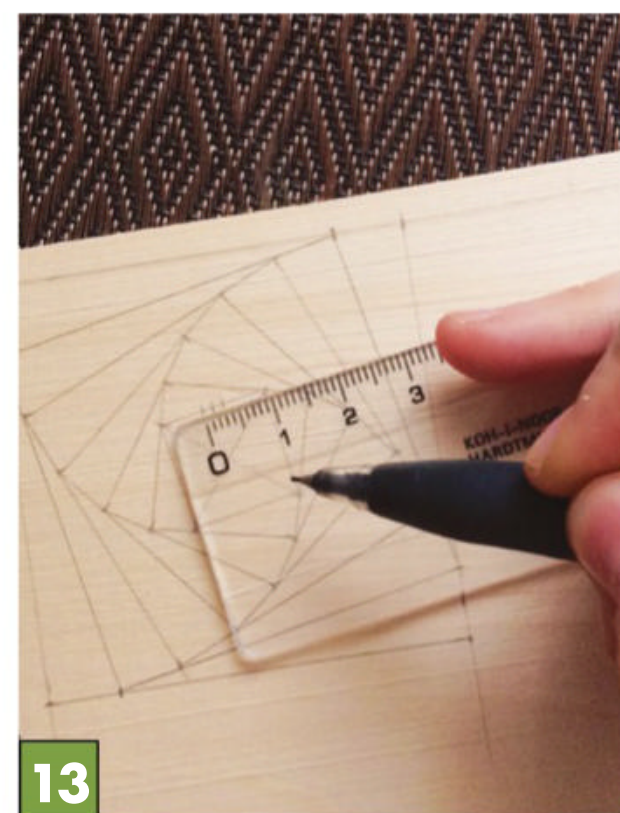
10



11



12



13

11 For the seventh (last) square, mark all the dots 6mm anti-clockwise from the corners on the previous square, then connect them together.

12 Draw two diagonal lines that connect the opposite corners in the resulting last square.

13 Now divide the sides of the last square in half, mark a dot, and then put dots 1.5mm to the right and left of it.

14 Connect these two points with the centre of the square.

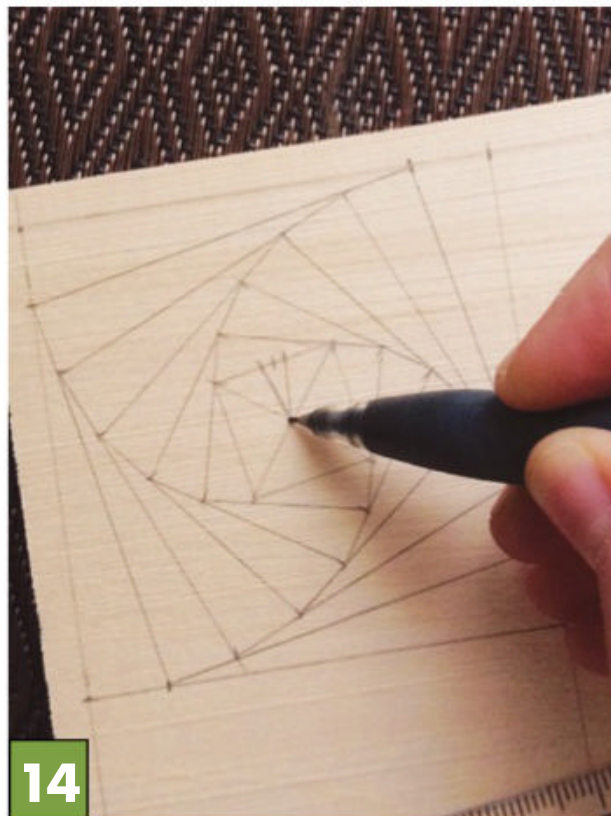
15 Repeat these steps on the other sides of the square.

16 Now start drawing lines inside the triangles for additional stop cuts. Start with the first (outermost) square and the first triangle to the left inside it. Divide the widest place of the triangle in half and connect this dot to the top of the triangle.

17 Next, mark a dot 5mm from the base, then connect it with the base of the triangle. Repeat steps 16 and 17 for the remaining triangles in the section, which follow a kind of spiral to the centre.

18 For the first three triangles in the section, mark dots 5mm from the base for the additional stop cuts. For the remaining three, mark dots 4mm from the base.

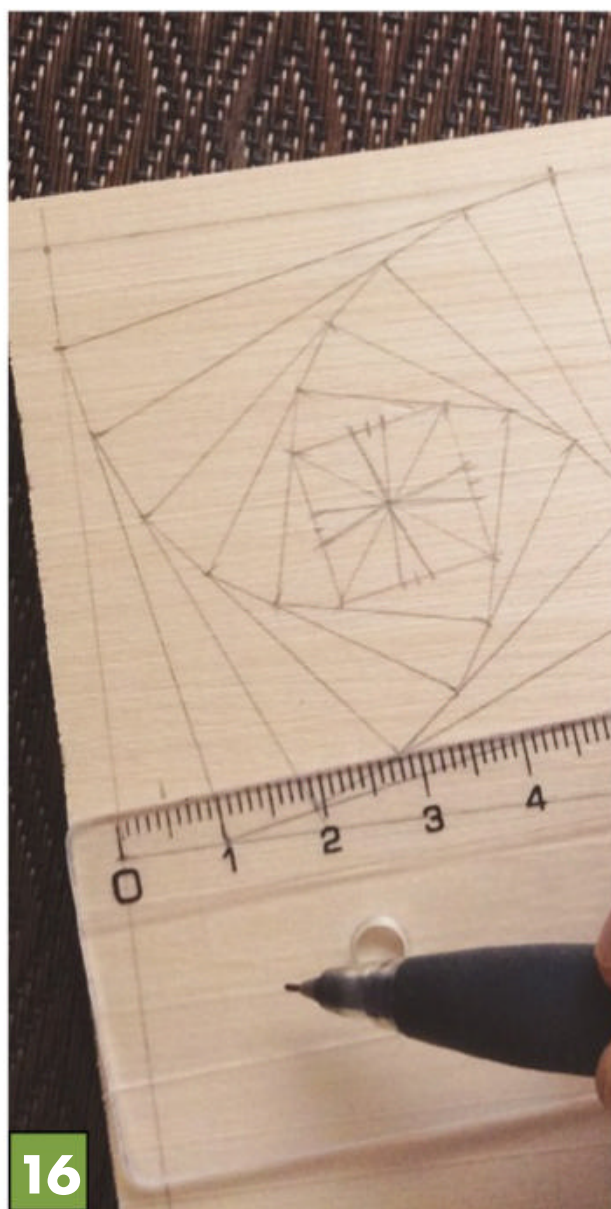
19 When the first section is done, repeat steps 16, 17 and 18 for the other three sections of triangles. The pattern is ready for carving.



14



15



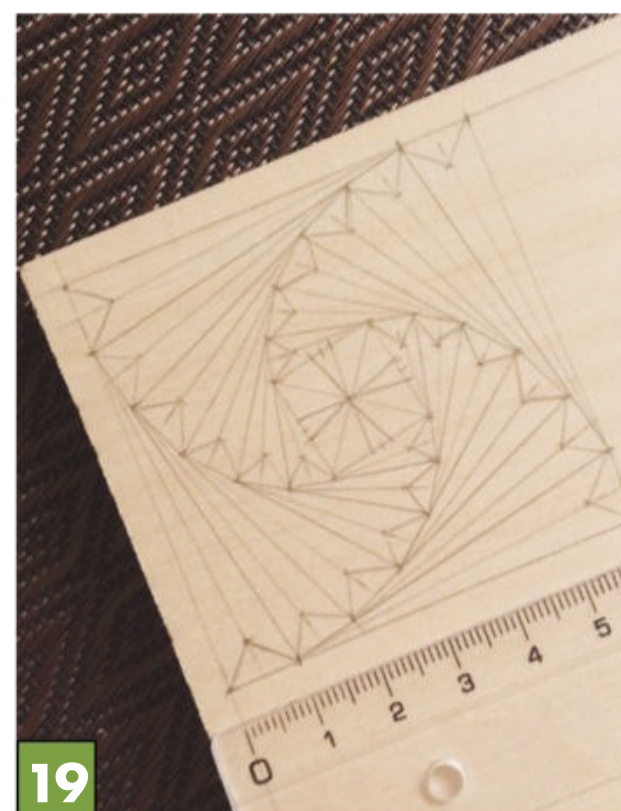
16



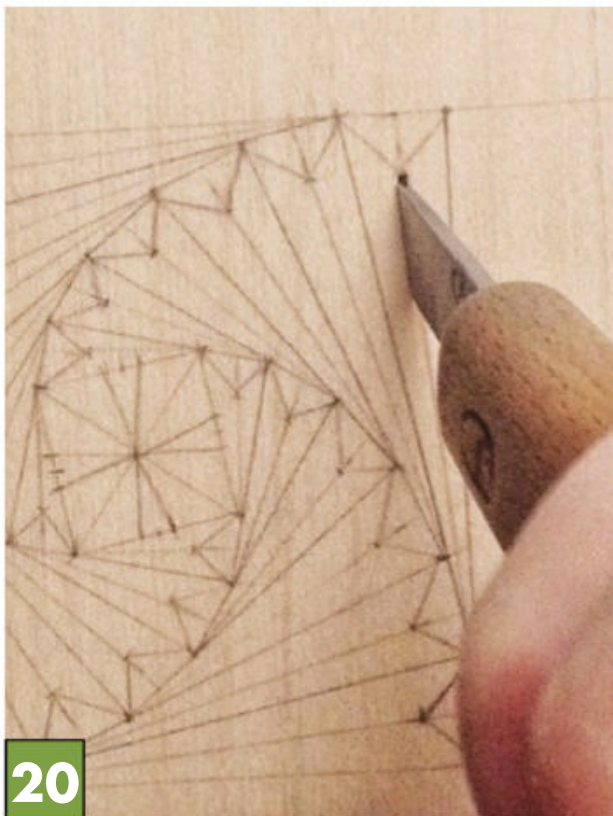
17



18



19



20



21



22

Carving process

20 First, make stop cuts inside all the triangles. Place the knife tip in the deepest place and lower the heel.

21 Keep the knife perpendicular to the surface of the wood to the top of the triangle, but avoid cutting the stop cuts right up to it.

22 Make cuts in the remaining triangles.

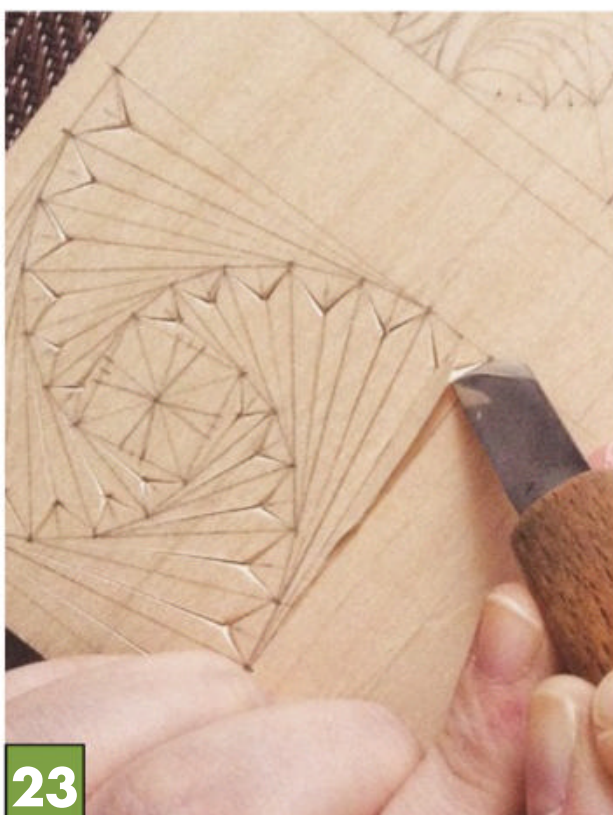
23 Start carving the pattern, for example, from the bottom triangle that goes along the grain at the bottom of the square. Undercut the side that goes straight along the grain at an angle of 45 degrees, carefully checking when the knife goes smoothly through the grain (in my case, the knife went smoothly when undercutting away from me).

24 Completely carve out the triangle, also at a 45-degree angle.

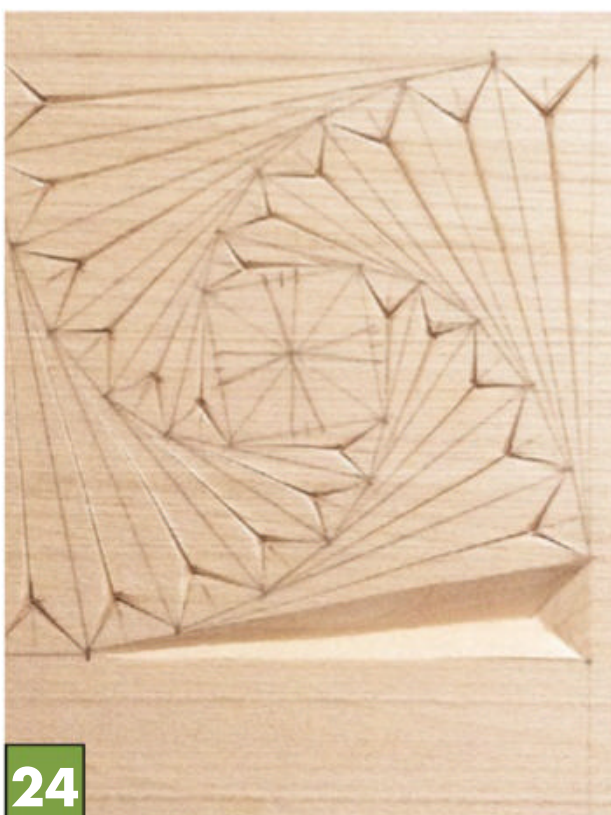
25 Then move to the left from this triangle, and undercut the base of the previous triangle; this will also go away from you (or towards you, depending on how you undercut the first chip).

26 Carve this triangle completely.

27 Now move to the top horizontal line of the square and undercut the side of the triangle that goes along the grain. The knife grip in your hand on this side will already be different from how you held the knife on the bottom triangle when undercutting its side, which also goes along the grain.



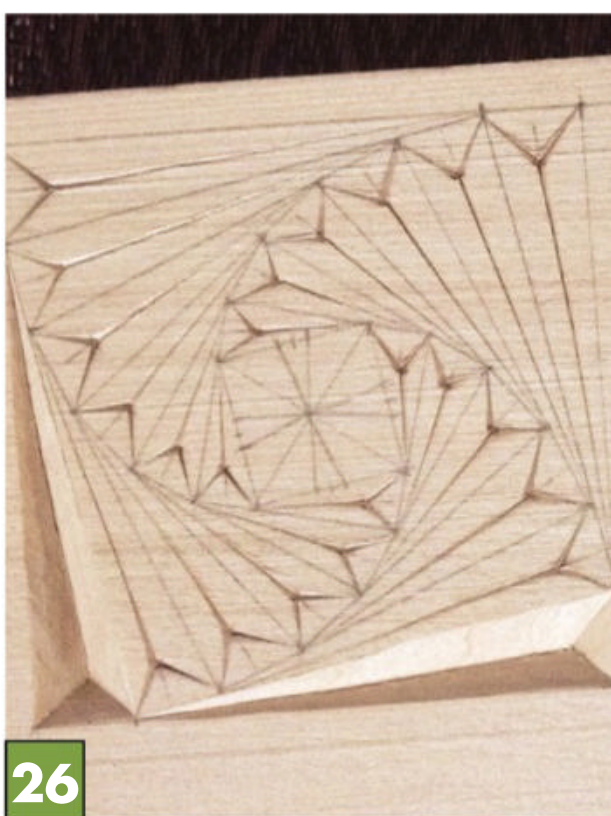
23



24



25



26

28 Carve out this triangle, then move to the right and undercut the base of the chip, then the whole triangle.

29 The most difficult triangles are now carved. The rest will require you to simply hold your knife correctly when undercutting. Follow the direction of the wood grain and have confidence when making cuts. Begin to carve the triangles in an anticlockwise direction. Begin with their bases.

30 Then carve the side that is connected with the triangle on the outer square, and lastly carve the third long side.

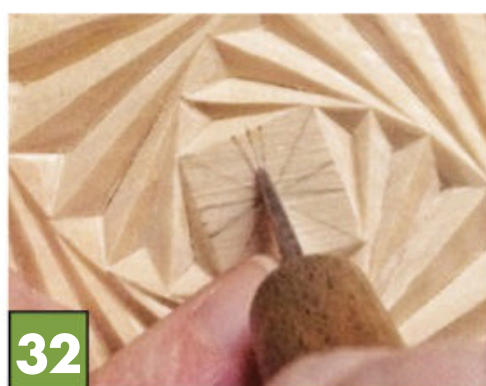
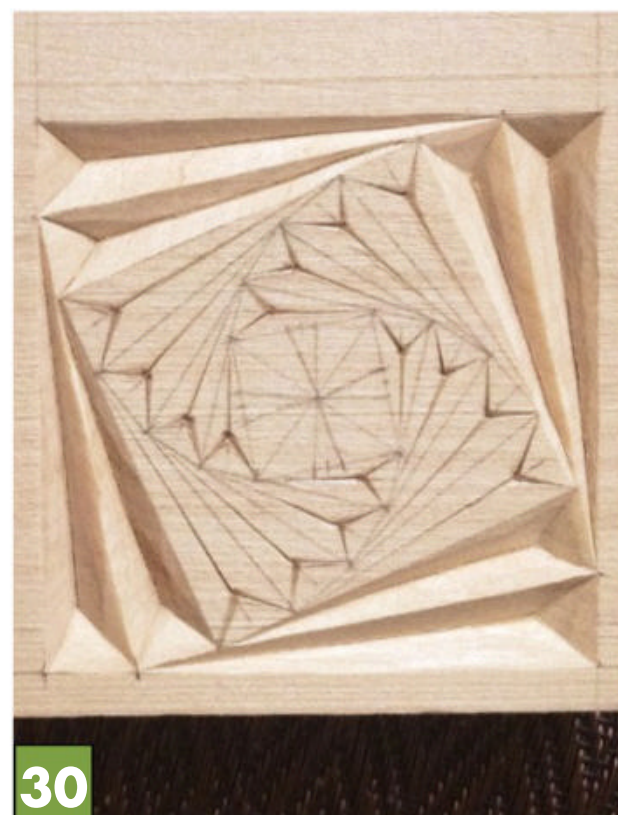
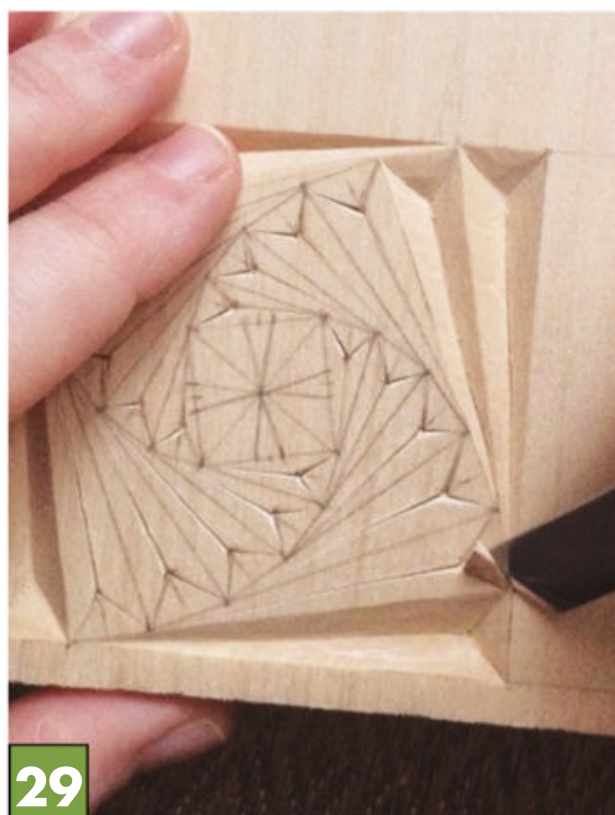
31 Moving anticlockwise, carve each triangle in turn until all the triangles are complete.

32 Now cut out the very central pattern. Make perpendicular undercuts in the middle of each of the small triangles.

33 Without bringing the tip of the knife right up to the point where these triangles are connected, make cuts to the right and left of these stop cuts at an angle of 65 degrees

34 The carving is now complete.

Chip Carving by Tatiana Baldina, published by GMC Publications, RRP \$34, available online and from all good bookshops.



Small-Scale Home Office

This sleek and modern desk and wall shelf combo is the perfect workstation that the whole family can share, anywhere in the house.

What can I say — the COVID years have been interesting. Among the many challenges these years have presented, one of the largest was learning to work remotely. To compound this “work from home” model, many parents found their children migrating to online learning as well.

While I was amazed how well most schools handled the remote learning, I was vastly unprepared to have my children learning from home. All of a sudden, many parents, myself included, were forced to put together a “learning area” for our kids. In a response to this, Chris Fitch designed the desk and shelf you see here.

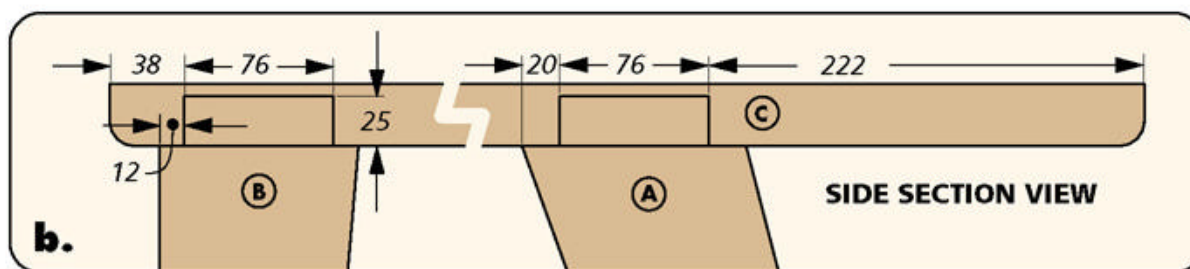
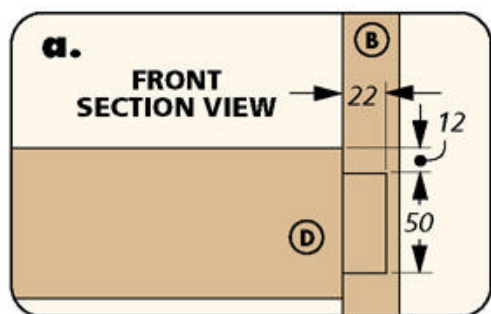
SLEEK DESIGN. Looking at the desk, you can see that not only is it the perfect place for a student to learn at, but its modern design makes it equally attractive for an adult working at home. The maple construction comes together quickly, and a pull-out tray keeps all your supplies close at hand. For a little more storage, Chris designed a simple wall shelf to sit above the desk. It matches the desk nicely and offers more storage than the desk alone. An additional benefit is that it transforms the desk from just a table into more of a work area.



