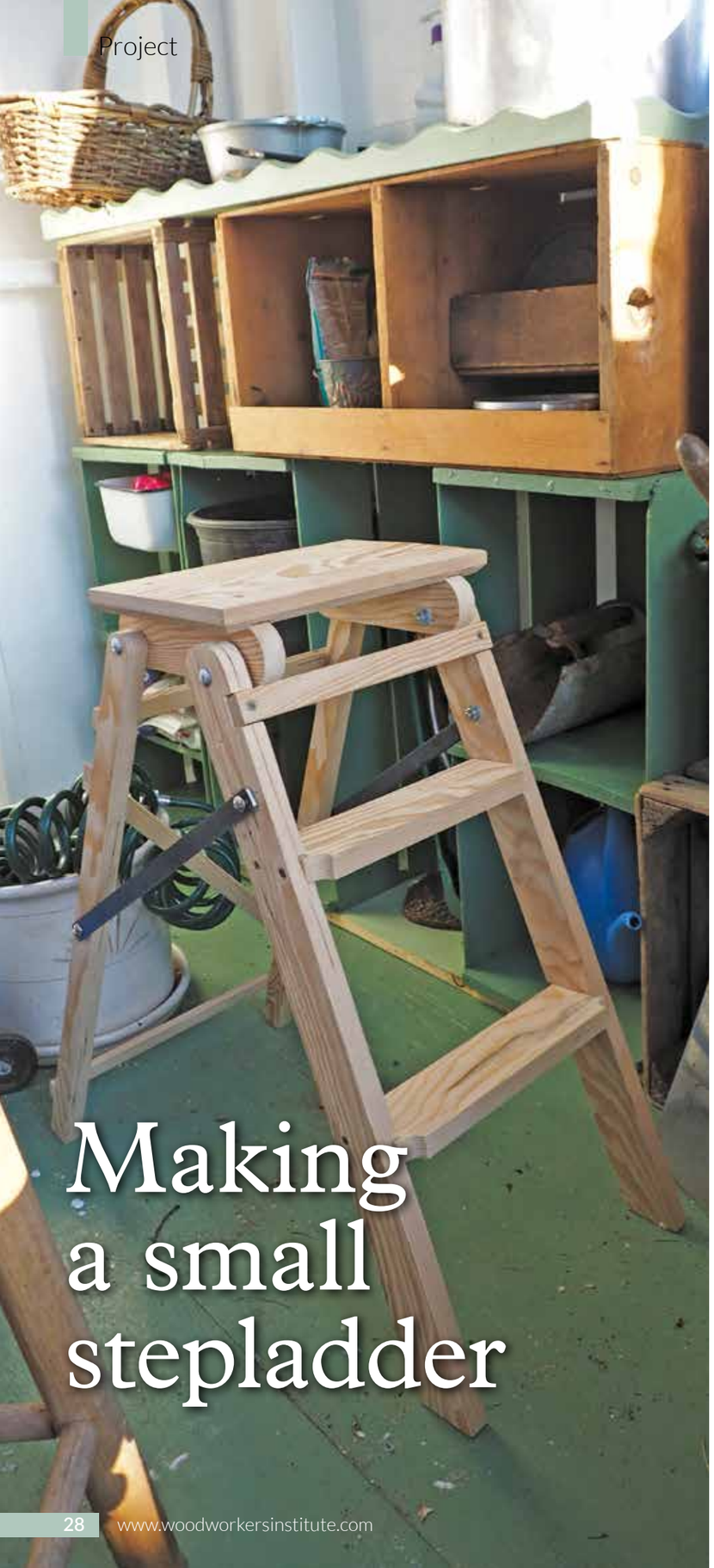

Making a small stepladder

Michael T Collins

ascends the giddy heights of ladder-making with his latest handy project

Step change

In 1862, John Basely invented the stepladder by putting a hinge at the top of two ladders so that they could be folded and easily stored. Born in Pennsylvania, Basely was a master carpenter and inventor, receiving the first US patent issued for a safety stepladder. Ladders had, of course, been used for millennia prior to his invention, but the changes Basely made to the design were hugely important, including the addition of hinges and using flat steps instead of rungs for safety. As you can imagine, he went on to become a very wealthy man.

