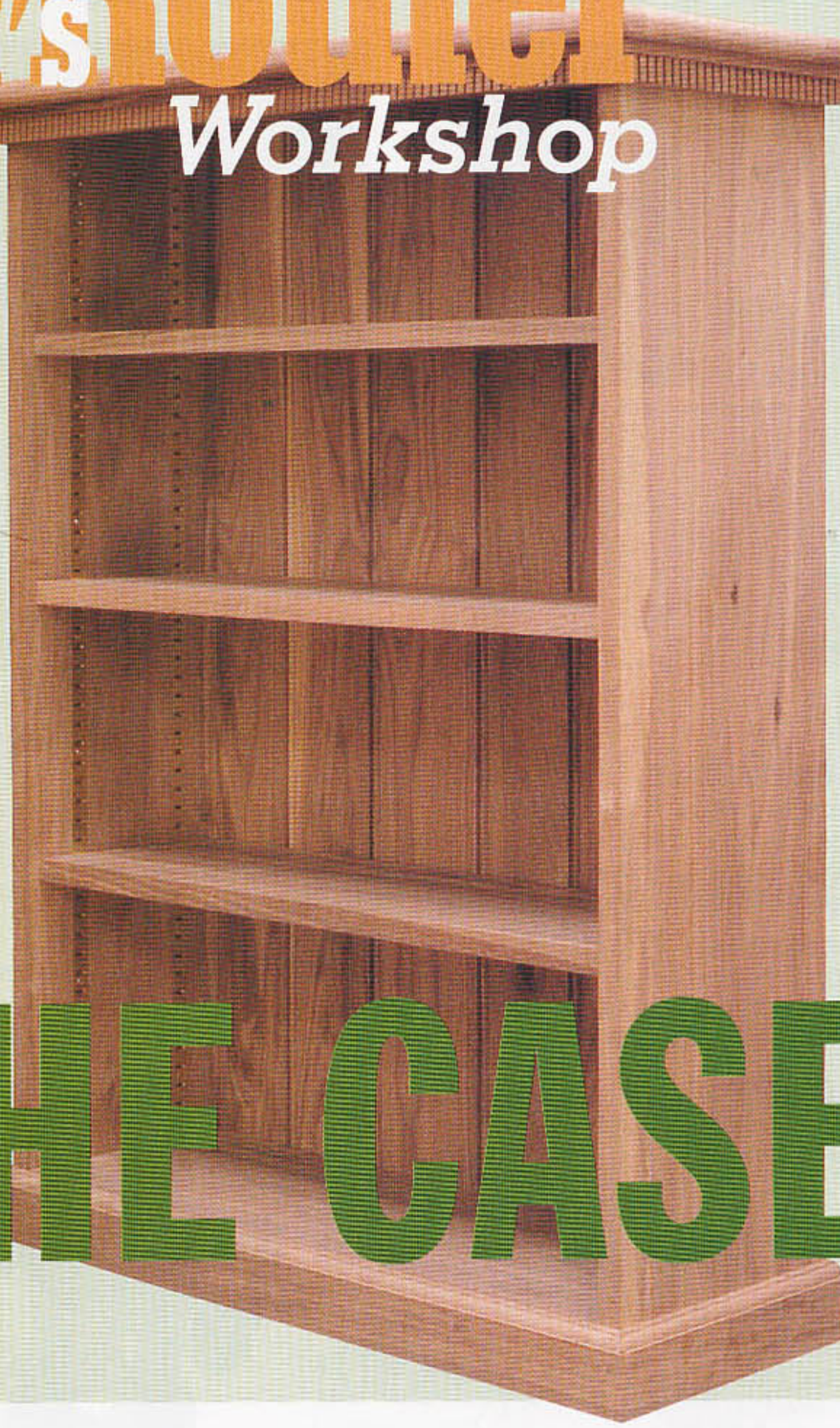
PROJECT

RALPH'S Router Workshop



PHOTOGRAPHS BY THE AUTHOR

Ralph Laughton continues his kit-led series by making a bookcase in walnut and in subsequent pages looks at some of the technical issues raised by the project

ON THE CASE

The Project

Making good furniture means using good wood. One of the main reasons certain projects fail is that they are made from inferior materials. Being readily available and relatively cheap, it is tempting to go out and buy pine (*Pinus spp.*) whenever making furniture. Indeed, I have built lots of furniture in this material over the years. There are times though when pine is just not up to the job. Apart from any aesthetic preferences, it doesn't machine cleanly and its inherent, 'soft' texture means that it isn't as robust as it might be.

Pine is great for country style tables, dressers and the like, the imperfections of finish and post-completion trauma can add to the charm of the finished piece. When it comes to building a piece of classic design, cheap softwoods look exactly that – cheap. When the Victorians used cheap materials they went to great lengths with stains and paint finishes to make the pieces look more expensive. In that day and age stripped pine was something of an anathema and would have appeared unfinished.

WALNUT

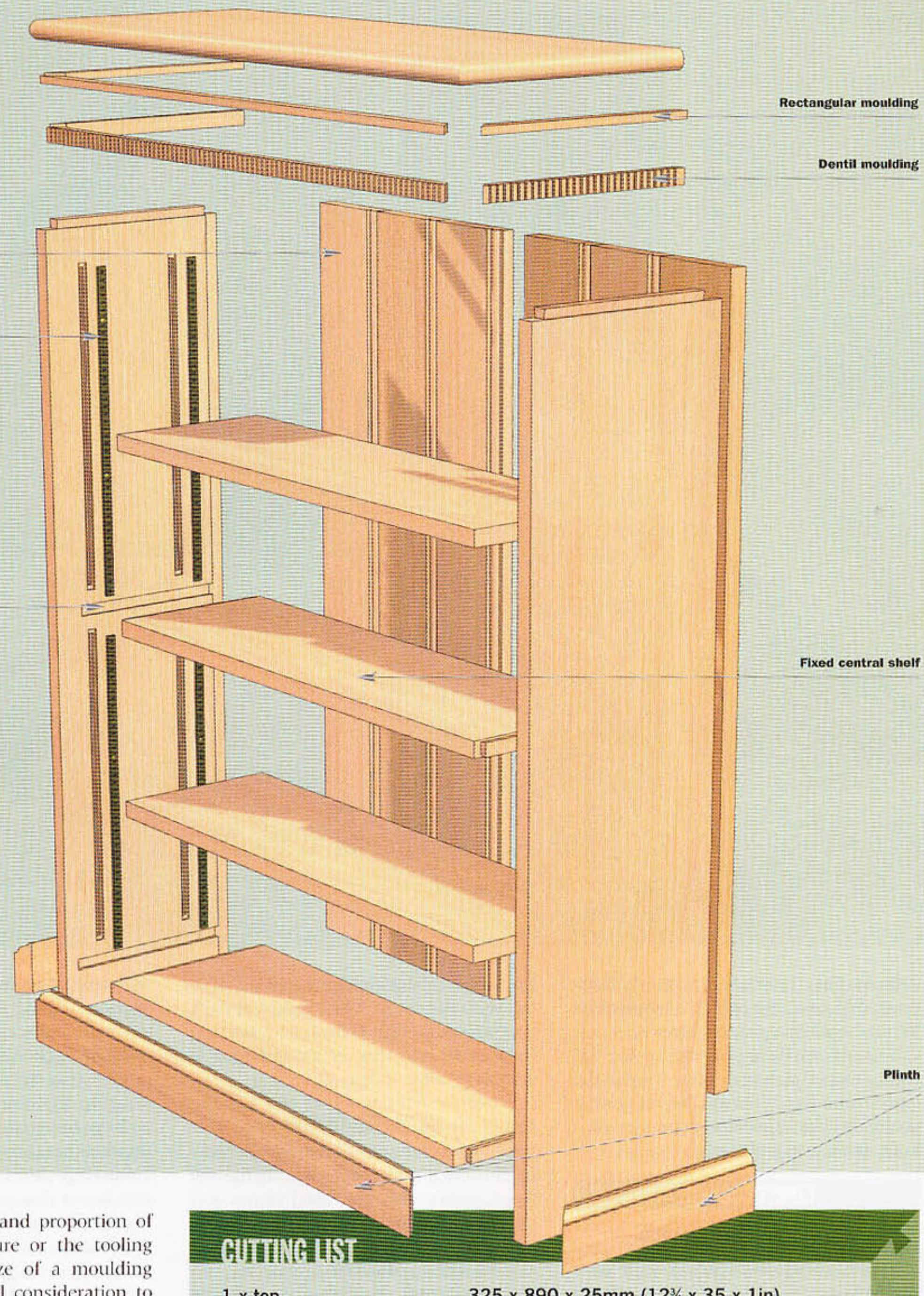
This bookcase is built in a Victorian style using simple lines embellished with a dentil moulding around the top and simple but pleasing roman mouldings elsewhere. The material of choice for this project is black American walnut (*Juglans nigra*) and another trip to South London Hardwoods secured some nice wide boards for the sides and top plus some narrower stock for the board and bead back panel.

Black walnut machines beautifully and responds to hand tools with equal sensitivity. Joint making is a real pleasure and the finish that can be obtained is deep and full of lustre. In case there is any doubt, I am quite keen on walnut!

DESIGN

A piece of furniture needs to be pleasing to the eye. Manufacturing parameters

Fig. 1 – Construction



often dictate the size and proportion of mass-produced furniture or the tooling will determine the size of a moulding or groove with no real consideration to scale.

To avoid this I always start to design a piece of furniture with an idea. That idea is committed to paper and sketched around until I am happy with it. It is at that point that the method of construction is considered – a dovetail here, a rebate there etc. The next thing to contemplate is how to produce the various components.

I worked out the overall size to be approximately 1120mm (44in) tall and 815mm (32in) wide, with a shelf depth of

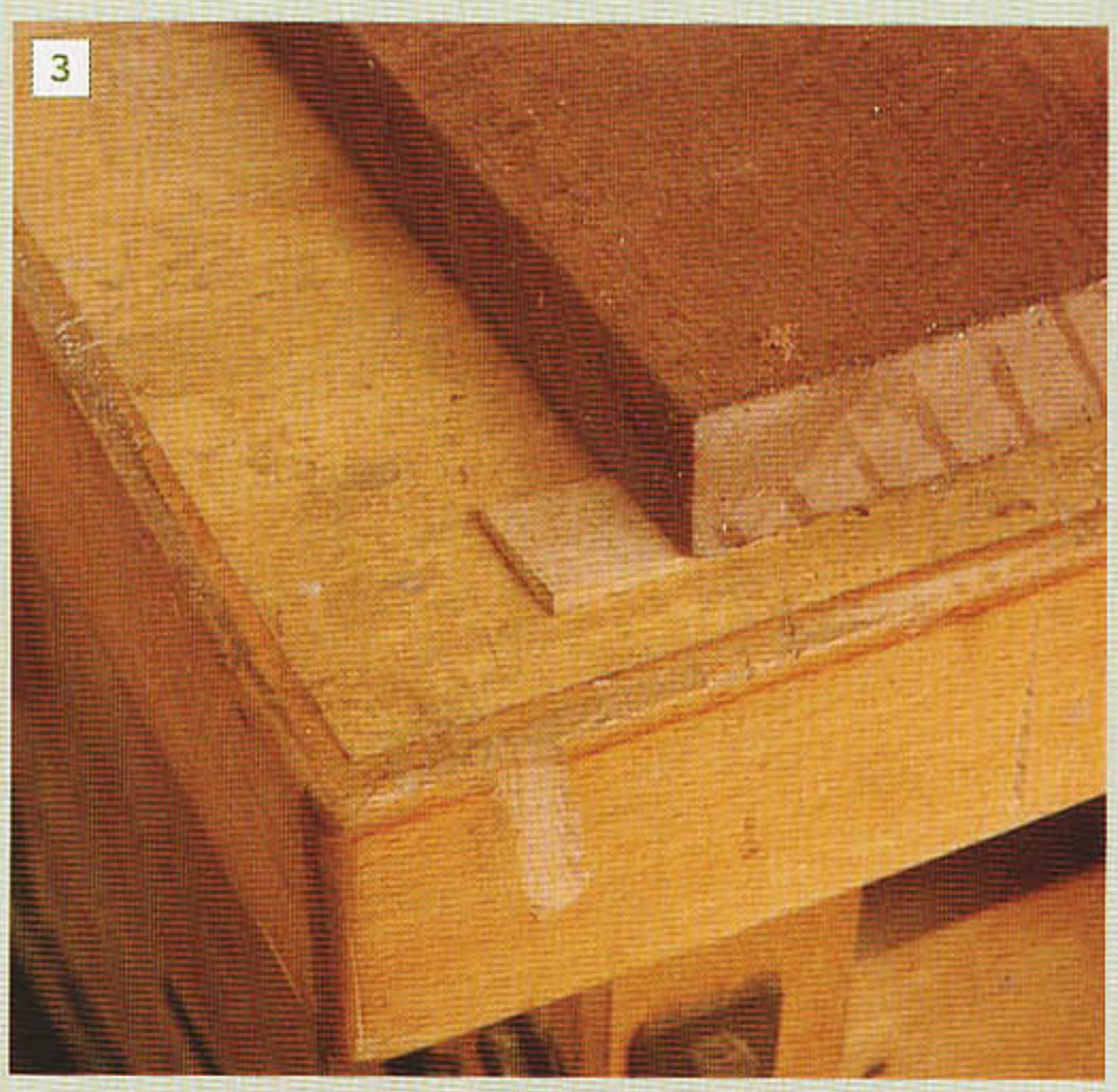
CUTTING LIST

1 x top	325 x 890 x 25mm (12¾ x 35 x 1in)
2 x sides	1107 x 280 x 22mm (43½ x 11 x ⅞in)
2 x adjustable shelves	755 x 230 x 22mm (29¾ x 9 x ⅞in)
2 x fixed shelf	775 x 230 x 22mm (30½ x 9 x ⅞in)
2 x bottom shelf	775 x 260 x 22mm (30½ x 10¼ x ⅞in)
6 x back boards (from)	1050 x 160 x 25mm (41¼ x 6¼ x 1in)
1 x plinth moulding	1500 x 75 x 18mm (59 x 3 x 23/32in)
1 x rectangular moulding	1500 x 10 x 20mm (59 x ⅜ x 25/32in)
1 x dentil moulding	600 x 20 x 15mm (23½ x 25/32 x 9/16in)
1 x dentil moulding	900 x 20 x 15mm (35½ x 25/32 x 9/16in)

6 x lengths of brass Tonk strip
8 x brass shelf studs (for tonk strip)
All timber black American walnut

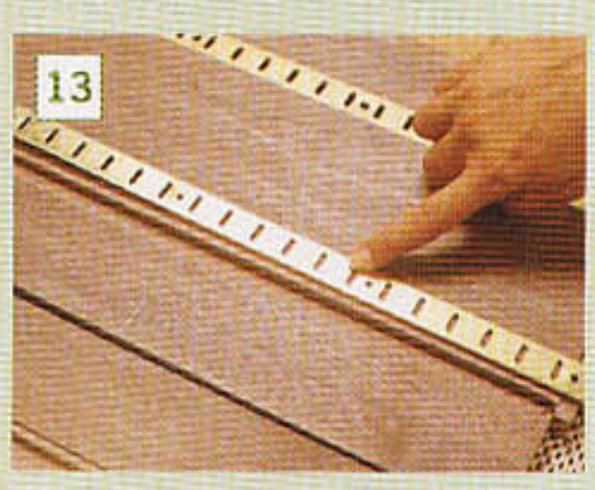
Selecting the boards ready for trimming. Take your time, and work out the most economic cutting resume

This little Makita cordless saw has a big heart and is more than capable of cutting this inch thick walnut down to size

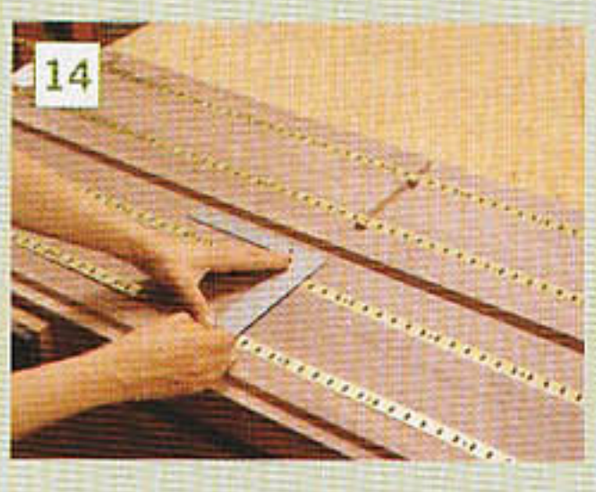


The top is too wide to plane on small machinery so it is time to work up a sweat. The board will need wedging if it is not flat in order to stop it rocking whilst planing

A second, deeper recess is cut to clear the shelf studs. While the router is out it is used to cut the rebates for the backboard and bead slats



Checking the orientation of the strip



Marking up the Tonk strip for cutting

Cutting the strip

230mm (9in). This means it will sit nicely centred in an alcove or be narrow enough to stand against a wall in a hallway.

Both sides will be housed into the top using stopped sliding dovetails as will the bottom and fixed shelves. The remaining shelves will be adjustable, supported on a brass Tonk strip and studs.

CONSTRUCTION

PREPARING THE TIMBER

If you have opted to finish your own timber you will have a problem with the top unless you have some pretty hefty machinery. My planer is only 200mm (8in) wide and the thicknesser will only take a 315mm- (12½in) wide board. One option would be to have the board finished by the timber merchant and do the rest yourself but that's the lazy way out. As far as I was concerned it was time to get back to some basic manual labour and break out the hand tools.

Now I know that a certain TV woodworker would split the board on the tablesaw, finish it in two pieces and then edge-glue it back together again. So it's out with the wedges and planes and off we go. Once you get going it does not take long at all and the resulting finish is second to none.

While the hand tools are out, give the rest of the machined timber a once-over with a smoothing plane to remove any machining marks. With a highly figured wood, such as this, the final finish is best done with a cabinet scraper.

JOINTS

Using natural timber for building furniture is fraught with all sorts of problems that need to be addressed. The main concern is that of movement. As timber dries out it shrinks. This shrinking is not as even as we would like and tends to distort the boards. Even after acclimatisation, a change in the moisture content of the air can cause movement. This movement is usually small and can be largely ignored. This is not the case when joints with a tight tolerance are employed.

Sliding dovetails are used to hold the sides true and prevent them from bowing apart. As all the sliding dovetails are cut to fine tolerances across the grain, any cupping of the timber will result in the tail getting wedged in the housing. Routing the housing straight is not a problem but getting the tail to fit can be if the shelf has the slightest cup in it.

Cutting this joint on the WoodRat eliminates that problem as the router is registering its cut off the machine, not the timber.

THE TOP

After trimming to size, select the best-looking side to be the top. Turn it over and mark the positions of the housings into which the sides fit. Cut the dovetailed housings on the WoodRat. Keeping the depth-setting the same as it was for the housings, cut the dovetails on the top of the sides and machine away the ends to form the stopped end.

Although it is perfectly possible to cut the roundover for the edge of the top on the WoodRat, you are working against gravity and any deflection from the

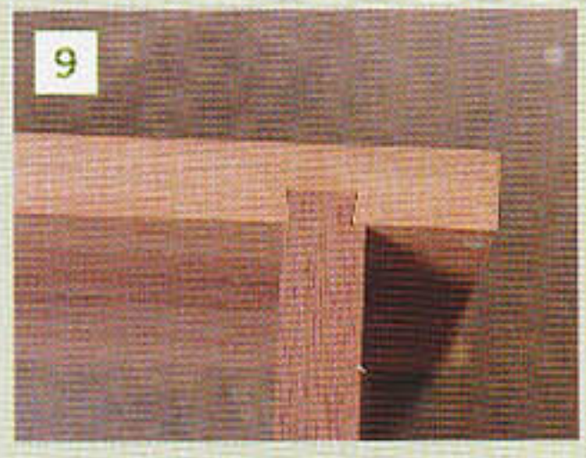
Start by removing any high spots with a long plane

Check your progress as you go with a long straightedge

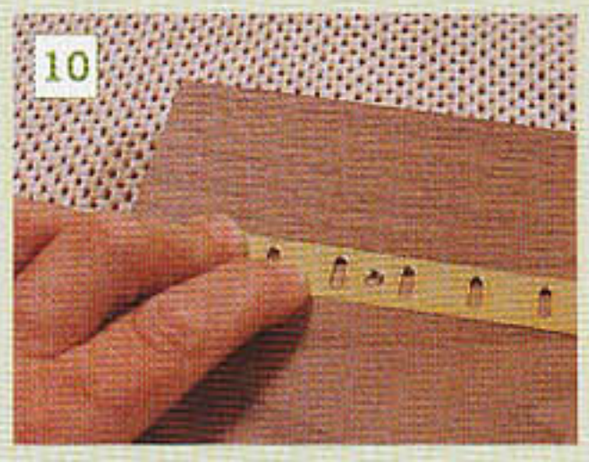
The board is now flat

Smooth it to perfection – hard work compared to putting it through a machine but extremely rewarding

The real thing. This is the sliding dovetail that joins the side to the top



It fits perfectly. The rest of the joints went just as well



Test-fitting the Tonk strip

The recesses are cut the full length of the sides and a final check for fit is made

Installing the cutter for the partial bull nose of the top. The collet extension makes this easier, but only if it is well balanced and the cutter is not removing large amounts of material

Setting the height. The fence has been pushed back for clarity but will need to be aligned with the shallowest section of the cut (deepest section of the cutter)

The finished edge of the top

While the router table is out, fit a roundover cutter and a small bearing to produce a stepped roundover...

underside of the table will spoil the job. For this reason it's back to convention and the router table.

The best way to make a rounded edge to the top is with a large staff bead cutter. This is a better option than a roundover cutter as the profile can be centred more easily and will not accentuate any slight variation in thickness. This monstrous cutter is a big investment so it is worth looking to see what other uses it can be put to. I opted for a Trend hand hole/staff bead cutter. Believe it or not this cutter will plunge and cut making it ideal for making hand holes in stools and tool boxes etc as well as performing the task in hand.

Set the cutter in the router table so that the deepest part of the cutter is in line with the fence or very slightly behind it. The crown of the resultant moulding must be in line with the untrimmed wood on the in-feed side of the fence otherwise the timber will drop as it leaves the in-feed causing a joggle in the moulding. Alternatively, a shim can be made from plastic laminate and attached to the out-feed fence. The cutter can then be aligned with the shim. This means the crown of the moulding will be supported by the shim and the timber will pass from one side of the fence to the other without dropping into the cutter.

BOARD AND BEAD

Quirked beaded boards are used to panel the back. These boards are thinner than the stock used for the carcass and shelves and are of random width, prepared from the maximum yield from the raw boards. This gives a hand-made feel that I quite like.

Form the bead on the router table. Again this is the safer option, any deflection from the table surface will damage the bead beyond repair. This is far less likely working with gravity as opposed to against it. The quirked bead is formed on one side of all the boards except one which is left square.

TONK STRIP AND REBATES

Tonk strip has a funny name but it's very useful stuff. It is the strip that is recessed into the sides of a bookcase so that shelf-spacing can be adjusted. It needs to be recessed into a stepped groove in order that the strip becomes flush with the surface and adequate clearance is available for the bookcase studs which support the shelves.

This groove can be cut in one pass using a special cutter, available in various sizes from Trend. However, unless you intend to build lots of bookcases, the investment might not seem worthwhile. It is amazing how little most router cutters get used. The straight cutters do most of the work I do.

I have a large collection of cutters amassed over a long period of time. 95% of them get used 5% of the time The other 5% get used 95% of the time. Straight cutters make up the 5%. They are so versatile it is worth investing in a cutter just the right size to make the shallow recess and if you need an excuse for another one, get one for the smaller groove too. Just tell the boss I said it was ok! If you are still in trouble, inform the boss that the two cutters cost less than the specialised one.

...and run some moulding for the plinth

Another change of cutter and the quirked bead can be run on the boards that make up the back

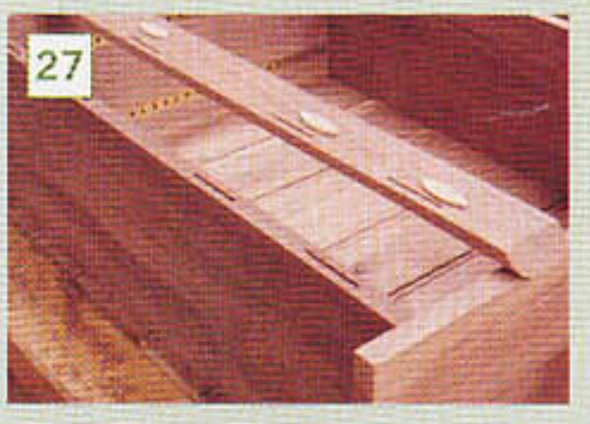
The sides are assembled with the top and fixed shelves using glue and 18g brads to keep it all together

Nailing the backboards in position

The last board is levered tight

The main carcass is complete

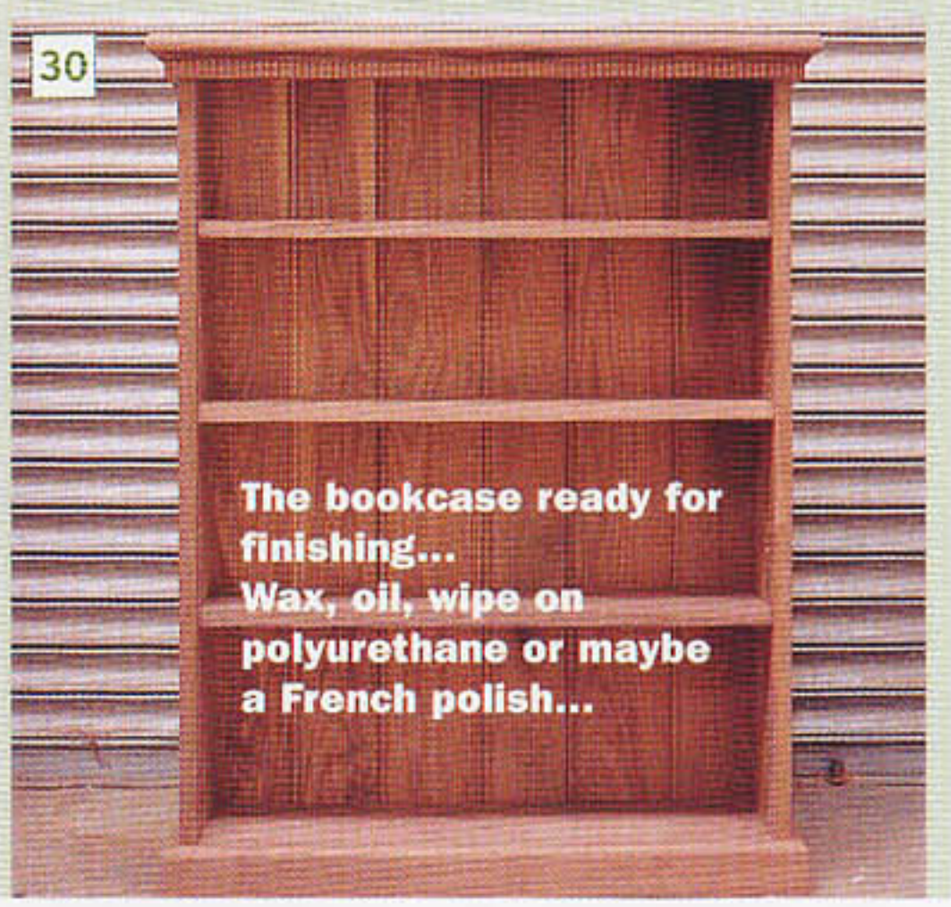
Fitting the mouldings...