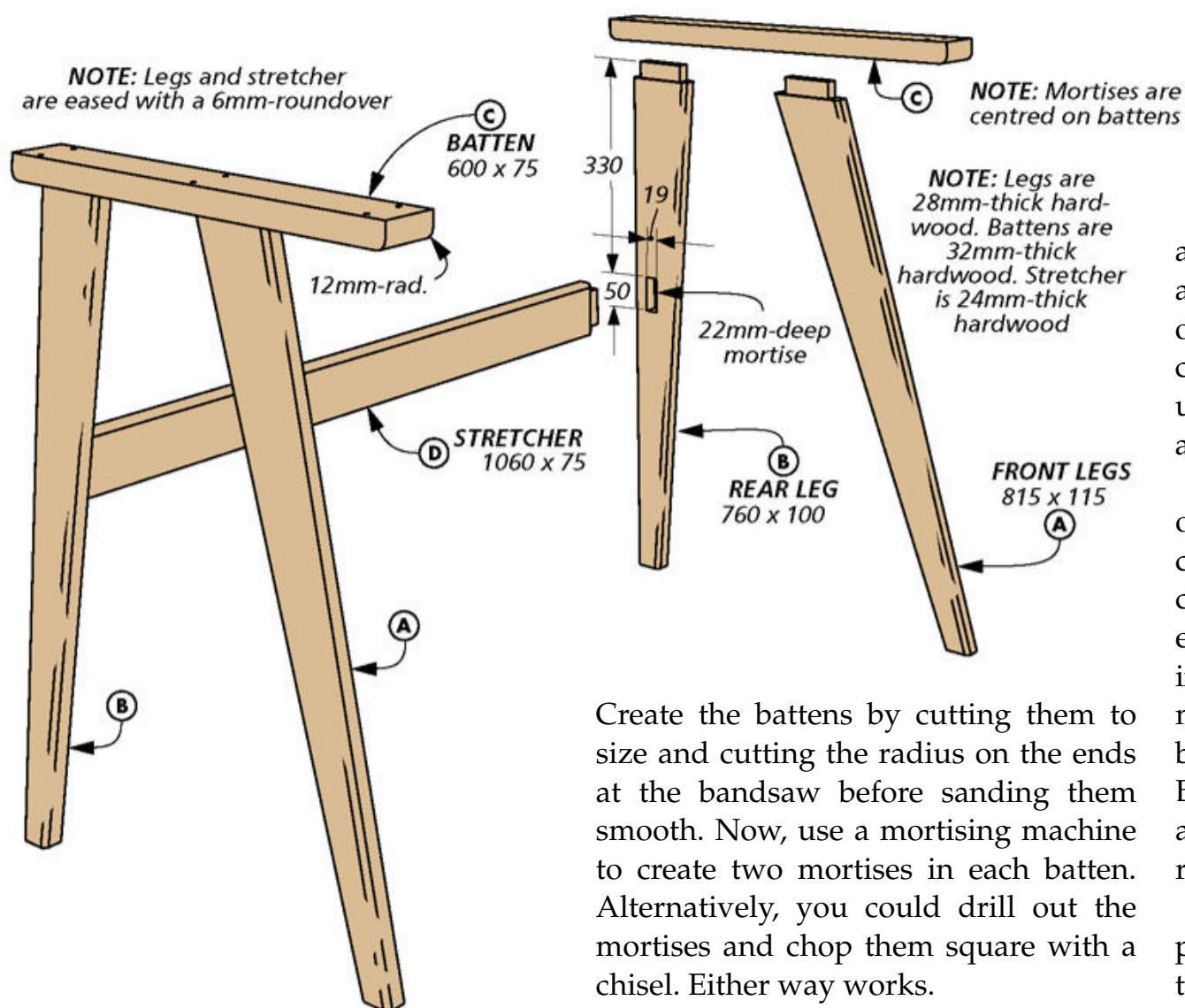
- ▲ Sliding doors on the left and right provide easy access to storage cubbies. We left ours open, but you could easily add shelves to break up the interior.



▲ Keeping the clean and simple design of this desk in mind, we opted for a low-key storage option in the form of a simple, commercially available slideout tray.



NOTE: Legs and stretcher are eased with a 6mm-roundover



For full-size leg patterns and tenon jig, visit our website at australianwoodsmith.com.au

an angle to create the tenons. Here, I used a jig that straddles the rip fence (available online). The leg is supported by a cleat and clamped in place. Then, it's business as usual to cut the tenons. Sneak up on the fit, and test the tenons in the mortises.

A QUICK STRETCHER. The last thing to do on the base is to make the stretcher to connect the back legs. This is simply cut to size and a tenon is cut on both ends. You'll also need to cut the matching mortises in the rear legs. Mortising machine for me when it comes to these, but again, choose your own adventure. Before assembling anything, spend a minute at the router table adding a roundover to the edges of the legs.

GLUE IT UP. At this point, let's see some progress. Start by gluing the legs into the battens. Then, join the two leg assemblies with the stretcher. With the base drying, it's time to concentrate on the top.

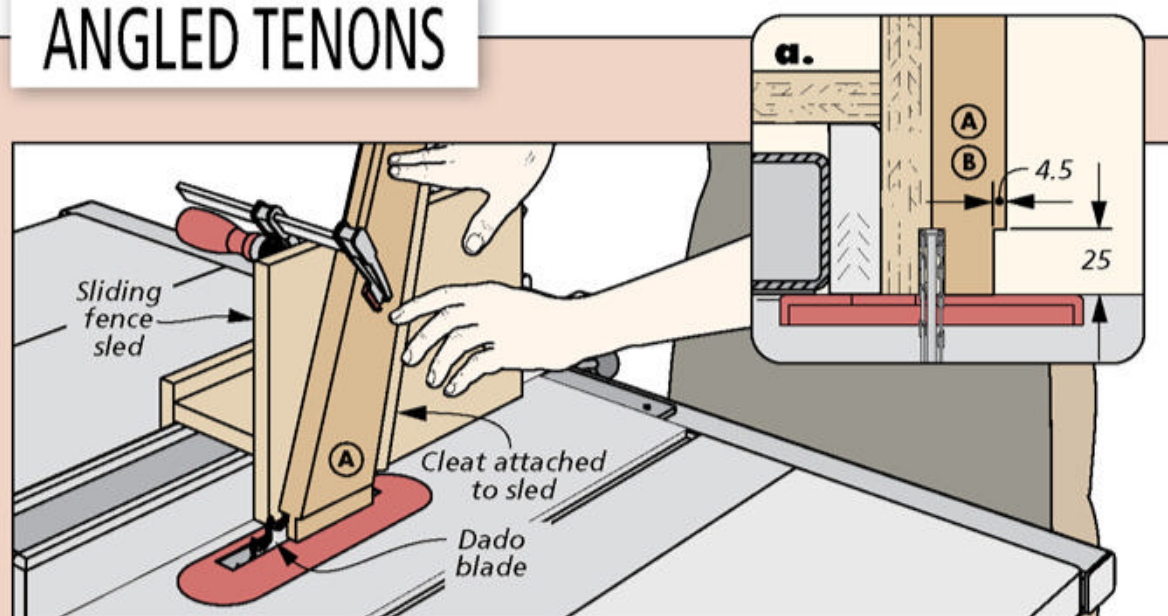
Simple & Sturdy BASE

The desk build starts off with the base. Looking at the main drawing above, you can see the parts that form the base. The first thing to take care of is creating the legs.

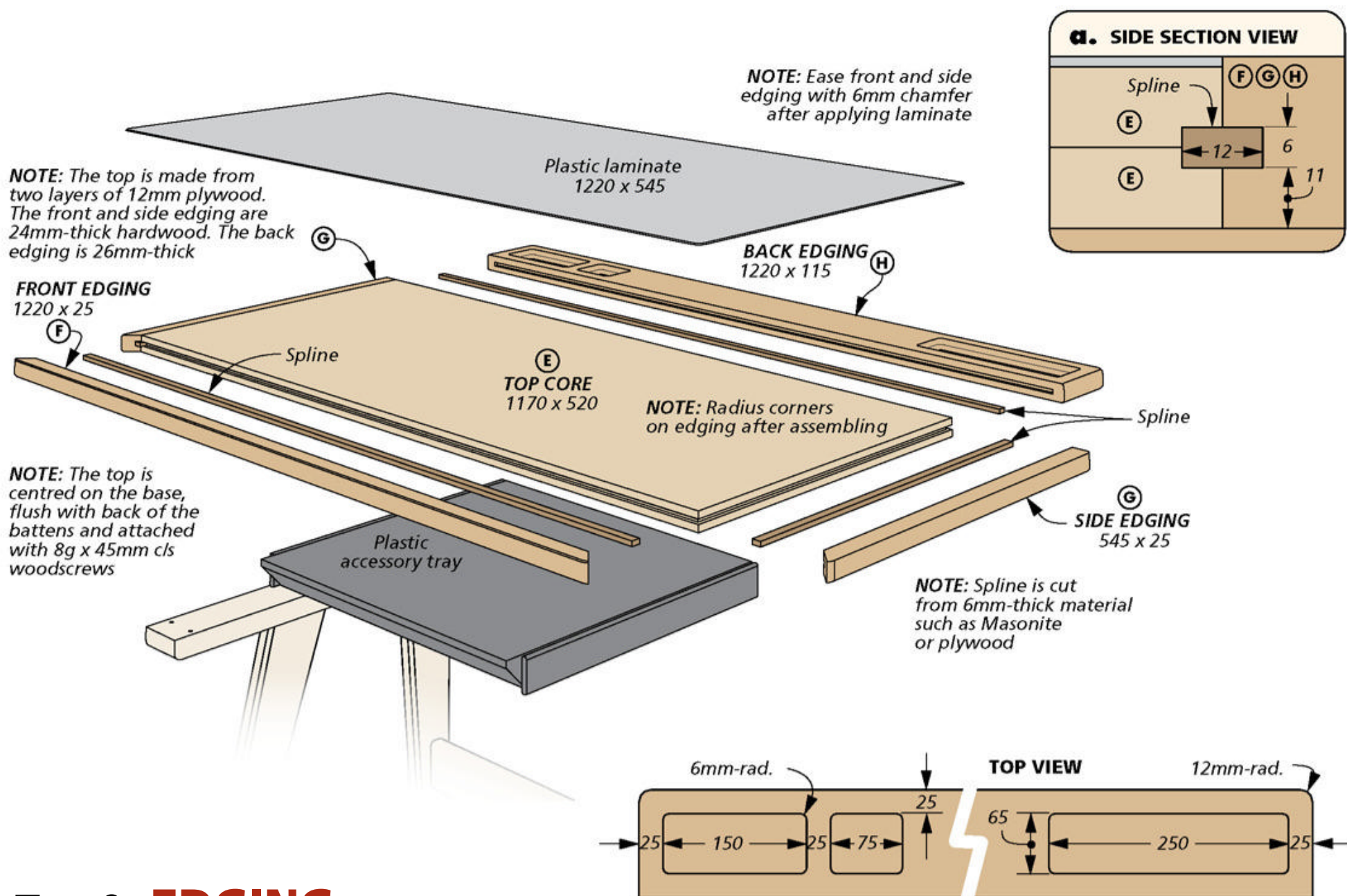
ANGLED LEGS. The front legs are set at an angle in relation to the top. The back legs also have a taper along the front edge. Create the legs by laying out the taper on your stock (here, we used maple, hoop pine could also be used) and use double-sided tape to hold the stock down to a sled, with the taper aligned to the edge. Then, cut the taper at the table saw, with the sled running along the fence. Now, you can set the legs aside for a bit while you work on other parts.

BATTENS. A pair of battens are used to attach the legs to the top (detail 'b').

ANGLED TENONS



Angled Tenons. Use a sled to guide the legs while cutting the tenons. Then, clamp the leg to a tall auxiliary fence attached to the mitre gauge to nip off the front and back of the tenons.



Top & EDGING

The top of the desk is built from two layers of plywood covered in plastic laminate. Hardwood edging wraps the plywood, with the back edging being wider to accommodate a few routed dishes for storage.

PLYWOOD CORE. Cut the plywood cores to

size and glue them together. I left the top core slightly oversized, and used a flush trim bit to trim it down to size. Now, cut a groove along the edges of the top with a slot cutter in a router. This groove will hold a Masonite spline, as you see in detail 'a.'

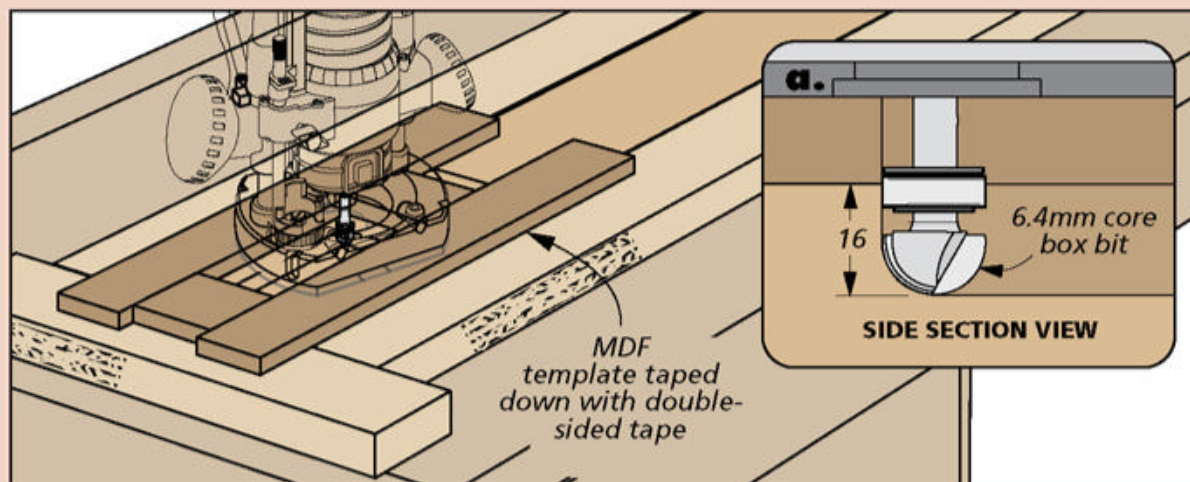
EDGING. Create the edging by cutting extra-long blanks to size, then rout a groove down the centre for the spline. Test fit the edging in place and mark the mitre locations on the ends. After cutting the mitres, install the edging with glue and splines.

LAMINATE NEXT. Before adding the back edging let's attach the laminate to the top. Apply contact cement to both the laminate and the desk top. Once it's dry, stick the laminate down with a roller. Now you can flush trim the laminate to the back edge and chamfer the front and side edging.

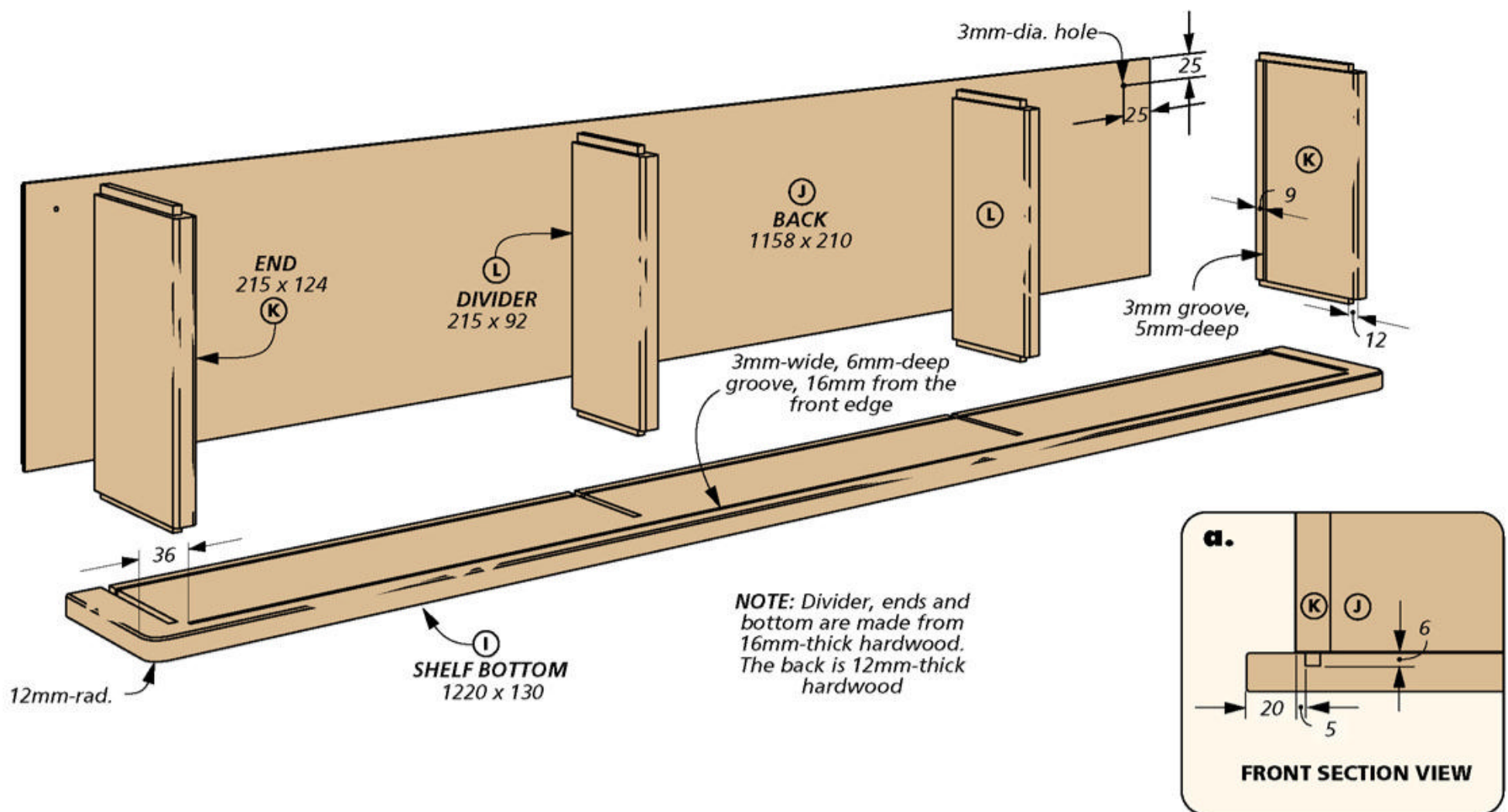
BACK EDGING. The back edging is wider and thicker than the other edging. Cut it to length and draw a couple of lines on your router table showing where the front and back of your bit are. These will help you rout the stopped groove for the spline.

Before attaching the edging on the top, rout some dishes for storage. You can see this set-up to the left. Use some scrap MDF held to the edging with some double-sided tape. Then, rout out the dishes with a bowl and tray or core box bit.

ROUTING DISHES



Routing Dishes. Using a core box bit, rout the dishes following the MDF template. On each successive pass, cut a little deeper until you reach the final depth.



Floating **SHELF**

With the desk complete, you can tackle the shelf. Like the desk, the shelf is built out of hard maple. The shelf needs to be assembled in a particular order, but because the top and bottom are almost identical, you'll make them at the same time.

TOP & BOTTOM. The groove in the top is slightly wider than the groove in the bottom (detail 'b' on the next page). Cut the top and bottom to length, and radius the corners of each at the bandsaw.

Be careful as you lay out the stopped trenches. Any variance here will cause the shelf to be out of square. I clamped the top and bottom back-to-back and laid everything out at once. Use a piece of MDF as a fence to guide your router. Here, I prefer to use a router with a plunge base. You can see the router set-up in the box on the next page. Rout the trenches for the end panels, along with the dividers in both parts.

STOPPED GROOVES. Now is the time to rout the stopped grooves in the top and bottom. This can be done at the router table with a pair of straight bits. Rout the back groove, along with the door groove in each part. Remember

that the top groove is a little wider.

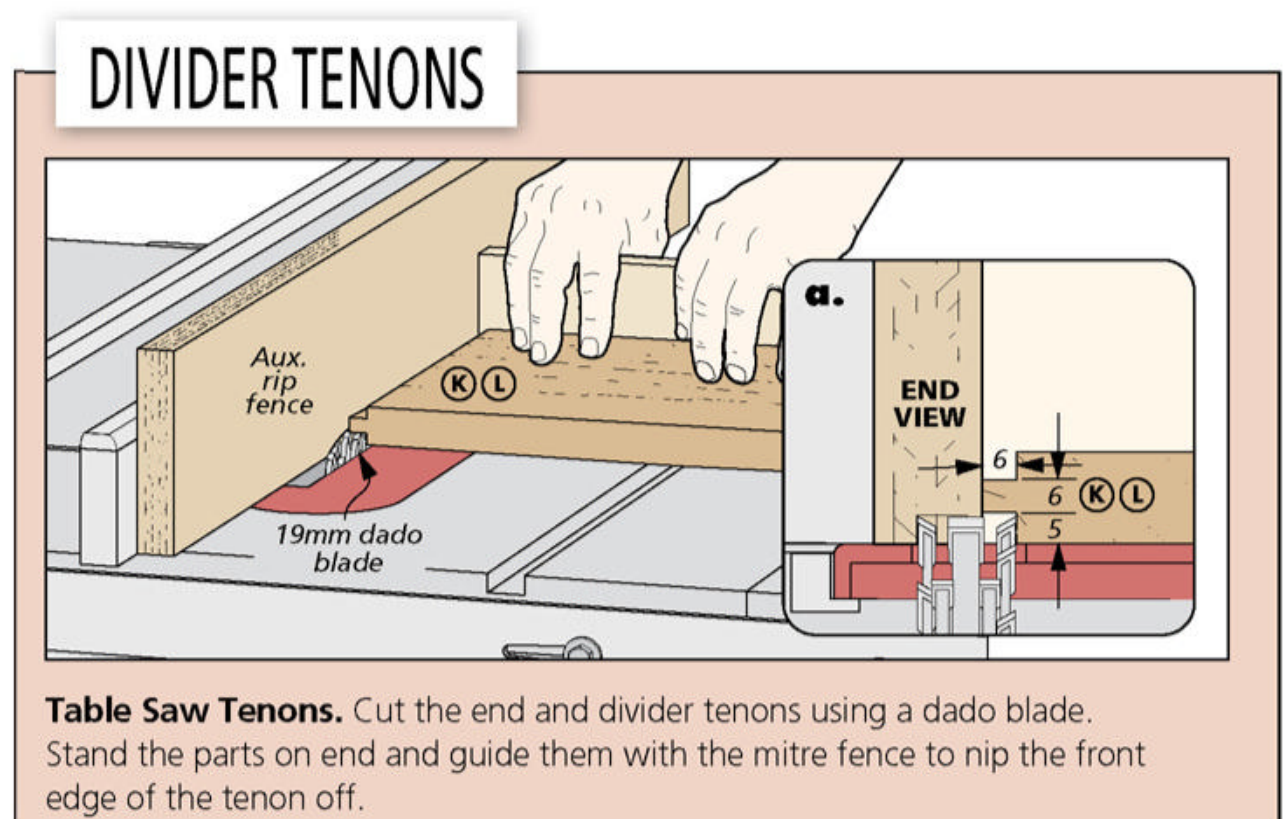
Finally, cut the back panel to size and rout a rebate along each edge. This will form a tongue to fit in the grooves you just cut. This is quick and easy at the table saw.

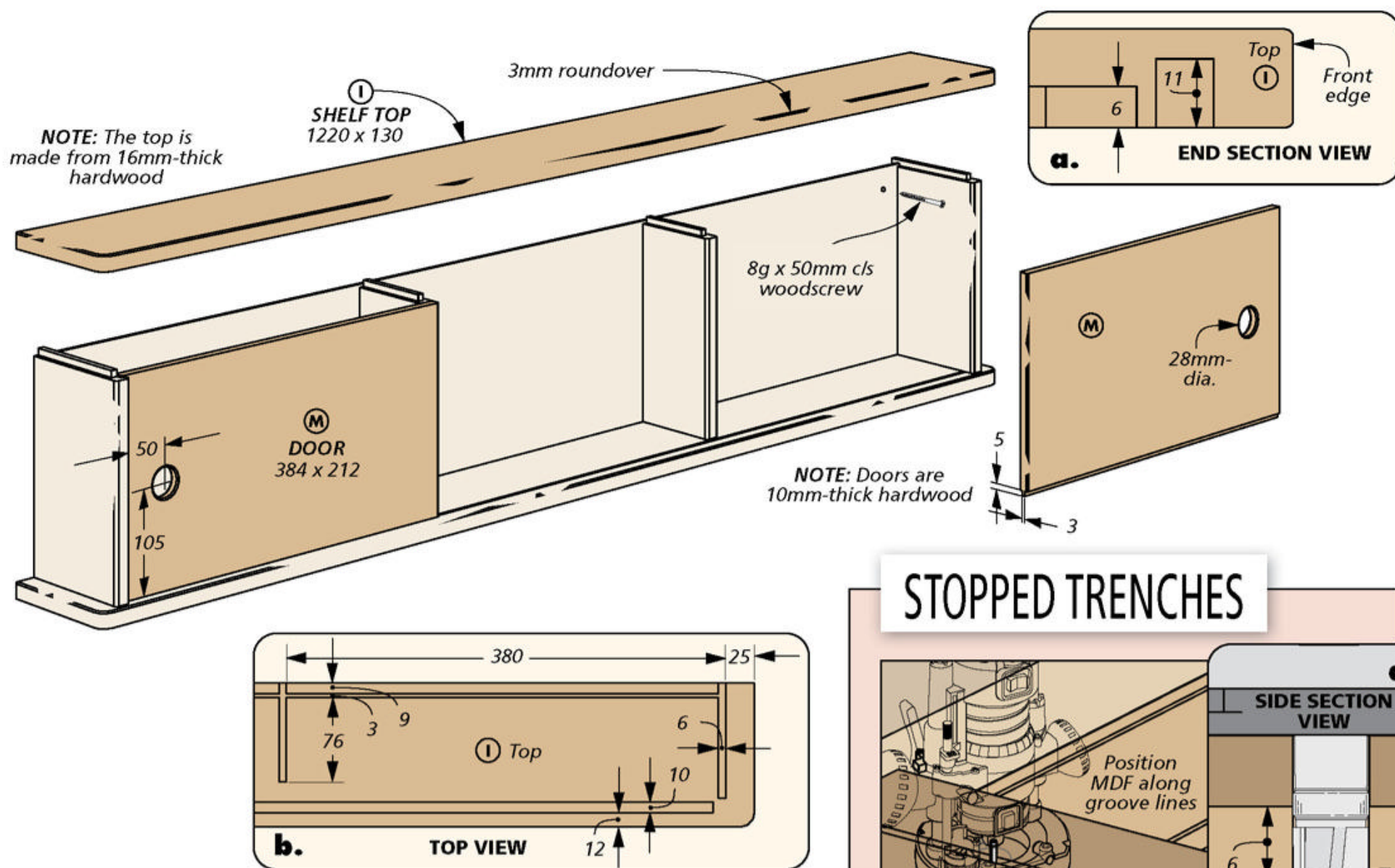
DIVIDERS, DOORS & ASSEMBLY

Making the sides, dividers and doors

are the final steps before assembling the shelf. The sides and dividers follow a similar process, so start with those first.

SMALL TENONS. After cutting the dividers and sides to size, you'll need to cut a tenon on each end to fit in the stopped grooves you routed in the top and bottom. Do this at the table saw, as seen in the box below. Make a pass along each





face before standing the workpiece on end and nibbling off the front edge of the tenon.

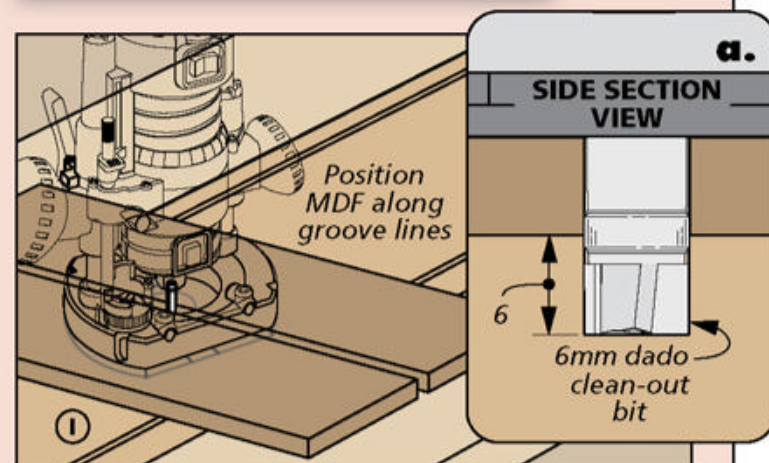
ONE MORE GROOVE. Before cracking open the glue bottle, you'll need to rout a groove along the inside face of the end panels. These are to hold the tongue on the back panel. With that done, you can assemble the shelf. Glue the dividers and sides into the top and bottom, but install the back without glue so it may float in the grooves. With clamps applied, set the shelf to the side and make the doors.

THE DOORS. The doors are simply hardwood panels cut to size. There is a small tongue along the bottom edge, that's easy enough to cut at the table saw. The doors slip into the top groove then drop into the bottom groove. Sand the doors so they slide smoothly. Finally, drill the finger hole in each door.

After a final sanding, all that's left on the desk and shelf is to add a finish, like spray lacquer. Then,

you can bring the desk inside, and mount the shelf to the wall with screws. Then, it's time to get some actual work done. **W**

STOPPED TRENCHES



Stopped Trenches. Attach some MDF with double-sided tape to create a fence. Then, rout the grooves with a dado clean out bit.

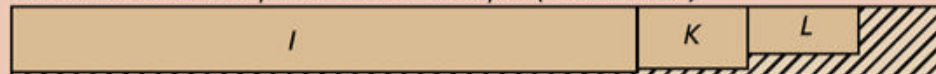
Materials, Supplies & Cutting Diagram

A Front Legs (2)	815 x 115 x 28	I Shelf Bottom/Top (2)	1220 x 130 x 16
B Rear Legs (2)	760 x 100 x 28	J Back (1)	1158 x 210 x 12
C Battens (2)	600 x 75 x 32	K Shelf Ends (2)	215 x 124 x 16
D Stretcher (1)	1060 x 75 x 24	L Shelf Dividers (2)	215 x 92 x 16
E Top Cores (2)	1170 x 520 x 12 ply	M Doors (2)	384 x 212 x 10
F Front Edging (1)	1220 x 25 x 24		
G Side Edging (2)	545 x 25 x 24		
H Back Edging (1)	1220 x 115 x 26		

2100 x 140 x 12 Hoop Pine or Hard Maple (Two Boards)



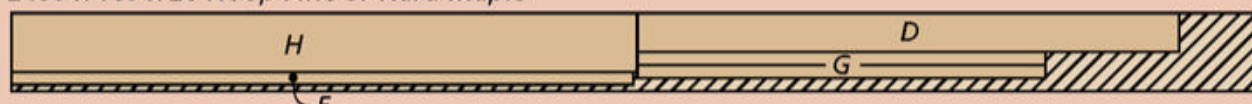
1800 x 140 x 19 Hoop Pine or Hard Maple (Two Boards)



2400 x 140 x 28 Hoop Pine or Hard Maple (Two Boards)



2400 x 160 x 28 Hoop Pine or Hard Maple





Arts & Crafts Chest of Drawers



▲ The contrast between blonde sides and white oak drawer fronts highlights the use of dovetail joinery. Beauty and joinery that lasts a lifetime is a good combo.



▲ This chest of drawers is the next branch of the handsome family tree you see here. The Gentleman's dresser (Issue 128), the Bed (Issue 147), and the Nightstand (next issue). ▼

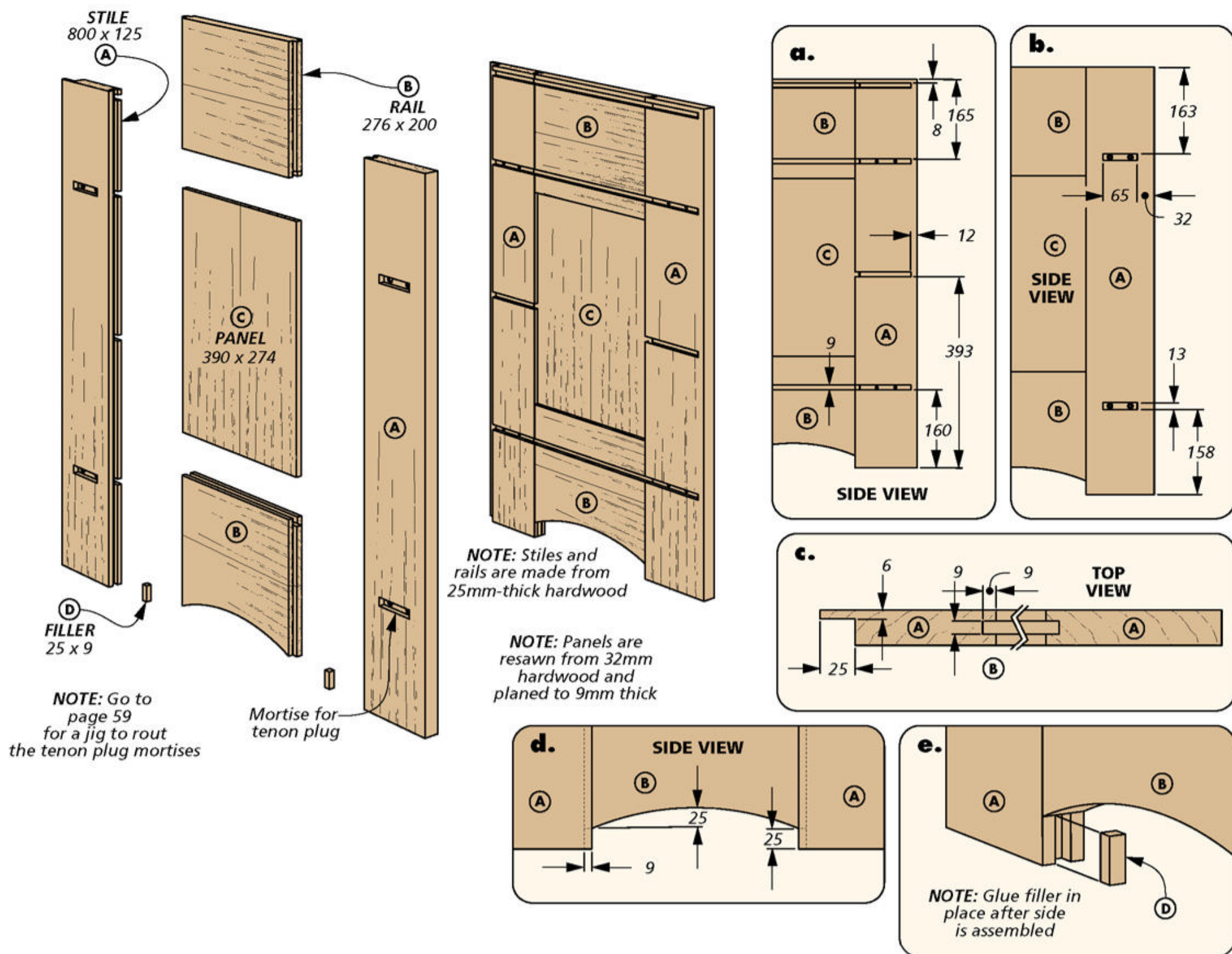


The good-looking chest of drawers you see here is the next offering in the suite of Arts & Crafts pieces for your bedroom. Lucky are the ones who get to build, and add this fine piece to their collection.

A piece of Arts & Crafts furniture is a perfect example of an object that is greater than the sum of its parts. Simple rectangles of wood, a modest taper here, a gentle arc there, and a handful of squares moving quietly over the surface. These elements alone are respectable enough, but when you braid them together in the chest of drawers you see here, there's an earthy symphony that the eye never tires of.

This chest of drawers is the latest addition in a suite of Arts & Crafts-inspired projects for the bedroom that started with the gentleman's dresser back in Issue 128. Like its predecessor, it's mostly white oak and maple frame and panels made with tongue and groove joinery. Lots of woodworking fun and challenges here.

In the spirit of generous marketing quotes, "but wait...there's more!" You have the added bonus of a wall mirror that echoes the design elements of the bed that you see in the inset photo. So if you choose to build it as well, your handsome quartet of furniture will blossom into a quintessential collection of Arts & Crafts furniture.



Building the SIDES & BACK

The solid-wood side panels you see above, along with the back panel that's on the next page, are made with tried and true tongue and groove joinery. It's a classic joint that makes for strong, good-looking panels.

The grooves in the stiles and the tongues on the rails provide plenty of glue surface. The joinery journey starts with sizing all the material.

As you see in the main drawing above, you'll need to glue up the boards for the rails and panels. First, the panels are resawn to 9mm from 25mm stock. I left the material for both of these parts oversized for the glue-up phase, then dressed them to their final dimensions afterwards.

GROOVES. Over at the table saw, start out

with the grooves in the stiles (detail 'c'). Make the first pass with a 6mm dado blade close to the centre of the board. Then flip the board end for end and make a second pass. The groove you're making here is to accept the panels and rails. Notice that you'll need these grooves on the inside edges of the rails for the panels as well. The tongues that go into these grooves will be made to fit later.

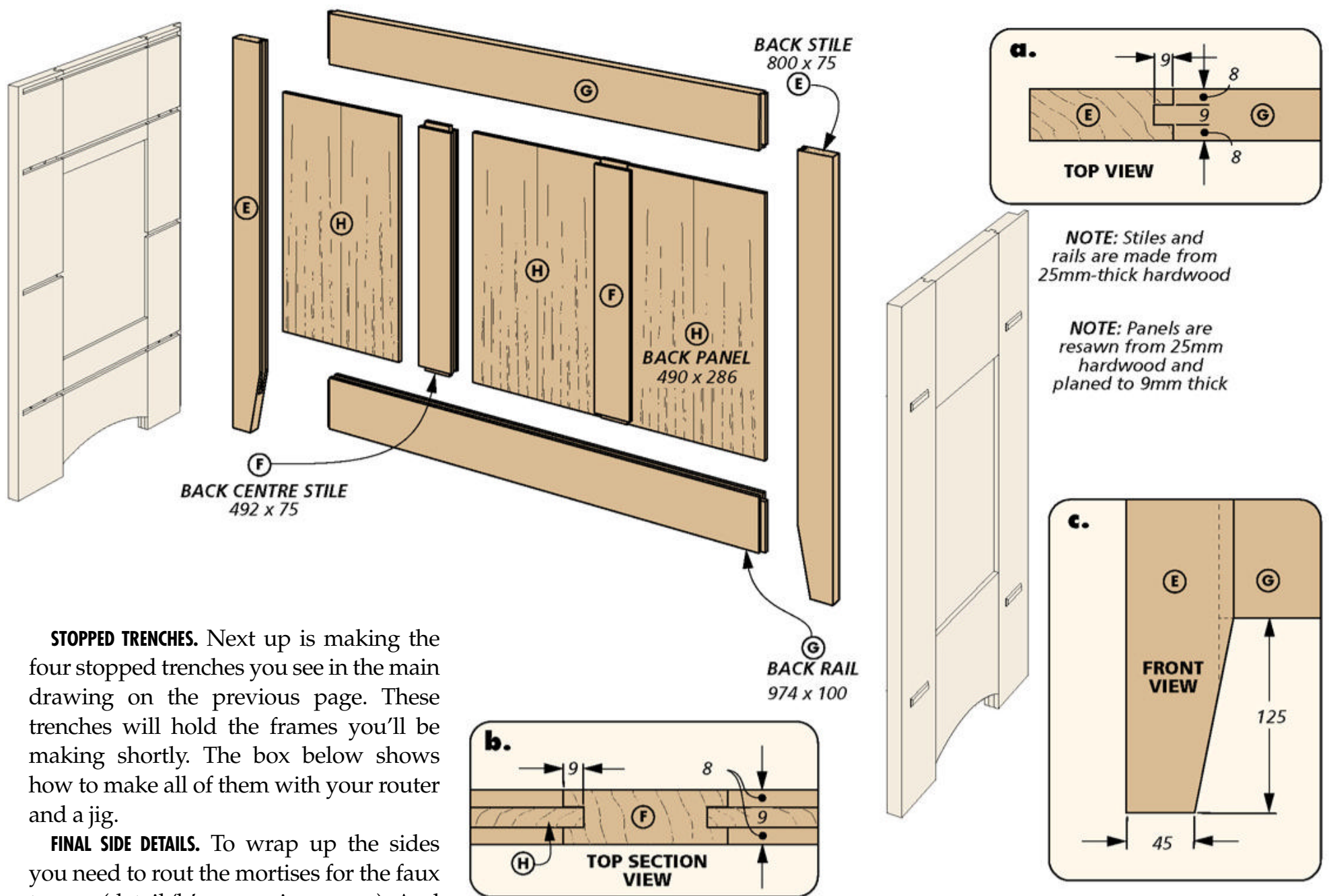
There's one more thing to do on the rear stiles — make the rebate for the back. Change the dado set to make this rebate you see in detail 'c.' Do this with the dado blade buried in an auxiliary fence, and the stile flat on the table.

TONGUES. Now you can make the tongues (detail 'c') to mate with the

grooves. The tongues require a set-up similar to the rebate you just cut in the stiles. The dado blade is buried in an auxiliary fence like before, but the rails are flat on the table saw bed and supported with your mitre gauge.

ARC ON BOTTOM RAIL. Lay out the arc on the lower edge of the bottom rail (detail 'd'). Then cut out the shape at the bandsaw (or use a jig saw) and sand the arc profile smooth.

GLUE UP SIDES. It's important to be careful about how much glue you're using when assembling all wood panels — the parts have to be allowed to move. It's best to just glue the centre of the top and bottom of the panels, and the upper third of the rails.



STOPPED TRENCHES. Next up is making the four stopped trenches you see in the main drawing on the previous page. These trenches will hold the frames you'll be making shortly. The box below shows how to make all of them with your router and a jig.

FINAL SIDE DETAILS. To wrap up the sides you need to rout the mortises for the faux tenons (detail 'b' on previous page). And drill countersunk holes in the mortises afterwards. Lastly, glue the fillers in place (detail 'e').

THE BACK PANEL

The back panel is a repeat of the joinery methods used on the sides, just different shapes and sizes (plus the addition of two

centre stiles).

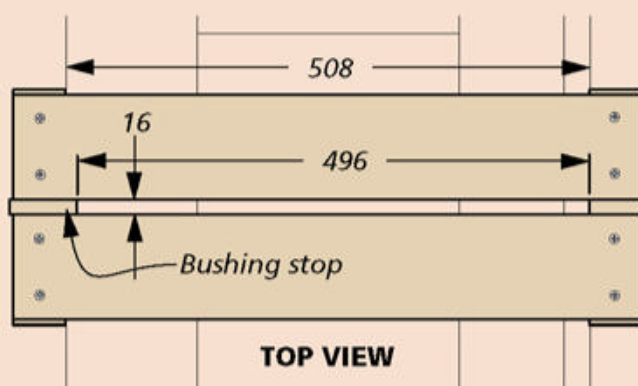
STILE SIZES. Your keen eye will notice that the centre stiles (detail 'b') are wider than the outer stiles. That's because the back sits in a rebate in the sides and you see 6mm of the sides.

As for the outer stiles, they're tapered at the bottom (detail 'c'). So it's back to the

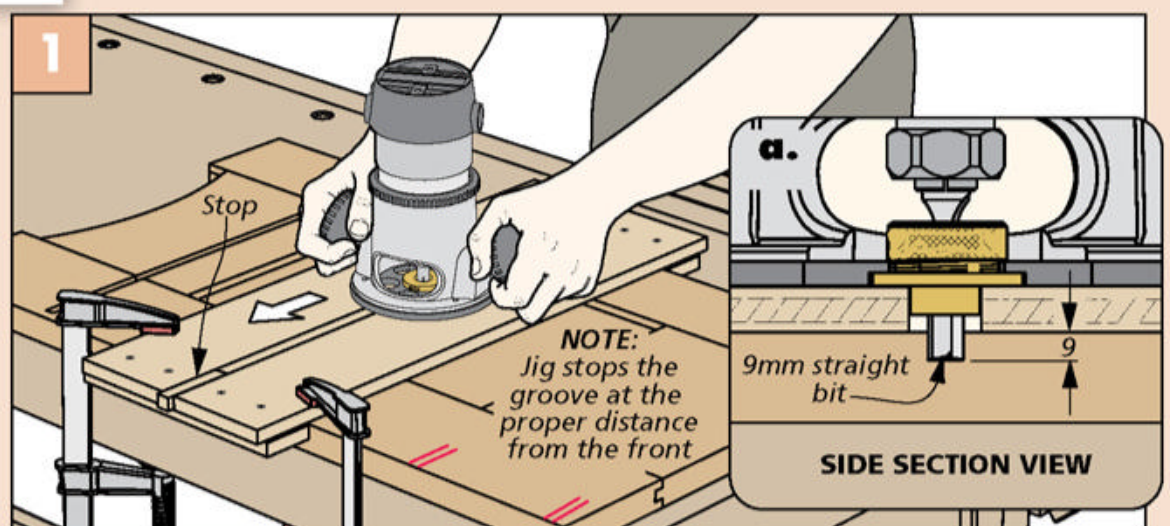
bandsaw to make this cut. After sanding the taper smooth, you're ready to glue up the back.

GLUE-UP. Before smearing the wet stuff, a dry run assembly of the back is a good idea. The real glue-up completes the last part of the case exterior. Next up are the interior frames.

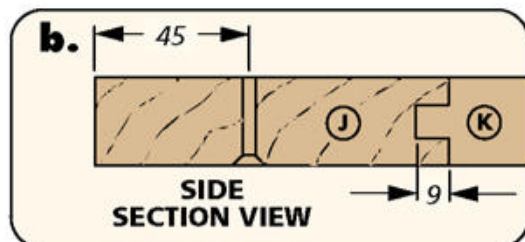
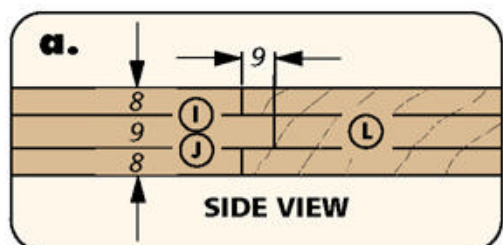
STOPPED TRENCHES & MORTISES



A Simple Jig. The cleats on the underside of the jig fit perfectly on the panel sides. The gap is the size of your router bushing.



Stopped Trenches. The clamps hold the jig and side firmly in place while you rout the stopped trenches. When all of the trenches are routed, use a sharp chisel to square up the front of the trenches.