...and the plinth

Cramping the front of the plinth to the bottom shelf

Finally, fitting the adjustable shelves



Install the parallel fence and the larger straight cutter into the router. Place the router on a flat surface, plunge until the cutter is touching the surface, lock down and zero its depth stop. Insert a piece of Tonk strip between the depth stop and base of the router (or turret if still fitted), and lock the depth stop. Make a test cut on an offcut of timber to check the fit and fence setting.

Cut all the shallow recess first and then, with the fence set in the same position, change the cutter for a narrower one and cut the deeper recess.

While using the router freehand it is a good idea to rebate the back edges of the sides and top using another straight cutter. Adjust the parallel fence faces as close to the cutter as possible. This will prevent the router tipping at the end of the cut. No matter how many jigs and add-ons you acquire over the years, the basic router with its fence and a straight bit is still a very effective tool. I could have made these cuts using the table or any number of jigs but keeping it simple is always the best path.

The Tonk strip has a top and a bottom, which is indicated by triangular arrow heads stamped into the back of the strips. Ensure the strips are all orientated the correct way, position in the recess and mark them up for cutting. A small section will need removing at the point where the centre shelf dovetails to the sides. Carefully cut the strip with a hacksaw and clean the sawn end with a fine file. Install the strip using 19mm (¾in) screws.

ASSEMBLY

Assemble the carcass on the bench using a dark wood glue and 18g brads. The 18g Ace & K angled brad nailer is perfect for skew nailing the shelves and top across the sliding dovetails. Do this from the underside so as to hide the entrance holes.

Turn the assembly over and place the boards into the rebate. The boards are trimmed as necessary so that they fit inside the rebate allowing a small expansion gap at each side. Place spacers in the gap at each side and cramp the first board tightly against them. Secure the board in place with 18g brads into the top and the two fixed shelves. Add the next board, cramp tightly to the first and nail in. Repeat the procedure across the back. The last board is secured by levering it against the penultimate board using an offcut of timber. A cramp is used to support the rebate.

MOULDINGS

The dentil moulding is cut on the WoodRat using a workshop-made indexing wheel and a 3.2mm (⅛in) straight cutter. This is made up with the square section strip moulding and is applied to the underside of the top using dark wood glue and 18g brads. The fine tip of Ace & K's angled nailer puts the brads in between the moulding.

The plinth is applied to the front of the bottom shelf using No.10 biscuits and glue. The side pieces are mitred to the front and fixed into position with glue and brads.

Add the adjustable shelves and the piece is ready for finishing.

ON THE CASE

Machinery & Equipment

In this section of the article Ralph takes a closer look at the WoodRat and explains how it proved invaluable in making the joints for this project

The WoodRat sits on a workshop-made bracket fixed to the wall. Rectangular ductwork makes for an ideal dust extraction system

The WoodRat sits on the bracket and stays there held by its own weight

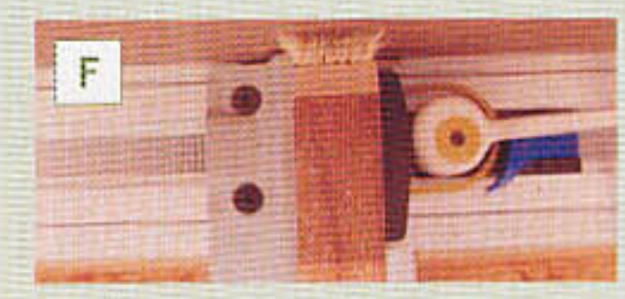
A single pull through makes the cut. There is no need to cut a clearance housing first

The nail brush is removed and the Blu-tack is now brought into play. Low-tech stuff this but it works. The acrylic template is used to position the cutter to cut the dovetails

Once the depth of the dovetail is set, make a template of the shape of the housing in a piece of clear acrylic. This will be used later to fit the dovetail to the housing

My first ever WoodRat sliding dovetail...

Setting the board under the baseplate using the centre liner to check position



The nail brush on a stick is used to apply pressure to the underside of the board and keep the top surface in contact with the underside of the baseplate

I am sure that Martin Godfrey must have been driving the wrong way along a one-way street when he came up with the idea for the WoodRat. The concept behind this piece of routing machinery is completely opposed to anything else on the market. It mounts on the wall, has no legs and the router mounts on top. To cap it all the must-have items include a nail brush and a lump of Blu-tack! Sound engineering and passion to get the job done makes the WoodRat the perfect machine for all sorts of joints.

Although the WoodRat is capable of making all sorts of joints, sometimes there are better ways. Not so with sliding dovetails, for which this machine is perfect. As the sliding dovetail has to be made to a fine tolerance to make a good fit, any distortion in the wood needs to be neutralised. This is most relevant on the ends of the shelves where any cupping in the wood will be transmitted to the dovetail causing the joint to bind. The WoodRat solves this by cutting a straight dovetail regardless of the shape of the wood.

MAKING DOVETAIL HOUSINGS

Mark the centre line of the housings on the side pieces and underside of the top. Set the timber under the sliding plate using the 'nail brush on a stick' clamped into the cam lock to apply upward pressure directly under the cutter. The weight of the board is supported with a roller stand and a clamp holding it to the plate. The board is positioned using the WoodRat's clever centring device and the housing is cut in one pass.

MAKING THE DOVETAILS

Keeping the depth settings the same, clamp the shelf vertically under the sliding plate and cut the tails as detailed in the ultra clear instructions. Whilst clamped in position, remove the end of the dovetail to accommodate the stopped housing. And that's it – easy simple dovetails that fit every time.

WOOD PERFECT

The WoodRat has many uses and this is but one. It is supplied with a wealth of good information that is easy to digest and once it is up and running I am sure that it will get constant use. It has been used to great effect to produce the dentil moulding around the top of this cabinet.

RALPH'S Router Workshop continued with a technical article on page 11

ON THE CASE

Techniques & Problem Solving

Having completed his bookcase, Ralph Laughton describes both the techniques he used and how he went about rectifying a potentially embarrassing mistake

Built-up mouldings are much more interesting than a single profile. Even a multiple profile is still lacking in depth and solidity. In some cases it is just not possible to machine the mouldings in one pass. The dentil moulding used on the top of the bookcase is a good example.

The top surface forms the first element as a semi bull-nose. This is part of the fabric of the piece. The rest of the moulding is built under that. The next element is a simple square section which caps a dentil moulding.

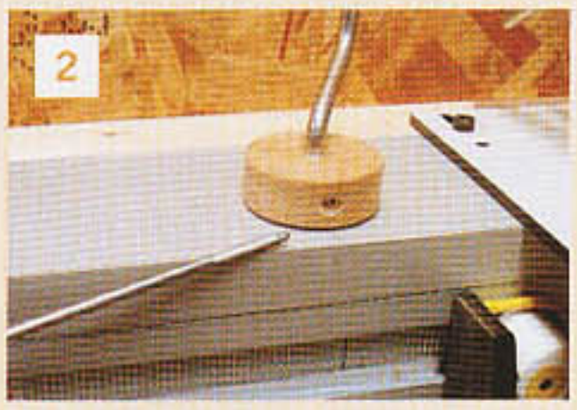
MAKING TEETH

The WoodRat's driven clamping carriage is ideal for repetitive cutting of all sorts of joints. However, cutting a long length of dentil moulding was going to be a problem without some form of indexing. Still using the WoodRat, marking it up by hand and cutting by eye would be another option although this approach offers no real advantage over the traditional method of a saw and square. The one thing missing on a WoodRat is any form of graduation between the carriage and the fixed wall bracket. In normal use this is all done by marking the bracket and aligning a pattern. Here there is no pattern. This is not a joint but a regular decorative moulding.

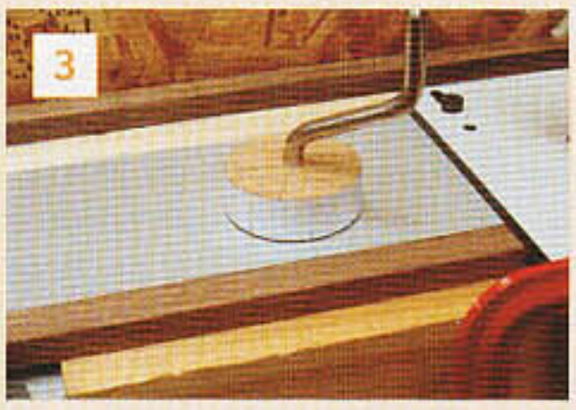
INDEXING

The carriage needs to be moved repeatedly a set amount. The carriage advances 35mm (1⅜in) for each full turn of the crank handle. If that rotation is divided up into seven sections each section will represent an advance of ➥

1 The indexing wheel is fitted to the crank handle. The tape ensures a tight fit with no risk of slipping



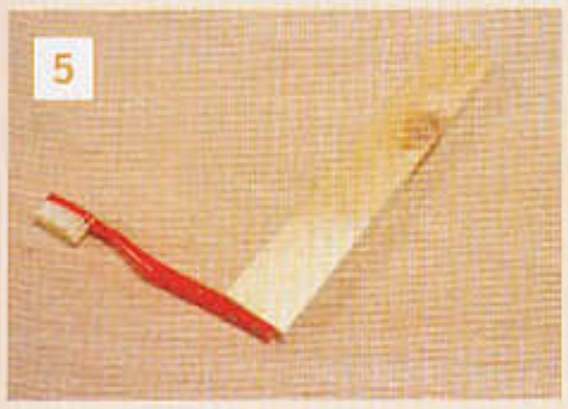
2 The screws pull the two halves back together



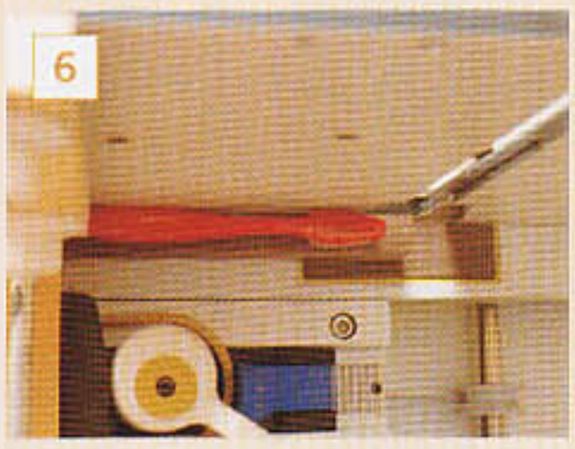
3 A paper scale divides up the wheel into seven equal segments

4 Double-sided tape will hold the stock in position

PHOTOGRAPHS BY THE AUTHOR

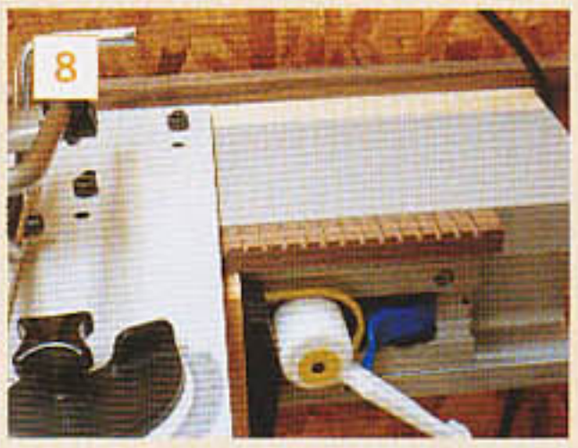


5 Aided by a toothbrush on a stick

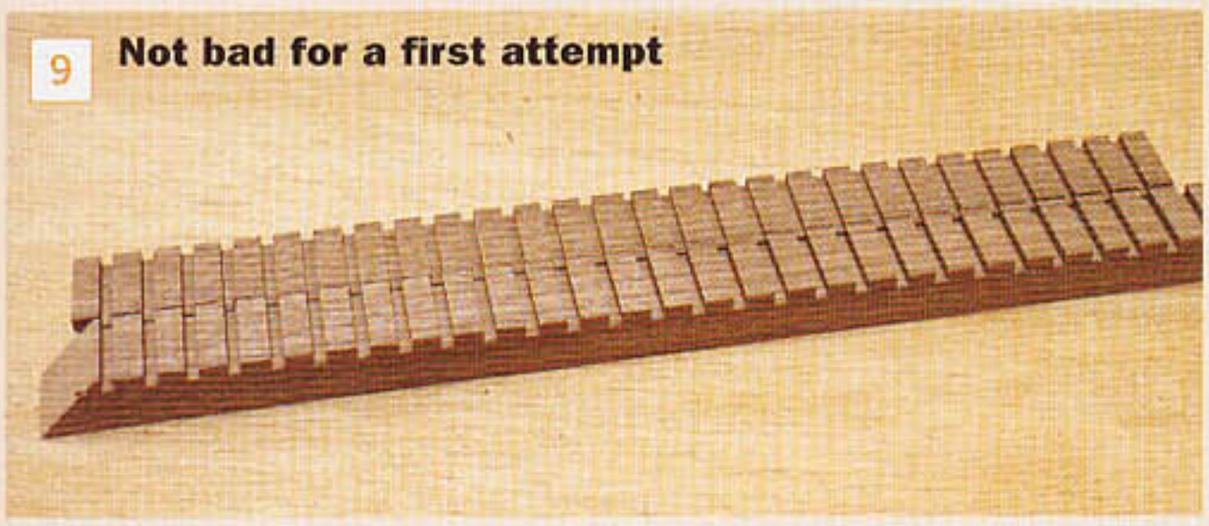


6 The toothbrush applies just enough pressure to hold the moulding blank against the backer block

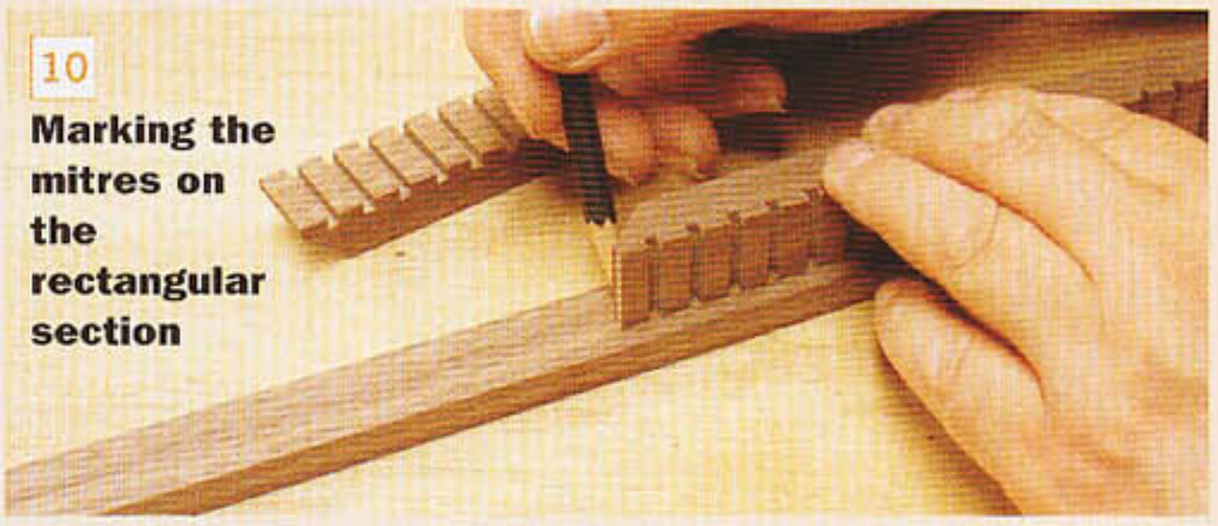
7 The backer block is fitted into the dust chute



8 The dentil moulding takes shape



9 Not bad for a first attempt



10 Marking the mitres on the rectangular section


Glue and nail the moulding components together


The left and right mouldings about to be fitted


The completed end mouldings

5mm (¾in). All we need is a wheel.

Cut a round piece of wood approximately 73mm (3in) in diameter and 19mm (¾in) thick. Drill a hole through the centre that is a fit over the crank handle of the WoodRat, and split the disc in half on the bandsaw. This will remove material and cause the central hole to be slightly distorted. This will aid clamping later. Drill and counterbore the pieces so they can be screwed together to form a disc again.

The disc is clamped around the crank handle and a piece of paper wrapped around it. The paper is divided into seven using the WoodRat's parallelogram and stuck to the edge of the disc with double-sided tape. A pencil mark is made on the top of the channel. By aligning the marks on the wheel with the pencil mark on the channel, the carriage can be advanced in regular steps of 5mm (¾in).

CUTTING THE DENTIL MOULDING

Fit a block into the dust chute to fill the opening completely. This will act as a backer and prevent any breakout. Set two blocks of softwood into the cam locks and secure the 'blank' to them with double-sided tape.

To complement the nail brush on a stick I have made a lightweight version – a toothbrush on a stick. This will ensure the blank is kept in firm contact with the backer piece.

Set the carriage at one end of its travel and align a mark on the indexing wheel. Make the cut and rotate the crank two sections. This will advance the carriage by 10mm (⅜in). Make the next cut and repeat until the sequence is complete. The result will be a perfectly spaced length of dentil moulding.

Good luck!

OH NO - REPAIRING A MISTAKE

From the outset I had thought this section would be about correcting dentil mouldings that had been misplaced. All the concentration and care paid off with the result of a perfect moulding first time. The problem I encountered in this project came with the mundane.

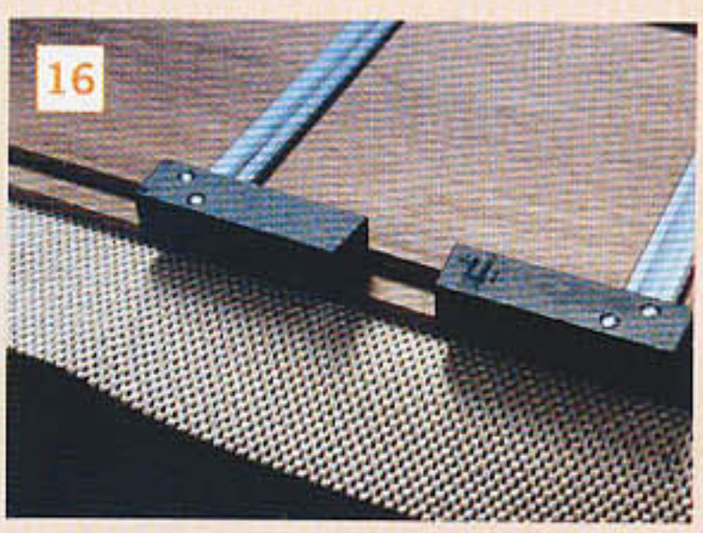
While cutting the rebate in the top for the board and bead I had obviously neglected to tighten the fence properly and it shifted slightly creating a wider rebate. A carefree, 'just knock this out' approach led to a silly mistake although I was able comfort myself with the knowledge that it happened in a concealed place.

To rectify this I set the router to make a wider rebate along the damaged area and cut an even recess. This was trimmed square with a chisel and a new piece of walnut was glued and cramped in place. Once the glue had dried, the filler piece was planed down to be flush with the surrounding timber.

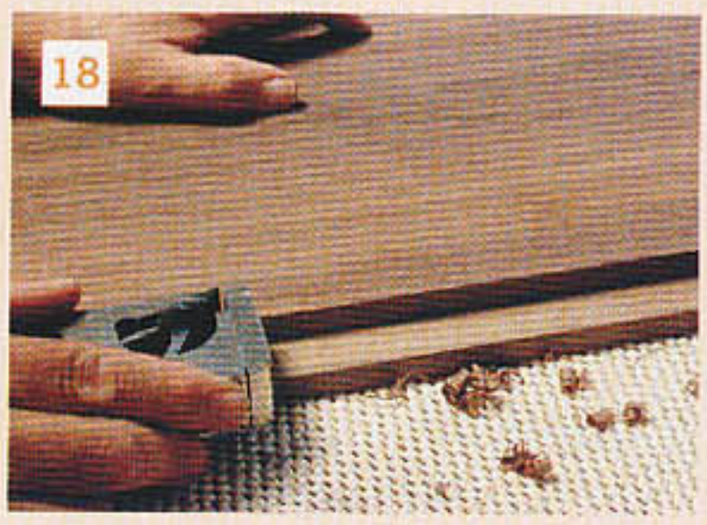
The problem acted as a reminder to check those thumb screws properly next time.

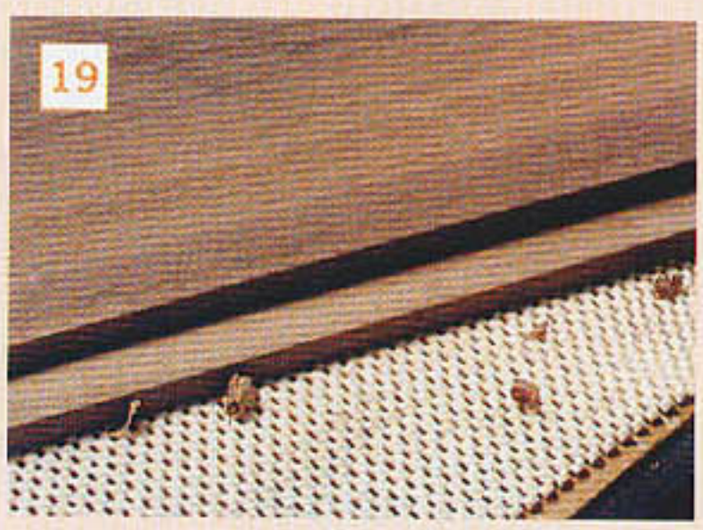

Oh no, who did that? Answers on a postcard


Squaring the ends and fitting a new piece of walnut


Gluing and cramping in place


Planing it flush


Re-establishing the rebate – by hand


What mistake?

PHOTOGRAPHS BY THE AUTHOR

Geoff Lucas designs and makes a bathroom shelf unit

PROFITABLE VENTURE

This is another of my quick MDF creations – jobs that use very little in the way of material, can be completed in a day and yet sell for a reasonable price. This one was the result of a commission for a small bathroom fitted out in a mix of traditional and modern styles, but it could easily be adapted into a bookcase for the living room or even for some extra storage in the kitchen. In this case though, the bathroom was part of a conversion from a church, hence the slight ecclesiastical reminder in the form of the shaped shelf brackets.

MDF – VIRTUES AND VICES

MDF is the 'perfect' material for this type of work, although purists would argue that it is not 'proper woodworking'. To me it is the finished result that matters so I am not going to get sidetracked into such arguments.

The one real problem associated with MDF is dealing with its dust which means that you must take adequate precautions during any machining operations. I use a dust mask as a matter of course, but also connect as many of the power tools as possible to a vacuum extractor. The router in particular generates huge clouds of powder-fine dust and if you can collect this at source the mess is reduced dramatically, as is the risk of damaging your lungs.

CONSTRUCTION

RIP OFF

Buying full sheets of MDF from a builder's merchant is still the most economical route, but they do take some managing. If you cannot handle a full 8 x 4 sheet, buy pre-cut pieces from a DIY store, although this will cost you significantly more.

Even half sheets are still quite bulky so the initial breaking down is best carried out using a power saw with the sheet resting on skids on the floor (see **photo 1**). You may find the biggest difficulty here is cutting accurately with the saw, so cut each piece a little oversize to allow for cleaning up later.

It is surprising how quickly the sheet disappears when you are ripping off 225mm (9in) widths. The overall dimensions of this project mean that you will have to cut six pieces for the main carcass and shelves (see **photo 2**). In my case this was all in 12mm (½in) material which is not overly strong on its own. Fortunately the rigidity builds up as the pieces are assembled, particularly when the back is fitted. The reduced thickness of each piece also means that you cannot screw the structure together so instead have to rely on tight-fitting housing joints and glue, no problem with a router!

BATCH PRODUCTION

Try and machine matching components together so they end up identical in size. If you do them individually there will inevitably be some slight variations ➥

The initial breaking down is best carried out with the sheet resting on skids on the floor

Cut six pieces for the main carcass and shelves

Quick-action clamps hold the pieces as one

MDF can quickly ruin planer blades

Use a small offcut of the shelf material to lock the sides together

Repeat the procedure for each shelf groove and housing

You also need a groove to take the back

Glue up the carcass using more glue than normal

Run a bearing-guided cutter around the shape

Put in a groove for the drawer bottom

The divider between the two boards is glued in place

The half-lap joints are cut with a router using the side fence

which only become apparent as the thing is assembled. By then it is usually too late.

I use quick-action clamps to hold the pieces as one (see **photo 3**). This enables me to plane it up as if it is a single board. If you use a planing machine be aware that MDF will quickly ruin the blades so as a way of minimising damage only work on one end of the cutter block (see **photo 4**), rather than forming a blunt section in the middle of you planer. A hand power plane with its TCT knives is probably the best bet for MDF although controlling it on long narrow edges will be difficult. Working with all the pieces clamped together in this way will give more support and ensure perfect unanimity – the key to accurate woodworking (see **photo 5**). It is best to prepare all the pieces you need at this stage rather than doing it as you go.

MARKING UP

Start by marking out the position of the shelves on the two sides of the carcass (see **photo 6**). A steel rule is more accurate and much easier to use than a tape measure. Even on a relatively simple projects such as this, measuring and marking accurately is essential, disproving the theory that this type of accuracy is confined to fine cabinetmaking.

GROOVING

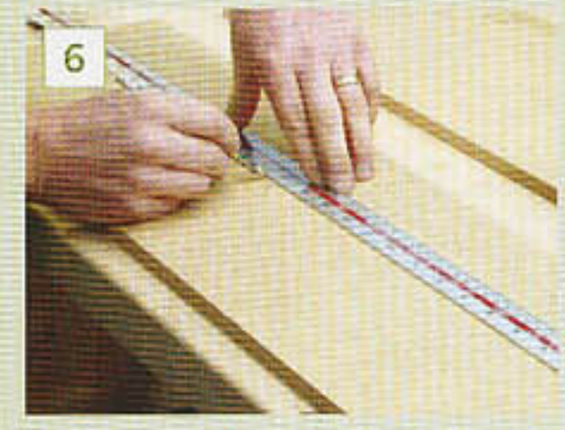
Cut the housings for the shelves with the appropriate bit in the router. The best way to get the spacing the same on either side is to clamp the straightedge across both boards and rout them as one (see **photo 7**). The Trend Clamp Guide is invaluable here as it performs both functions at the same time. However, make sure you run the router the right way, always feeding it against the direction of the cutter's rotation, so it is pulled against the straightedge and doesn't wander off (see **photo 8**). Once you have cut the first groove across both boards use a small offcut of the shelf material to lock them together while you reposition for the other grooves (see **photo 9**). Repeat the procedure for each shelf groove and the housing for the top off the carcass (see **photo 10**).