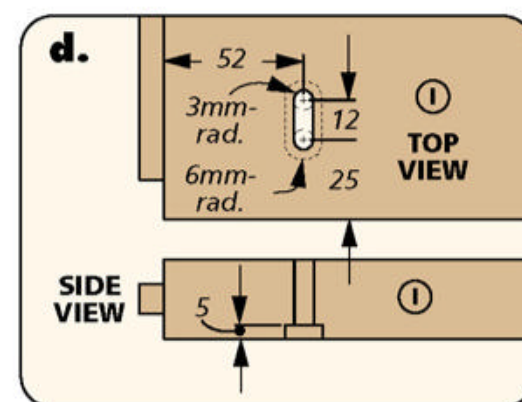
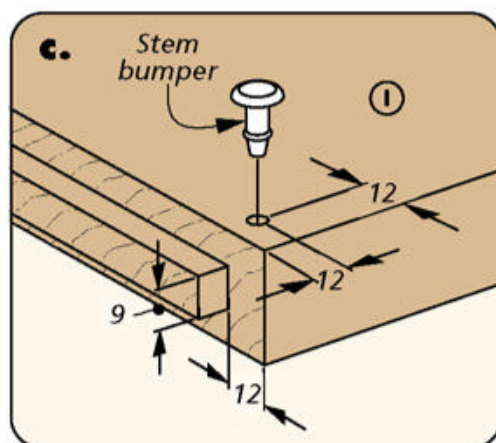
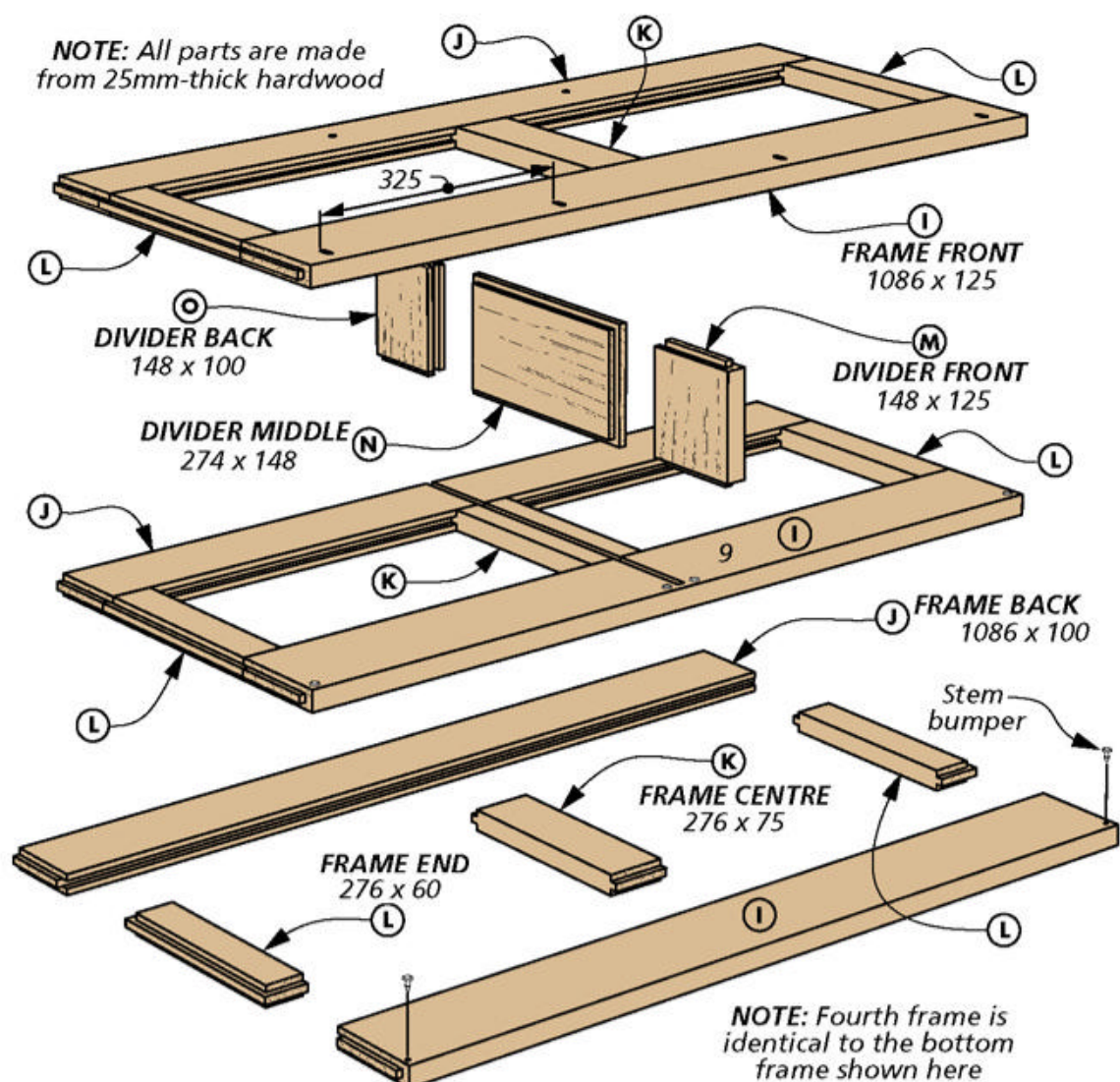


Making the FRAMES

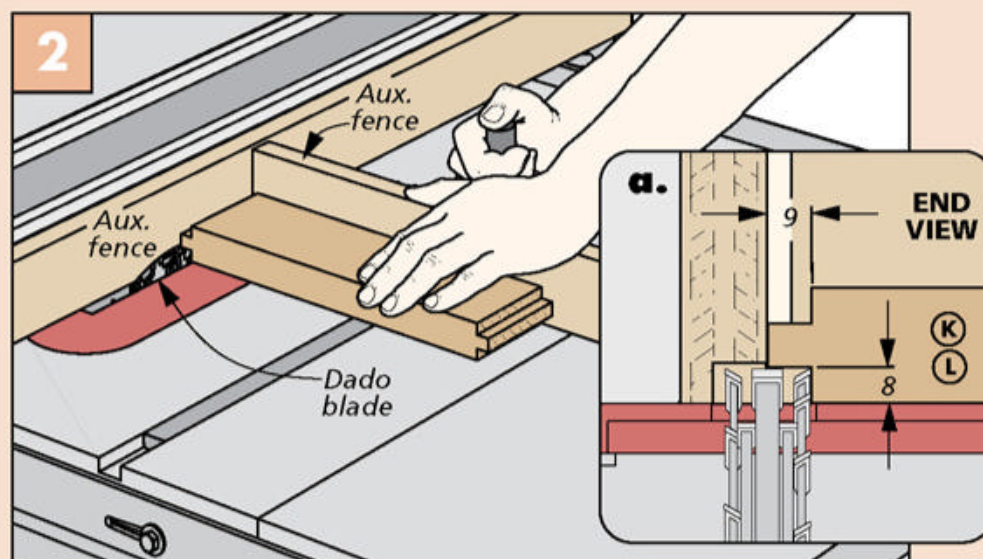
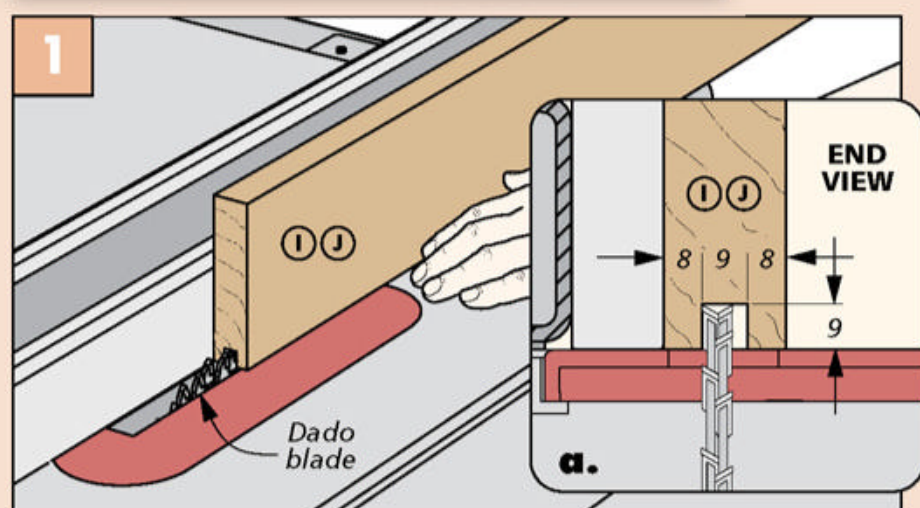
The four frames you see in the drawing to the right serve two functions. First, they bring the sides and back together to form the case of the chest of drawers. Second, they create the cavities that hold the drawers you'll make later on.

And, yes, I said four frames. Your eyes aren't playing tricks on you. Since they're structurally identical, we left out the one that is the twin of the frame that is exploded.

All the frames mate with the trenches you made in the sides. Notice in the top two frames there are trenches to hold the divider pieces for the smaller drawers. You'll make the divider in a little while. Let's start with the parts for the frames.



MAKING THE FRAME PARTS



Grooves First. A dado blade in your table saw is how you start the centred groove. Flip the workpiece between passes and adjust the fence to arrive at the proper groove size.

Tongues Next. To make the mating tongues, the dado blade is buried in an auxiliary fence. Raise the blade in steps, like making the groove, you want to sneak up on a perfect fit.

PREPARING THE FRAMES

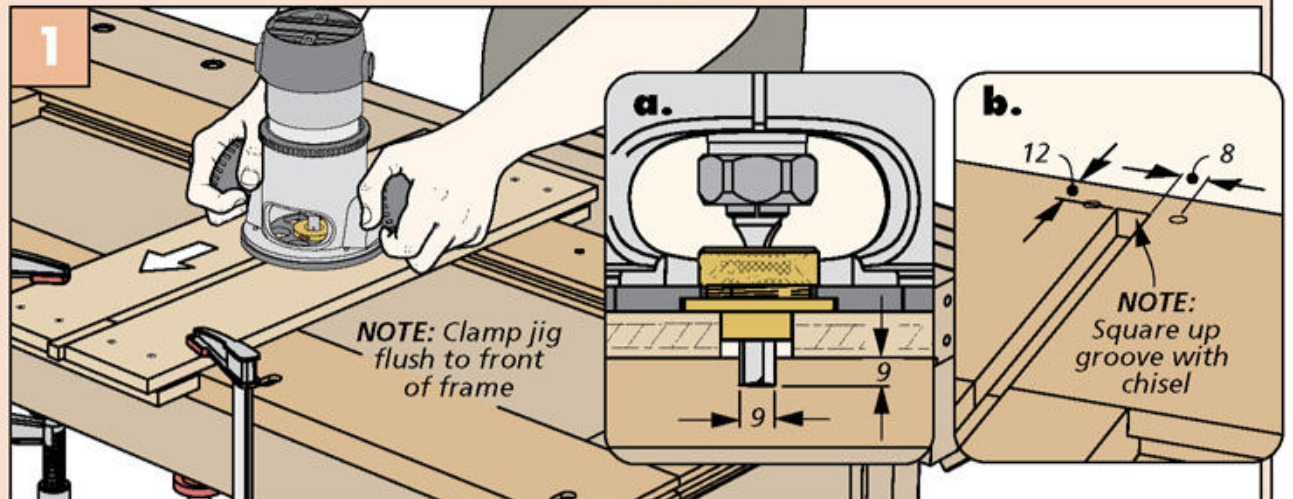
FRAME PARTS. Figure 1 in the box below shows where the joinery process is kicked off. The centred grooves in the front and back frame pieces will mate with the end and centre pieces shown in Figure 2.

Before gluing up the frames I addressed a few details on the front and back frame workpieces. As you see in the main drawing and detail 'b' on the previous page, there are a couple of mounting holes to drill on the top frame back. The top frame front has four counterbored slots (detail 'd'). All these holes are for mounting the top to the case, later on. Next, drill the holes in the lower three frames for the stem bumpers (detail 'c'). The bumpers allow the drawers to travel smoothly in the chest of drawers.

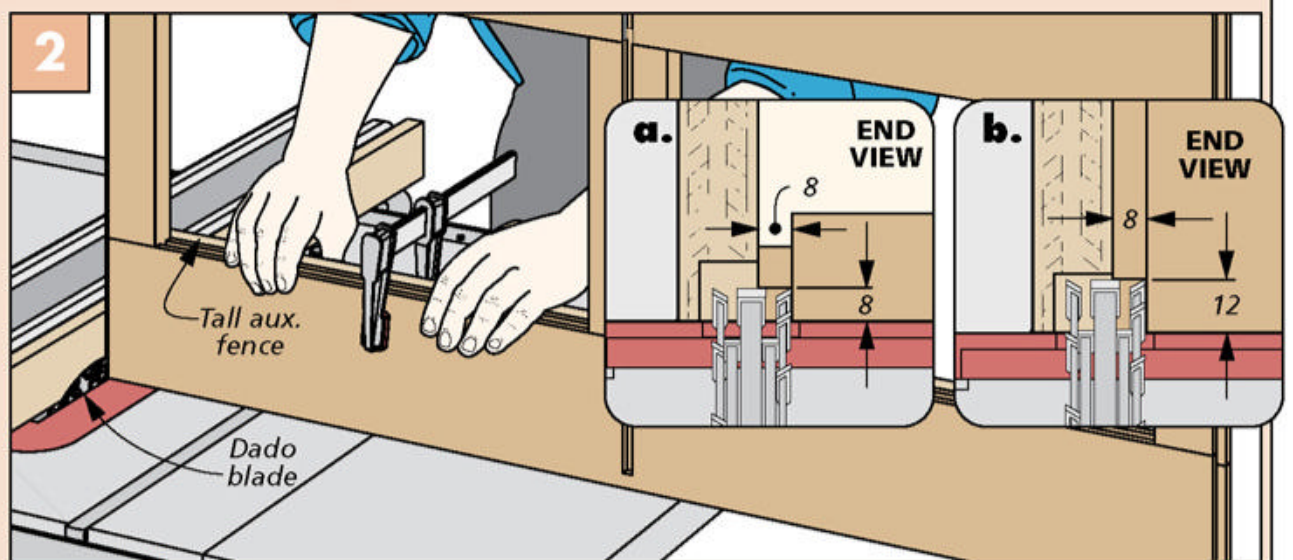
GLUE UP THE FRAMES. Nothing new here, gluing up the frames is actually less stressful than the panels you did earlier. Just make sure each frame is square. After the clamps are off, there are trenches to make for the dividers.

Figure 1 in the box above shows how to make the trenches for the divider. Figure 2 shows the details for the tongues and the shoulders. Now, you can make the divider.

Figures 3 and 4 below show the work you need to do on the divider parts. The



Accommodations for the Divider. The jig you used on the side works here. For the stop to register and perform properly, clamp the jig flush to the front of the frame.

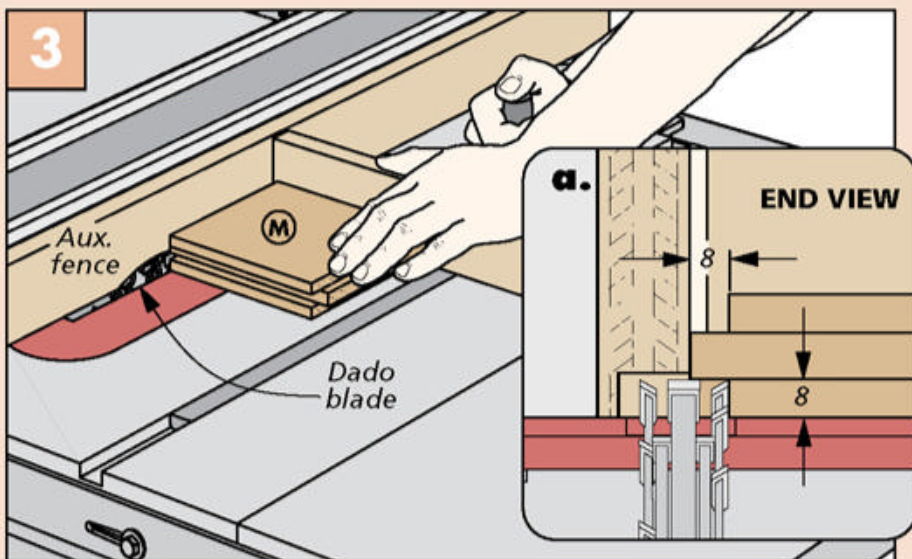


Tongues & Shoulders. First, cut the tongues on the assembled frames. Then with the workpiece clamped to a tall auxiliary fence on your mitre gauge, cut the shoulders.

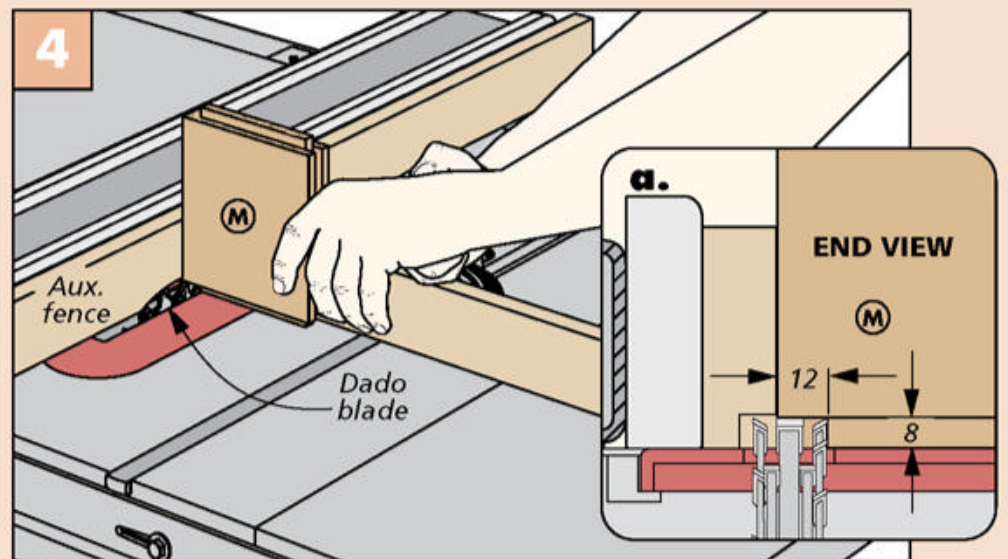
main drawing on the previous page shows the three parts. After they're made, you can glue them up.

SETTING THE STAGE. Next, you need to glue

together these four frames to the sides and back you made earlier. This is the part where the master of ceremonies booms out "drum roll please!"



Tongues for Dividers. The three parts that make up the divider assembly have tongues that you cut at the table saw with the same set-up as the tongues on the frame pieces.



Making Shoulders. To cut the shoulders on the front workpiece you have to stand the piece on edge. Use your mitre gauge with an auxiliary fence to do this safely.

It's time to **ASSEMBLE & TOP OFF THE CASE**

So, yeah, maybe a drum roll is a little dramatic. But it does take some forethought and planning to bring all the parts of the case together. You do have one ace up your sleeve though — the frames that are screwed to the sides.

As you see in the drawing in the box below, the bottom and second from the top frame are screwed to the sides through the mortises that hold the tenon plugs. The rest of the info in the box will help you successfully assemble the case of the chest of drawers. Then you can turn your attention to the remaining details of the case.

WOOD SELECTION. The top of the chest of drawers, as you see on the next page, is glued up from narrow boards. I probably don't need to tell you this, but I'm

going to — take your time selecting and matching the wood for the top. It's a juggling act between matching grain pattern and wood colour that you want to be interesting but subtle.

After the clamps are stowed and the top is trimmed to size, you can rout the mortises. The jig you used on the sides works here as well. Then ease all of the edges but the rear bottom that is flush with the case.

ATTACH THE TOP. Notice in details 'a' and 'd' that there are two different types of screws that hold the top in place. Pan head screws go in the slots at the front, while standard wood screws go in the back. Also, take note in detail 'd' that there are no screws in the mortises at the front of the top. As the main drawing

shows, the screws in the back come from both directions, through the mortises in the top, and the underside through the back rail. At the front, the screws in the slots allow the top to move. Now let's go to the other end of the case and add the skirt.

THE SKIRT. The main drawing on the next page shows that the skirt is glued to cleats that in turn are glued to the case under the bottom frame (detail 'b'). Detail 'c' shows how far the cleat and skirt are set back from the front of the case.

THE TENONS. It's time to make the faux tenons for the mortises. The box at the bottom of the next page shows you how. Once they're made and installed you can move on to the drawers.