You also need a groove to take the back (see **photo 11**). I pondered for sometime whether to put in a groove or a rebate. The groove is always better as it locks the whole structure together more firmly when you put in the back, but the small section of MDF left on the outside of the groove is very brittle and can easily break away. On reflection I would probably have been better off cutting a rebate, as I only just got away with sliding the back in without breaking off any of the groove. Also remember that the sides are handed, so put the groove in the right place on each.

THE GLUE-UP

Glue up the carcass using more glue than normal as MDF is very absorbent (see **photo 12**). If you have them, use plenty of sash cramps to hold it together, but beware of over tightening

Working with all the pieces clamped together will give more support



Mark out the position on the shelves on the two sides of the carcass

Clamp the straightedge across both boards and rout them as one

Make sure you run the router the right way

Run a simple edge mould along the plinth section

Give the front plinth a little decorative shaping

Use a jigsaw with a fine blade to minimise any tearing

A drum sander does a superb job

Make a trial assembly of the drawer and...

...glue it together with the base in place

Once the carcass is dry fix the plinth in place

A series of V-grooves cut to imitate match boarding

as this thin section material can distort alarmingly. If you have cut the housings the right size in the first place it is only a question of holding the joints together rather than pulling them up tight.

BITS AND PIECES

While you are waiting for the glue to set, make a start on some of the other bits. Run a simple edge mould along the plinth section whilst still in one length (see **photo 13**). Don't use very elaborate cuts on MDF as all the machined surfaces will end up becoming rougher when you start applying any sort of finish. Keep them simple so they can be sanded easily.

Give the front plinth a little decorative shaping, experimenting with a French curve until you get a shape you like the look of (see **photo 14**). This can be cut out using a jigsaw with a fine blade to minimise any tearing (see **photo 15**). MDF is relatively soft and you can sand the cut surface, but a drum sander does a superb job and enables you to get the curve really clean (see **photo 16**). Only when it is properly smooth can you run a bearing-guided cutter around the shape to give a little extra detail (see **photo 17**). If you do this without firstly preparing the edge properly, any irregularities are telegraphed into the mould and the finished result looks terrible.

DRAWER SIDES

The drawer sides are prepared next. It is difficult to cut any form of joint in MDF as it is so brittle, so I just half lap and glue the corners. You also need to put in a groove for the drawer bottom using an appropriate cutter in the router (see **photo 18**). For utility furniture like this I prefer to use melamine-faced hardboard as it is easily wipeable. It only requires a 3mm (⅛in) groove, but be careful using these very fine cutters as they are easily snapped off. It is always better to make several shallow passes than trying to do it in one go.

The divider between the two drawers is just glued in place (see **photo 19**), but take your time to make sure that it is dead central and square in both directions, or you will find it difficult to fit the drawers properly later.

The half-lap joints for the drawers are again cut with a router using the side fence (see **photo 20**). Working across the end of narrow section like this can be quite awkward. Slide the plastic sub-fences together so they are as close as possible without fouling on the cutter. At least you then have as much support as possible but if you are still struggling to guide the router, clamp a piece of scrap in line with the drawer front and cut through onto this. Make a trial assembly of the drawer to check the dimensions and make sure it fits in the recesses of the carcass (see **photo 21**). If everything is OK, glue it together with the base in place and clamp it firmly (see **photo 22**). Provided you have cut the baseboard square and it fits snugly in the grooves, the drawer should pull up square, but do measure the diagonals to make sure.

Slide the back into the grooves and pin it in place

The top is a piece of 18mm MDF with a radius

The same technique is used for the drawer fronts which are planted onto the front of the drawer

Check for smooth and easy running

Stick two pieces of 10mm MDF together

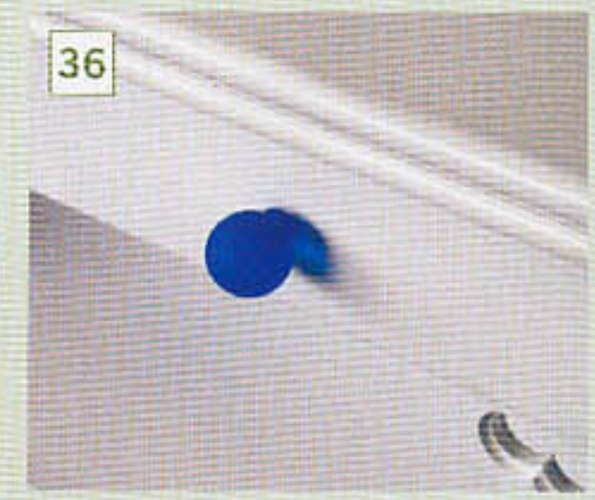
Drill three overlapping 25mm- diameter holes

Using a small Roman ogee bit, run round the inside of all the holes

Finally, fix the brackets in place with a little more Superglue

Complete and ready for finishing

I applied some standard white undercoat



Finally, fit some suitable knobs to the drawers

FIXING THE PLINTH

Once the carcass is dry, the plinth can be fixed in place. Cut the pieces a bit oversize initially so you can trim the mitres for a perfect fit (see **photo 23**). I actually use Superglue designed for fitting cornices as it allows you to hold the mitre together perfectly whilst it dries, which only takes a few seconds.

BACK, TOP AND DRAWER FRONTS

The back is just a single sheet of 10mm (⅜in) MDF with a series of V-grooves cut to imitate match boarding (see **photo 24**). Space the grooves evenly and don't go too deep or the back becomes very weak. Slide it into the grooves in the carcass sides and pin it in place (see **photo 25**).

The top is a piece of 18mm (²⁵⁄₃₂in) MDF with a radius machined on the front and sides. Again this just glues and clamps in place (see **photo 26**). Do be careful however that it doesn't slide about as you clamp up and check that the overhang is even before you leave it to finally set.

The same technique is used for the drawer fronts which are 12mm MDF routed with the same design as the plinth (see **photo 27**) and then just planted onto the front of the drawer (see **photo 28**). The drawers may need easing slightly with some light sanding to make them slide freely in the recesses. Remember that the unit is going to be painted, so it is far better to have them a fraction loose at this stage to allow for the thickness of the paint.

FURTHER DECORATION

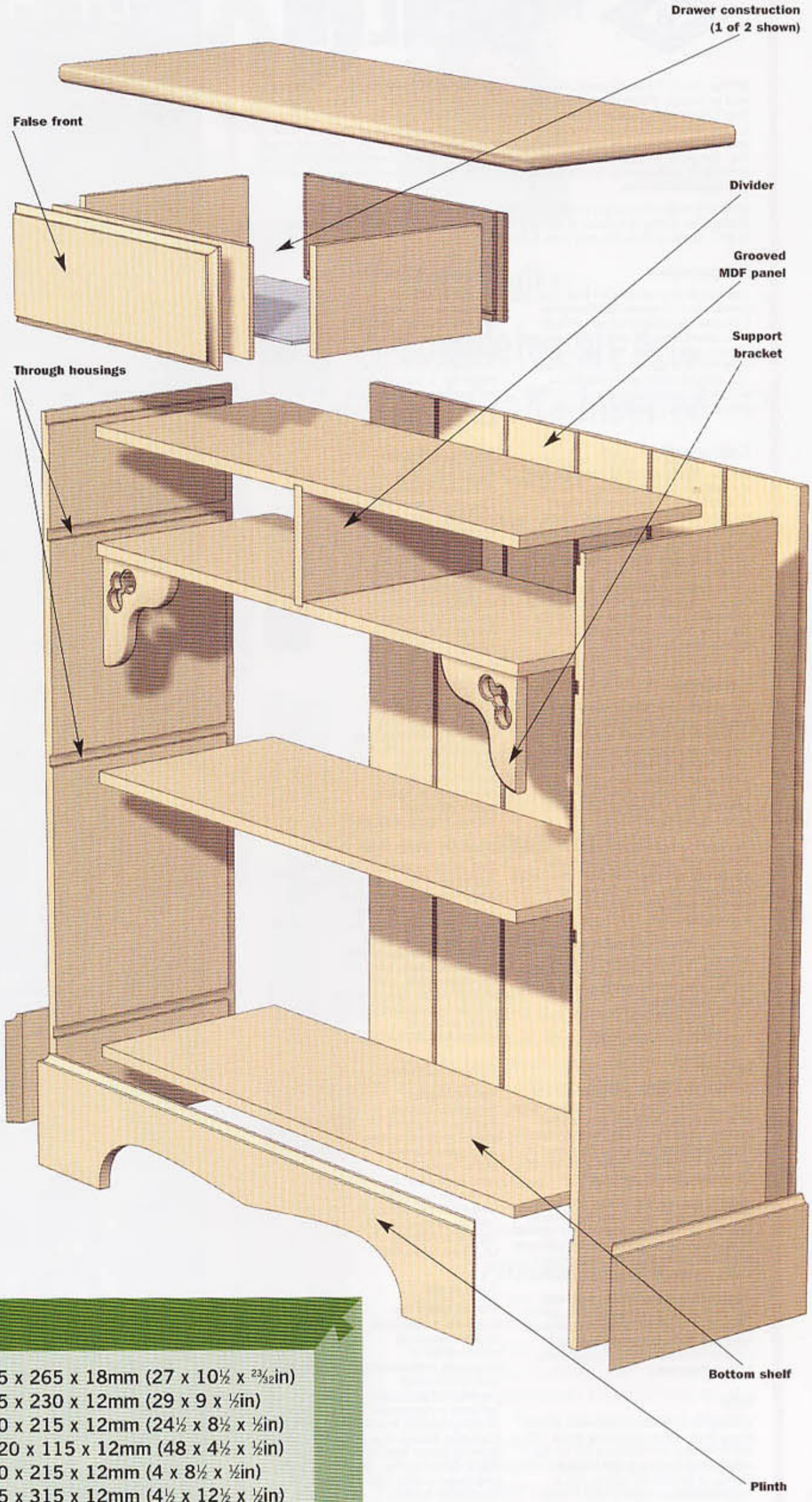
The final decoration is in the form of some corner brackets that adds just a touch of detail to reflect the church theme. Stick two pieces of 10mm (⅜in) MDF together with double-sided tape and cut out the shape of the brackets (see

FINISHING

The unit should now be complete and ready for finishing (see photo 34). MDF is always difficult to finish well, particularly along any edges that have been machined, which tend to look too rough. I have used various techniques over the years to try and overcome this problem, but now usually start with a coat of cellulose sanding sealer. This stabilises the surface and can be flattened down really smooth before applying whatever painted finish you prefer. I applied some standard white undercoat and then followed up with two coats of white gloss (see photo 35). If you flat down between coats you will eventually get a very smooth finish.

Finally, fit some suitable knobs to the drawers. I found some nice glass ones in a local DIY store, which I attached with a single screw through from the back (see photo 36).

Fig. 1 – Construction



In use

photo 30). To make them look a bit lighter, drill three overlapping 25mm-(1in) diameter holes (see **photo 31**). Then using the lower half of a small Roman ogee bit, run round the inside of all the holes to complete the detail (see **photo 32**). Finally, fix them in place with a little more Superglue, setting them back slightly from the edge of the carcass to form a shadow line (see **photo 33**).

CUTTING LIST

1 x top	685 x 265 x 18mm (27 x 10½ x 23/32in)
2 x sides	735 x 230 x 12mm (29 x 9 x ½in)
4 x shelves	620 x 215 x 12mm (24½ x 8½ x ½in)
1 x plinth	1220 x 115 x 12mm (48 x 4½ x ½in)
1 x divider	100 x 215 x 12mm (4 x 8½ x ½in)
2 x drawer fronts	115 x 315 x 12mm (4½ x 12½ x ½in)

All material MDF
10mm MDF for drawer sides
Hardboard for drawer bottoms

THE BIG TOP

JOHN BULLAR

John Bullar completes his Arts and Crafts-inspired elm dresser by the addition of a display top

In the last issue I described making the base of this dresser with its pair of drawers and cupboard doors, ready to take the display cabinet on top. Now we are going to look at the upper section with its traditional square-panelled back and corniced top.

DESIGN FEATURES

The glazed doors were an option my client wanted. Although the open shelves of a traditional farmhouse dresser can provide a handsome way to display the owner's crockery, in days gone by they also meant the traditional farmer's wife's duties included dusting the contents of their dresser every day, which isn't really compatible with the pressures of modern life! While open shelves are excellent for display, glazed doors make good sense if the contents are crockery or glassware for use and not just for show. The same design could also be used to make an attractive and practical bookcase cabinet.

PREPARING THE ELM

When I bought the timber for the whole dresser, I set aside a particularly wild board to use for the back panels. Although the figuring was impressive, there were practically no clear lengths in this piece large enough to make anything longer than panels. I took several attempts at laying out the cutting of the nine approximate squares, working around the shakes and bark intrusions. An MDF template makes it easier to mark out the panel edges.

Having rough-sawn the panel pieces

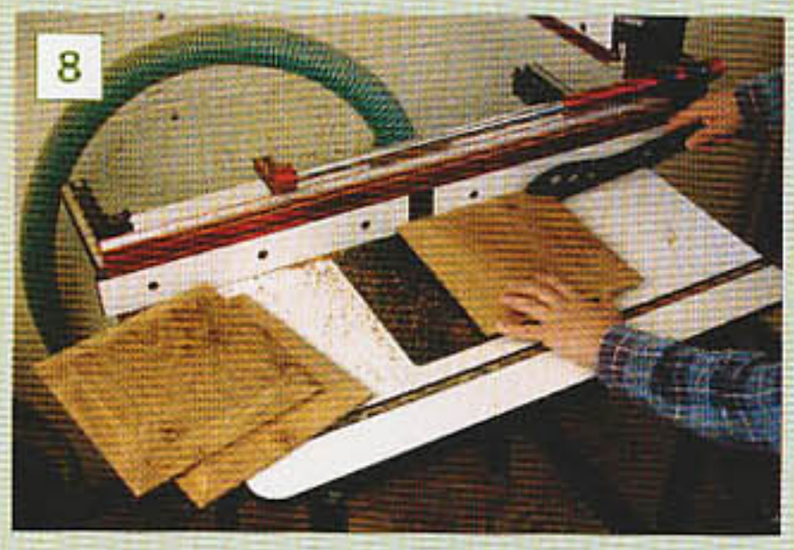
PHOTOGRAPHS BY THE AUTHOR

The carcass is dovetail-jointed on the corners

The dovetails are routed on the shelf ends to slide into dovetail housings

The panels are marked out with a template and cut from between major 'natural features' in the elm

Fielding edges are pre-routed with a straight bit



The fielding chamfers are cut on the router table

The cabinet is dry-fitted as a trial run

Door frame rails and stiles are cut with bridle joints and rebated

slightly oversize with a jigsaw, I straightened them up on the tablesaw and planed the front faces.

Once planed, the panels needed thicknessing. One snag I have often had in the past when trying to thickness short pieces of timber is that they can become skewed, then jam in the machine. To avoid this I attached the panels in sets of three to a piece of plywood using double-sided sticky tape. Although it made a weak bond, the tape was sufficient to hold the panels on the sledge board while I fed them into the mouth of the thicknesser. I used a pushstick on the last panel to keep them all going straight.

The boards for the side panels, shelves, top, and cornice are all cut from timber with slightly less disrupting features in it, but even so, it took several attempts to mark them out.

The frames for the doors are quite narrow and need to remain straight. Mine were made from mild-grained timber to avoid twisting in service.

CARCASS CONSTRUCTION

The carcass is a square-framed unit, joined by lapped dovetails between the solid top, sides, and framed bottom. The shelves are slid into dovetail housings in the sides.

You could make the bottom from another piece of solid timber. Alternatively you might build it directly on to the top of the base carcass making the whole cabinet as a single unit. However, based on bad experiences in the past, I usually prefer to make large furniture from smaller manageable units.

The sides, top and base frame joints are prepared using a router with a dovetail jig. Prepare the dovetail housings in the side panels and the dovetailed ends on the shelves to slide in on the router table. For a good sliding fit, make sure the dovetail cutter height remains the same for both parts of the housing joint. For cutting ends on shelves the position of the fence is critical. It is best to test out the joint on one or two pieces of scrap of the same thickness as the shelves.

With all the joints cut, do a dry-run of the carcass to make sure everything fits. The final assembly and glue-up requires all the panels to be fitted in place first.

PANEL MAKING

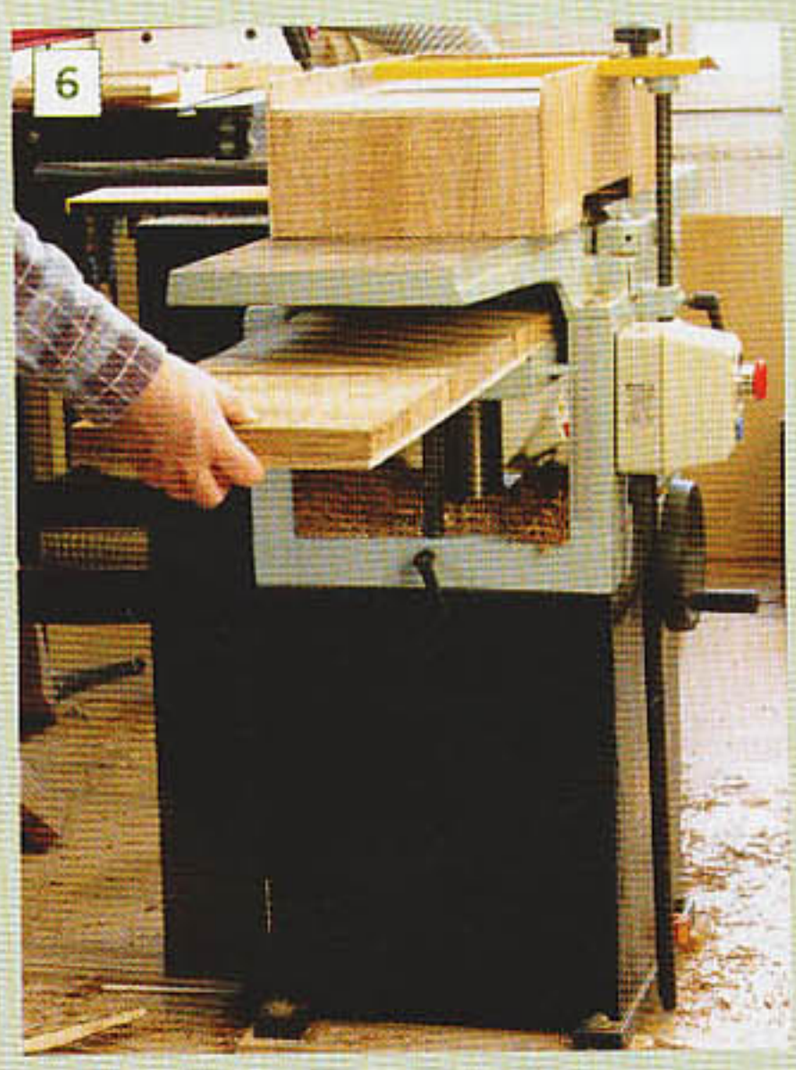
There are nine panels in thee rows of three. Between the panels in each row are short stiles – vertical timbers with rebate slots in each side to receive the panel edges. These stiles have stub-tenons on their top and bottom ends to slide in the shelf rebates along with the panels. While the stiles are not structural, they help brace the carcass back, and of course fill the gaps between the panels.

Having cut, planed and thicknessed the panel pieces, they need to be fielded to form tapered edges that will slide into rebates in the cabinet sides and shelves. If this work is done with a router rather than a plane, the router bit will need to be quite large so I would only attempt it in a router table. To keep the inner edges of the fielded panel tidy and prevent

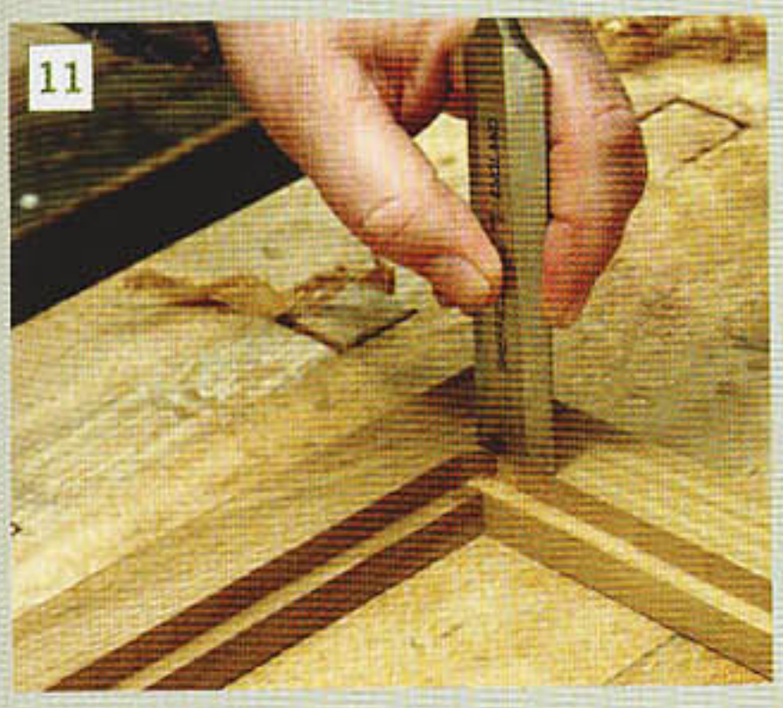
A stack of nine rough-sawn panels ready for planing and dimensioning

The panels are taped on a 'sledge' board ready for thicknessing

The cornice is cut at a compound angle with a block cut to fit inside



The short panels pass through the planer without a hitch



After gluing up the door frames the rebate corners are squared ready for the glass

The cornice is screwed on the cabinet top

Door pull handles turned as a disk, then sliced off

them spelching, rout them first with a fine straight bit to form a stepped edge on the fielding.

PANEL FITTING

The centre row of panels do look as if they would be a Chinese puzzle to fit – the three panels and two rails need to be trapped between the vertical slots in the cabinet sides and the horizontal slots in the shelves above and below. The major snag is that the shelves themselves prevent the sides from parting because of their dovetail housings. I thought about this for a while and some ideas went through my mind – such as fitting the last panel from behind with open-backed rebates and holding it in with screw fixings – a pretty untidy solution!

Eventually I realised all this was unnecessary – the panels needed to end up in their slots with an extra millimetre of freedom each side allowing for wood movement. You should make use of this fact. With the shelves fully engaged in their dovetail housings in the left side, but only partway engaged in the right, slide all the panels and rails tightly against the left-side slot. This will temporarily create 5mm (3/16in) of extra slack, allowing the right-hand end of the shelves to be fully engaged in their housings. The panel edge should just clear the right side until it is aligned with the slot. Now the panels and rails can be knocked back to their correct position, engaging all the panels' edges evenly in their slots.

Fitting the top and bottom row of panels is more straightforward. They should simply slide in from above and below, before the dovetail-jointed cabinet top and the bottom rail is glued and fitted to trap them in place.

CORNICE

The cornice should be cut from narrow boards. As it has no structural significance it can be made from fairly wild pieces of timber. Mine had some large bark intrusions in the back, so the front was quite burred and interesting.

Chamfer the upper and lower edges at 45° and cut the ends at a compound angle to produce the required mitre. I did this work on the bandsaw using an angled sliding fence and some angled blocks to secure the timber against. A compound mitre saw or a tablesaw with an angled crosscut fence will both do the job well. Alternatively, with a bit of care it could be cut with a tenon saw in a mitre box.

The corners are joined using a screwed and glued block, cut to the corresponding compound angles and fitted inside the top of the cornice.

Fix the cornice to the carcass top with a large number of small screws through its lower edge. Don't glue it as it needs to be removed for fitting the upper door hinges.

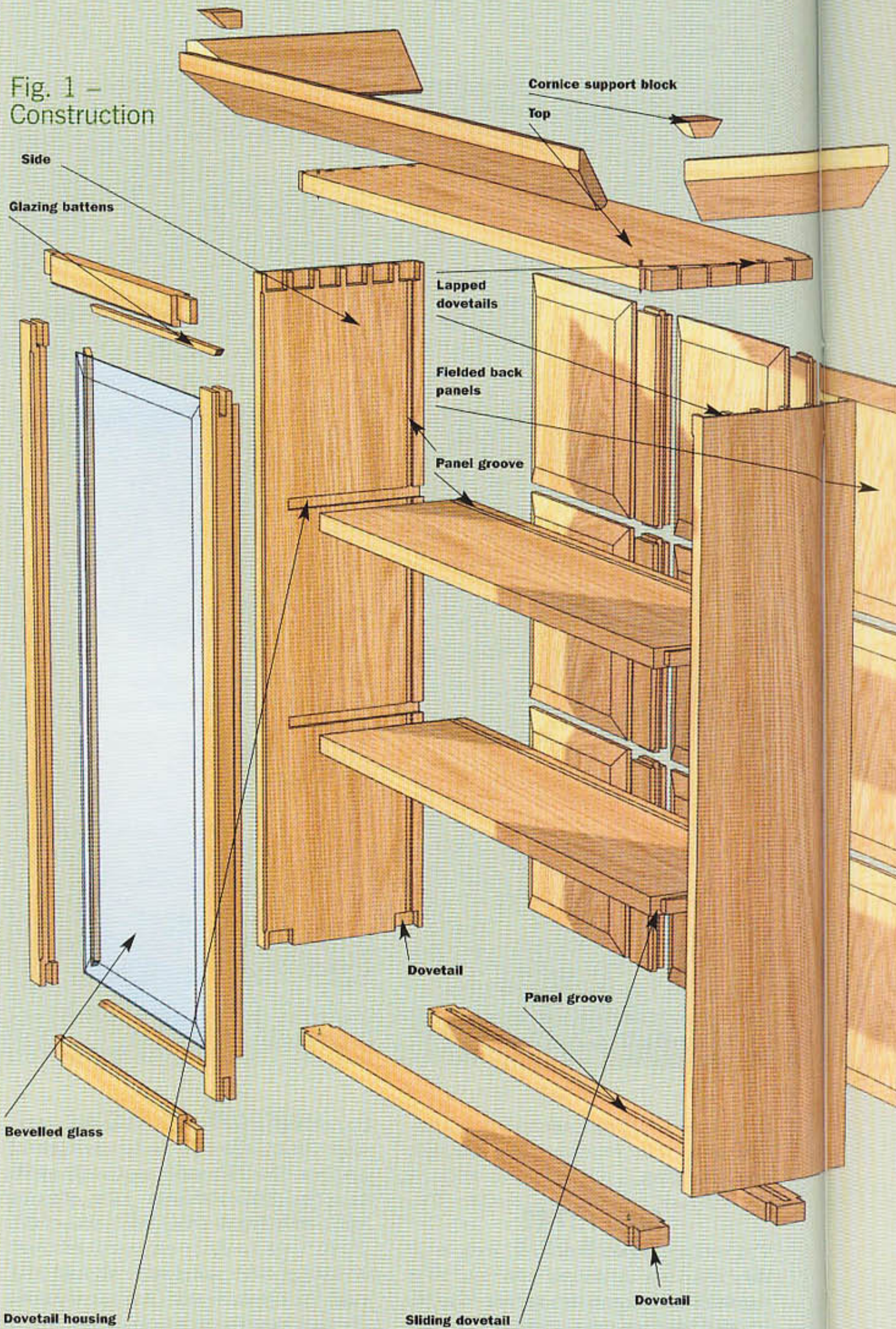
DOOR FRAMES

Having thicknessed the frame material and cut the pieces to length, cut bridle joints on the router table and rebate the inside edges of the frame components to receive the glazing.

The fitted door pulls

Finished cabinet with the top glazing fitted

Fig. 1 – Construction



As soon as the door frames are glued up, measure the inside dimensions of the recess for the glass as accurately as possible. After checking the measurements in several places and knocking 1mm (1/32in) off each to allow for shrinkage, order a pair of bevel-edged panels from your local glass dealer. For safety, it is wise to have door glazing toughened. Bevelled-toughened panes usually take a couple of weeks to produce so once they are ready the cabinet should have already received a few coats of oil.

I wanted the bevel-edged glass to echo the pattern of the fielded elm panels. 25mm (1in) is the widest bevel that can be cut on 4mm glass (using 6mm glass would have made the doors too heavy) so I also made the panel fieldings on the rest of the cabinet 25mm (1in) wide to match.

The doors are pivoted in a similar manner to the base unit, using a home-made pivot pin arrangement rather than conventional hinges.

Drill a pilot hole through the carcass top and lower frame rail in the hinge position, 25mm (1in) from the carcass side, and half the door thickness from the carcass front. With the door wedged in position, push a needle through each pilot hole to mark the door edge. The pilot hole in the frame should be enlarged to give clearance of the screw shaft and then counterbored from the outside to make a tight fit for the stack of brass washers. It is important that the pin pivots in the trapped washers, not the wood.

After the hinges and catches have been

Fig. 2A –

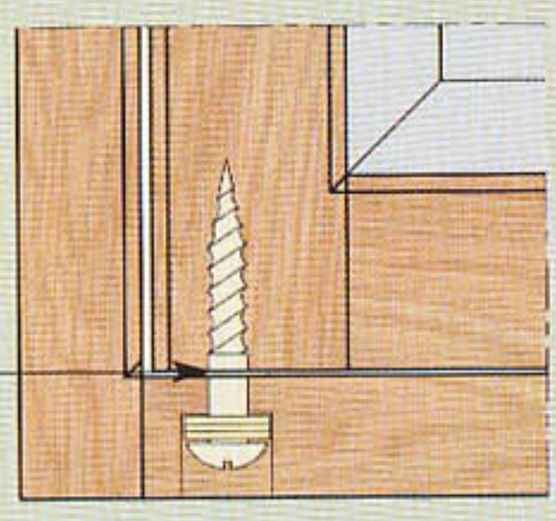
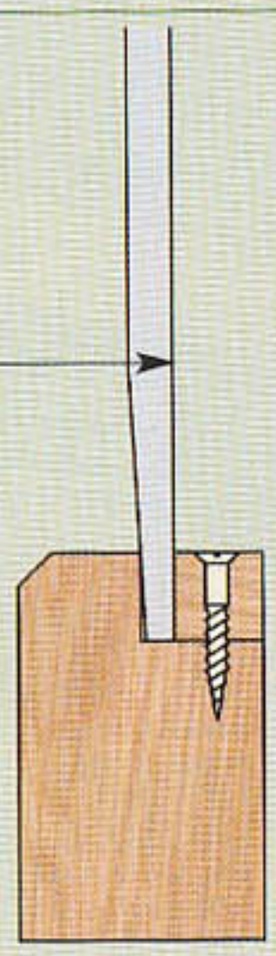


Fig. 2B –



Display top is for crockery that is good to see and good to use

CUTTING LIST

CARCASS
1 x top.....850 x 220 x 22mm (33½ x 8⅝ x ⅞in) elm
2 x sides .....850 x 220 x 22mm (33½ x 8⅝ x ⅞in) elm
2 x bottom frame .....850 x 45 x 22mm (33½ x 1¾ x ⅞in) elm
PANELLING
9 x panels .....250 x 270 x 22mm (9¾ x 10⅝ x ⅞in) elm
6 x stiles .....270 x 45 x 22mm (10⅝ x 1¾ x ⅞in) elm
DOORS
4 x door stiles .....820 x 35 x 22mm (32¼ x 1⅜ x ⅞in) elm
4 x door rails .....400 x 35 x 22mm (15¾ x 1⅜ x ⅞in) elm
8 x glazing battens .....8m x 8mm (cut to fit) elm
2 x bevel-edged glass .....4mm ordered to fit glass
CORNICE
1 x front.....950 x 100 x 22mm (37½ x 4 x ⅞in) elm
2 x sides .....280 x 100 x 22mm (11 x 4 x ⅞in) elm

“I wanted the bevel-edged glass to echo the pattern of the fielded elm panels”

fitted and adjustments made to ensure they fit true, insert the glazing in its rebate, using screwed battens from behind to hold it in place. I trial-fitted the glazing and doors completely in the workshop but then removed the glass for transport and assembly of the dresser.

FINISHING

As with the base carcass, the surfaces should be planed as far as possible to avoid the use of coarse sandpaper and the damage it can do to wood fibres. Using fine sandpaper ensures the wood surface has a silky feel, but make sure the sanding machine or hand-held block behind the paper is completely flat and level so it keeps the edges crisp.

My door pull handles were concave-sided arc shapes made from scraps of elm turned on the lathe, being somewhat smaller than the handles on the lower carcass to match the finer frames.

Danish oil gives richness to elm but do not apply it as you would varnish or you will get a treacle-like finish. Dilute the oil with white spirit, brush it on and then wipe it off the surface again before a skin forms. Apply several coats of oil leaving a day between each and then polish with a beeswax paste.

Finally, with the dresser assembled, polished and the doors fitted, fit the glazing back in place and secure it with battens.

Having worked on construction of the cabinet as two separate units, seeing it come together as one was a pleasant surprise.

TECHNICAL TIPS

PHOTOGRAPHS BY THE AUTHOR

Geoff Lucas designs and constructs an edge-jointing jig

The ability to join up narrow pieces of wood to make wider boards is one of the most basic woodworking skills. It is also one of the most difficult if you want to end up with a seamless join. Whilst the strength of modern adhesives often means that a straightforward butt joint is probably all that is needed, it will only work effectively if the mating halves of the joint fit together perfectly.

THE PROBLEM

The obvious answer if you have a planing machine is to try and straighten the edges on the surfacer. However, unless you are very careful and the surfacer has a very long table, it is a difficult job to get the necessary perfect straightedge. There always seems to be a gap at either end of the joint, (see **photo 1**) and pulling these gaps up tight with sash cramps at the gluing stage means that you build in tremendous stresses that are violently released with any subsequent changes in temperature or humidity. The joint either cracks open, or more likely because the glue is so strong, the wood itself breaks first and then a crack develops at the end of the board.

Even if you do manage to use a machine planer to get a perfect straightedge the small ripples left by the blades are sometimes enough to accentuate the glue line (see **photo 2**). While this may suffice for general joinery it is not good enough for fine cabinetmaking.

Traditionally the use of a long-soled plane was the only sure way of truing up the edge (see **photo 3**). Even this though isn't as simple as it first appears and it takes some considerable practice and skill to be able to shoot a perfect edge by hand, even if you can afford to buy the plane!

THE SOLUTION

The answer lies in the use of a router to produce an edge that is perfectly matched to its opposite half. Theoretically you could run the router against a straightedge for both pieces and they will probably fit well enough. However, any slight bumps or irregularities in the straightedge will be reproduced by the cutter and as the edges are cut independently the resulting fit, though good, can never be perfect.

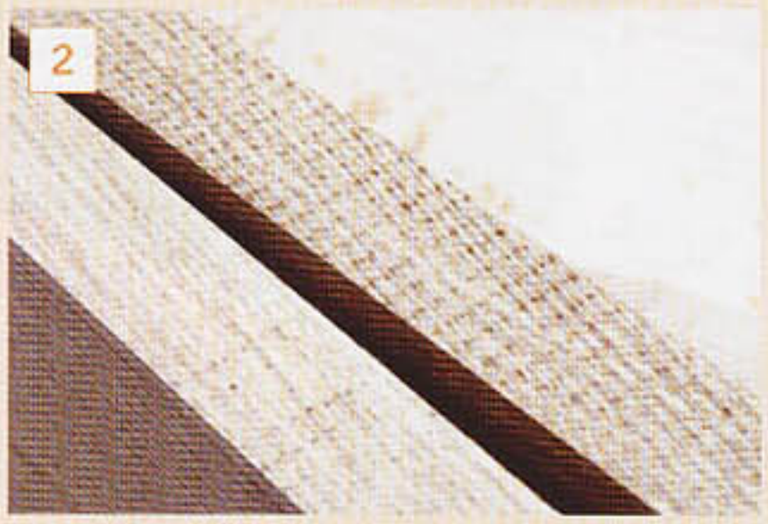
Perfection can only be achieved by cutting the two mating edges simultaneously against the same straightedge and for this you can make a very simple jig. It is one of the most straightforward of routing jigs and the hour or so spent making it will be more than repaid in the quality of joint you're guaranteed to get in all your subsequent panel work.

CONSTRUCTION

MADE TO FIT

There are no critical dimensions for this jig, you will have to try and guess the biggest sized piece you are likely to

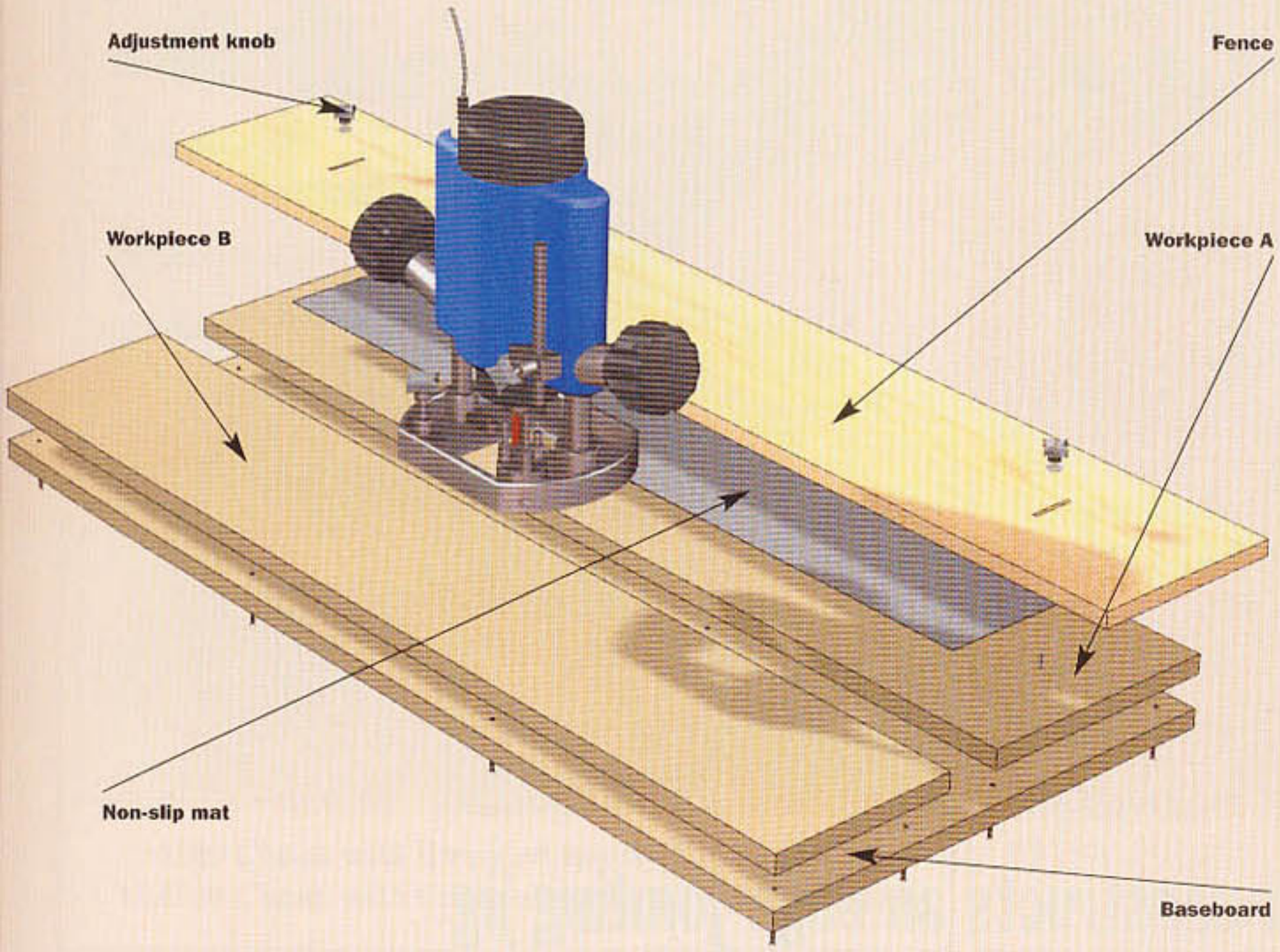
There always seems to be a gap at either end of the joint



Small ripples left by the blade are sometimes enough to accentuate the glue line

Traditionally the use of a long-soled plane was the only sure way of truing up the edge

Fig. 1 – Construction



It is useful to make this fence adjustable

I stuck a strip of non-slip mat to the underside of the fence

handle and make it accordingly. This one is about 1m in length and comfortably handles my relatively small-scale work. You will need three pieces of MDF, a wide one of about 460mm (18in) as a baseboard, another piece about 230mm (9in) for the main table, and a narrow one about 180mm (7in) for the other side of the table (see **photo 4**). Glue and screw the two parts of the table onto the baseboard such that there is a gap of about 50mm (2in) between them (see **photo 5**). I don't bother lining the ends or edges up particularly well at this stage, just fix it all together and then true up the whole assembly as one (see **photo 6**).

FENCE

Now you need to make a fence for the router to run against. This should be as straight as possible, but the whole idea of the jig is that it is not that critical. Make the fence a good 75mm (3in) longer than the jig itself to make sure there is plenty of support for the router when you get to the end of a cut. It is useful to make this fence adjustable so position it on the jig with the router in place and with a straight cutter against one side of the gap in the table (see **photo 7**). Now you can mark either end of the fence for a slot that will allow the fence enough movement such that the router position can be adjusted until the cutter runs in the middle of the gap.

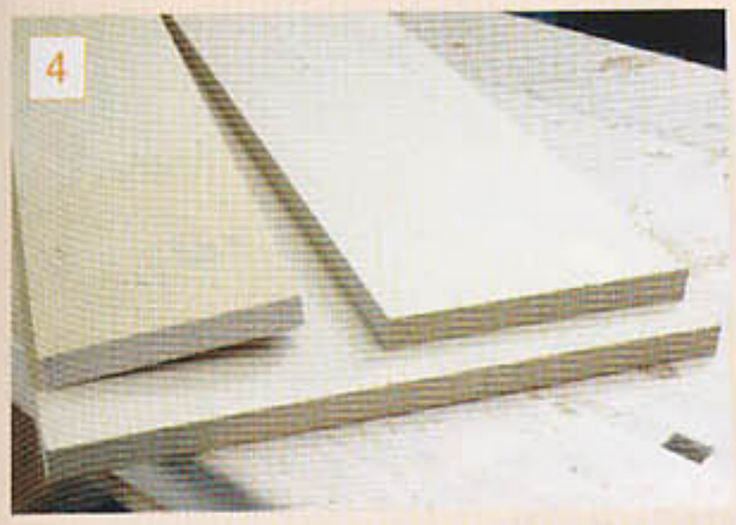
Cut the necessary slot to accommodate the locking bolts, using a straight cutter and the side fence on your router, making several passes until the cutter plunges right through (see **photo 8**). Put the fence back in place on the jig and mark and drill the position of the fixing bolts, firstly counterboring the underneath of the jig, so the heads of the coach bolts are flush with the base (see **photo 9**).

The clamping arrangement is some form of locking handle or knob, which you can buy from most router equipment suppliers (see **photo 10**). Failing that just use a nut, though this is obviously fiddlier to operate every time you need to move the fence. For extra grip I stuck a strip of non-slip mat to the underside of the fence, which proved to be a real benefit when clamping down onto the rather slippy surface of some pieces of hardwood (see **photo 11**).

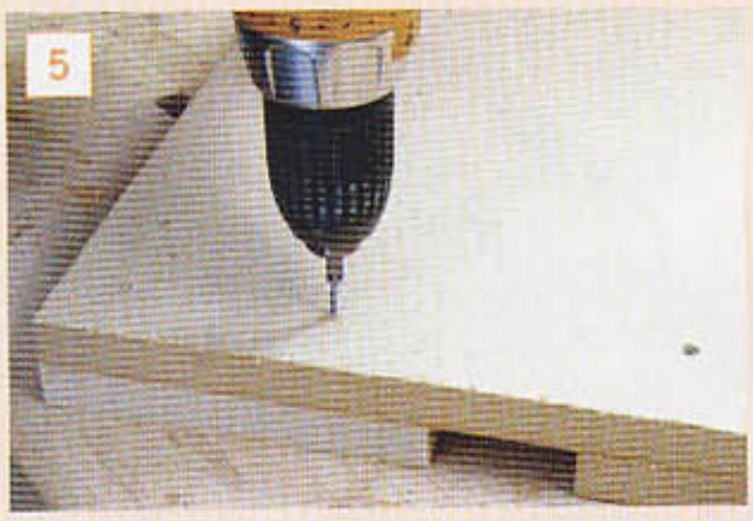
That is all there is to this simple edging jig, but to use it effectively you need all-round access to it so clamp it firmly on the end of your workbench (see **photo 12**).

SET-UP

Now you're ready to start trimming some edges, but firstly you will have to determine the distance from the edge off your router base to the cutting edge of the bit (see **photo 13**). For the majority of work I tend to use the straight section of the base against the fence, so measure

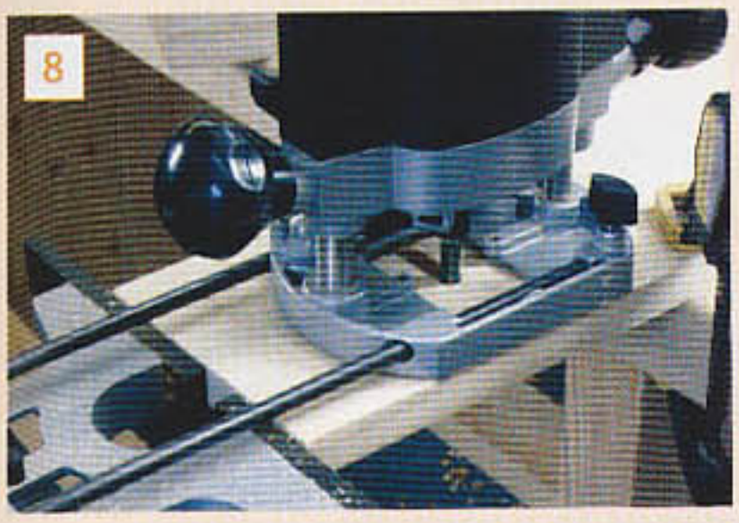


You will need three pieces of MDF



Glue and screw the two parts of the table onto the baseboard

I don't bother lining the ends or edges up particularly well at this stage

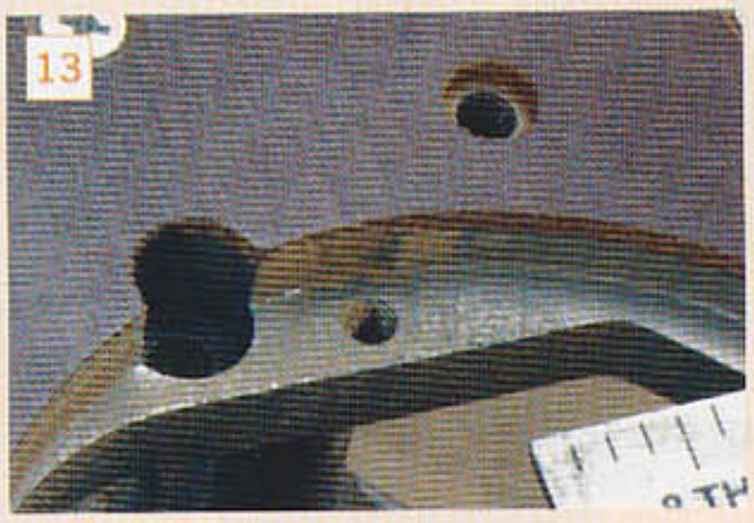


Cut the necessary slot to accommodate the locking bolts

Counterbore the underneath of the jig so the heads of the coach bolts are flush with the base

The clamping arrangement is some form of locking handle or knob

That is all there is to this simple edging jig



Determine the distance from the edge off your router base to the cutting edge

Clamp one of the pieces you wish to trim under the fence

this distance and call it 'A'. If your router base is totally circular you can measure from anywhere provided the cutter is central in the base. It might be worth checking that this is so if you ever have alignment problems later.

Clamp one of the pieces you wish to trim under the fence with it protruding by distance 'A' plus 1mm (‰in), (see **photo 14**). This extra 1mm (‰in) will depend on the hardness of the timber, the power of your router, and the depth you are cutting. You could possibly increase it a fraction if the edge is very uneven, but bear in mind that you have to use the jig by making a single pass at full depth, so keep the cuts as light as possible. With the necessary distance set, make sure the clamps are really tight and then run your router along the fence working from left to right when the fence is behind the router (see **photo 15**).

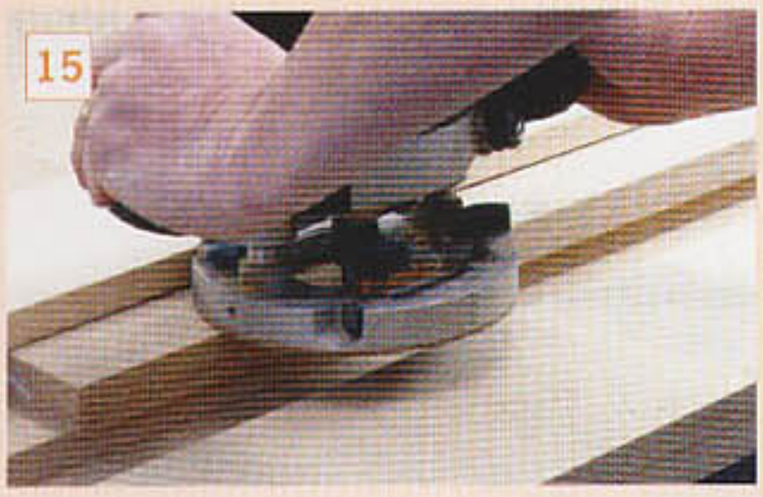
Make sure this cut cleans up the whole length of the edge. If it doesn't, move the workpiece out slightly from under the fence and make another cut. When you are satisfied the first edge is cut true, leave it in place and clamp the second piece on the other half of the table, keeping the two separated by about 1mm (‰in) less than the diameter of the cutter you're using (see **photo 16**). You will have to use separate clamps for this. I find two speed cramps quite sufficient.

Now make another pass down the fence, which should now only cut the second piece (see **photo 17**). Notice that because you are now using the other side of the cutter you have to work from right to left to make sure the router stays in contact with the fence. Leave the first piece clamped in the jig and now try the second piece up against it (see **photo 18**). This allows you to see if the second cut is perfect, if not move it in a fraction and take another light pass. The joint will then be perfect as any irregularity in the fence will be mirrored and therefore cancelled out on each edge. It is a good idea to mark the orientation of the pieces to each other with a pencil line at this stage so you can fit them back together later (see **photo 19**).

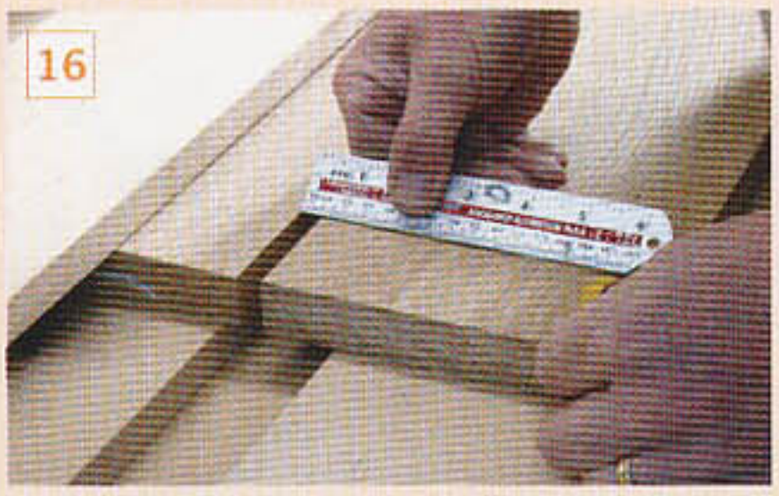
IRREGULAR EDGES

There are other variations you can do with this jig as well. Sometimes the grain patterns of the boards you are trying to join may be too irregular to be hidden satisfactorily with a straight joint. Or maybe you want to join two pieces in a wavy line anyway. In this case make another fence, but this time shape it to the necessary curve (see **photo 20**).