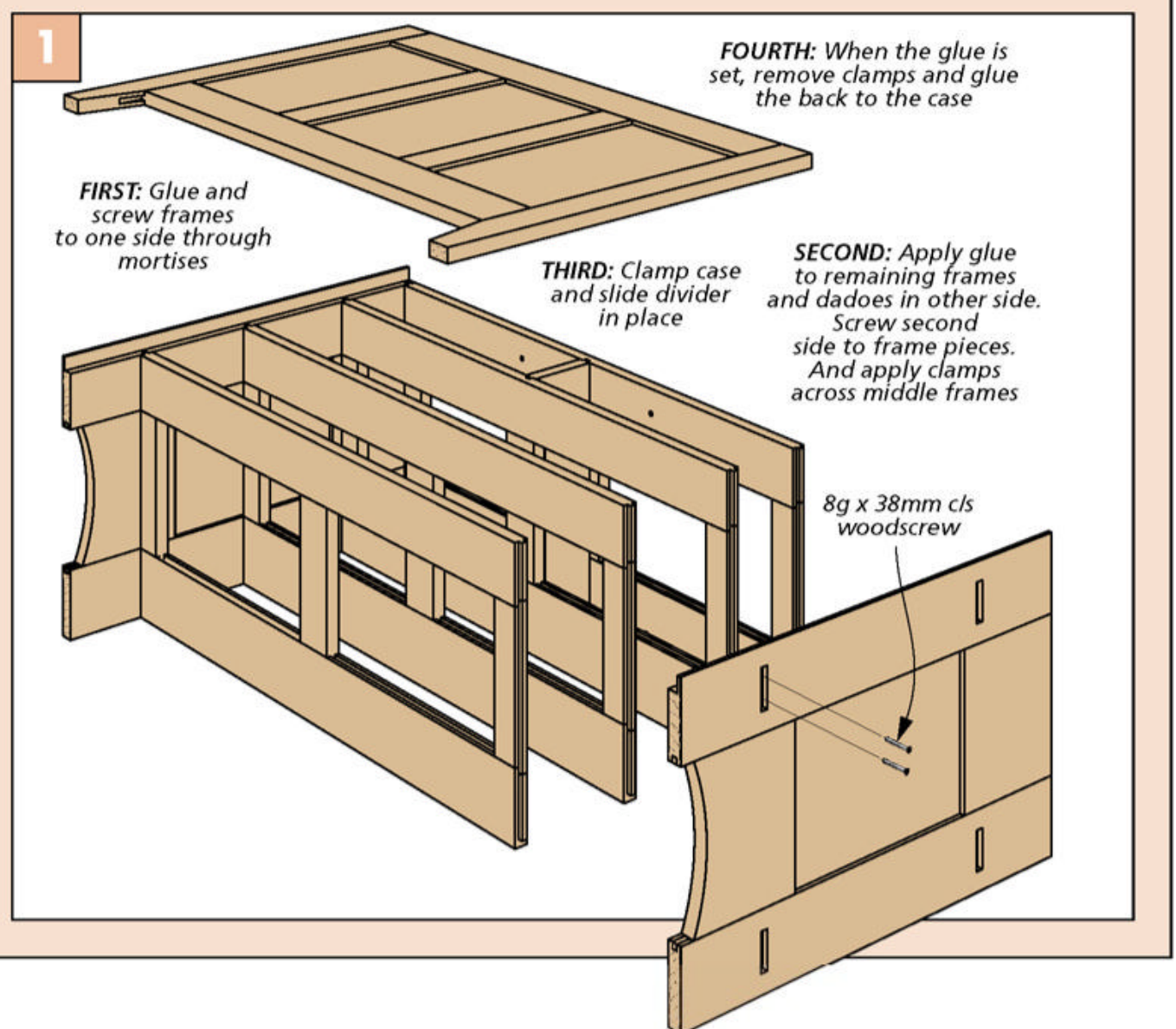
BRINGING THE CASE TOGETHER

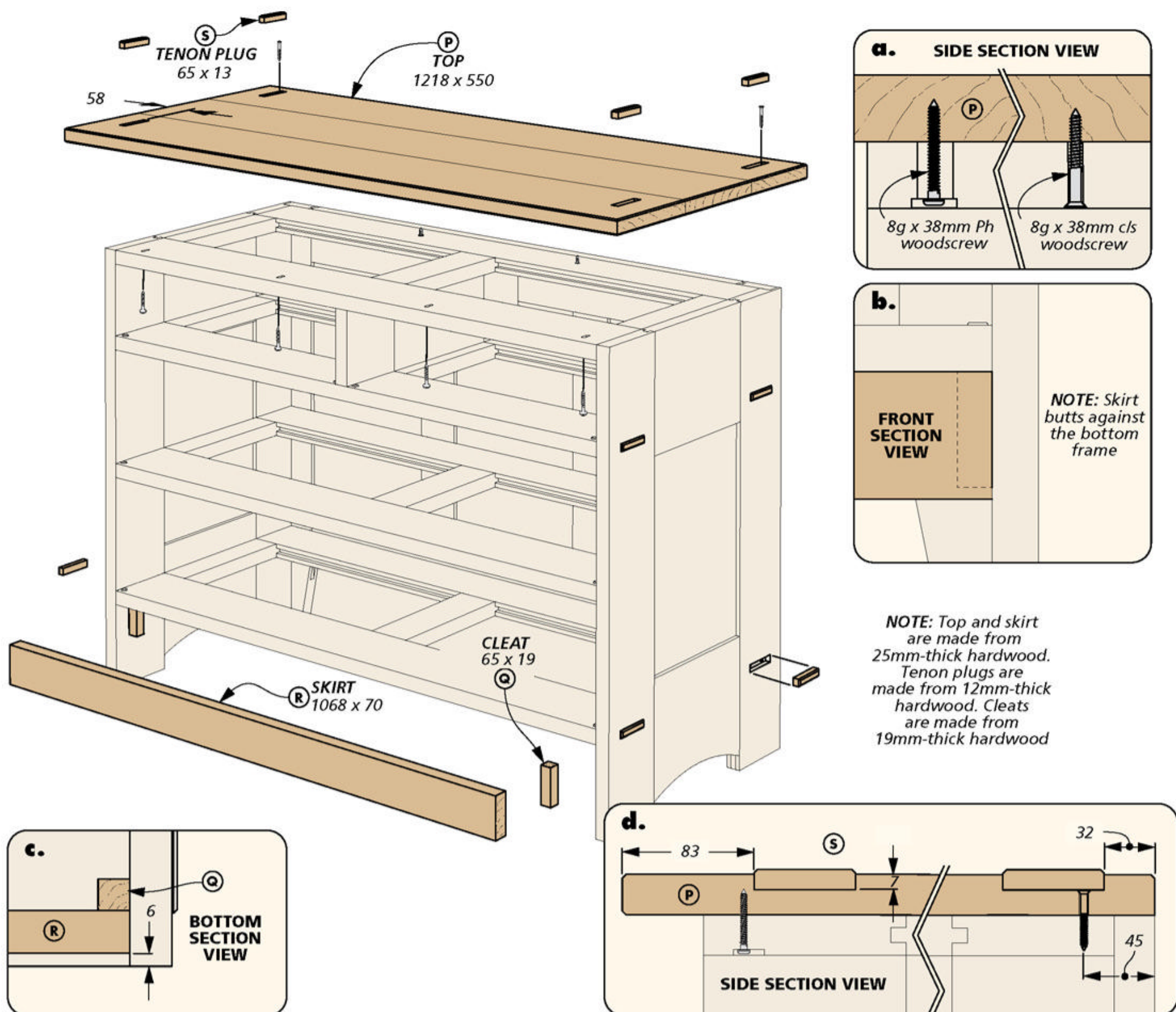
There are a handful of things to do to have a successful assembly of the case. Here's a short list that will help.

First, have the right accessories on hand. Rags and warm water for any mess the glue makes. I always apply a little beeswax to the threads of the screws that I'm using. And keep them in a bowl close to the drill.

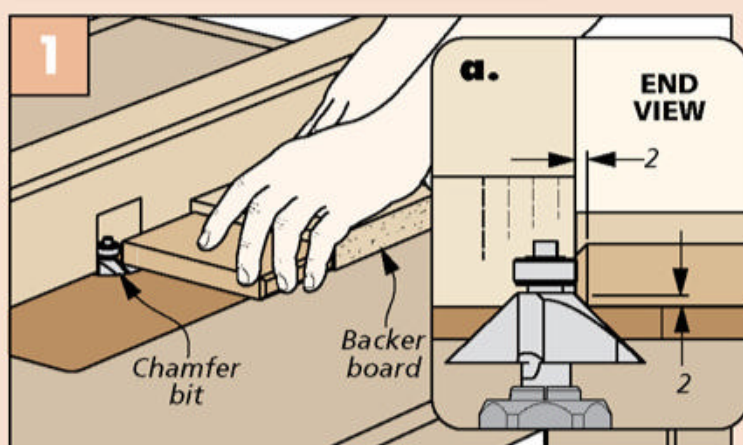
Also, after cleaning the area of unwanted items, I pre-gap and place the clamps close to where they'll be needed.

Dry Run. The dry run allows you to pre-drill for the screws, removing any step that consumes time always helps. Making sure the edges of the sides and frames are flush is also done in this rehearsal. Finally, using slow-set glue will give you extra time.

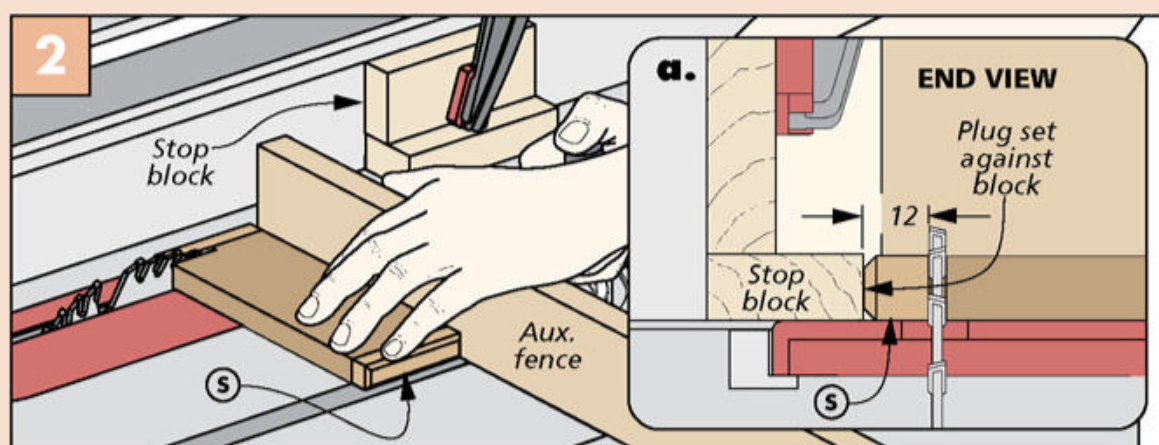




FAUX TENON PLUGS



Rout the Chamfers. A chamfer bit chucked into your router table lets you ease the edges of the tenons. For safety, always use a backer board.



Cut the Tenon Plug Free. An L-shaped stop block clamped to the fence ahead of the saw blade provides room for the workpiece between the fence and the saw blade as you cut the tenon plug free.

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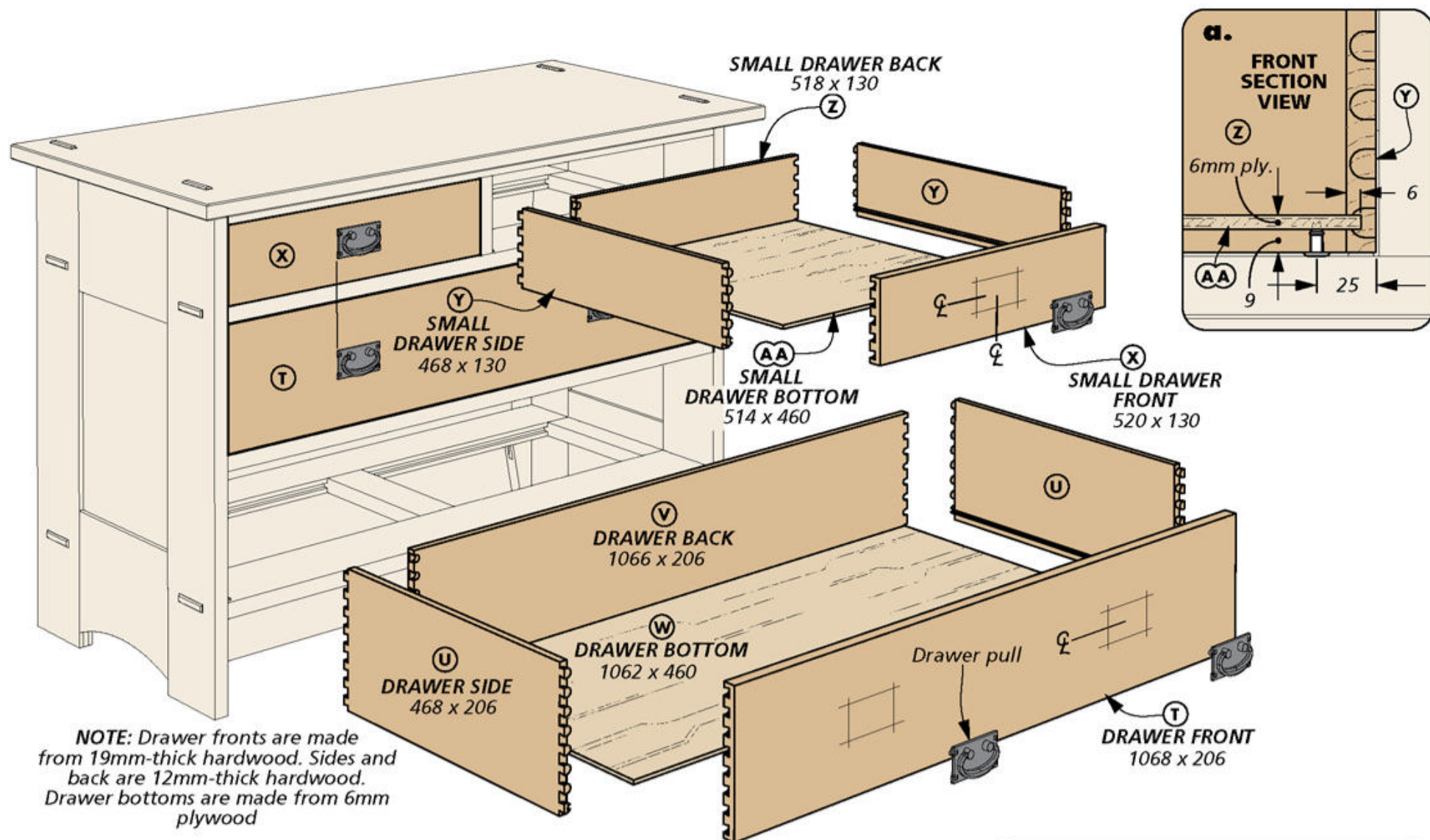
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Finish with the DRAWERS

The four drawers, with their oak fronts, blonde maple or pine sides and back, and plywood bottom, are next on the list. You cannot come up with stronger joints than the half-blind dovetails used on this drawer. The process starts with sizing the parts.

DRAWER DETAILS. All the drawers above have an even reveal around the opening they reside in — including space for the stem bumpers. (The bumpers are installed on the lower edge of the drawer backs and in the front of the case frames.) The drawer depth shown, fits the chest of drawers case perfectly.

The wood choice and thickness for the drawers is an optimal combination for a drawer that needs to perform for a long time. The main drawing above shows that the sides and back are made from 12mm-thick material. The lighter wood (in colour and thickness) makes it easier to operate

the drawers. The drawer front is 19mm thick. The added thickness gives plenty of support for all the pulling and pushing that the drawer is put through in its lifetime.

HALF-BLIND DOVETAILS. The dovetail layout that's shown in detail 'c' will work for both drawers. When all the routing is done, stow away the dovetail jig and router. Next, you'll need to head over to the table saw to cut the grooves for the drawer bottoms.

Since there's no false drawer fronts on this project, you have to find another way

to hide the groove for the drawer bottom. The box on the next page shows how to do that. All you have to do is locate the groove in the centre of the lowest tail on the side pieces. That set-up will place the groove in the lowest socket on the drawer parts. There are a few more things to do before assembling the drawers.

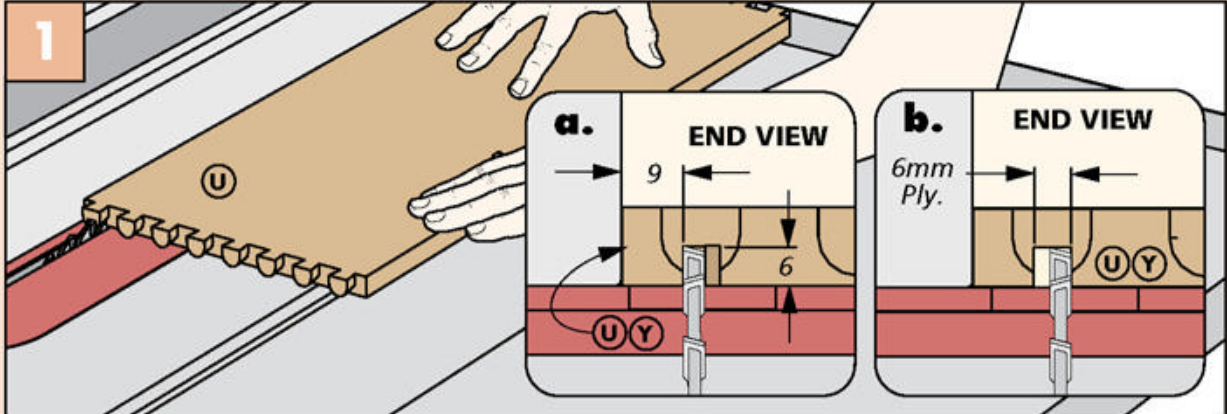
PRE-ASSEMBLY. First, drill the holes for the stem bumpers (detail 'a'). They're centred on the thickness of the drawer back. Now let's look at the drawer pulls.

It's easier to lay out and drill the holes for the drawer pulls before the drawer is assembled. The main drawing shows the pull centred on the face of the small drawers. For the big drawers, centre them horizontally and align them vertically with the pulls on the small drawers.

It's best to stain the drawer fronts before assembly. Doing so you'll save a lot of time and headaches. Now you can glue up the drawers. Be mindful of any glue squeeze out.

FINISH. Two coats of lacquer will protect this beautiful chest of drawers for a lifetime. Enjoy. 

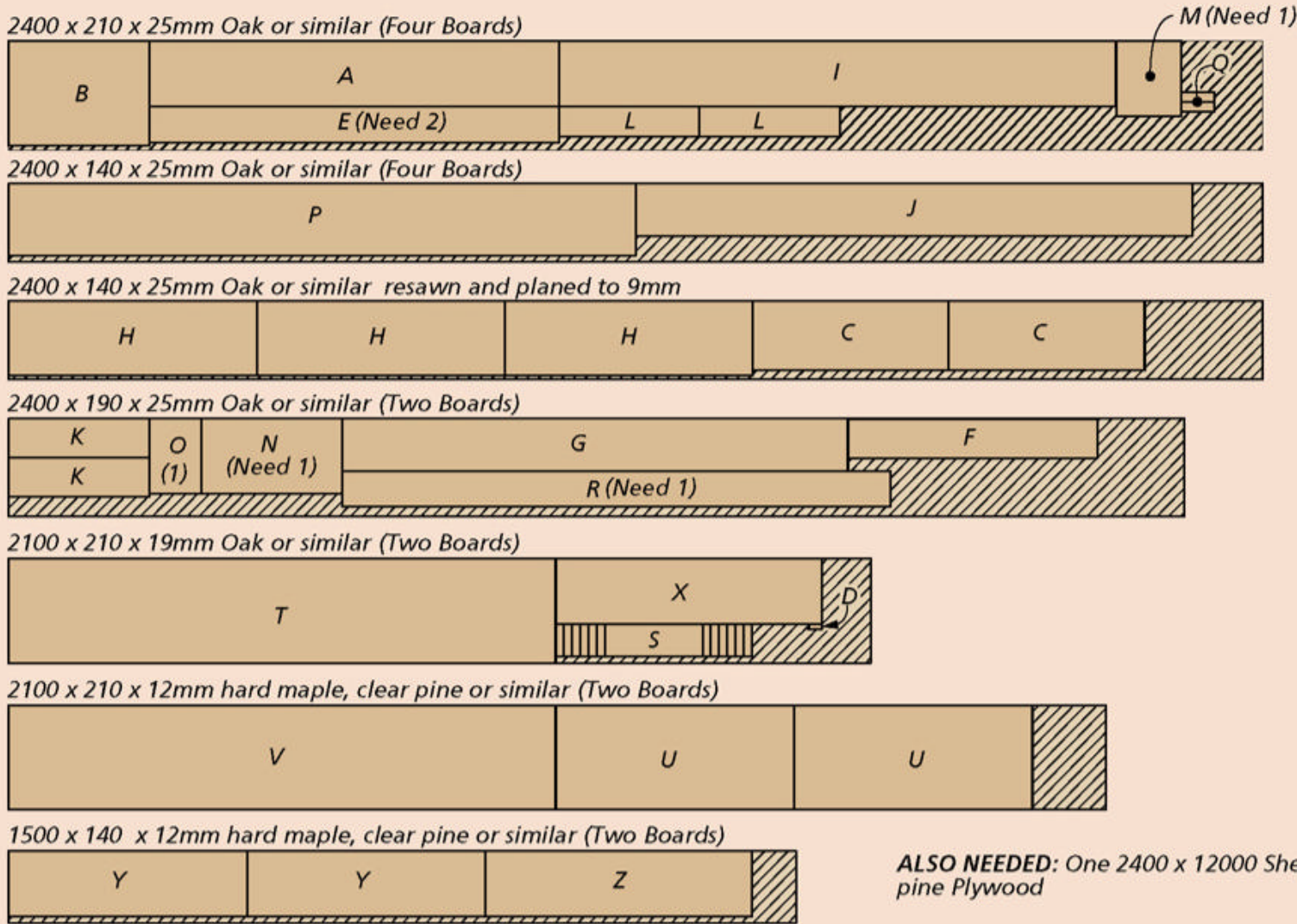
DRAWER BOTTOM GROOVE



Hide the Groove. The groove for the drawer bottom is hidden inside of the dovetail joinery. I made multiple passes to match the thickness of the plywood bottom.

Materials, Supplies & Cutting Diagram

A Stiles (4)	800 x 125 x 25	L Frame Ends (8)	276 x 60 x 25	W Drawer Bottoms (2)1062 x 460 x 6 ply
B Rails (4)	276 x 200 x 25	M Divider Front (1)	148 x 125 x 25	X Small Drawer Fronts (2)520 x 130 x 19
C Panels (2)	390 x 274 x 9	N Divider Middle (1)	274 x 148 x 25	Y Small Drawer Sides (4) 468 x 130 x 12
D Fillers (2)	25 x 9 x 9	O Divider Back (1)	148 x 100 x 25	Z Small Drawer Backs (2) 518 x 130 x 12
E Back Stiles (2)	800 x 75 x 25	P Top (1)	1218 x 550 x 25	AA Small Drawer Btms. (2)514 x 460 x 6 ply
F Back Centre Stiles (2)	492 x 75 x 25	Q Cleats (2)	65 x 19 x 19	
G Back Rails (2)	974 x 100 x 25	R Skirt (1)	1068 x 70 x 25	• (24) 8g x 38mm c/s Woodscrews • (4) 8g x 38mm Ph Woodscrews • (16) Stem Bumpers • (6) Drawer Pulls
H Back Panels (3)	490 x 286 x 9	S Tenon Plugs (12)	65 x 13 x 12	
I Frame Fronts (4)	1086 x 125 x 25	T Drawer Fronts (2)	1068 x 206 x 19	
J Frame Backs (4)	1086 x 100 x 25	U Drawer Sides (4)	468 x 206 x 12	
K Frame Centres (4)	276 x 75 x 25	V Drawer Backs (2)	1066 x 206 x 12	





Arts & Crafts Mirror

▲ First, faux tenon plugs add interest to the sides of the mirror. Then there's positive and negative space interplay created by the middle stiles. Finally, the cap adds the crowning Arts & Crafts touch to the mirror.

Mirror, mirror, on the wall who's the ... I'll leave inquiring questions up to you. But it's true that there is a certain magic to mirrors. That magic mostly comes from the alchemy that appears to happen when you apply silvering to the back of a piece of glass — the simple act of physics transforms the glass, giving it the magical power we call a reflection.

This reflection will add light and depth to the environment it resides in. It also helps in the more mundane activi-

ties of life, like straightening your tie, or a final check for little green bits left from lunch hiding in your teeth.

But this mirror is also graced with the Arts & Crafts-inspired frame you see in the photos on this page. The design pays homage to a bed frame that was in Issue 147 of *Australian Woodsmith*. You can find the matching gentleman's dresser in Issue 128. In our next issue we will complete the bedroom suite with a matching nightstand.