You will also have to cut the mating halves with the same profile, and then clamp the first one in place making sure the line of the curve is all within the gap between the two pieces of the table (see **photo 21**). If your workpieces are quite narrow and are sticking a long way out from under the fence you may have to put



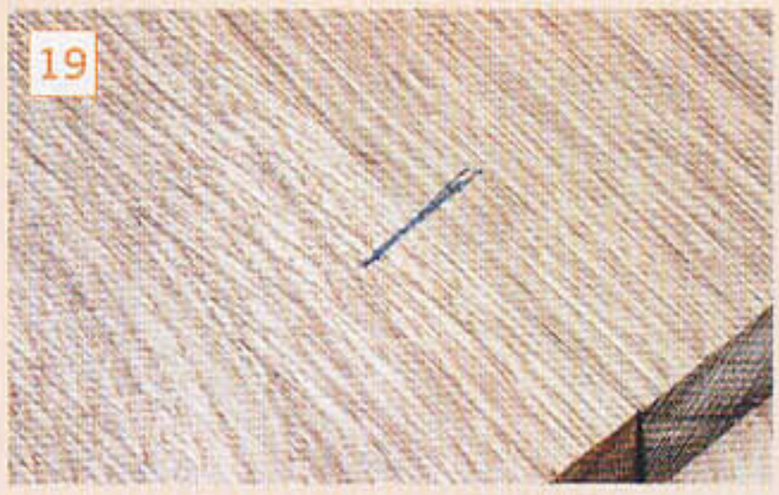
Run your router along the fence working from left to right



When you are satisfied the first edge is cut true, clamp the second piece

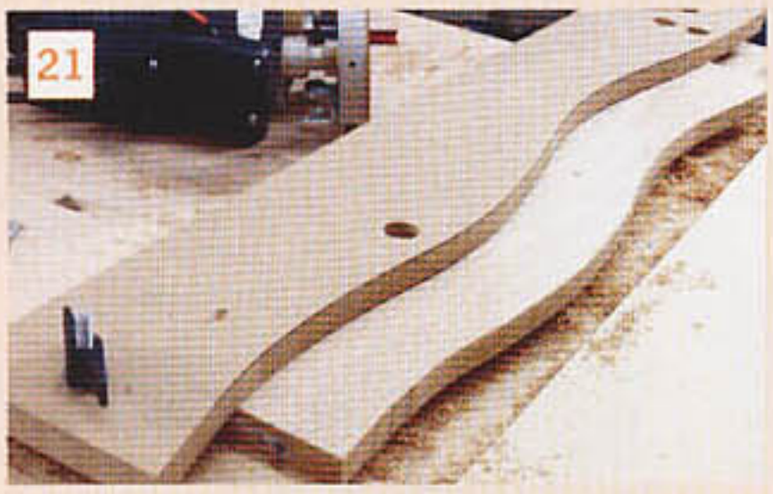
Make another pass down the fence, which should now only cut the second piece

Leave the first piece clamped in the jig and now try the second piece up against it

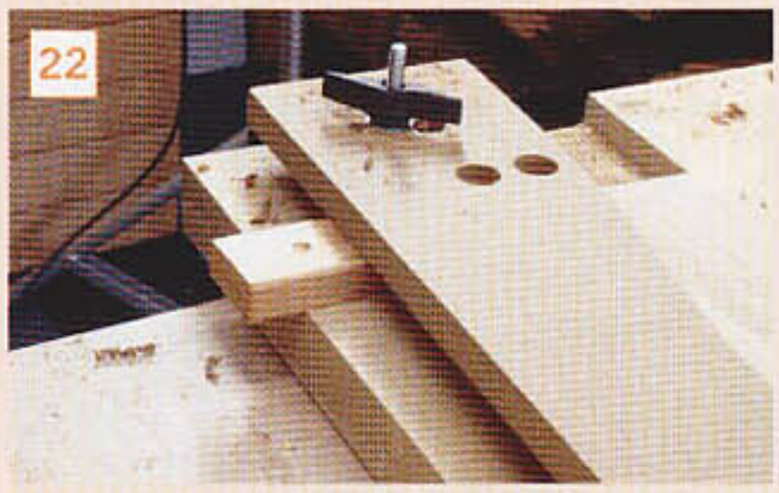


It is a good idea to mark the orientation of the pieces to each other

Or maybe you want to join two pieces in a wavy line anyway



Make sure the line of the curve is all within the gap between the two pieces of the table



Use a temporary packing piece to stop the fence tipping backwards

Now use the round part of the base to run against the fence

Fix this in the jig the same way as before

Working from right to left, keep the router tight up against the fence

The resulting edges will be perfectly matched

in a temporary packing piece to stop the fence tipping backwards (see **photo 22**).

The edge is cut in exactly the same way but now I have to use the round part of the base to run against the fence (see **photo 23**). You may have to make several passes with this, moving the work out a fraction each time as it is more difficult to line-up the fence and workpiece profiles when measuring to a curved edge.

PERFECT MATCH

The second workpiece has to have the same initial profile cut on it, but note that the shape is the reverse of the first and not a duplicate. Fix this in the jig the same way as before, measuring the gap between the two components to be just less than the diameter of your cutter (see **photo 24**). Run the router down between them, again working from right to left to keep the router tight up against the fence (see **photo 25**). The resulting edges will be perfectly matched and the halves will fit together as one (see **photo 26**).

It may not be obvious unless you have a mathematical brain, but this jig is actually creating a different curve on each piece. One curve is dissimilar to the radius of the other by the cutter's diameter. However, if you keep the curves really gentle the two pieces are sufficiently similar to fit together perfectly, though using the smallest possible bit will further minimise this offset.

The smaller the radius of the curves the bigger the discrepancy will be between the two pieces, so if you need to joint two pieces together with really exaggerated curves it is just not possible on this type of jig. In this case you will have to use a separate template and guidebush arrangement.

PROJECT

ABOVE AND BEYOND

John Everett comes up with an alternative overhead routing set-up particularly suited to those woodworkers involved in miniature work

A small router is a common choice for miniature work such as dolls' house items and the like, although it is typically used in conjunction with a small router table. While this is fine for many items, the main problem with this set-up is that you are unable to see the actual work in progress. The commercial answer would of course be to simply buy a purpose-made machine for the job, but for us lesser mortals who have neither the space nor budget for such a purchase, we need an alternative solution. Here's what I came up with.

REQUIREMENTS

I wanted my overhead routing set-up to meet some essential requirements. It needed to be inexpensive to construct, sufficiently accurate for small-scale work, and I didn't want it to take up any appreciable space in the workshop while not in use. It also needed to be quick to set up and dismantle and with a minimum of fuss.

The project is based on the Trend T3 router which is inexpensive, light in weight and has speed control, making it ideal for such a set-up. The only other components needed are a fine height-adjuster for easy and accurate cutter height setting, and a 24in guide clamp from Trend. To increase its versatility I decided to add a circular routing facility, which entails incorporating a 'lazy Susan' bearing. I obtained mine from Craft Supplies.

As I suspect is the case in many workshops up and down the country, a tablesaw already takes up most of my free floor space. This seemed a good place to start by utilising a good, flat surface which comes with many useful items already, such as the rip fence and grooves in the table top at precise right angles to the fence.

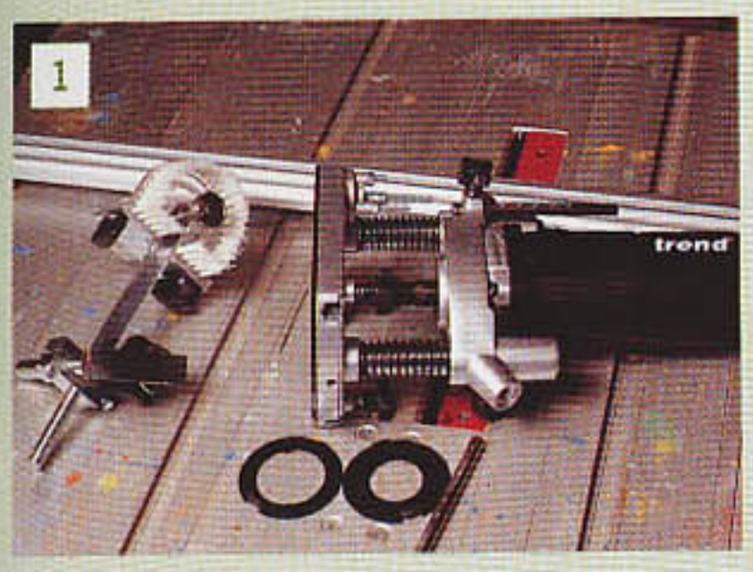
CONSTRUCTION

BATTEN AND BASEBOARD

The first thing to do is to cut out a suitable baseboard. The one shown here was made by recycling a piece of veneered chipboard, some 20mm (¾in) in thickness. If you can obtain a similar piece make sure it is cut precisely square and cleaned up for a smooth surface on the underside so it will slide smoothly on the saw table.

Next measure up the slot in the saw table. Mine was 7mm (¼in) in depth and 11mm (7/16in) in width. Cut a batten to these dimensions, sand it smooth and check for a good sliding fit in the groove. A little drawer-glide spray will make a good slide and helps maintain stress-free working later on.

Once you have your batten and baseboard, mark up the position for the

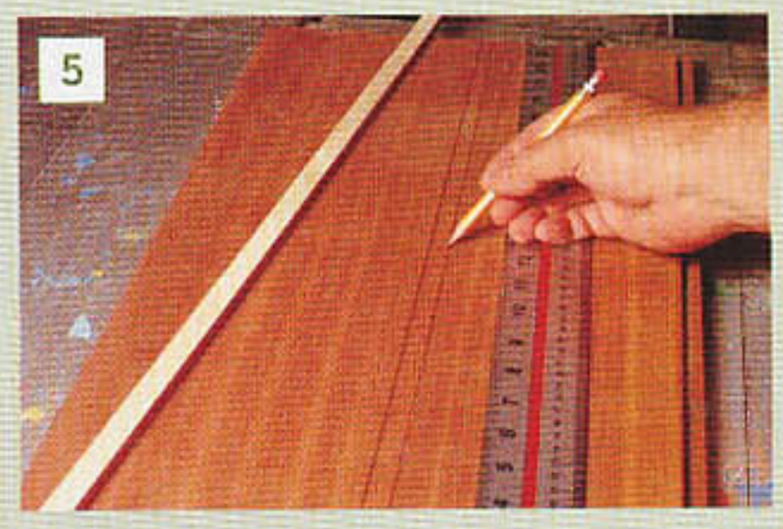


The Trend T3 router kit used for this project

Guide rods and a fine height-adjuster fitted to the T3 router ready for installation

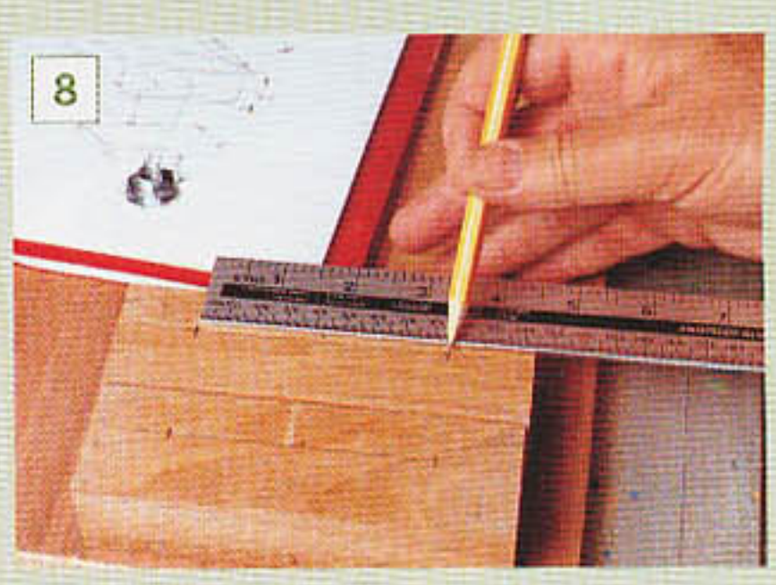
Check the dimensions of the saw table guide slot before cutting the guide strip for the sliding baseboard

Check for square as construction progresses



Mark out the position for the sliding strip of the baseboard

Check that the router to be installed fits into its main support block. Note that the router base partially rests on the rip fence for additional support and stability



Mark out the hole positions on the rod support blocks

former to fix to the underside of the latter. My board measured 330 x 600mm (13 x 23⅝in). The longer side faces the rip fence with the shorter sides to the front and rear of the table. This allows the guide clamp to act as a backstop for the material being routed. Being adjustable, it allows a good range of material widths to be accommodated on the sliding table. Screw and glue the batten to the underside of the baseboard and once the glue has fully set, make sure it slides freely in the tablesaw groove.

CLAMPING THE ROUTER

Next, turn your attention to the router itself and all the necessary clamping arrangements. You need a good-sized block of wood for the base, measuring approximately 150 x 160 x 40mm (6 x 6⅜ x 1⅝in). I used a piece of hardwood which happened to be roughly this size already and only needed a little cleaning up and checking for square.

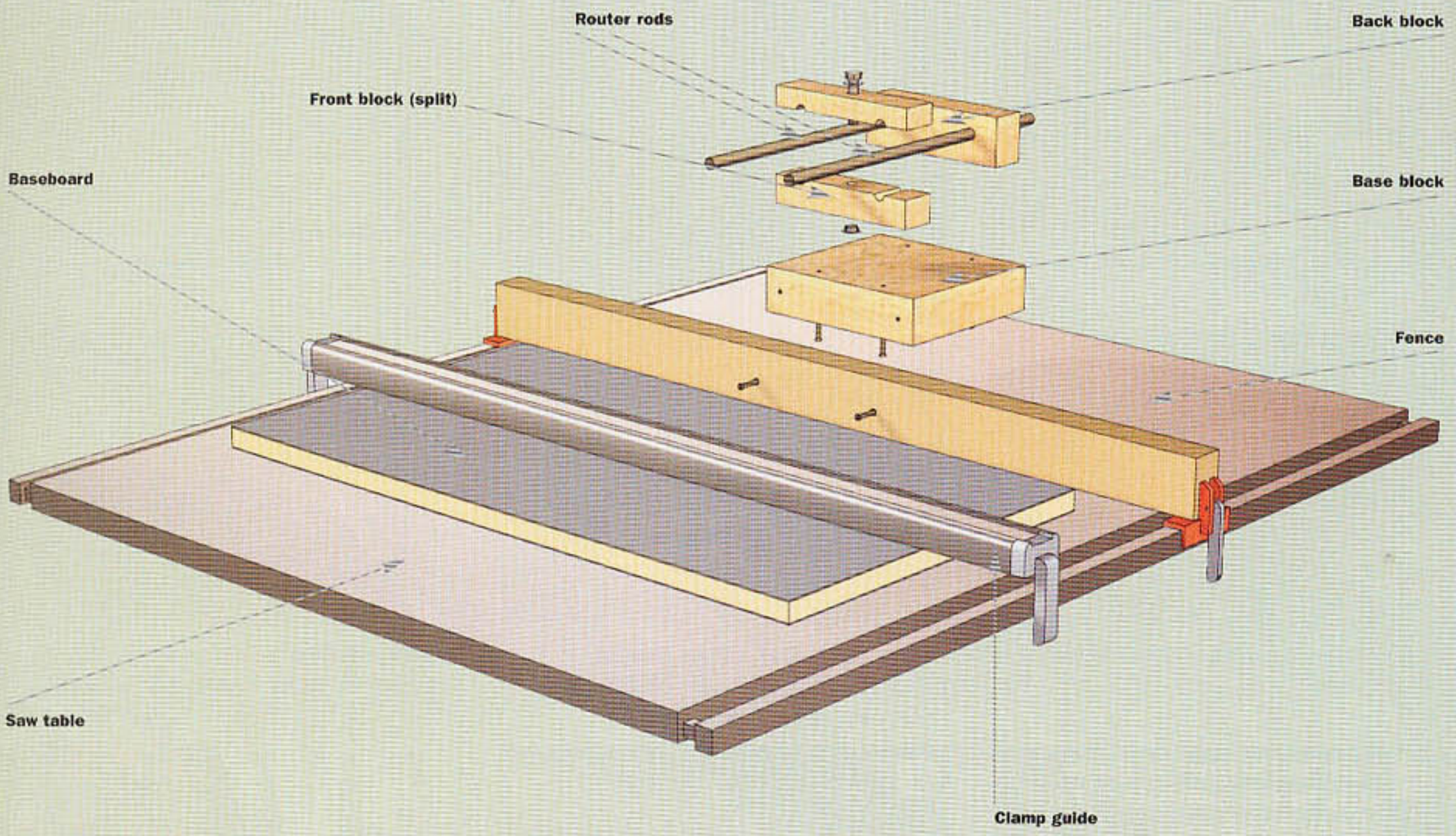
You now need a couple of rod supports, cut to 140 x 32 x 43mm (5½ x 1¼ x 1⅝in). Again hardwood is best as there will be less 'give' in the finished pieces, thus helping to maintain accuracy. Once these two pieces are to hand, mark up the positions for the holes which will take the guide fence rods supplied with the router kit. If you are using the Trend T3 then the holes will have a spacing of 85mm (3⅜in), which should be 25mm (1in) up from the bottom of the rod supports. Using a bench drill make the holes for the rods to be fitted in.

The front rod support is now cut along its length and with the saw cut bisecting the two rod holes, you end up with an upper and lower part to the block. Keep the saw kerf as thin as possible or the holes will be too tight a fit on the rods.

Drill a hole in the centre of both blocks (at the same time and with the two halves realigned in the drill press) to take a clamp bolt. I used a 9mm bolt with a 9mm prong nut which is counterbored into the underside of the lower part of the clamp block. The fixing bolt will probably need to be cut to length so that when fully tightened it will enter the prong nut fully, without protruding below the bottom surface of either the prong nut or rod support block. The counterbore for the prong nut is best done with a Forstner bit of the appropriate diameter so that the surface of the prong nut sits a little below the surface of the block – 1 or 2mm (1/64-3/64in).

Now mark the two blocks for position on the base block and glue and screw in place, making sure they are square to each other. When you drill out for the fixing holes for the rod support blocks, make sure the screws do not foul the rod holes. Do bear in mind that you will also ➥

Fig. 1 – Construction



need two further holes into the face of the block for it to be ultimately screwed in place on the saw table rip fence.

Check your clamp bolt for a good fit and use a decent-sized plain washer to prevent the head of the bolt from biting into the surface of the wood as it is tightened. At this point, you can also fit the guide rods into the base of the router and check the holes in your mounting block to ensure they are a good fit. The mounting block has been arranged so that part of the router baseplate will sit on top of the rip fence and be further supported and clamped in place by the mounting block. This gives it just that bit of extra support in use and also helps maintain accuracy as the baseplate will be perfectly parallel to the saw table and hence the sliding baseboard, which holds the stock to be routed.

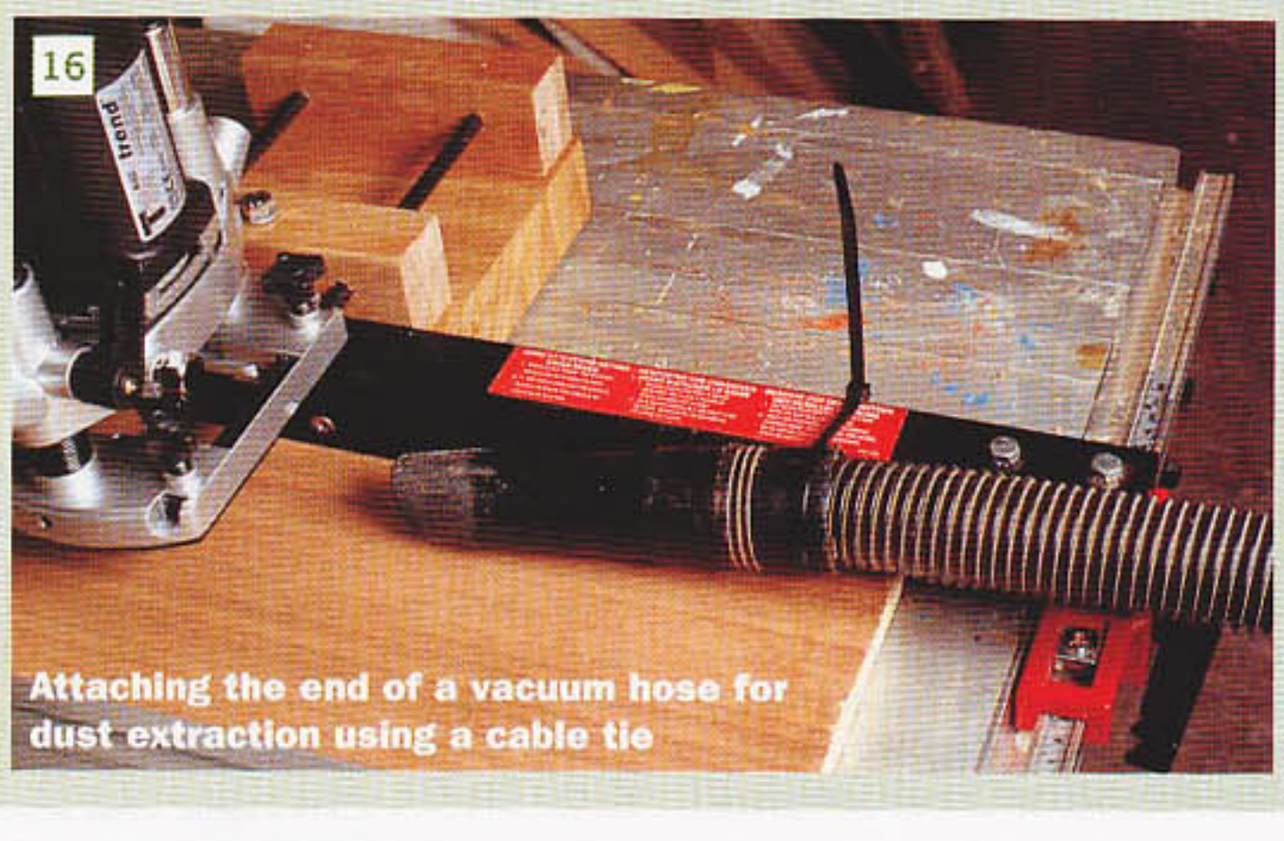
FITTING THE ROUTER

With the set-up complete, the router can be quickly removed from its mounting by simply undoing the wing nuts (which clamp the guide rods) and sliding the router out. The cutter can now be easily changed with the actual router removed from the tabletop set-up. Once the router bit has been replaced, the router can be simply slid back onto the guide rods, and the wing nuts re-tightened.

If your rip fence isn't sturdy enough to take the additional weight, the base of the router block can be simply clamped to the saw table providing additional stability. However, with a fairly large hardwood block sitting flat on the saw table, there shouldn't be too much problem in this respect, although some less expensive rip fences do tend to be a little on the lightweight side.

DUST EXTRACTION

With this type of set-up, a degree of dust extraction is definitely called for. After all, the whole idea is to be able to see what you are doing as the work progresses and there is a need to remove the waste from the cutting area so this can happen. There will probably be surplus holes already in place on the rip fence for attaching sacrificial strips and one of these can be used to temporarily attach a suction hose using a cable tie of the flexible plastic sort. These can be obtained from a number of suppliers for a pittance. I got mine from Screwfix Direct.



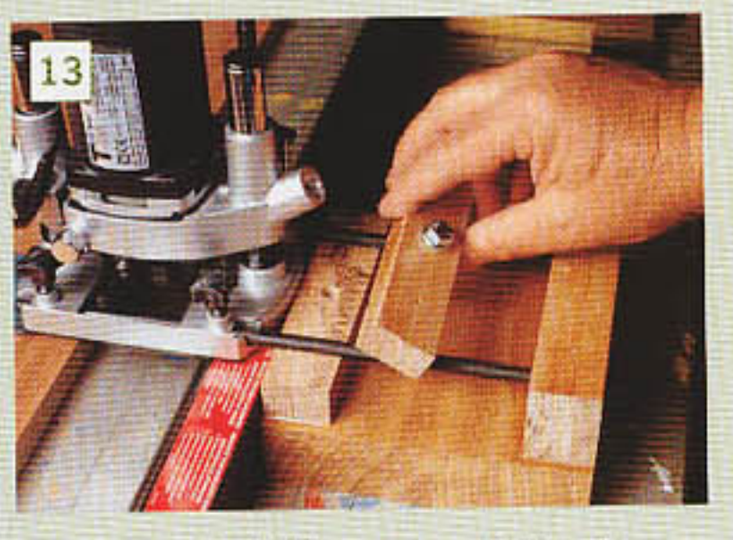
Attaching the end of a vacuum hose for dust extraction using a cable tie

Check the diameter of the guide rods of the router to ensure the correct-size drill bit is selected for a fairly tight fit

Fitting the rear rod support block with glue and screws

Saw the front support block in two halves and have the prong nut ready for installation

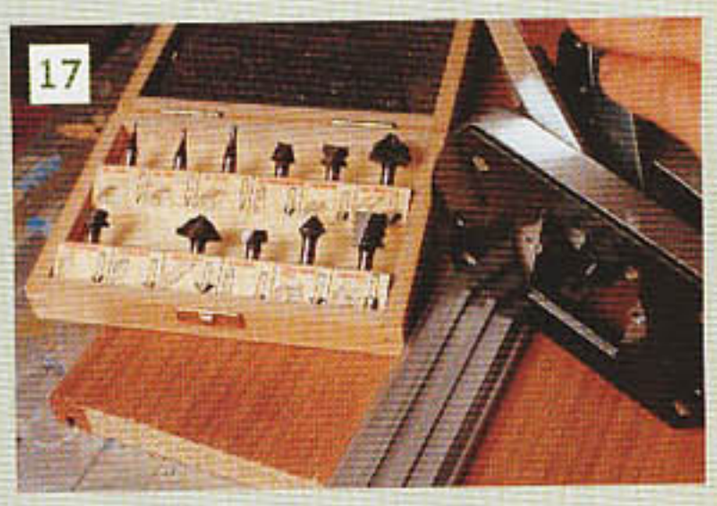
The bolt needs to be sawn to length so it secures the top and bottom halves of the front support block without being able to screw in far enough to foul the saw table while in use



The layout of the support block with the T3 router ready for installation

Mark the hole positions for the screws which will attach the support block to the saw table rip fence

The final assembly ready for operation



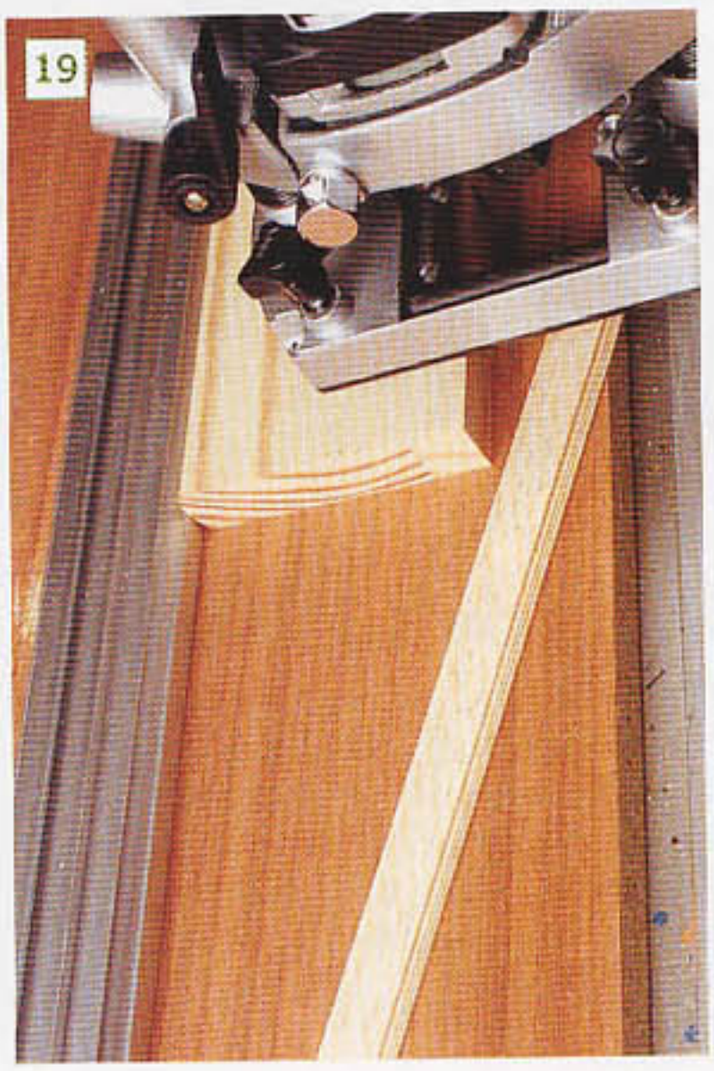
Setting up the router with a ½th scale skirting board cutter from the Trend dolls' house cutter set

The set-up in use

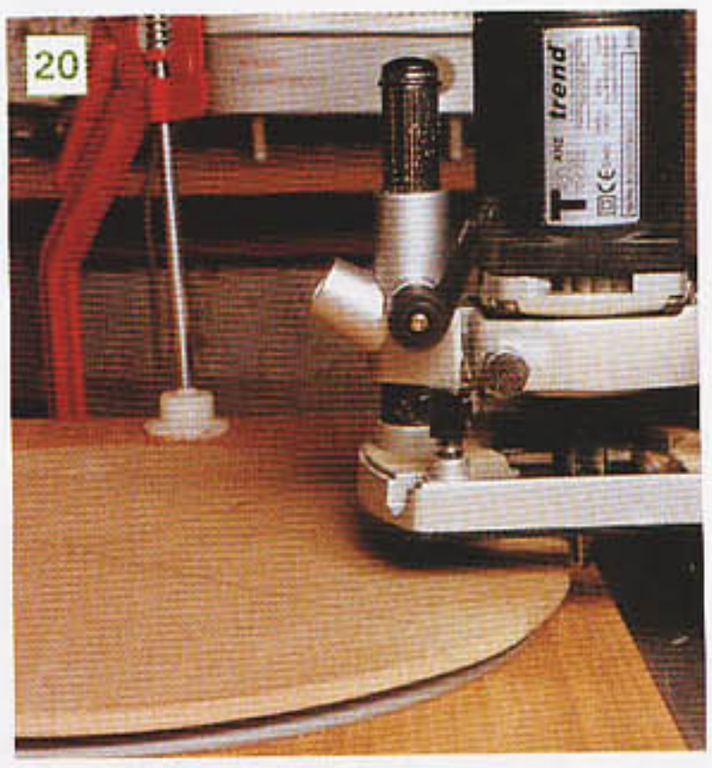
IN USE

The router can now be used for cutting miniature items such as the ½th scale skirting board shown in **photo 19**. Note that with routing on this scale, the machining itself is carried out while the skirting board is still part of a larger stock piece of material and should only be removed once you have completed routing the design. This is done quickly and easily on a small tablesaw and the guide clamp is just moved forward a little for routing the next length of skirting board or whatever it is you need to cut out.

To prevent the routing set-up from taking up workshop space while not in use, remove the two screws which fix the router block to the rip fence and slide out the baseboard for storage until it is needed again. It is a good idea to replace the router block screws in their holes so they aren't lost while not in use.



The first strip of miniature skirting board is routed and cut away from the stock ready to make the second and subsequent strips



Up and running

ADDITIONAL REFINEMENTS

CIRCULAR ROUTING FACILITY

In order to make my set-up more versatile I decided to add a circular routing attachment to the baseboard. This calls for a rotating board on top of the existing sliding board and a lazy Susan bearing. These bearings are available in a range of diameters and in my case one of 12in was the most suitable. They are pretty accurate with no detectable side play which would obviously lead to inaccuracy in cutting circles.

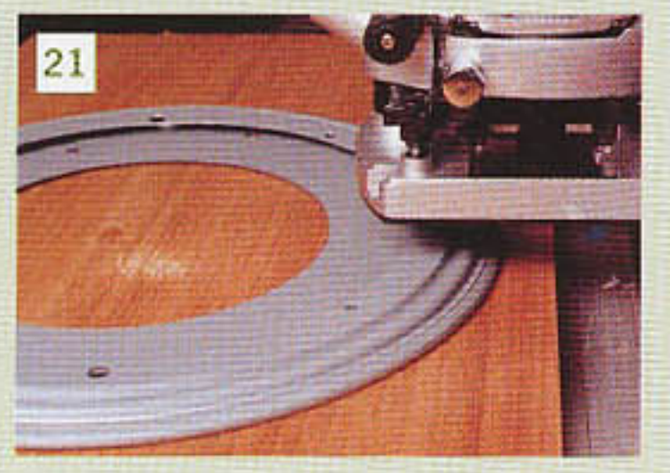
Begin by cutting out a disc of MDF, a little larger in diameter than the bearing itself. In this case, a disc of 320mm (12½in) was called for. Perfect accuracy is not important here, so cutting the disc a little larger than its final size is fine. This will be trimmed once fitted to the baseboard to ensure a perfect circle which matches the router cutter exactly. Mark out the disc on a blank of MDF and drill a small hole through the centre. This can be used to pencil in the cutting line for the disc and will serve later as a centre guide for the blank to be routed with the use of a small pin tapped through from the underside of the disc.

Roughly cut the disc to size and then turn your attention to the existing sliding baseboard. Lay the bearing in position so that no part of its metal can ever come into contact with the cutter. Mark out the position of both the bearing and the access hole on the sliding baseboard. If you look at the bearing you will see a fairly large hole in the base flange which lines-up with all the screw holes. Mark the position of this hole and then drill through the sliding baseboard. This will give you access for a screwdriver to fit the disc in place once you have screwed the bearing in its place on the sliding baseboard.

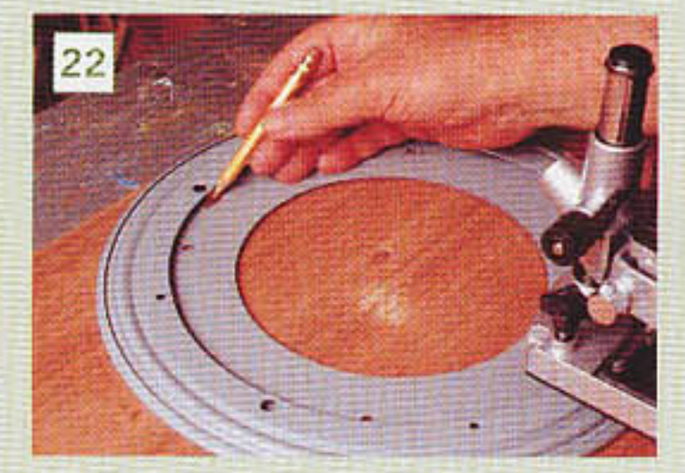
Screw the bearing in place onto the sliding baseboard and lay the disc in place so it is centred on the top of the bearing. This disc will act as the new baseboard for your workpiece but will ultimately rotate to allow you to rout circles. Using the access holes you drilled in the sliding baseboard, screw the disc in place by lining up the first screw hole with the access holes and then rotating the disc to the next screw hole and so on.

Finally, insert a straight cutting bit, set the router height so it will cut the full 9mm (11/32in) depth of the disc and check that the sliding baseboard is in position so the centre line of the disc lines up with the centre of the router cutter. Now clamp the sliding baseboard in place so it cannot move from its set position.

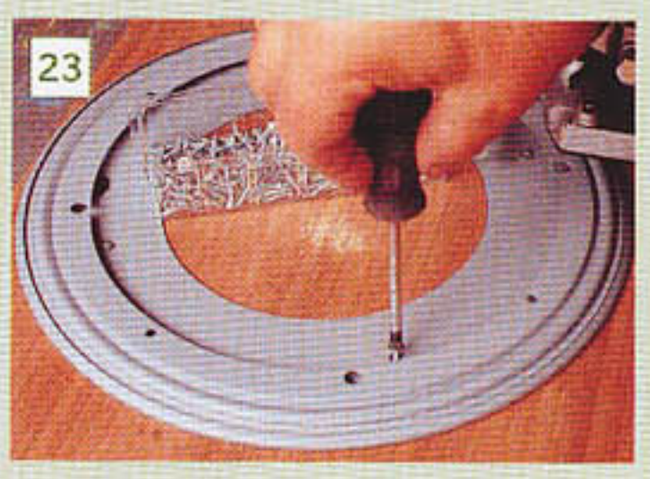
Start the router and slowly rotate the disc. Your set-up should now line up correctly with the router cutter position enabling you to cut a perfect circle. You can now add your workpiece and rout perfect circles or circular edge detail every time.



The lazy Susan bearing is positioned on the sliding baseboard so that the metal of its construction cannot come into contact with a router cutter while in use



Marking out the position of the access hole which facilitates fitting the upper baseboard once the bearing has been screwed down onto the main baseboard

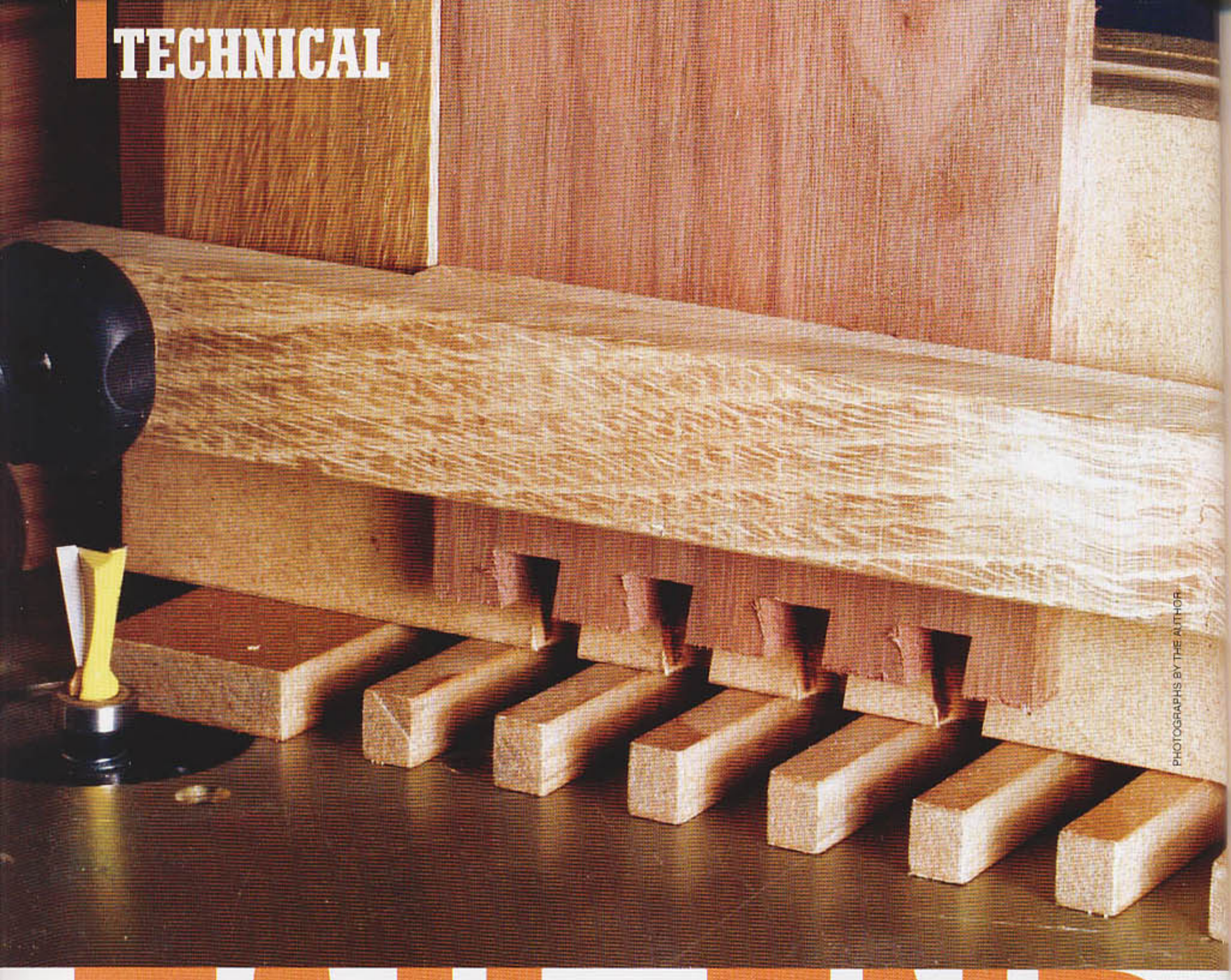


The bearing is screwed down onto the main baseboard

With the sliding baseboard inverted, the upper disc of MDF which forms the top rotating baseboard can be fitted using the access hole for driving the screws

Fitting a straight cutting bit to the router which will be set up in its support block and used to cut the rotating baseboard in a circle which will exactly match the operating position of the router

Tightening the straight cutter in the T3 router



PHOTOGRAPHS BY THE AUTHOR

TAIL END

As I described in the last issue, with a little care and not much expense a good-quality jig can be made using the Stots Dovetail Template. The advantages of using this system are that you can make the jigs any length and very easily construct several versions of the templates.

The basic template gives you joints on 1in spacings with equal ½in pins and dovetails, which look neat but machine-made. You can, however, easily make a 2in-spaced jig using every other position which gives you 1½in pins and ½in dovetails which look more hand-made (see **fig.1/jig 2**).

A third variation is to make a template that will allow you to have a mix of both, either just providing a large centre pin (see **fig.2/jig 3**) or a decorative mix to suit the project in hand.

Whichever way you look at it, the Template Master jig is good value as for only a few pounds and a weekend's work you can end up with a versatile and comprehensive set of dovetail and comb-jointing jigs.

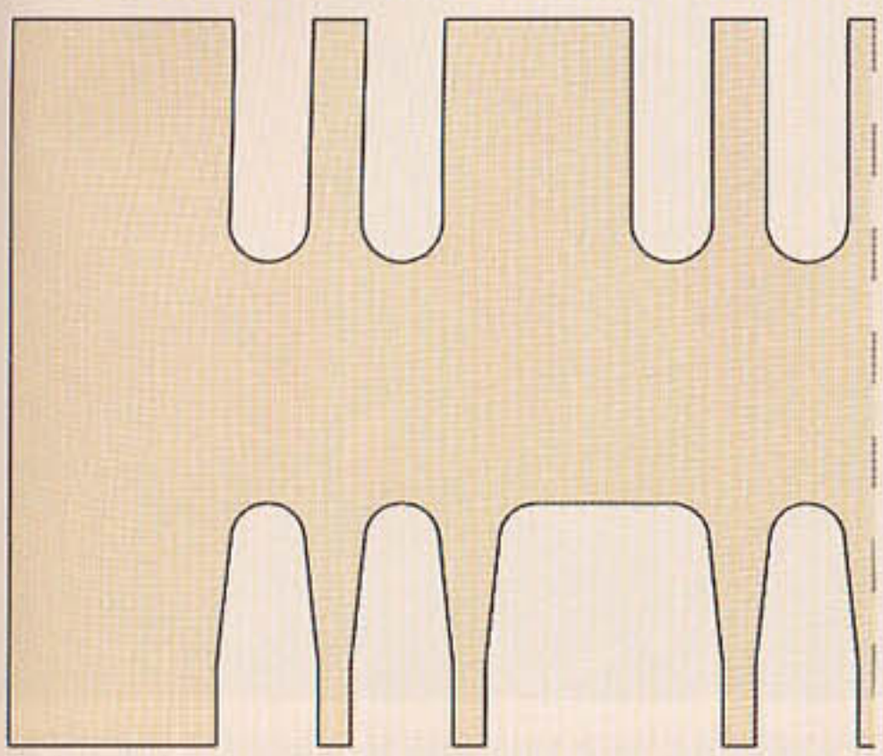
MDF RULES OK

The MDF templates are quick to machine and cheap, but this doesn't mean they are only fit to be used once and then thrown away. Whether you are a home-user or professional in need of the occasional special jig, they should provide you with a reasonable working life.

Having recognised this I decided to abandon my attempt to make a phenolic jig plate, at least until I can find some material that is much more easily machinable. But as a jig thickness of 20+mm (¾in) is ideal to accommodate a decent range of workpiece thickness, it is unlikely that I could machine one without access to CNC routing equipment.

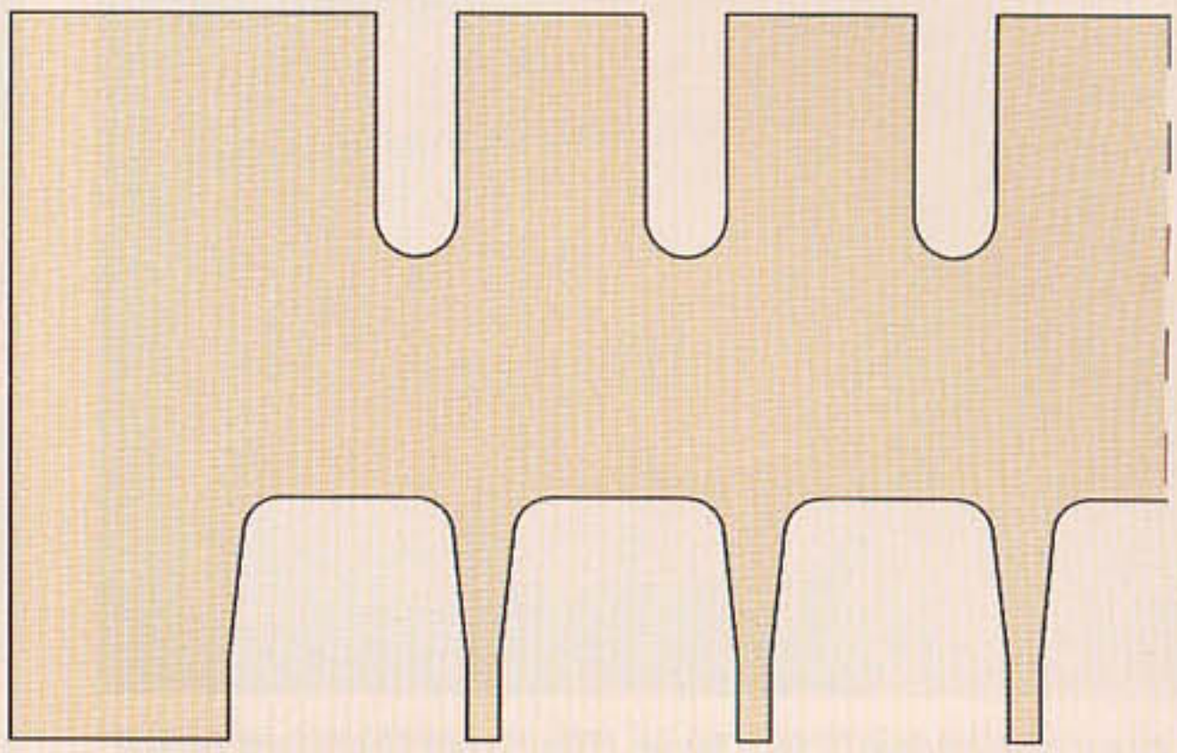
If you want to use a dovetail jig day in day out, I would recommend a more durable template than MDF. You could consider the Katie, Kellerman or Gifkins jigs and perhaps use the Stots Template to create specials for 'one-off' jobs.

Fig. 1 - Jig 2



½in tails and 1½in pins

Fig. 2 - Jig 3



A mixed pitch allows for a large centre pin

DAVID TIPPEY

Having made a dovetail and comb jig in the last issue, David Tippey demonstrates how to use it

TOUGHER TEMPLATES

Not all MDF is of the same quality and when routing templates I found that some in my collection of offcuts was a little softer with a core that was 'woolly' when machined. By applying several liberal coats of well-thinned cellulose sanding sealer, which was soaked up like a sponge, I achieved a much tougher and more durable surface on the MDF jigs. When they were fully dried I carefully de-nibbed the surface with 400-grit abrasive and then put a little wax on the inside of the fingers. The bearing on the dovetail cutter is now a nice positive, sliding fit between the jig fingers without any binding. The surface of the jig has been consolidated and is considerably tougher, so it should give a much better working life.

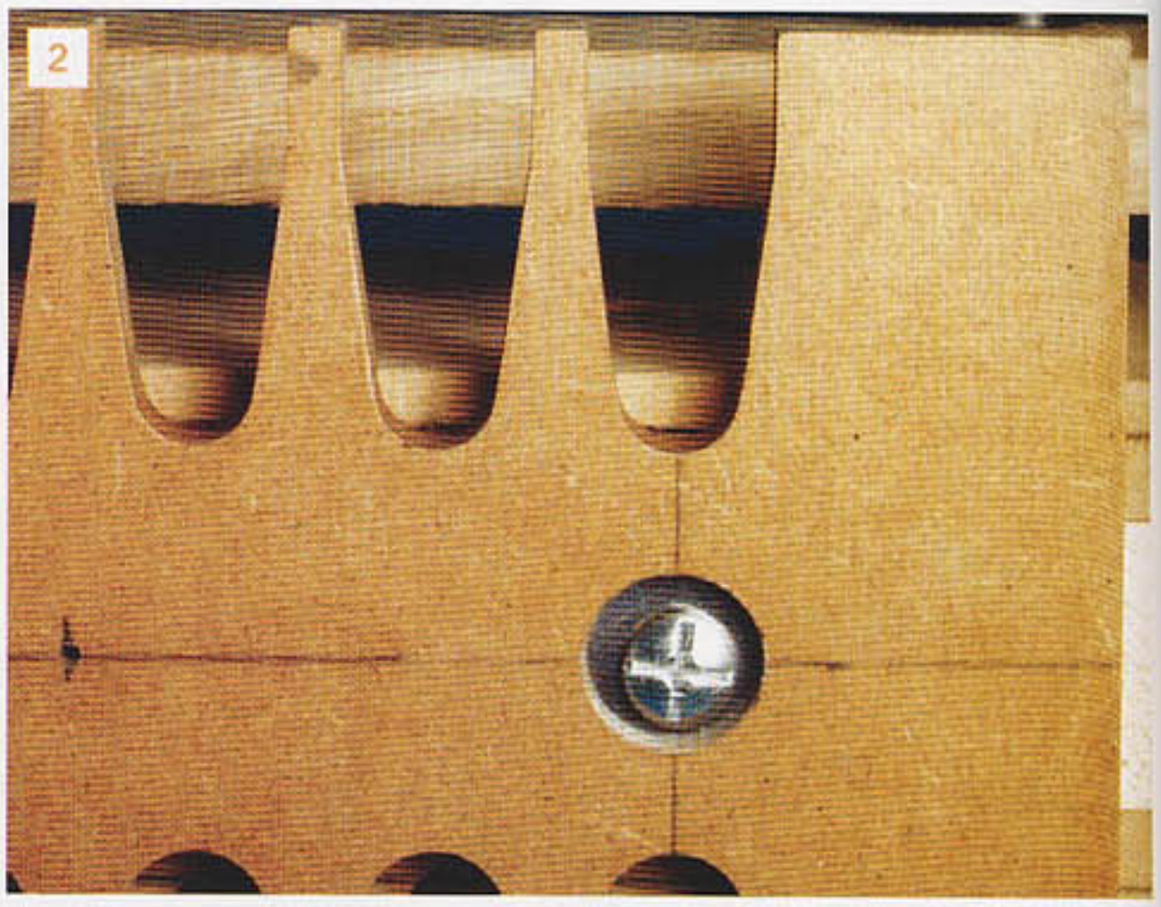
FIRST FIT

When you attach a template to the spine, its position will need to be adjusted to get the fit of the joint correct. You do this by moving the spine in relation to the tapered finger (pin) side of the jig, moving it nearer to the tapered fingers for a looser fit.

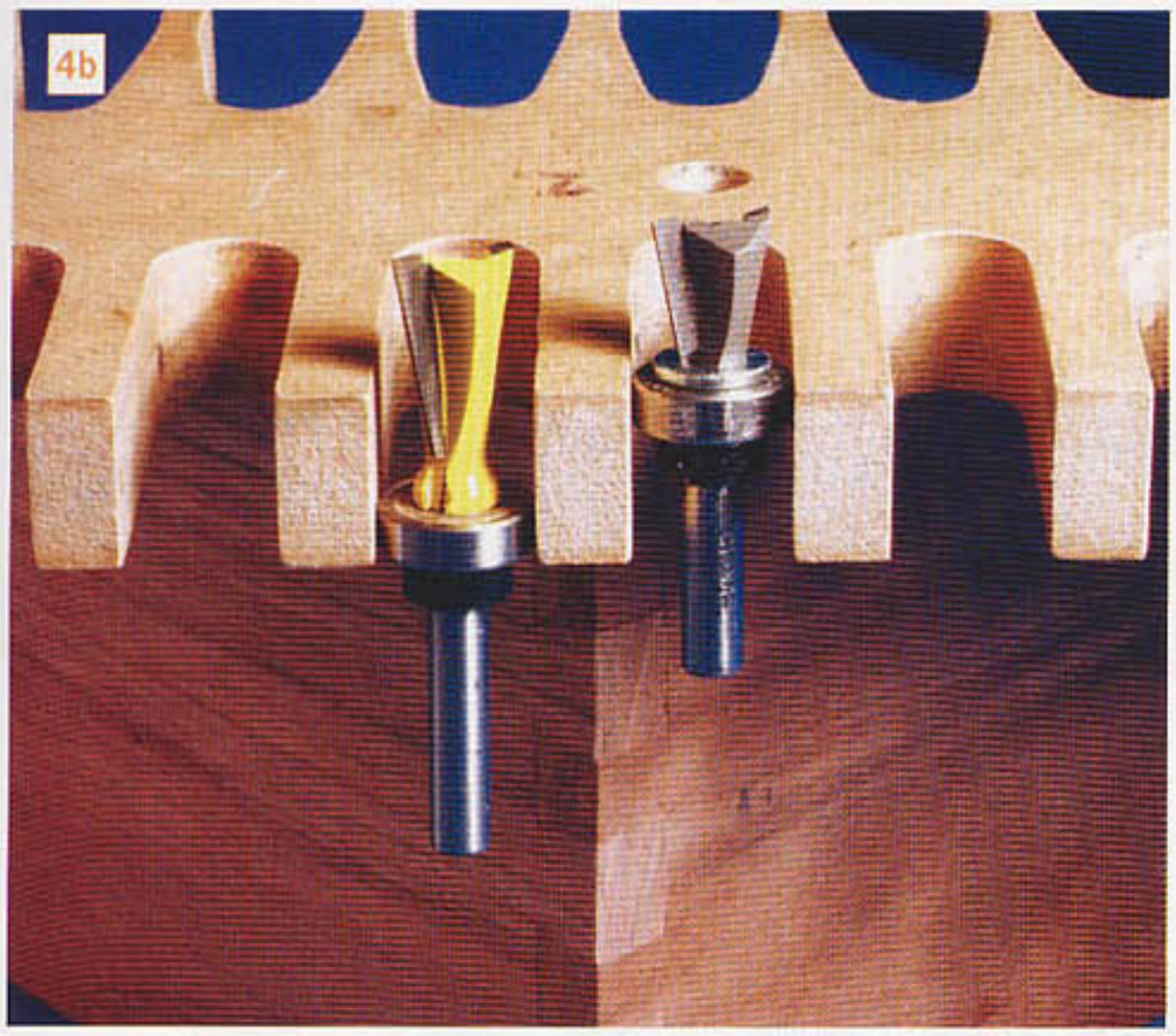
Initially draw a fine pencil line 6mm (¼in) from the edge of the facing piece (see **photo 1**). Now fit the template with this line just barely visible at the back of the taper pin template slots and tighten the fixing screws (see **photo 2**). Set the dovetail cutter height (more of this in a moment) and using a piece of scrap material cut the tails. Set up the straight cutter and cut a set of tapered pins on a second piece of scrap. It doesn't matter about the positioning of the stops, as we aren't interested in the alignment of the two pieces, just the fit of the dovetails.