Start with the STILES & RAILS

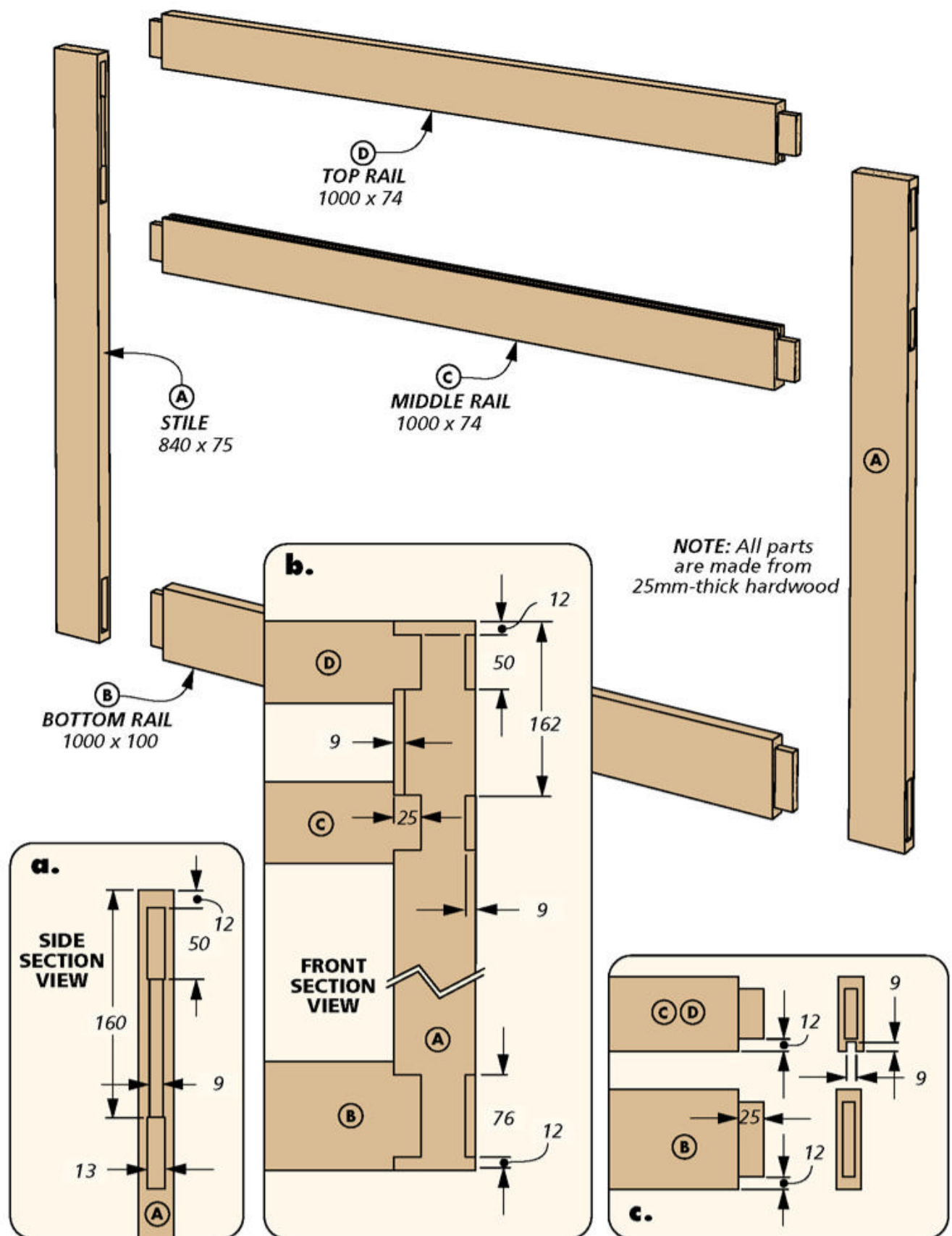
Mirrors of the size we are using here are heavy, so it's important to have a frame that can carry the load. That's not going to be a problem though, as you see in the drawings to the right. In keeping with the Arts & Crafts spirit, the stiles and rails used for this mirror are generously proportioned. As are the tenons on the three rails that join them to the stiles.

To get started, cut the workpieces to their final size. Then you can set aside the rails and focus on the stiles.

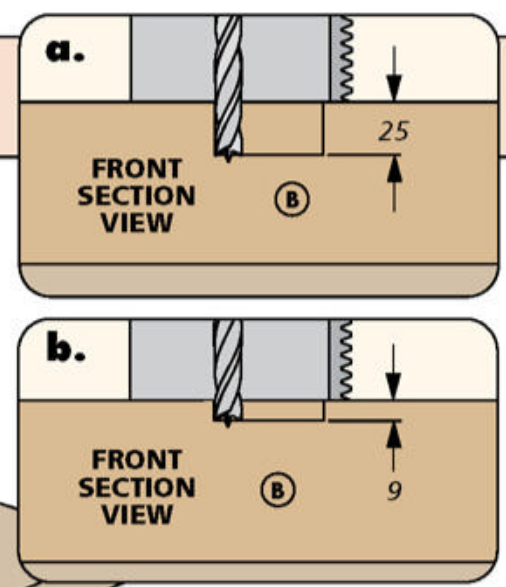
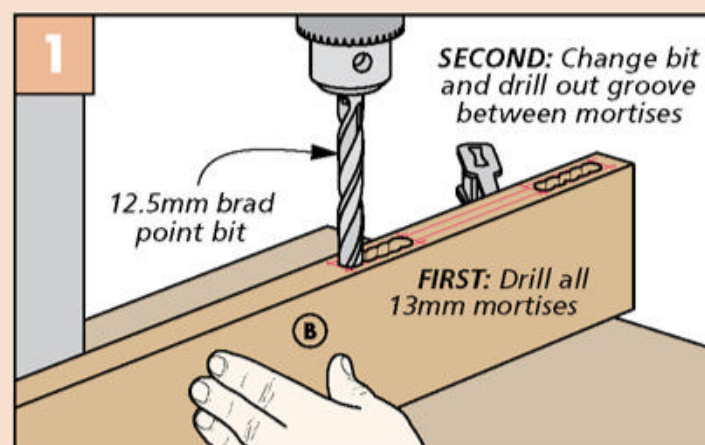
MORTISES IN THE STILES. There are two sizes of mortises you need to make in the stiles. The longer mortise is for the bottom rail tenons on the inside of the mirror, and the tenon plugs on the outer edges of the stiles. The shorter mortises are for the middle and top rails, all of these are shown in detail 'b.' The box below shows the steps needed to make the mortises on the inside, as well as the outside edges of the stiles.

Detail 'a' shows a groove between the two upper mortises. This groove holds a filler piece that you'll make later. I used a smaller brad point bit and made those grooves at the drill press.

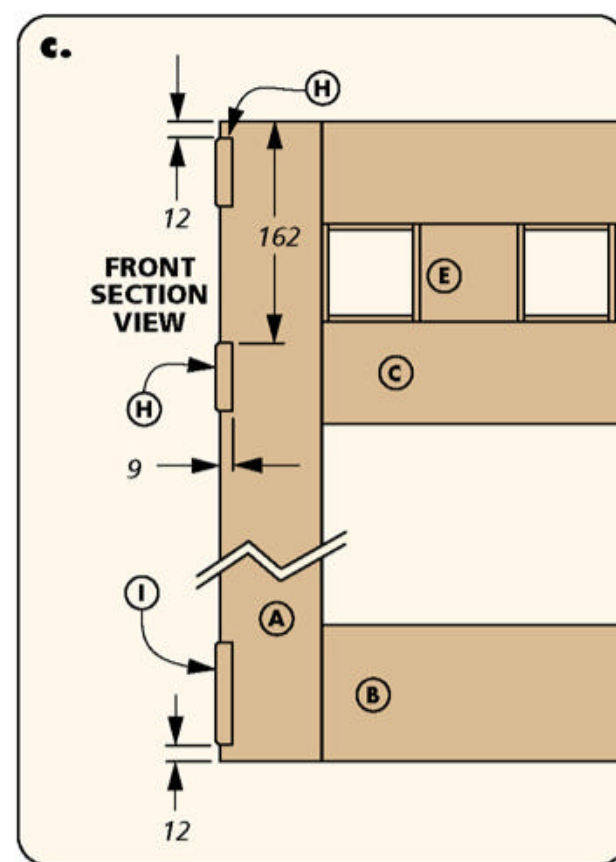
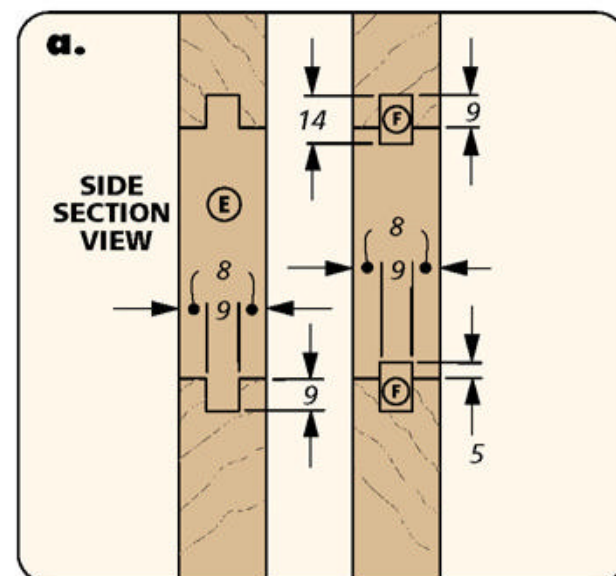
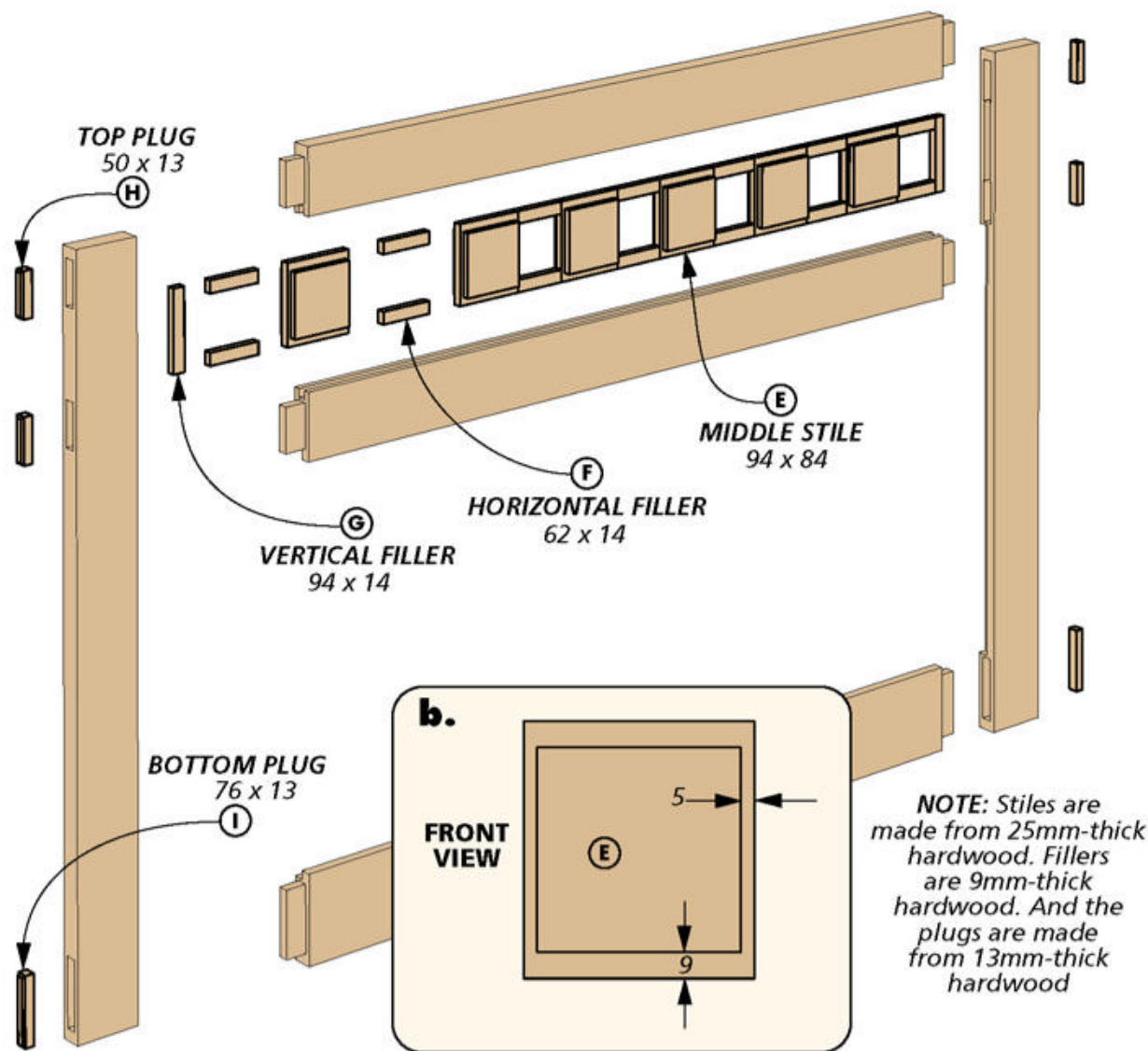
TENONS ON THE RAILS. The tenons on the rails are made at the table saw. Using the rip fence as a stop, and the mitre gauge to guide and support the rails, I cut all the cheeks first. Then I stood the rails on their edges to make the shoulders. All that's left here is making the grooves in the middle and top rail (detail 'c'). Now you're over half way home on this project. On the next page you'll find the directions for making the rest of the parts of the mirror frame.



MORTISE ON BOTH SIDES



A Two-Tiered Mortise. Start out with the larger, deeper mortises for the rails (detail 'a'). Use this bit for the tenon plug mortises as well (detail 'b'). Then you can change out the bit and make the groove between the two rail mortises.



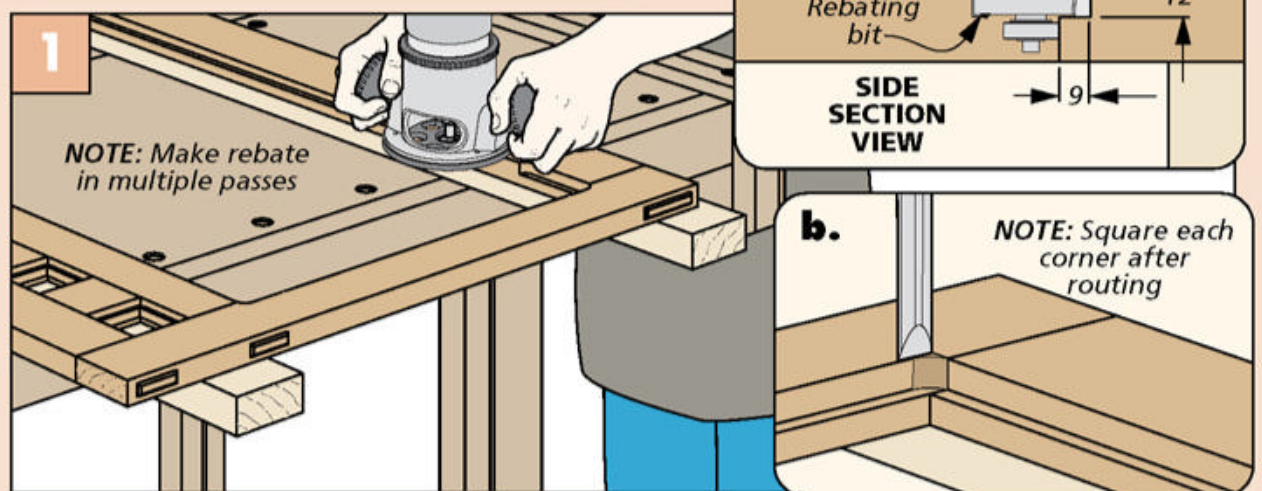
Throw in some **DECORATIVE DETAILS**

You've got a few more pieces to make before you can glue up the mirror frame. As you see in the drawing above, there are six middle stiles. Technically, these are the only pieces you need to glue up the frame. But I wanted to use the filler pieces to help space the stiles evenly across the length of the mirror. The tenon plugs and the cap

for the top of the mirror are decorative elements that can wait until later.

START WITH STILES. The easiest way to make the stiles is to start with a blank that's longer than the total length of the six stiles. Using your table saw with a dado blade buried in an auxiliary fence, cut the narrow tongues on the long edges (detail 'b').

ROUTING BACK REBATE



Use a Rebating Bit. A rebating bit chucked into your router is the best way to make the rebate in the back of the frame that holds the mirror and Masonite back.

Then, cut each of the middle stiles out of the blank.

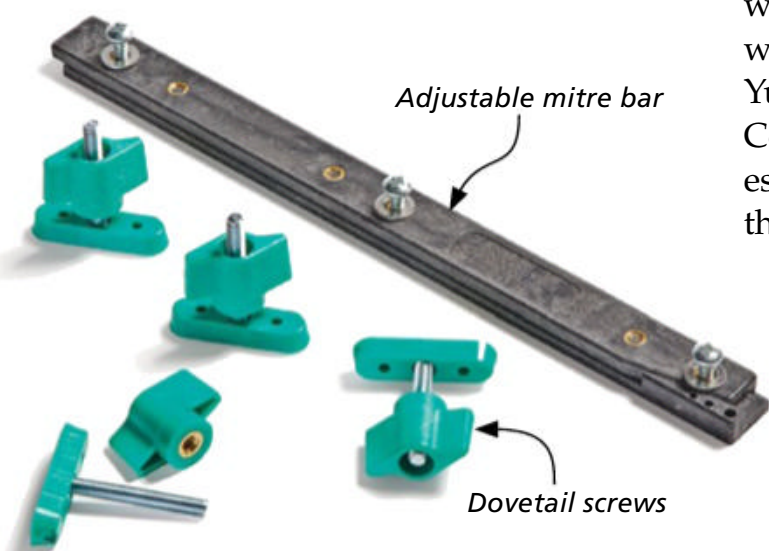
Making the tongues that go in the groove of the rails is just a matter of switching back to the set-up you used for the tongues, this tongue is a little wider than the first one you made.

FILLERS. The filler strips do the double-duty of spacing the stiles in the frame, and adding a nice shadow line accent across the top of the frame. I milled the fillers in long strips, but held off on cutting them to length until the next step — the dry run.

DRY RUN. Doing a dry run before going live with glue has always paid off in my book. In this instance there's an added benefit of getting to space the stiles, and



ZeroPlay 360 Sled Kit



Adjustable mitre bar

Dovetail screws

▲ The ZeroPlay 360 kit comes with a mitre bar and four dovetail screws. You need to supply the plywood components — and imagination.

After 40-plus years of producing woodworking furniture plans, can you guess what our most popular plans are? Jigs. Yup, I'm a little surprised by that, too. Considering all the outstanding bookcases, dressers, beds and boxes, it's amazing that table saw sleds could beat all that.

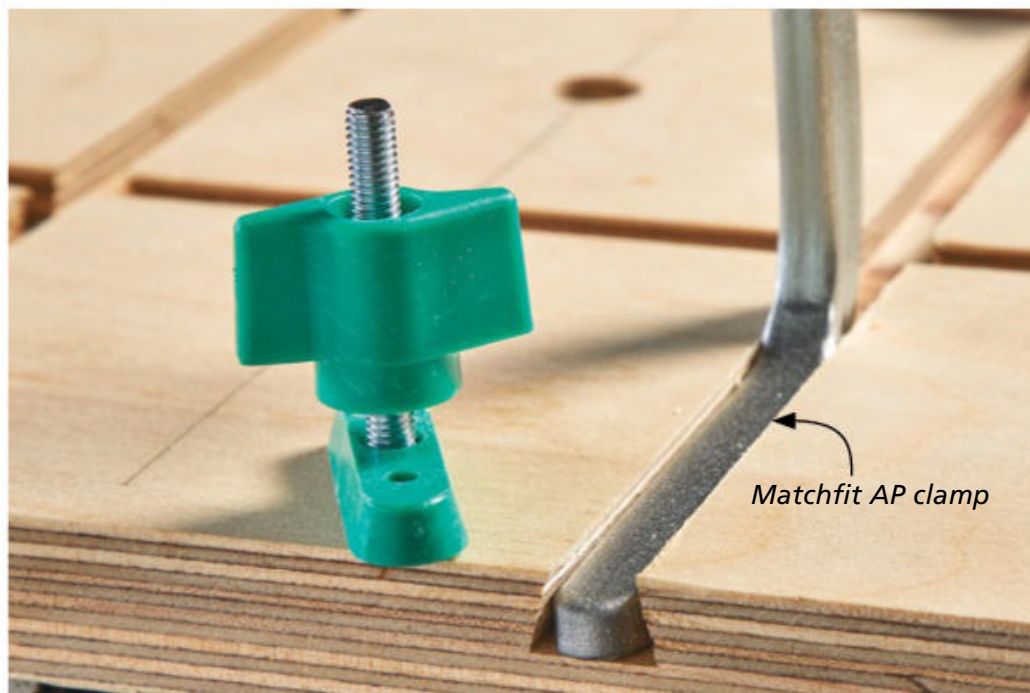
I think the reason for that popularity is that a reliable crosscut sled — or other jigs — can be used on all kinds of woodworking projects, regardless of their style. And not everyone has the same furniture taste, or needs. The thing about designing and making jigs is that it can quickly become a rabbit hole. I've heard quite a few woodworkers declare they prefer making furniture over building jigs.

In an effort to bring those two camps together, I submit for consider-



▲ Matchfit AP clamps have an anti-pivot foot to grip a workpiece of almost any size and shape.

ation the ZeroPlay 360 Sled Kit from MicroJig. This hardware kit, shown in the left margin, provides some essential supplies to speed up the process of designing and creating your own jigs. Let's take a look at what the kit includes and how you'd put it to use in your workshop.



► Creating any type of jig means supplying your own plywood platform to go with the hardware kit.

▲ The plastic key on the dovetail screw slides into a complementary groove cut into the platform of the jig. The grooves also accept the head clamps to increase workpiece control and safety.

WHAT'S INCLUDED. The kit isn't a sled itself. Instead, it provides some key items. The most familiar is the adjustable mitre bar. On the surface, it doesn't seem like a big deal. Adjustable mitre bars appear on most woodworking retailer's sites. The way this one adjusts is what sets it apart.

The bar consists of two parts with tapered mating edges. As the parts slide back and forth, the overall width of the bar increases or decreases. An adjustment screw on top of the bar allows you to dial in the fit of the bar while it's still in the mitre slot, as shown in the right photo. This saves a lot of back and forth in getting a smooth-sliding fit without

any play in the slot.

Threaded holes on top of the bar allow you to attach it to the sled from above.

DOVETAIL SCREWS. The other part of the kit, four "dovetail screws," are what make the kit sing. These screws sport a dovetail-shaped key. They're designed to slide in matching grooves cut into the surface of jigs and sleds. You can see this in the photo above and the main photo on the previous page.

The grooves take the place of extruded aluminium T-track that's often used in workshop-made jigs. The screws and knobs add flexibility, allowing you to



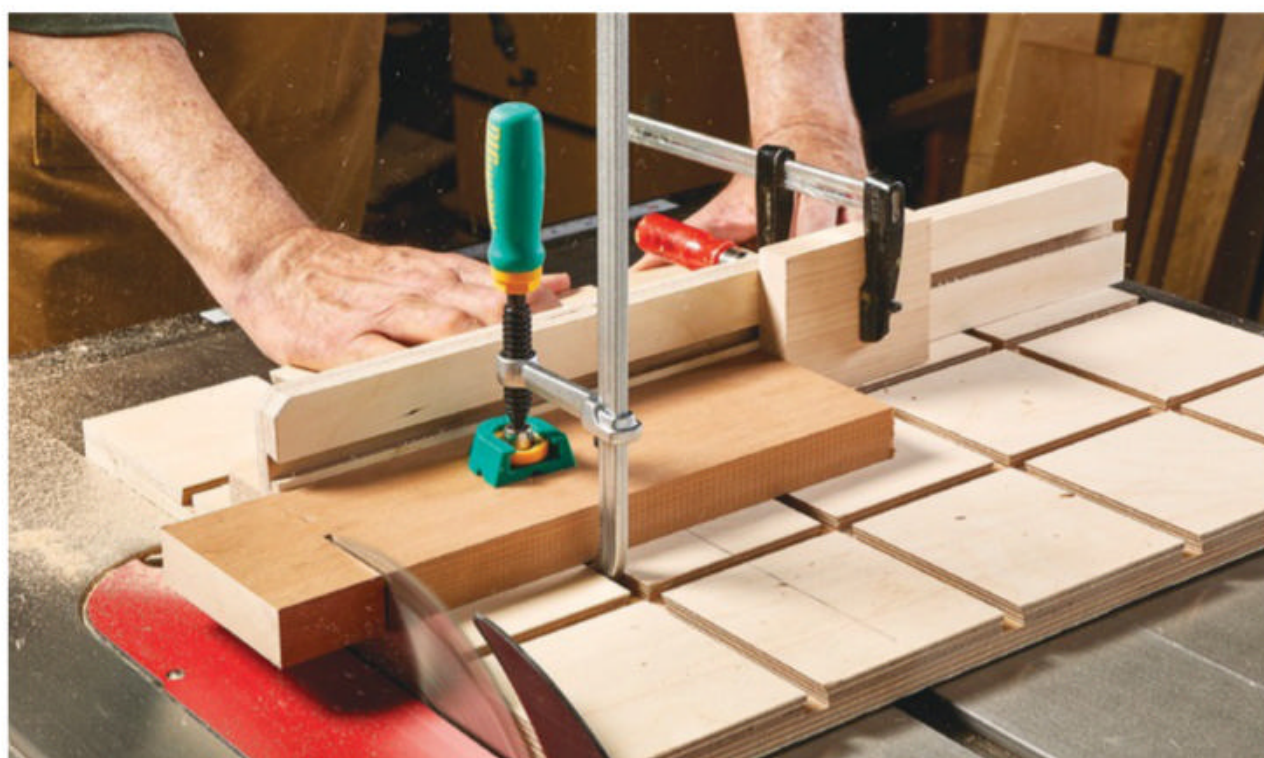
▲ The two halves of the mitre bar are tapered to customise the fit to the mitre track in your table saw.

secure fences or stops anywhere you want, instead of being tied to a piece of T-track.

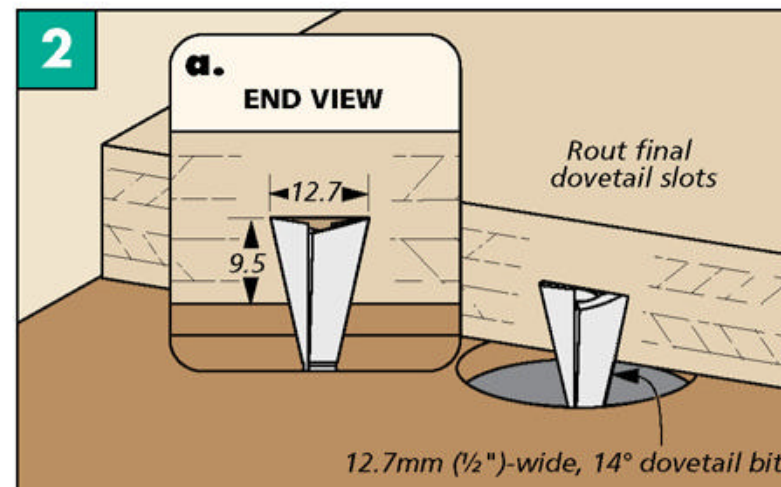
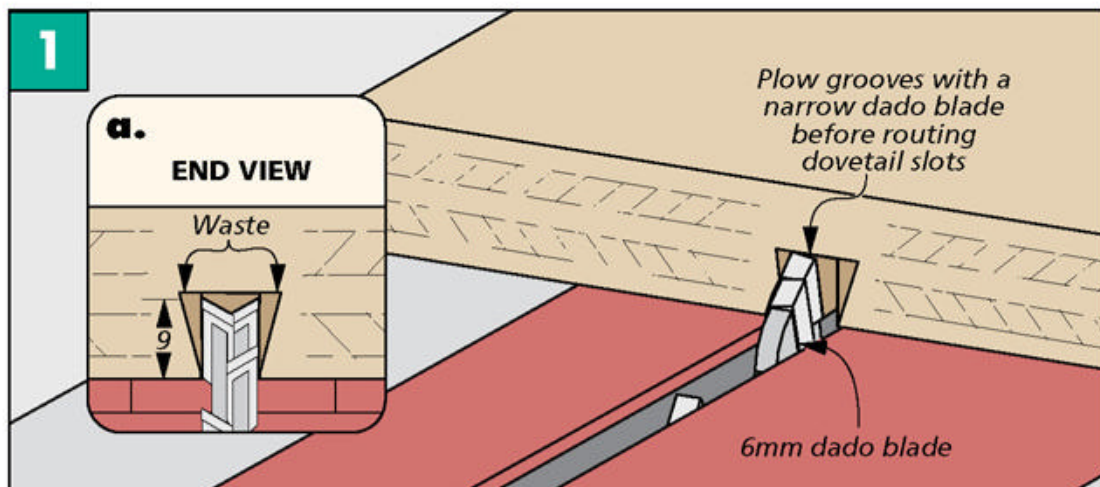
AP CLAMPS. The concept of adding dovetail-shaped grooves to jigs and work-surfaces gained traction with MicroJig's MatchFit AP dovetail clamps released several years ago. While the clamps aren't part of the kit, I consider them an essential part of the system and worth getting.

Recently, the clamps were upgraded to provide a more secure hold on narrow and odd-shaped workpieces. An auxiliary anti-pivot foot slips over the swivel end and prevents the clamp from slipping off a workpiece, as shown in the right photo on the previous page.

A SIMPLE SLED. One way to get an idea for how to put this kit to use is to make a crosscut sled like the one at left. The slots accept a fence and clamps for making 90° cuts as well as mitres (shown in the photo on the previous page). Next we'll look at making the grooves.



▲ A crosscut sled stands at the top of the list for table saw jigs. The dovetail slots in the base secure the fence and accept clamps to keep a workpiece from shifting during a cut.



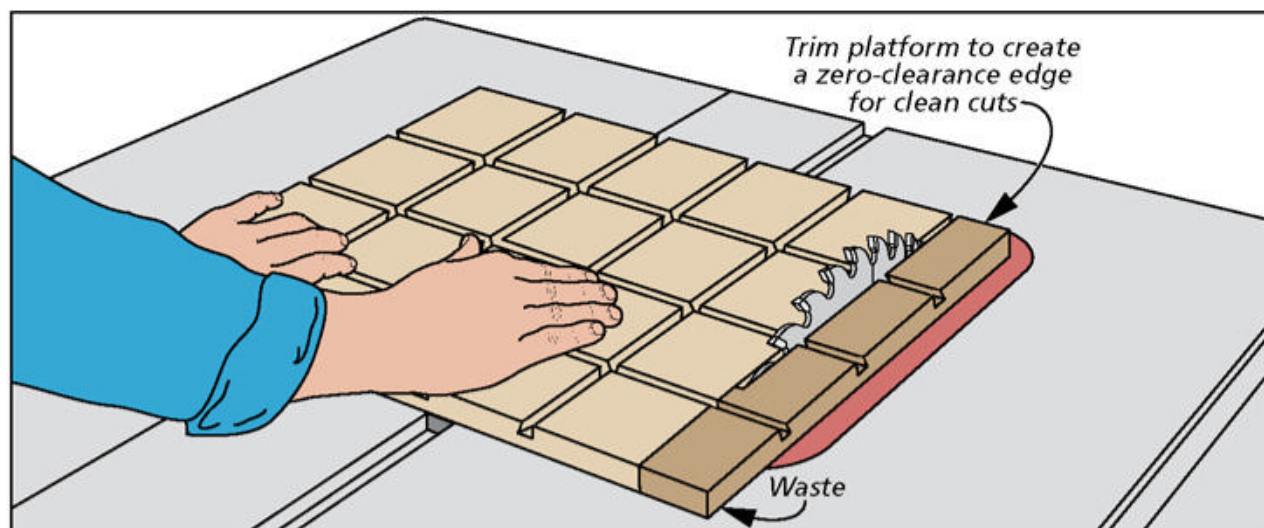
CREATING THE SLOTS

It's pretty clear that making the slots is going to require using a dovetail bit. The bit you need is a pretty standard 14°, 12.7mm (½")-wide cutter. However, with as much material as you need to remove, that puts a lot of mileage on the bit. There's a more efficient way.

The two-step approach is shown in the drawings above. Start at the table saw with a 6mm dado blade installed. Set the blade height to just below the final depth of the groove (9.5mm).

Plow a groove with the dado blade at each of the locations. This removes most of the waste from the groove and gives you a clear way to line up the cut for the dovetail bit.

ROUTER TABLE. At the router table, use the fence to centre the bit on the groove. The bit



needs to be raised to the final height. The routing goes pretty quickly. It's a good idea to make a test cut and check the fit with the clamp or dovetail screw, just to be sure.

For a table saw sled, I like to make the platform slightly oversize. This way, when

you attach the mitre bar, you can trim the platform with an initial cut (drawing above).

But don't stop there. You can put the hardware kit to work on other tools, too. Take a look at the box below. Suddenly making jigs doesn't seem too bad after all. **W**

THINK OUTSIDE THE TABLE SAW



On the Router Table. A dado sled comes in handy for making small boxes where the smooth cut of a router bit beats the look of a dado blade cut.



On the Bandsaw. For a long jig like this, you can use two in-line mitre bars to guide it. Use it to cut tapers or to put a straight edge on rough-sawn stock.

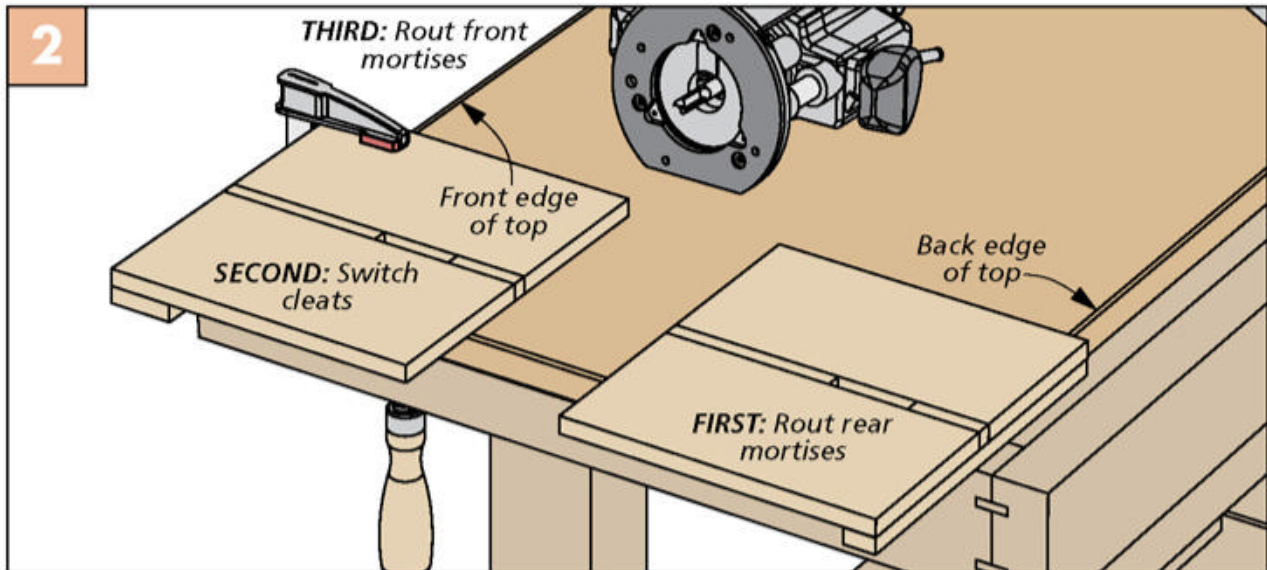
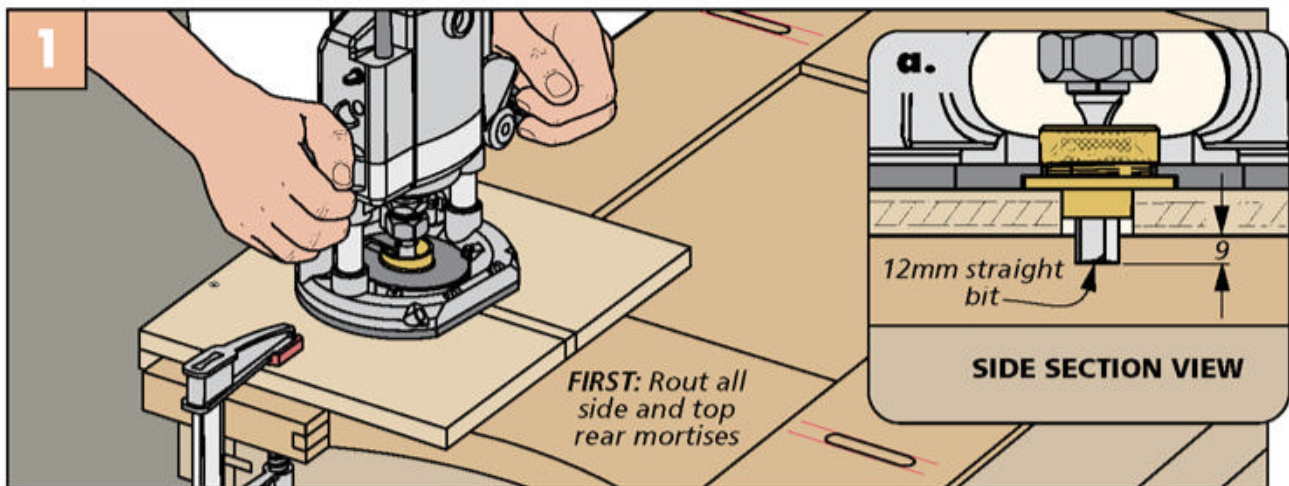
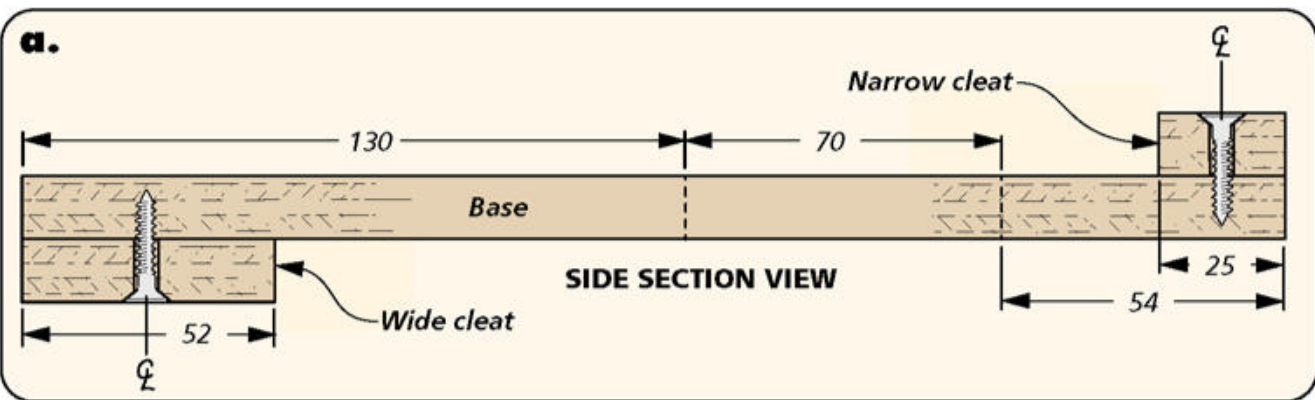
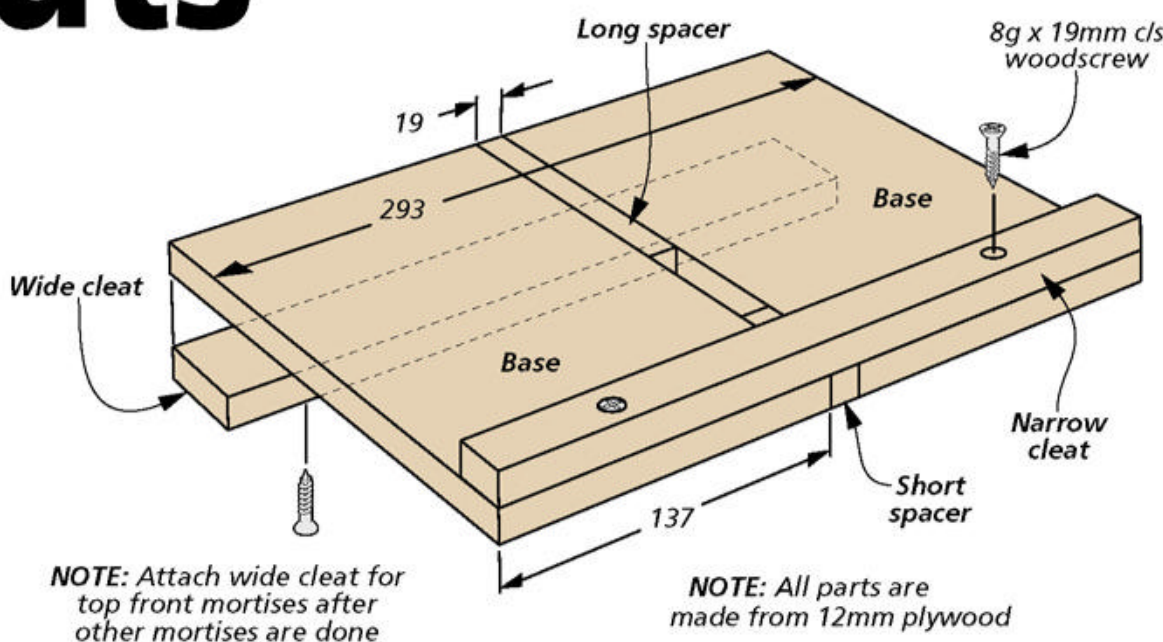
Workshop Notebook & Short Cuts

TEMPLATE ROUTING JIG

The sides and top of the Arts & Crafts chest of drawers are assembled with screws through the shallow mortises that also hold the tenon plugs. To ensure consistent mortise sizes, I used the router jig shown at right.

The two-part base and a pair of spacers form an opening for a guide bushing and straight bit. The width of the opening matches the bushing. The bushing should slide smoothly in the slot without moving from side to side. The distance between the spacers determines the overall length of the mortise.

For all of the mortises except the two near the front edge of the top, clamp the jig to the workpiece with the narrow cleat securely against the edge of the workpiece. Use a plunge router to make a couple of passes to reach the final depth like you see in Figure 1a. For the two front mortises on the top, remove the narrow cleat, flip the jig over and attach the wide cleat. That cleat butts against the front edge of the top.





Rustic Beaded Box

Pat Carroll uses a classic design feature that looks great and also disguises the join.

A rustic beaded box made from basic tools other than a homemade beading tool. The timber for this project is Irish yew (*Taxus baccata*). Further enhancements were added to the piece by using texture on the handle to accentuate the rustic feel of a well-used object. A design change was made to the piece with

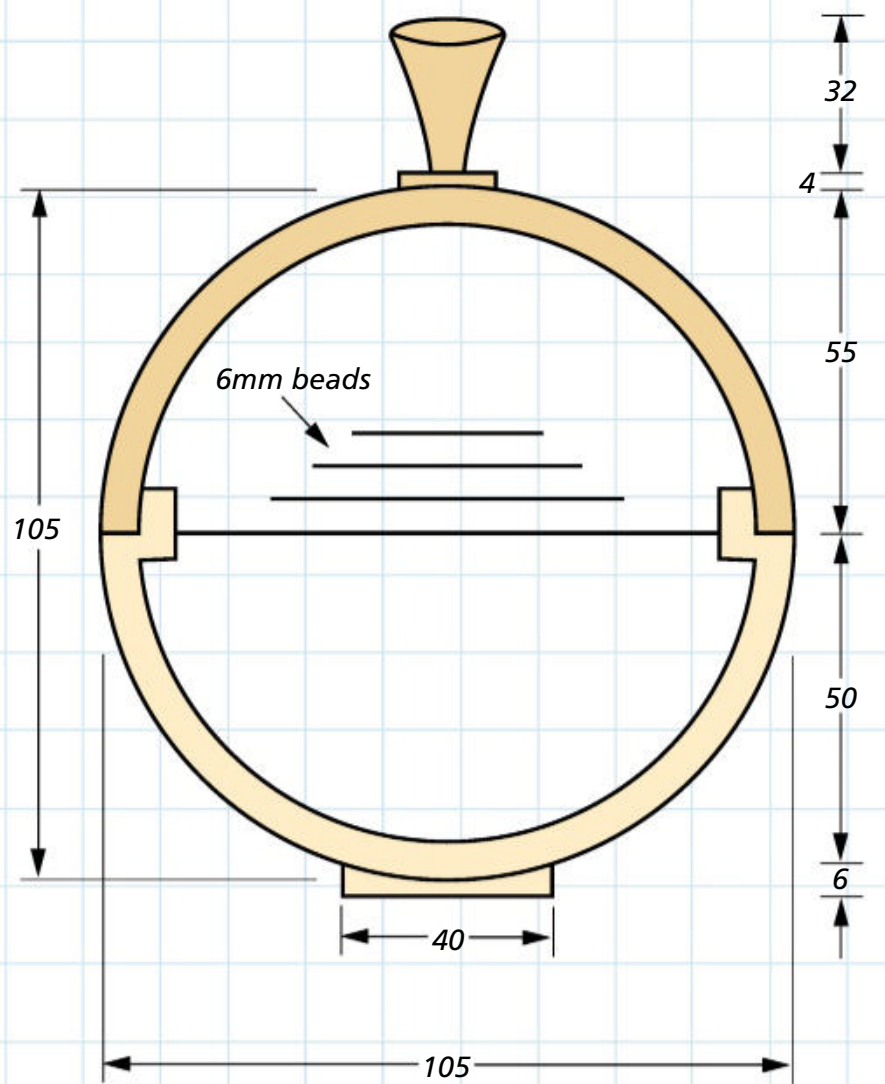
the addition of colour. Then Verdigris wax gave the aged look to the piece, finished off with a light brush of copper gilt cream. A loose-fit lid suited this piece as it was designed as a trinket or jewellery box. The base needs to stay in place when the lid is opened so as not to risk losing its small contents.

EQUIPMENT AND MATERIALS

Tools

- 25mm spindle roughing gouge
 - 13mm spindle gouge
 - 6mm parting tool
 - 4mm parting tool
 - 6mm spindle gouge (beading tool)
 - 25mm round nose scraper
 - Pointed detail tool
 - Texturing tool
 - Callipers
 - Dust extractor
 - Danish oil
 - Black spray paint
 - Verdigris wax
 - Copper gilt cream
 - Abrasives, from 120 grit to 400 grit
- ### Materials
- Yew (*Taxus baccata*)
220mm x 100mm x 100mm

The measurements shown are guidelines. By all means follow the pattern or create the item to your ability, requirements and lathe capacity.

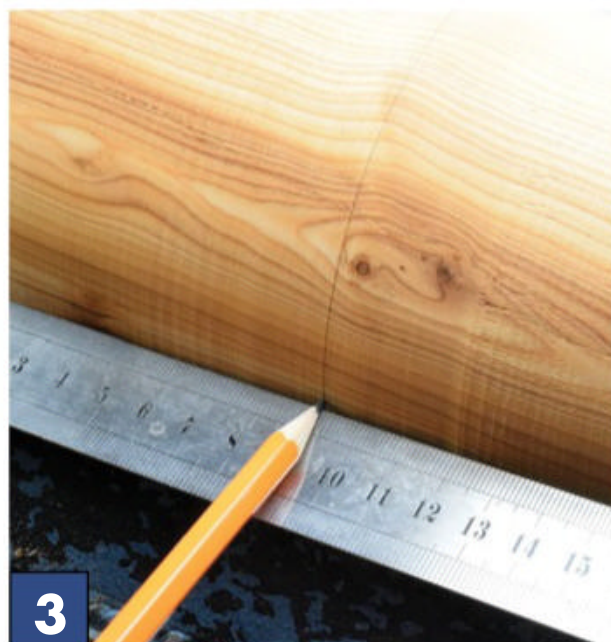


1 I use a piece of yew (*Taxus baccata*) with the grain running parallel to the lathe. The piece is mounted between centres and, using a spindle roughing gouge, brought to a cylinder. Remember to wear all safety equipment necessary. Instead of using yew, you could use any close-grained dense hardwood for this project. But whatever timber you use, make sure it is one that you can cut beads cleanly with minimal tearout.