If you are lucky the fit will be right first time, but you can tighten or slacken the fit by adjusting the position of the spine. Aim for a very tight fit at this stage. When you are happy with it, lock it in place by tapping a couple of panel pins into the spine, through the pre-drilled pilot holes in the jig (see **photo 3**). This locks the setting ➥

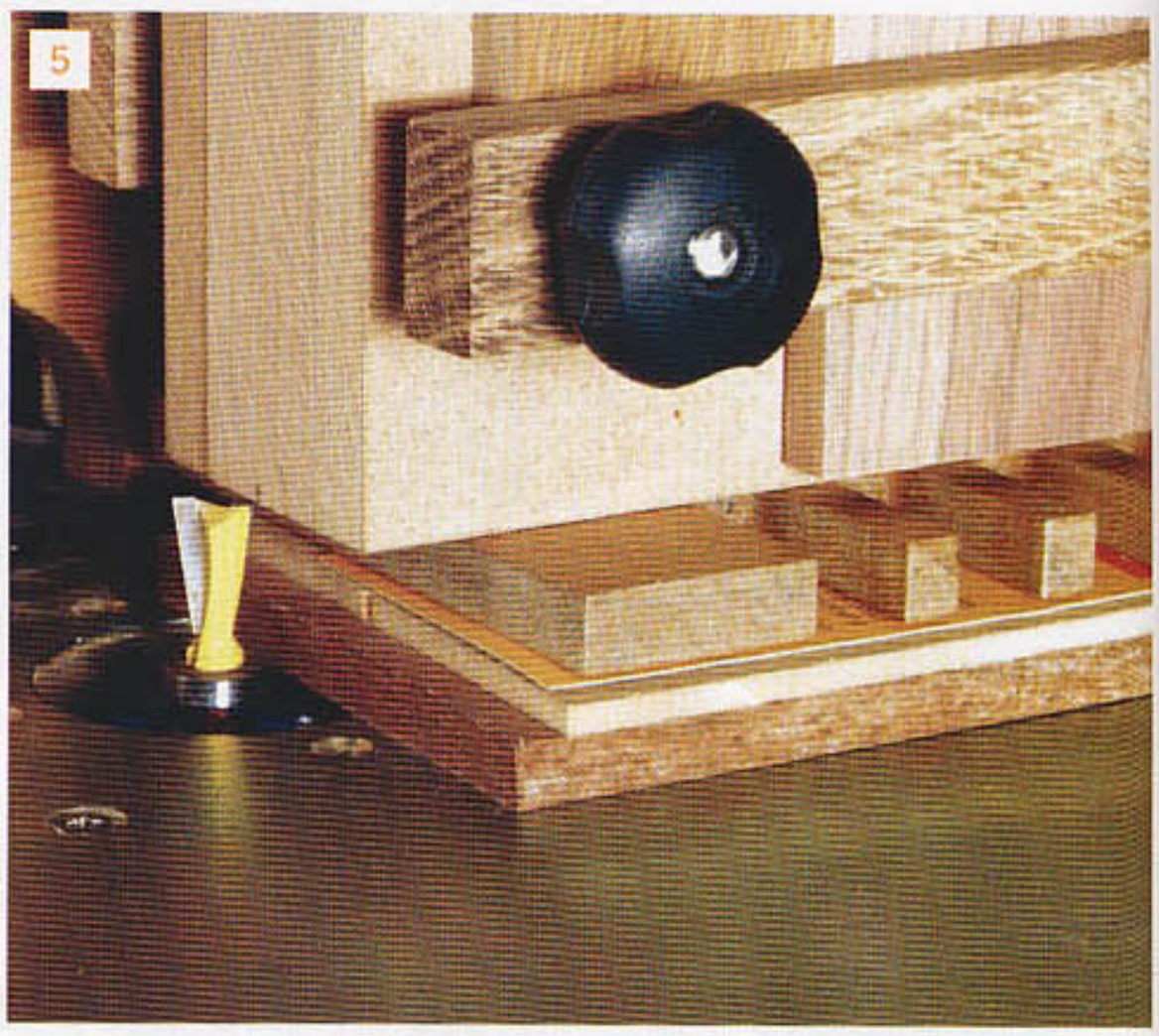
Draw a fine pencil line 6mm (¼in) from the edge of the facing piece



Now fit the template with this line just barely visible at the back of the taper pin template slots



Alternatively, you may also be able to find a shorter bodied ½in-diameter dovetail cutter of the same angle



Adding the card will leave you the same thickness of extra material in the pins and tails

and if the holes are in different places on each one, would allow several jigs to be accurately relocated on the spine.

LOOSEN UP

Remember that on wide workpieces you will probably need a slightly looser fit than if you are working on small boxes and drawers. It is better to set up the jig for a tight fit as it is very easy to alter to a slacker fit for larger work.

Simply remove the facing piece of MDF from the pin side of the jig and make several paper or thin card shims to fit between the spine and the facing. Fitting more shims between the spine and the facing piece will move it out, slackening the fit of the joints. If you change or resharpen cutters you will probably need to alter the shims to accommodate the slight difference in cutter size. Using paper or card shims makes this a very simple operation without having to reset the template. The ease of setting up and the ability to make fine adjustments are key benefits of this design.

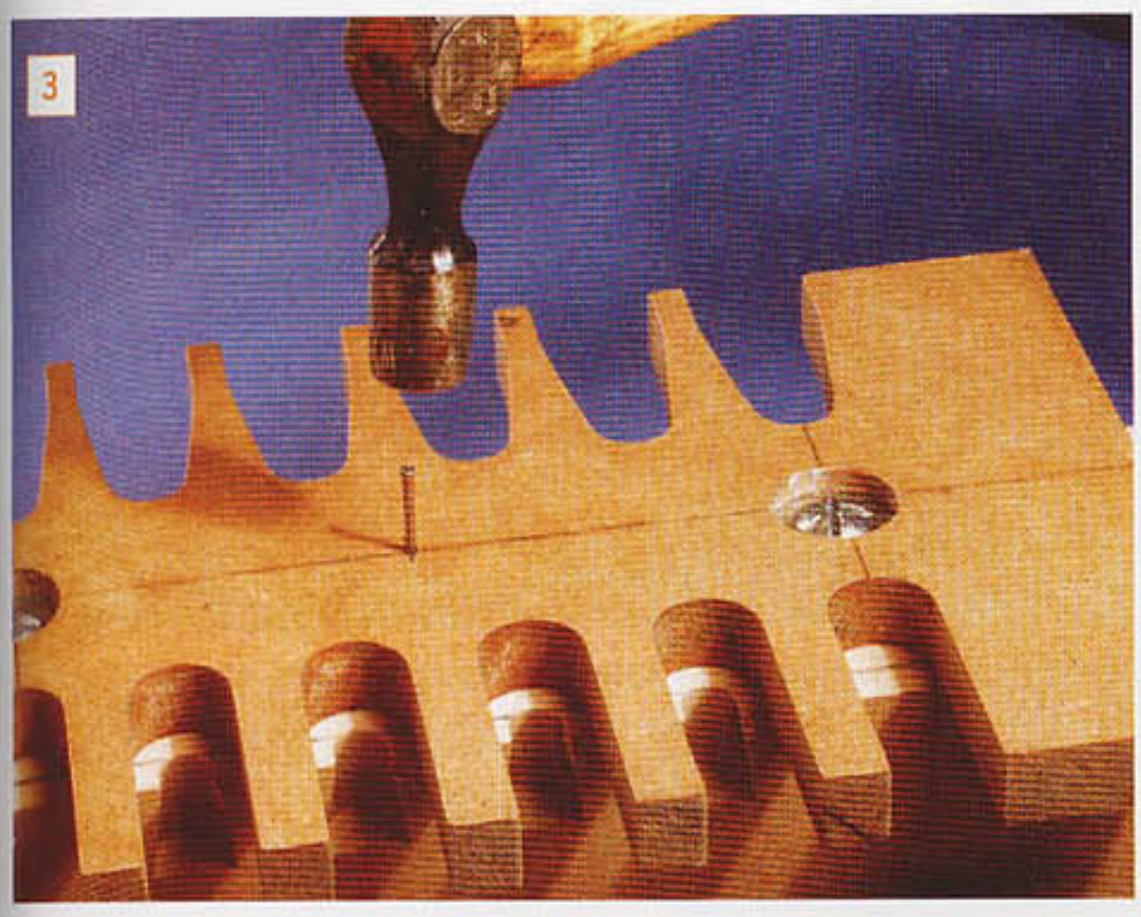
THIN WORKPIECES

The router bits supplied by Axminster are quite long and if your template is not at least 20mm (¾in) thick, you may find when jointing thin boards that the cutter cannot be set to the correct height with the bearing still running in the jig. The simple answer is to raise the workpiece in the jig by placing a parallel spacer under it before it is clamped firmly in place (see **photo 4**).

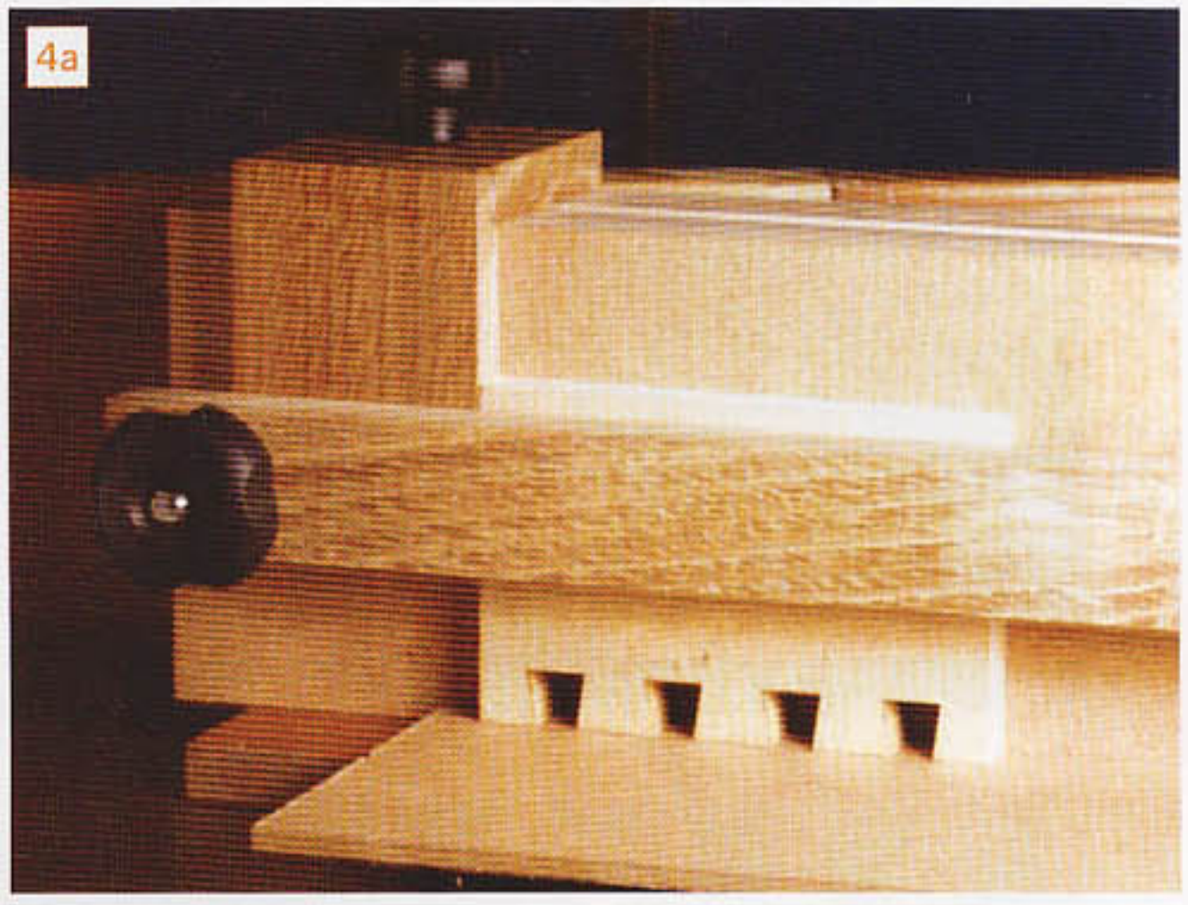
The spacer is removed before machining. Various thickness MDF offcuts prove ideal, so if you find you need them, it's worth cutting a set of different spacers from scrap and keeping them with the jig. Alternatively, you may also be able to find a shorter bodied ½in- diameter dovetail cutter of the same angle, which would achieve the same thing. I had one in my cutter rack which came from a set of router cutters (see **photo 4b**).

CUTTER SETTINGS

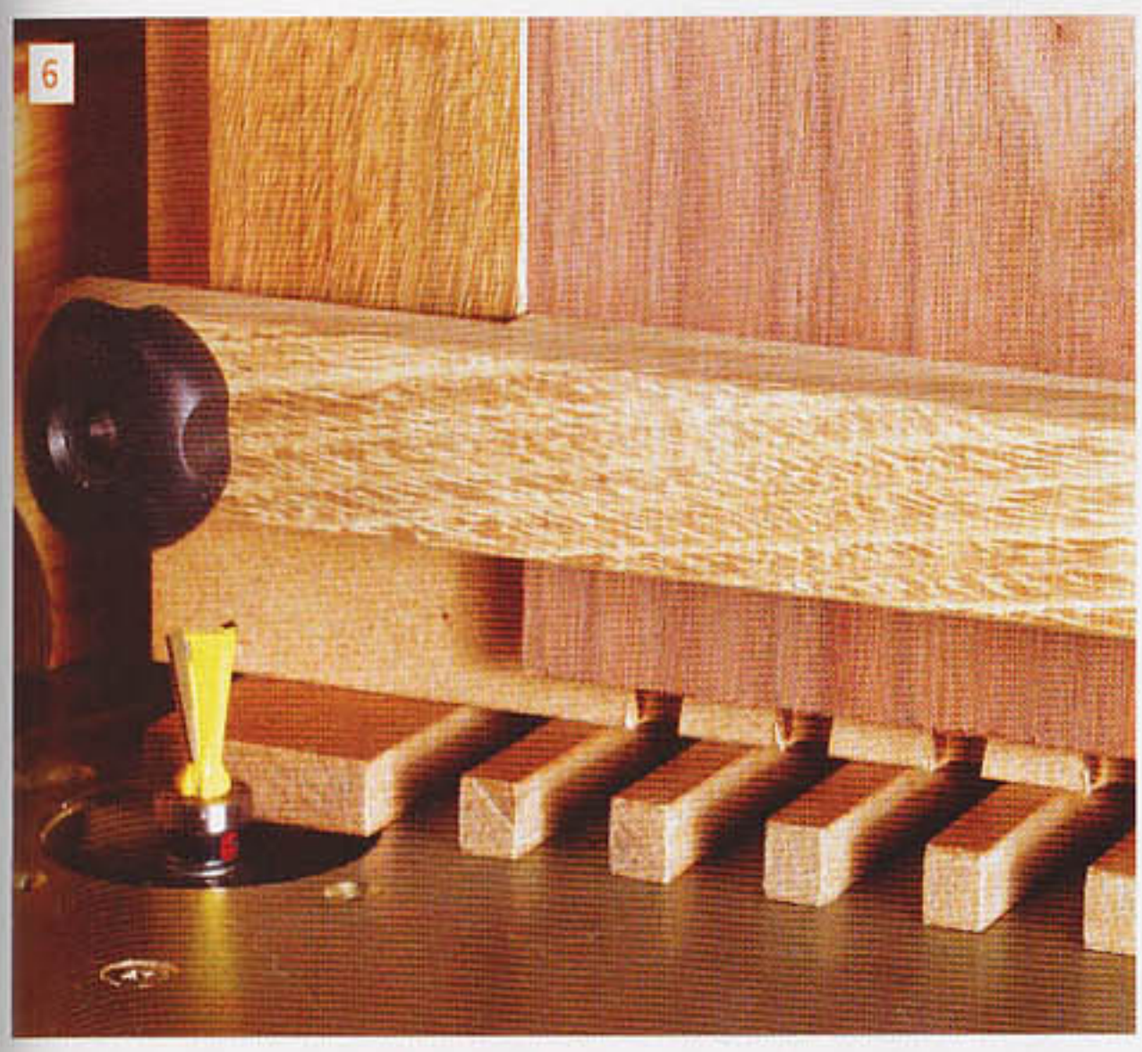
The reason I made the template shorter than the spine was to provide an area to easily set the cutter height. To do this sit the jig on top of a piece of the material you are jointing and add a thin piece of card between them to increase the height. It wants to be about the same thickness of a business card – mine was cut from the front of a glossy catalogue.



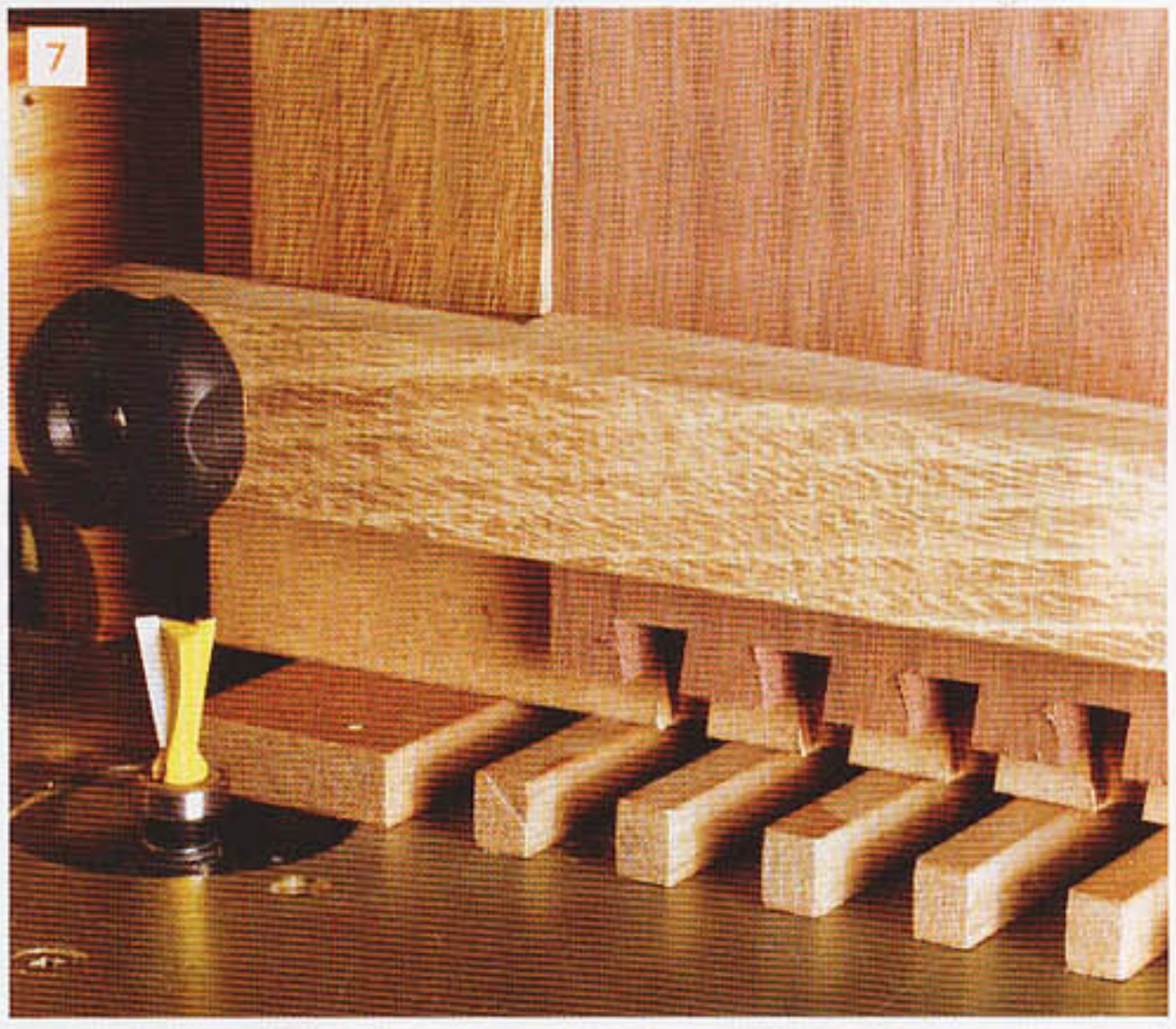
Lock it in place by tapping a couple of panel pins into the spine



Raise the workpiece in the jig by placing a parallel spacer under it



With the stop locked and the cutter height carefully set, the workpiece can be clamped in place and the tails cut



Feed the work slowly into the cutter for a better finish and less chance of breakout

Adding the card will leave you the same thickness of extra material in the pins and tails, leaving them just proud when the joint is assembled. This is cleaned off later after the joint is made, ensuring a neat finish. You could use a flush-trimming bit to clean the corners up. If you have had to raise the workpiece in the jig you will also need to put the spacer you used under the jig too (see **photo 5**). Now carefully raise the cutter until it just touches the bottom of the spine – a router fitted with a fine height-adjuster is very useful for this.

STOPS AND TAILS

As you would normally use dovetails on at least two, and probably all four corners of an article, the stops allow you to set the jig up for repetition work. To make alignment simpler, cut the tails first using the dovetail cutter. It's always a good idea to do this with a couple of offcuts from your project, to check the set-up before commencing on a pile of expensive wood.

The stop is adjusted so that the jig openings are centred on the workpiece. This can easily be done visually or you can use a rule to check it is equidistant. With the stop locked and the cutter height carefully set, the workpiece can be clamped in place and the tails cut (see **photo 6**).

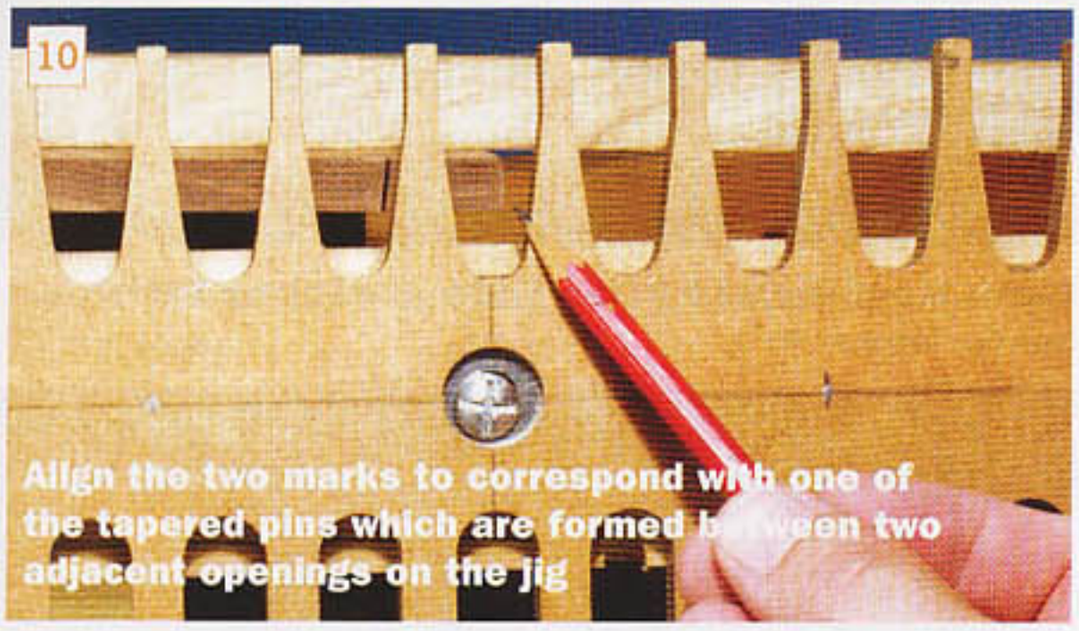
The stop allows the work to be repositioned accurately even if the work needs to be packed up with a spacer to suit the bearing on the cutter. You want at least half the bearing thickness running on the jig, preferably all of it.

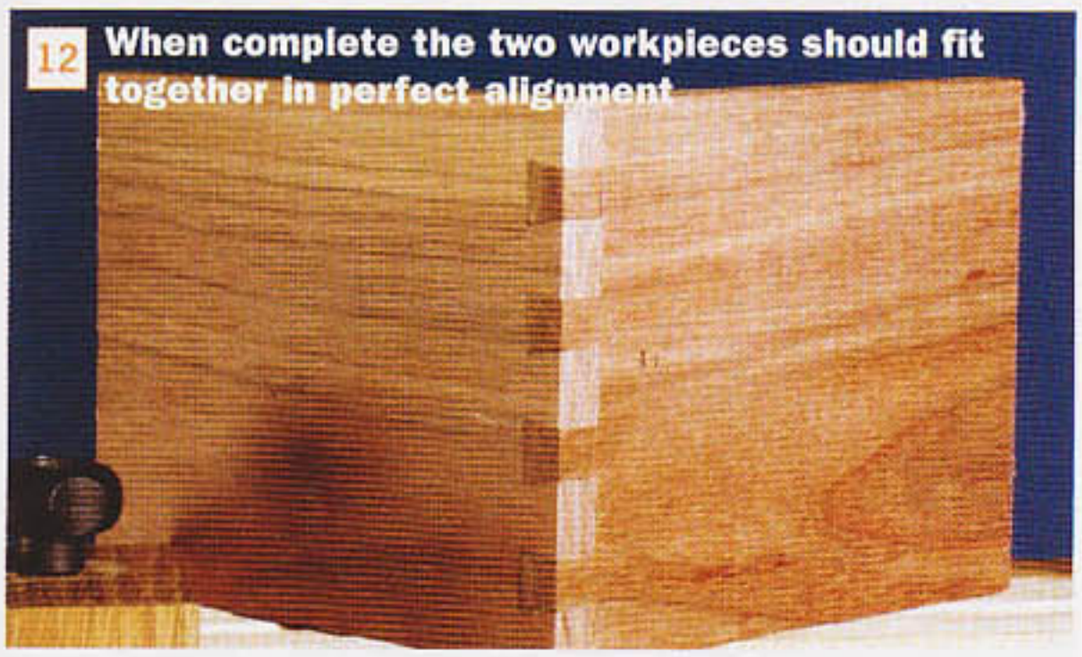
Make sure the cutter is clean and sharp and feed the work slowly into the cutter for a better finish and less chance of breakout (see **photo 7**). Take a second cut to ensure the sides are clean and fully cut and keep the jig clear of dust and chips which might affect the cut.