2 A tenon is formed on each end of the piece to suit the jaws of your chuck. I need a 50mm tenon for my chuck, but of course adjust the size of the spigot to suit your chuck jaws. Once cut, insert the piece into the chuck and tighten securely. The piece in the chuck will be the top of the box.

3 With the piece trued up, it is inspected for cracks or issues that may compromise safety during turning or the quality of the finished piece. Using a divider or ruler, mark a centre line on the piece.

4 Using the 4mm parting tool, create a parting approximately 25mm into the centre of the piece. Then, using a 6mm parting tool, create a tenon to the recommended size on the plan. Again, using the 4mm parting tool proceed to part the piece off, leaving 1mm (witness mark), of the tenon on the top of the piece and a tenon of 6mm minimum on the bottom of the piece.





5



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8



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5 Complete the parting with a saw if you are not confident completing the parting off with a chisel when the lathe is rotating. Note the scrap wood on the lathe to protect the saw and lathe bed.

6 Drill a hole to the required depth into the piece. Use masking tape on the drill bit to give exact depth. This allows an easy starting point for the gouge.

7 With the flute of the 13mm spindle gouge at 45° or the flute facing 10 o'clock, gently pull from the centre out, allowing the tip of the tool to cut. Although there is plenty of waste wood, light cuts are best, helping to avoid torn grain.

8 Proceed all the way out with the cut stopping 1mm away from the witness mark left by the parting tool. Use the parting tool if preferred to clean the recess, and keep the walls parallel.

9 Offer up the bottom of the piece to check the fit. Proceed with very light cuts until the two pieces fit comfortably together. Align the grain and bring up the tailstock for support.

HEALTH AND SAFETY

Always ensure all health and safety issues are addressed regarding tools and equipment. Good dust prevention measures should always be adhered to in order to protect your health. A clean workshop helps make it safer. Think twice, cut once.

10 If an exact sphere is the desired shape, check the diameter of the piece with callipers, then transfer the measurement to the piece ensuring the joining is in the centre. Cardboard templates or sphere jigs can be used. For this project, freehand was applied.

11 Remove as much waste wood as possible with the parting tool, working from the outside inwards. Use light cuts to help minimise the risk of damaging the piece. Work to the line on both sides.

12 Using a 13mm spindle gouge shape the piece, working from the highest point towards the centre with each cut. Working from the outside towards the middle, forming the piece, continuously check the shape.

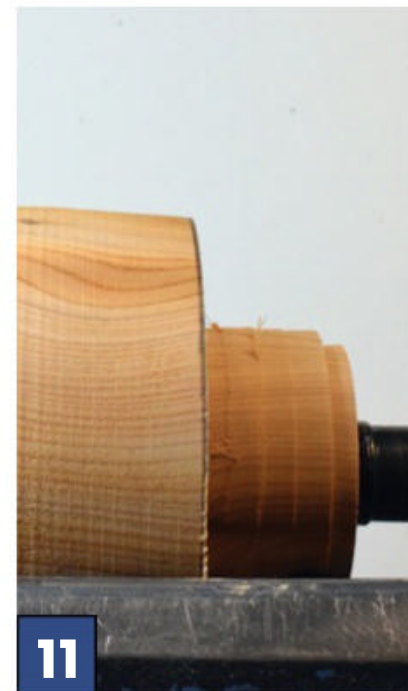
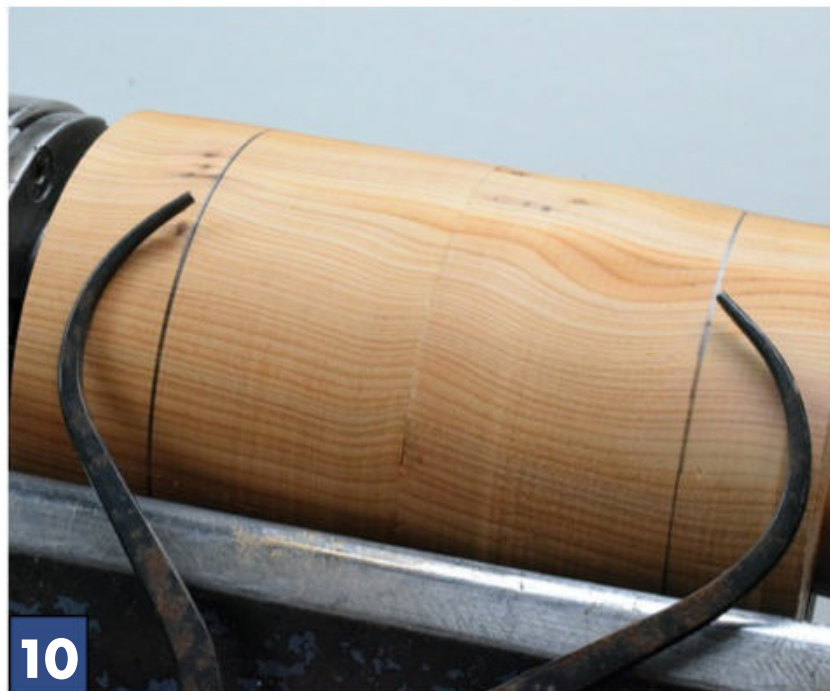
13 Light cuts rolling the tool as if forming a bead. Refine the piece to the required shape, remembering not to cut into the joint area as this will cause problems with the spigot and tenon.

14 The tip of a 6mm spindle gouge has been ground to approximately 40°. The sides have also been ground to minimise burnishing the neighbouring beads with friction. Practice on a scrap piece of wood is advised.

15 Use as fast a speed as is safe to help give a clean cut. With the left point of the tool exactly in the joint the cutting tip is exactly on centre, by raising the handle lightly engaging the cut. The tool is very minimally rocked from side to side allowing the wings to shear cut each side as it is rocked. Once the centre of the bead is formed, withdraw the tool or tear out can occur.

HANDY HINTS

The angle used on the homemade beading tool is a personal choice. Grinding the tool in stages helps to not heat the tool, and lose its temper. Many manufacturers make dedicated beading tools in various sizes.





16



17



18



19



20

16 The next bead to the left of the joint is formed next, ensuring the point of the tool is again in the joint. Check for a clean joint on the piece.

Proceed with marking out at least three beads at a time, using the beading tool. This also gives a reference point for the tool to engage the cut. Proceed as far around the piece as possible on both sides.

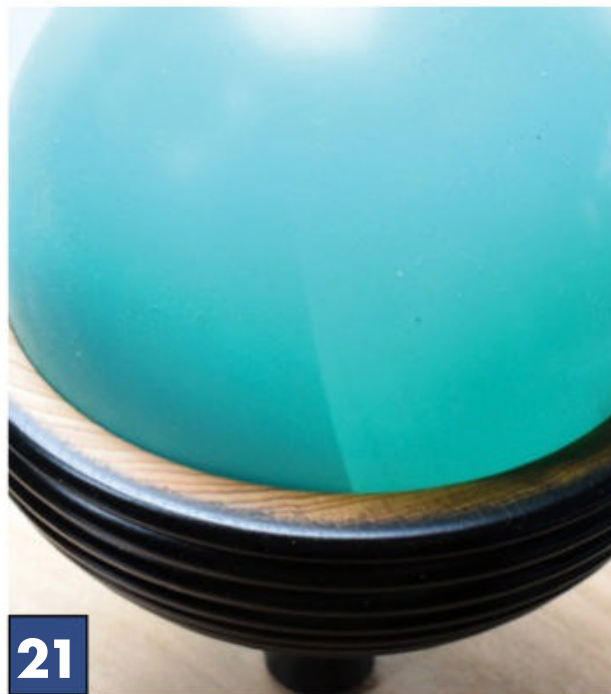
17 At this point the piece is sanded, starting with 150 grit and finishing with 400 grit. Note extractor pipe in picture. A dust mask is also recommended. There is never overkill in safety precautions.

18 The top is now hollowed with a 13mm spindle gouge, using the same technique as in step six. The inside is refined using a 25mm round nose scraper and a bead added for design, then sanded through the grits and finished inside with Danish oil.

19 The top is removed from the chuck and the bottom fitted and secured in the chuck. The top is fitted and masking tape is added for further security. More waste wood is removed and the beads on the top completed. Always use the tailstock when possible for securing the piece.

20 As the handle was finished and texture applied to the top, the decision to add colour was taken. With the piece sprayed black, several light coats are applied and allowed to dry. Use caution with dyes as they can bleed into the inside of the piece.

21 Due to the afterthought of the colour addition, the inside of the rim had to match the outside. The inside was finished with Danish oil and, to protect it from over-spray, a balloon was inflated to fit tight to the surrounding edge.



21

22 The top is removed and the rim is painted to match the outside of the piece. The base is then hollowed using the same procedure as in step six. The inside is sanded from 150 grit to 400 grit and Danish oil applied.



22

23 A scrap piece of wood is used as a jam chuck to finish the base. Masking tape is again used as a further safety precaution. The beads are completed and the remaining natural wood is sprayed black.



23

24 Verdigris wax is added for an aged, worn look. A light brush of copper gilt cream adds to the rustic effect. When the paint dries, the base is cut back to the natural wood, again sanded through the grits and detail lines added for visual affect. Two more coats of oil are added to the interior. It is lightly denibbed with 320 grit between coats.



24

25 Here's the finished piece with a loose top lid. **W**



25

To Coppice or Pollard?

Severely pruning a tree can make it productive for 1000 years.

My new neighbour downsized and moved into a lower-maintenance cottage across the road. After having lived in England for twenty years Karen had accumulated an interesting assortment of antique furniture.

Unfortunately, the carver chair was just too big for the new dining room. The remaining set of six chairs all had bodger-made legs and spindles. Insert-

ing Japanese wooden nails into crucial joints had the chairs locked tight and as good as new. It was a delight to work with a set of chairs that must have been made 150 years ago, products of a craft culture that had bodgers working in coppiced forests, making components for the chairmakers in the local towns.

The good news for me was that I was gifted the carver.

COPPICING

The term "coppice" is derived from the French word "couper" which means to cut.

Most of the woodlands of Europe and the UK are no longer wild, they have been managed for at least a thousand years. Typically, a farmer with a large acreage would put aside some unproductive land and cultivate it as a woodland. Deciduous species like ash, elm, oak, hazel, lime and willow would be allowed to take over the space and thrive, providing habitat for animals and birds as well as acting as a windbreak and helping to keep erosion at bay.

Typically, one eighth of the woodland would be coppiced every year. Coppicing takes place in winter when the trees are leafless and the stems dormant. The initial cutting takes place just above the ground and leaves behind a stool. The 8-year-old root system below the stool kicks into gear in spring and quickly sends up new shoots that bud and drink in the sunshine.

The eight-year cycle will see these new shoots mature into relatively straight stems of varying diameter. They themselves are harvested and used to make broomsticks, shovel and rake handles as well as stock for local bodgers. The stems that are rejected by the bodger would be cut into firewood and sold to



▲ Coppiced forests are cut down to stumps, pollarding lifts the stems above grazing height.



▲ A carver chair with bodger-made legs and spindles. The chair is a team effort and represents a deep culture of craft.



▲ Bodgers made the most of the material available. The defect in the leg was hidden by the chairmaker.



▲ Roy Davi (the Leura Bodger) at his pedal lathe turning chair spindles with a pole lathe.

the locals to heat their homes. Nothing was wasted. The offcuts from the harvest would have been stacked, covered in dirt and burnt slowly to form charcoal that would then be sold in local towns for cooking.

Coppiced oak woodlands would have been harvested on a 35-year cycle, while willow can be coppiced on a 2-year cycle.

The technique of harvesting an eighth of an ash woodland on an eight-year cycle means that the farmer has an endless supply of timber, firewood and charcoal. He always has 7/8ths of the woodland standing and is effectively cropping the trees.

The magic of coppicing is that a species like ash that might normally have a 250-year life span can live for a thousand years. The savage pruning of the tree reinvigorates it and makes it eight years old again. It is crucial that each stem is cut at an angle so that water does not get a chance to pool and allow pathogens to enter the cambium layer.

POLLARDING

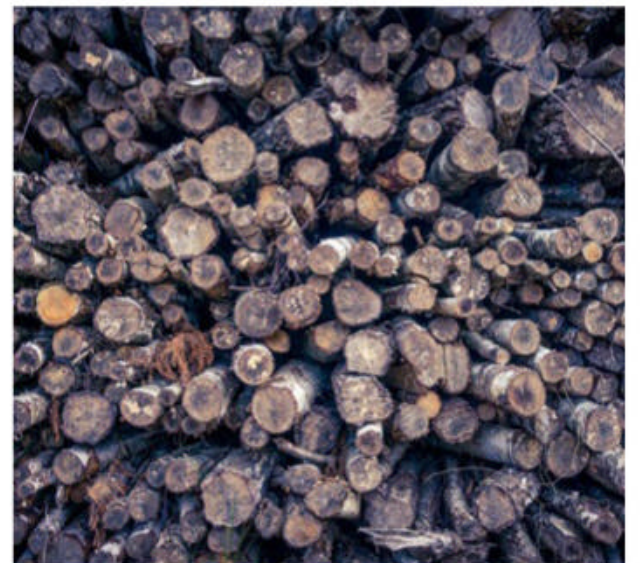
Pollarding is similar to coppicing in that the tree is radically pruned above head height. Typically, pollarded trees are found on the edges of grazing fields. These trees act as wind breaks, their roots draining the soil while the foli-

age thrives above head height and away from hungry mouths. Pollarded hazel and willow can provide canes for fence making as well as basket weaving. Harvesting the stems in winter has them leaf free and with very low levels of sap. This means they will not be susceptible to biological breakdown.

Some species of trees are pollarded to provide winter "hay" for stock. These trees are harvested at the end of spring when their leaf cover is at its maximum and the stems are full of sap.

THE BODGER

It is strange that the word "bodger" these days connotes something shoddy. Windsor chairs and the chair above are anything but shoddy. They are a team effort and reflect on a culture that saw the bodger living in the woodland for a month or so turning legs and rails from stems that he harvested in winter. The chairmaker would have carved the seat, crest rail and the arms and then selected legs and rails from a bulk order delivered by a bodger. A team effort in the days before mass production cut us off from the local forests and the village craft culture. A culture that was sustainable, good for the environment and worth revisiting. **W**



▲ Coppiced logs and stems harvested on an eight-year cycle. A source of furniture timber & firewood.



▲ Willow stems can be harvested every second year. They are flexible and easily woven into baskets.



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The winner of the Gifkins Dovetail Jig Package from Issue 170 is Brian Rowland of Ivanhoe East, Vic. Congratulations!

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Hinging Heavy Doors

On most cabinetry you position hinges symmetrically. Doors are a different matter. Heavy doors often require three hinges; with the top two positioned close together.

The heavy-duty hinges on Matsumoto Castle's keep speak volumes about hinge position. The bottom hinge is mostly in shear and is acting as a pivot. The top two hinges hold the door vertical. If the middle hinge was to be removed the top hinge would eventually stretch and fail due to the moment of force it has to keep in check.

You might think that placing a third hinge directly in the centre would have been the most logical thing to do. I am sure some castle keep and cathedral door installers have tried this solution. The test of time has seen the middle hinge migrate

towards the top hinge in order to share the load and keep the door from sagging.

In modern buildings it is the fire doors that tend to have three hinges. Most house doors are relatively light and can easily be swung on just two hinges. It is obvious that I have a thing about hinges and have always taken note of their position on doors and cabinets.

In Federation houses you will notice that the bottom hinge is usually spaced 260mm from the bottom of the door and the top hinge is usually 160mm from the top. My guess is that this spacing is due to convenience. A carpenter will be on his knees installing the bottom hinge and standing comfortably installing the top. If the hinges were symmetrical, he might have to lay down to install the bottom hinge.

After reading this article I am sure you too will start to take notes on hinge position. When I install hinges on a cabinet or a small box, I tend to use the hinge itself as a spacer. That is, I open the hinge and lay it on the face and edge of the door or lid and then use a marking knife to cut a datum for the top of the hinge. I then move the hinge down so the datum becomes the outside edge of the hinge and then mark the bottom. At this time, I reverse the hinge

so the knuckle rests against the face of the lid edge or door and mark the depth of the hinge. The final step in the marking out of the hinge is to set the marking gauge to the centre of the pin and run a line down the edge.

I can't feature a photo of my favourite Japanese castle without giving it some background. Matsumoto Castle is a plains castle. That means it is built on a plain and not on a hill or mountain. It would have been surrounded by moats and rings of buildings. The peasant farmers would have lived in the outer ring. The samurai and officials would have lived in the inner ring and the shogun inside his moated castle. Wars are not the most dangerous enemy of Japanese castles, interestingly, it is storms and lightning. Lightning strikes on castles cause fires that can eventually explode the gunpowder store. Matsumoto castle is on a plain and has therefore not been exposed to the number of lightning strikes that mountain-built castles have had to cope with.

When Thomas Franklin invented the lightning conductor in 1750 the number of castles and other tall buildings around the world that were burnt to the ground due to lightning strikes rapidly declined. **W**



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HARDWARE & SUPPLIES SOURCES

QUICK AND EASY CONSTRUCTION

If you are mass-producing panels the best way forward (once you have your stock ripped to width) is to install a single flat-topped dado blade in your table saw. These blades are available from Timbecon in 4mm, 6mm and 6.4mm tooth sizes. Perfect for cutting a flat-bottomed groove in your stile and rails.

HAND SAW TECHNIQUES

The one piece of advice that we forgot to give in this article was to keep your saw lubricated. A wipedown with camellia oil is the Japanese way to keep rust at bay and your blade slick. An applicator with a lid (to keep the dust off) is available from Japanese Tools Australia.

SQUARE CHIP CARVING

Tatiana mentions BeaverCraft and Flexcut knives in her delightful book. Carroll's Woodcraft Supplies stocks a wide range of BeaverCraft carving knives, while Carbatec can supply Flexcut blades. Timbecon and Carroll's both carry a range of Kirshen (Two Cherries) carving tools. Huon pine is the closest cousin to basswood when it comes to its ability to be easily carved. Basswood is common in Europe and the USA but only available in Australia in narrow sections.

SMALL-SCALE OFFICE

The organiser drawer that slips under the desk is available online from Rockler (68264).

ARTS & CRAFTS CHEST OF DRAWERS & MIRROR

The stem bumpers used as drawer glides in this project are available online from Woodworkers Supply. Their order number is 939-910. If you are not going to use stem bumpers you should add an extra 2mm to the heights of the drawer sides, backs and fronts.

Finer Fittings carries a range of antique Arts & Crafts drawer pulls. Go to their website to see their range. Otherwise you can source the pulls used in the project from Van Dyke's Restorers. Their order number is 02042234.

Mirror clips and hangers are available from Bunnings. Your glazier may also stock what you need to clip your mirror in position and hang it.

ZEROPLAY 360 SLED

To build the ZeroPlay sled you will need to purchase the MicroJig MatchFit Dovetail Clamp Pro Pack from Timbecon. It comes complete with all you will need to make this clever and very useful jig. While you are online you should check out the range of MicroJig options that Timbecon can supply.

Tiny Treasures DoveTails Competition 2023



The theme for the 2023 Sunshine Coast Wootha Prize is DoveTails. *Australian Woodsmith* is proud to sponsor the \$2500 prize for Tiny Treasures.

It is a certainty that from April 29 - May 1 2023 the Tiny Treasures Competition will run and *Australian Woodsmith* will be happy to hand over the \$2500 prize money to the winner.



▲ The Tiny Treasure needs to fit into a 130 x 130 x 110mm post-pak. It is both stored and presented on a cleverly designed plywood plinth.

State border closures shut down the Maleny Wood Expo for the last three years. Now they are open we can come together and celebrate Australia's premium wood expo in a "country show" atmosphere and be blown away by how creative the citizens of this wide brown land are!

WOOTHA PRIZE

Wootha Prize offers wood artisans working in sustainably harvested Australian timbers from native forests or plantations, recycled or weed timbers, the opportunity to showcase their work to the broad Maleny Wood Expo audience and win the Wootha prize of \$10,000.

TINY TREASURES

Australian Woodsmith challenges you to think "outside the box" and come up with a beautifully designed and exquisitely crafted work that can fit inside a box!

The genius behind this category is to make the competition accessible to anybody across Australia: no need to hire a trailer and drag your creation across the countryside, just post it!

Applicants need to go to malenywoodexpo.com so they can submit a description of their proposed (or existing) entry. Successful applicants are then sent a post-pak so they can post their Tiny Treasure in for a chance to win.

The winner of the Tiny Treasures competition will also be in the running for the \$10,000 Wootha prize!

TALES OR TAILS

The theme "DoveTails" is open to interpretation. It may be that you run with the infinite array of joinery techniques that use dovetails to weave timber together.

It may be that a dove and its tail opens up a world of sculptural interpretation for you. Or it might be that you play with dovetails in a new and creative way (like Julia Allan's delightful dovetailed eggs).

We are looking forward to handing over a cheque for \$2500 to a crafty and clever artisan who comes up with a gorgeous piece that stuns the judges and spreads the word that making something with your hands is a profoundly wonderful thing to do.

Entries close Friday March 17, 2023. **W**



▲ *ZeroPlay 360 Sled Kit.* This kit will speed up the process of designing and creating your own jigs. We'll show you how starting on page 56.

Final details



▲ *Arts & Crafts Chest of Drawers & Mirror.* The chest of drawers and mirror are the next projects in the Arts & Crafts bedroom suite. All the instructions you need begin on page 42.



▲ *Small-Scale Home Office.* This sleek and modern desk and wall shelf combo is the perfect workstation that the whole family can share. Turn to page 36 to get started.



▲ *Rustic Beaded Box.* Pat Carroll uses a classic design feature that looks great and also disguises the join. Step-by-step instructions begin on page 60.



▲ *Carving.* Tatiana Baldina takes you through all the steps to create a dramatic twisting square pattern starting on page 30.

BECOME THE ULTIMATE WOODWORKER

WL-20 SWIVEL HEAD WOOD LATHE

The WL-20 lathe is the bigger brother to the WL-18 and has three major features that sets them apart. The centre height is 185mm giving the ability to turn larger diameter bowls up to 370mm apart. The centre height is 185mm giving the ability to turn larger diameter bowls up to 370mm apart. The distance between centres is a very useful 1100mm for turning long spindles, table legs or similar items alike. The head can be swivelled out to turn large bowls and in addition the head can also be repositioned along the bed in the most convenient location to suit your preference and comfort.

The WL-20 lathe is mainly made up from cast iron to provide the rigidity that's required and needed in all good wood lathes. Changing the spindle speed from 500 to 2000rpm is extremely easy via the stepless variable speed control lever mounted on the front of the head.



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PLANER JOINTER & ACCESSORIES

PJ-6B BENCH PLANER JOINTER

The PJ-6B Planer/Joiner is perfectly designed for all those light to medium duty applications. This unique jointer comes with a 730mm long cast iron table and a 580 x 110mm adjustable tilting fence that allows the operator many options to plane timber effortlessly at the desired angle.

This little planer has a very generous 153mm maximum cut width, and it is mainly constructed from cast iron material to provide ample rigidity, and helps dramatically reduce vibration when under load. The two HSS cutting blades are powered by a 1.5hp 240V motor, and spins the blades at a very impressive 10000rpm. Another great feature that's supplied standard with this machine is the unique built-in fan with dust chute and bag system to collect its own timber waste.

The PJ-6B Planer is perfect for when a portable compact machine is needed for all those one-off jobs, and also to save on valuable storage space. This is ideal for any small woodwork shop or for the home hobbyist who needs to occasionally plane timber.



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