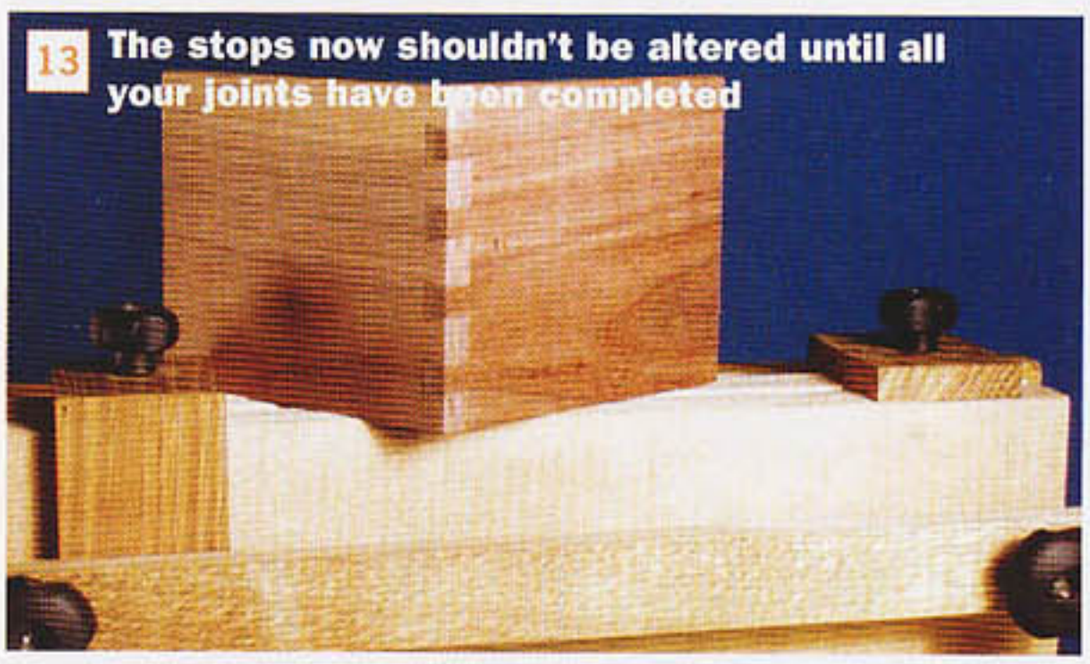
MARKING THE PINS

Next align the tails with the second workpiece, as if you are assembling the joint. Use a very sharp pencil or awl to transfer the position of both sides of one cut onto the end grain of the second board (see **photos 8** and **9**).

Put this board in the pin side of the jig and align the two marks to correspond with one of the tapered pins which are formed between two adjacent openings on the jig (see **photo 10**). Adjust the ➥







second stop to suit and then recheck the alignment. The second workpiece can then be clamped in place, the ½in straight cutter fitted and set for height as before, and the pins cut (see **photo 11**).

As the pins are wider than the cutter, to prevent the chance of breakout on the unsupported face of the work, take a light cut across the full width of the pin's face before removing the rest of the waste. Do this as two or more plunge cuts, one with the bearing running down each side of the template. Don't cut them on the way out or you will certainly get breakout. Again take a second cut just to make sure all the waste has been removed.

When complete the two workpieces should fit together in perfect alignment. The stops now shouldn't be altered until all your joints have been completed (see **photos 12** and **13**).

I was very pleased with the results and consider them amongst the best dovetails I have ever cut. Now I have made the jig I won't avoid using it in future.

VARIATIONS ON THE THEME

SIZE VARIATION

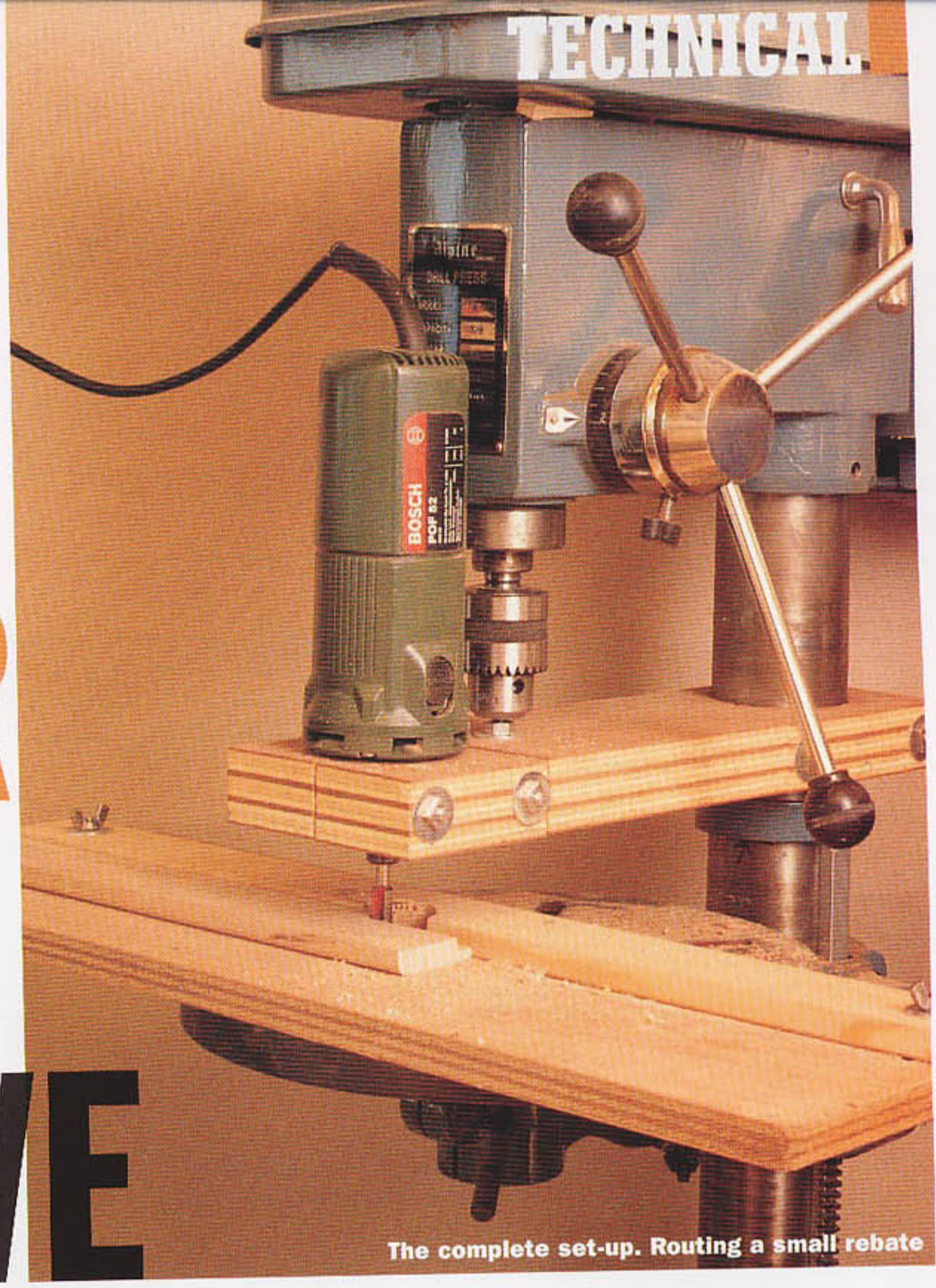
It is actually possible to vary the size of the pins and dovetails by using spacers. The Gifkins jig addresses this properly and makes available a set of various thickness spacers. There isn't really the space to do this effectively with the ½in pins and tails of the standard jig, but if you make a 2in pitch template or a special template to enable you to cut a larger centre pin, it is possible to adjust the size of the centre pin to make your dovetails fit the workpiece better. You can also do this to allow extra material for the saw kerf when you are going to cut a box in two to form a lid. By allowing for the saw cut your dovetails will still be evenly spaced on the box and lid and you will get a much more professional-looking job.

This is done by putting a spacer between the stop and the workpiece and offsetting it by the thickness of the spacer. You then cut only half of the joints up to the centre of the workpiece. The spacer is then removed and the rest of the joints cut. This has the effect of making the centre pin and dovetail larger by the same amount as your spacer thickness. Try it with some scrap – it is easier to actually do than describe.

COMB JOINT

The last trick you can easily do with this jig is to cut 1in pitch comb joints. You use just the tail side of the jig, and the ½in straight cutter, fitted with the ⅝in bearing from the dovetail cutter.

OVER AND ABOVE



The complete set-up. Routing a small rebate

PHOTOGRAPHS BY THE AUTHOR

BOB WEARING

If you're in need of an overhead routing system but can't afford to buy one, Bob Wearing has a cost-effective home-made solution

Most router-users will have seen advertisements for overhead routing systems and be well aware of the several advantages using one gives, the most notable of which is being able to see exactly what you are doing. They have also probably noted the cost, and from there the matter has ended. This need not necessarily be the case and if you buy the materials yourself you can actually make an overhead routing system for a fraction of the price you'd pay to buy one.

MATERIALS

To make this system you must have a pillar drill and a router that can be removed from its base. Quite modest routers have this facility, including the Bosch POF 500 which I was using.

You will also need a stout wooden support arm. Mine was built-up from three layers of 13mm (½in) multi-ply. The sizes are suggestions only and can be modified as required.

CONSTRUCTION

Measure the drill pillar column with a calliper, mine was 73mm (2⅞in) in diameter. Cut the laminated ply 22mm more than this on each side which in this case is 117mm (4⅝in).

Next, mark out the centre for the column hole and drill a 6mm (¼in) through-hole. The only way to form such a hole is with a router. If the router cutter is not sufficiently long to achieve the necessary thickness, work from both sides.

For a through-cut, or the second of two cuts, secure the arm to an offcut of MDF or ply using either panel pins or double-sided tape. If you don't when the cut is complete the centre waste will be free to fly out and the results could be most unpleasant. Fuller details of this hole-cutting aid are given in my book *Router Tips & Techniques*, available from GMC Publications, and can be seen in **photo 1** and **fig.3**.

Fig. 1 – Set-up

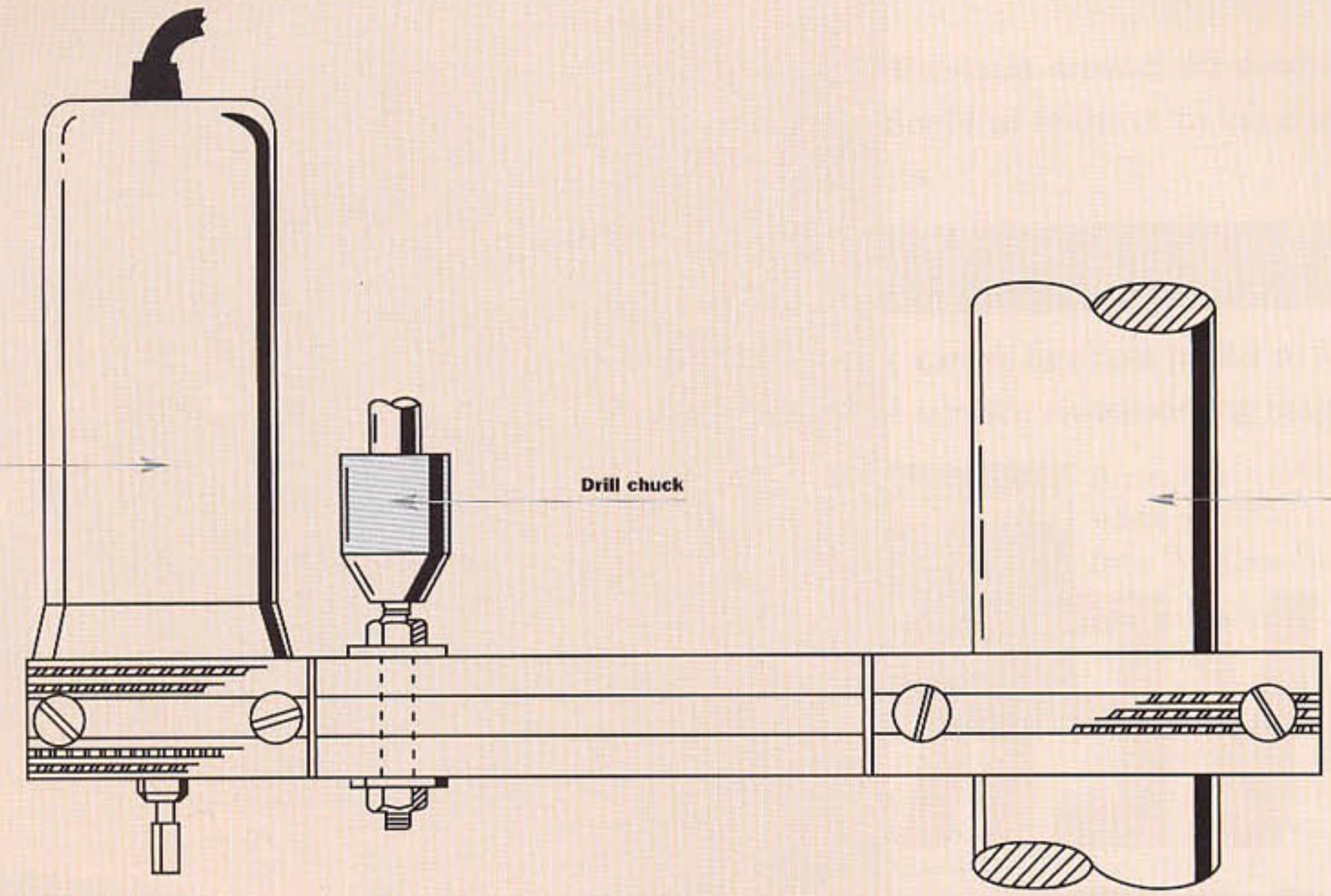
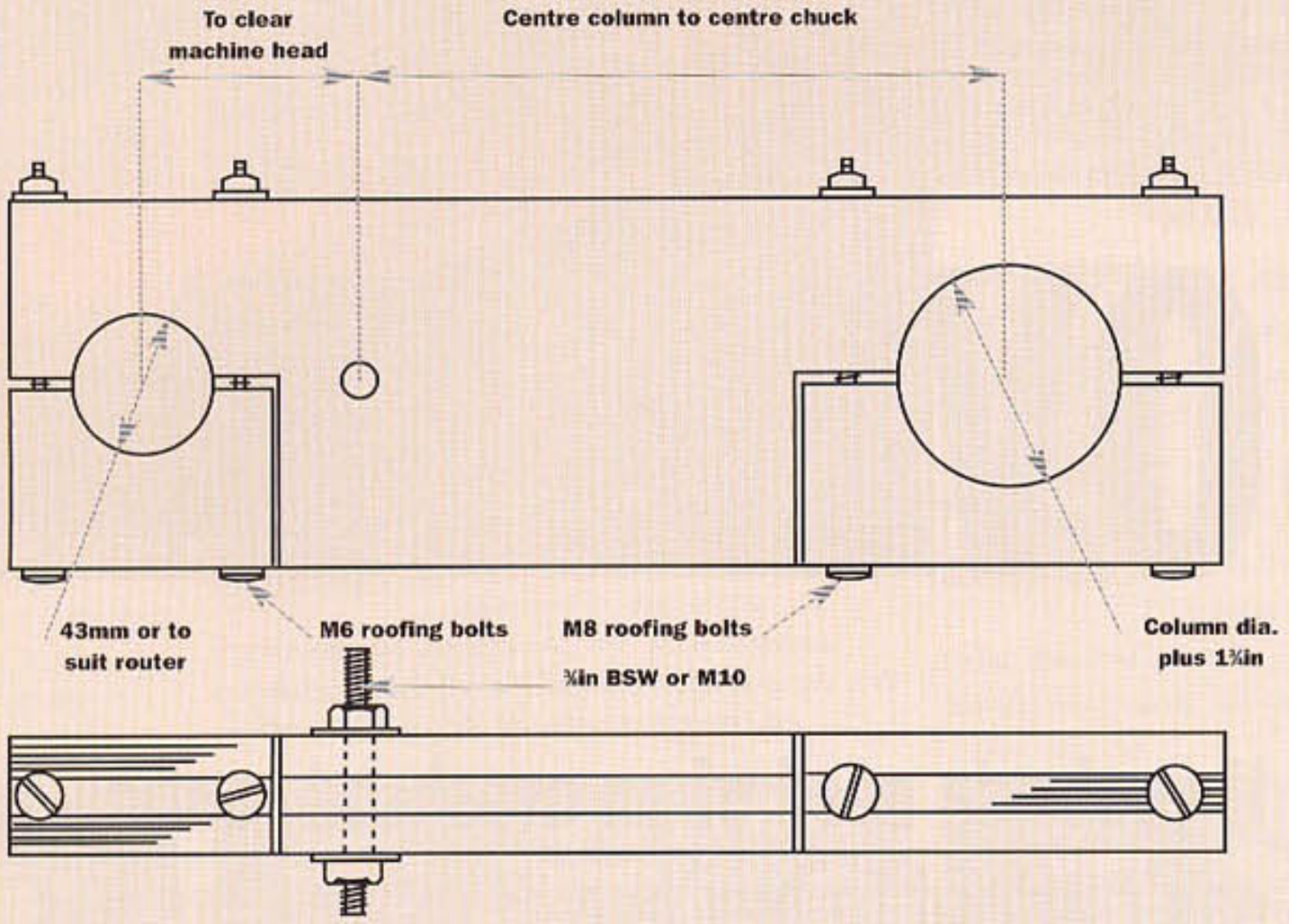


Fig. 2 – Construction and dimensions



Now separate a clamping piece from the main unit. Before sawing, drill holes for the two clamping bolts. These should be either M6 or M8 carriage bolts, that is those with a square under the head to prevent any rotation. The lengthwise cut should be made with as wide a kerf as possible and I would suggest using a circular saw with the blade wound up to full height. The short crosswise cut can be made with a thinner bench-saw or alternatively a bandsaw.

If the rack on the drill pillar is a fixture, cut out a notch to accommodate it. If the rack can revolve with the table, it should be held rigid. The easiest way to achieve this is by fitting a jubilee hose clip. Fit the unit to the pillar, tighten and then fit a short sharp pencil in the drill chuck, swinging the arm to mark an arc. Gauge the centre line across the arc and drill through at 11mm (7/16in) to later take an M10 or ⅜in bolt with its head removed.

Re-assemble with the bolt in the chuck, two nuts and large repair washers. These give a fine adjustment of the arm so it is truly square to the pillar.

Measure the maximum diameter of the router body in order to locate it as close to the drilling machine head as possible. Locate the centre and make a hole for the collar on the router. In the case of my Bosch router, this is 43mm (1 11/16in) in diameter. An expansive bit can be used in the drilling machine. If you plan to use a brace and expansive bit, first drill a small pilot hole truly vertical.

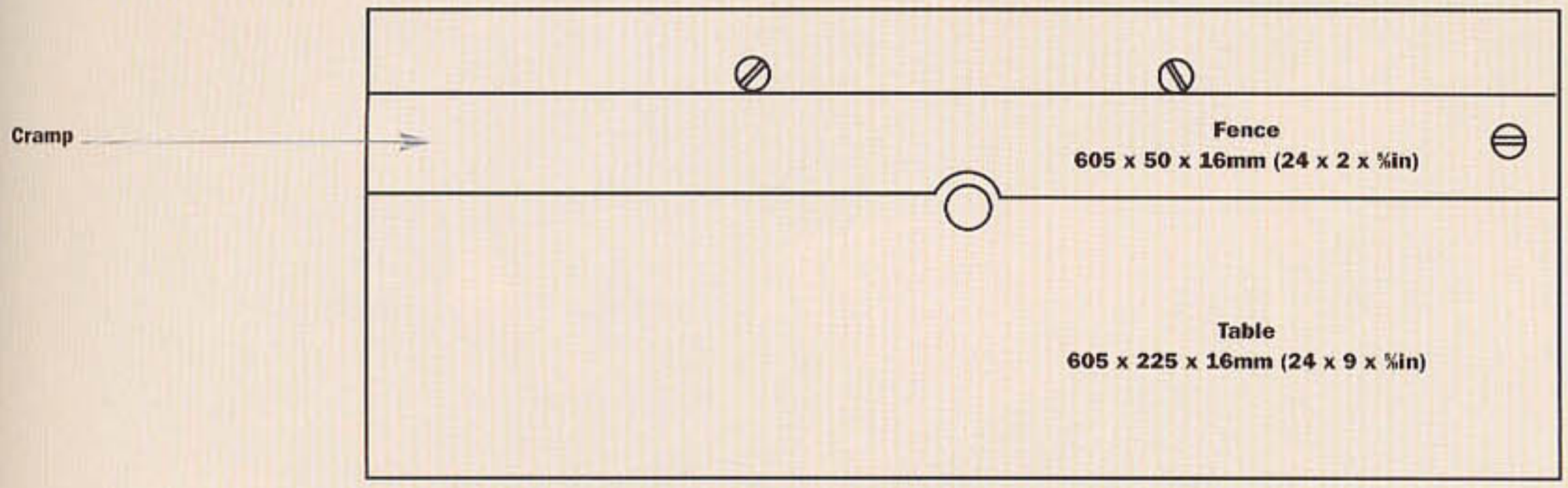
Drill holes for two M6 clamping bolts and remove a section as already described.

You may find that the router's collar is slightly tapered and if so, cut a 6mm (¼in) strip from thin card and glue it round the inside of the hole. Cramp it with the router in place, making sure it sits firmly in the shoulder and is truly vertical.

The router table itself is quite basic. Some sizes are suggested but use whatever material comes to hand. Any man-made board will suffice. Fit counterbored clamping bolts and glue on three small wood blocks which will ensure that the table goes on in the same position every time. Drill a central hole of about 38mm (1½in).

Make the fence from a hardwood strip

Fig. 3 – Hole-cutting aid



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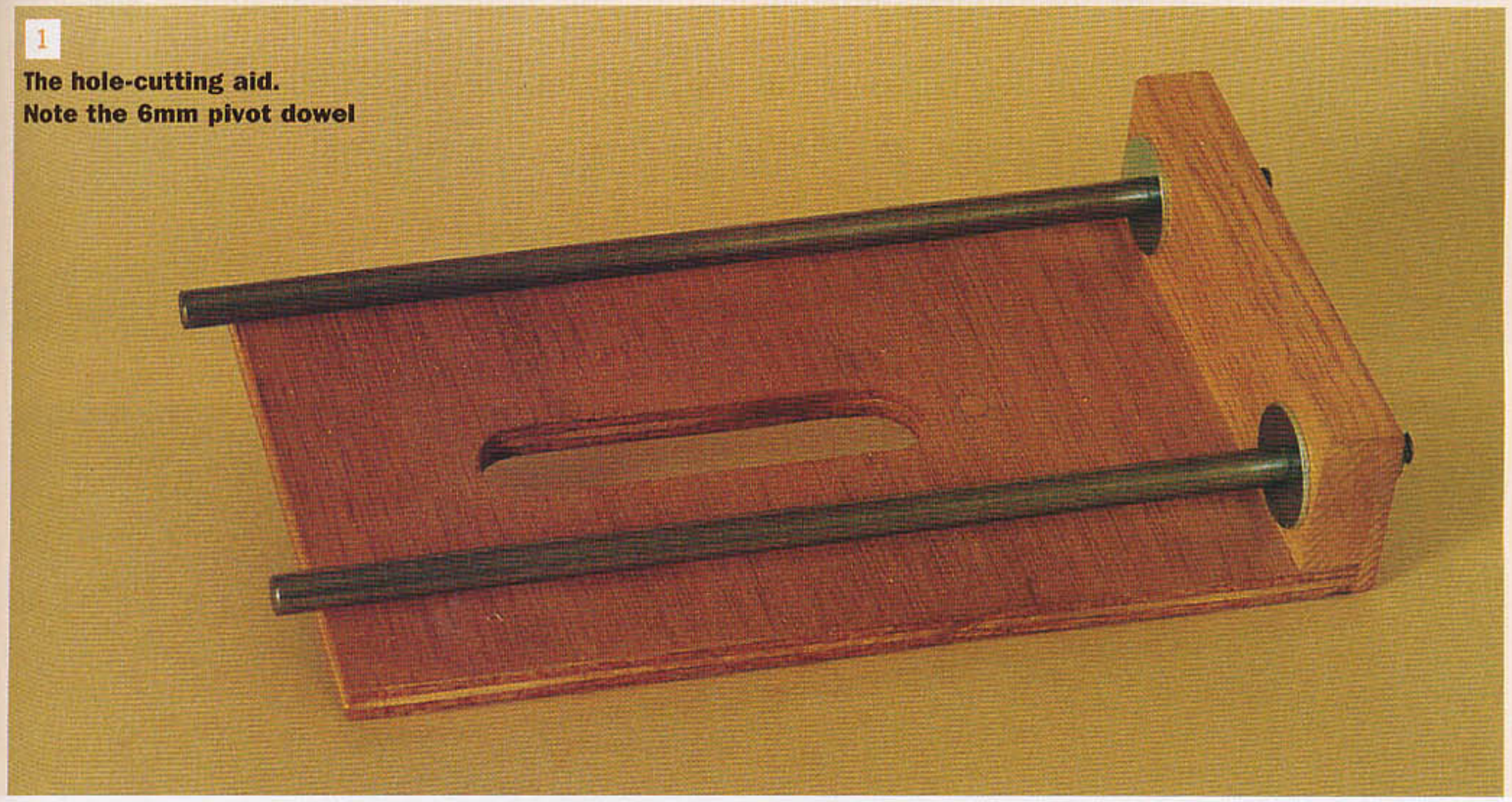
The hole-cutting aid. Note the 6mm pivot dowel



and fix with a pivot screw at one end. The other end which provides the adjustment is secured with a cramp.

If you want something a little more ambitious, rout a slot at each end and secure with thumb screws going into T-nuts set in underneath.

IN OPERATION

In operation the system should be pretty straightforward. The fence is suitably set and the depth of cut controlled by raising or lowering the table. When doing this check that there has been no sideways displacement of the table.

I have already described how to cut holes but I would like to again stress that the central waste must be secured in some way to prevent it flying out.

When cutting discs or wheels, mark the centre and circumference and then saw off the waste as close to the line as possible. Put a thin pin through the centre into a false table. This is cramped to the main table and the workpiece revolved. Move the false table forward in succession until you reach the marked circumference. If this pinhole is not acceptable, pin on a piece of similar size and attach the workpiece using double-sided tape. Then proceed as described.

DUST EXTRACTION

There are two possibilities for dust extraction. The first entails making use of the central holes in both the router table and the drilling machine's table. Try and find an offcut of plastic tubing which will fit the hole in the table. I was able to fit two pieces together in a telescope-like fashion, secure with a jubilee hose clip and then connect this to my small workshop dust extractor. Some tubing can be expanded by pushing in a tapered wood plug after heating in steam from a kettle. Alternatively make four to six lengthwise cuts so the tube can be expanded or compressed to fit.

The second method is to suitably bore a wood block and attach this to the fence as near to the cutter as possible. Both methods remove a substantial proportion of the dust formed – the aim of any good extraction system.