Reach for the shelves

This article will not make you wealthy, but it will give you a lift in life and an insight into the mechanics of making a stepladder. I have at least four stepladders, ranging in height from 1-2m. Often, when reaching heights for a project, a few extra centimetres make all the difference in getting to those hard-to-reach areas. Stepladders, with their large, sure-footed steps, are one of the most useful tools you can ever add to your workshop, thanks to their safe and secure functionality. This article will simply outline the process I used and, by following along, you should be able to adapt the construction to suit your own needs.

So let's step straight into work and prepare the wood.

I have a nice selection of straight-grain, rough-sawn lumber, which would work perfectly for this project. But the piece I want to use for this particular job has a slight cup and twist to its length that will need removing before I can progress with the ladder. These flaws are easy to remove – all that's required is a methodical approach and lots of elbow grease.

Safety note

Michael has built a traditional pattern of short stepladder. It is not recommended that you alter the design to increase the number of steps for safety reasons.

Flattening a warped board

1 If you want to skip this section, then simply buy a couple of construction boards.

Start by roughly cutting the pieces to length. This serves many purposes – it breaks the wood up into smaller twisted pieces that require less work and it will generally preserve more wood on really twisted boards.

2 Snap a chalk line along the length of the boards so any bowing is cleared. Then, paying attention to the grain direction, bring the edge down to this line with a jointer plane. I keep a block of bees wax handy – it's amazing how easily a heavy plane slides across the wood when wax is applied to the sole and friction is reduced.

3 Once planed, mark it with a cabinetmaker's mark – this will be the face edge. If the board is cupped, place it so the convex side is uppermost, it is more stable this way. If the board rocks, place small wedges underneath to keep it steady. Next, using a shoulder or combination plane, flatten a 12mm section at both ends of the board to a depth that just clears the cup and at right angles to the planed face edge.

4 Sight down the board with a pair of shop-made winding sticks – a winding stick will exaggerate any twist in the board. If the winding stick 'marker' at the far end is occluded, adjust the rebate until you have the winding stick parallel.

5 This picture shows the slight twist in my piece of board. Now, snap a chalk line the length of the board on the edge, from one rebate to the other. Repeat this on the other edge. Plane each rebate slightly lower if the snap line does not lie within the board's entire length. Next, start at the planed edge and use a scrub or jack plane (with an aggressive iron 10in radius), to bring the surface down to the snap lines. Make sure you work diagonally across the board. It's a good idea to chamfer the exit side of the board so that tear-out is minimised, especially with a scrub plane that takes big bites. Check for flatness by using the edge of the sole of the plane. Finally, end with a jointer, planing down the length of the board. The jointer will bring the scalloped ridges down with each successive pass. Stop once the plane is taking continuous shavings. Mark this as the face side.

From the newly planed face side, use a marking gauge and deeply mark the thickness of the wood on all edges. Repeat the planing regime on the opposite face. The gauge line will act as a stop and 'feathering' will be revealed as you plane down to it. A pencil line would be easily missed. Check for squareness. Finally, gauge the width of the board from the marked face edge using a combination square, or marking gauge, and plane down to this line. You should now have boards that are uniformly thick and square and you will have had quite a workout. ➤

Tools and supplies

- Ripsaw, tenon saw
- Jack, jointer, router and block planes
- Marking gauge
- Assorted drill bits
- Bevel gauge
- Selection of chisels
- Spokeshave
- 2 x 5mm x 50mm carriage bolts, nuts and washers
- 2 x roofing bolts, nuts and washers


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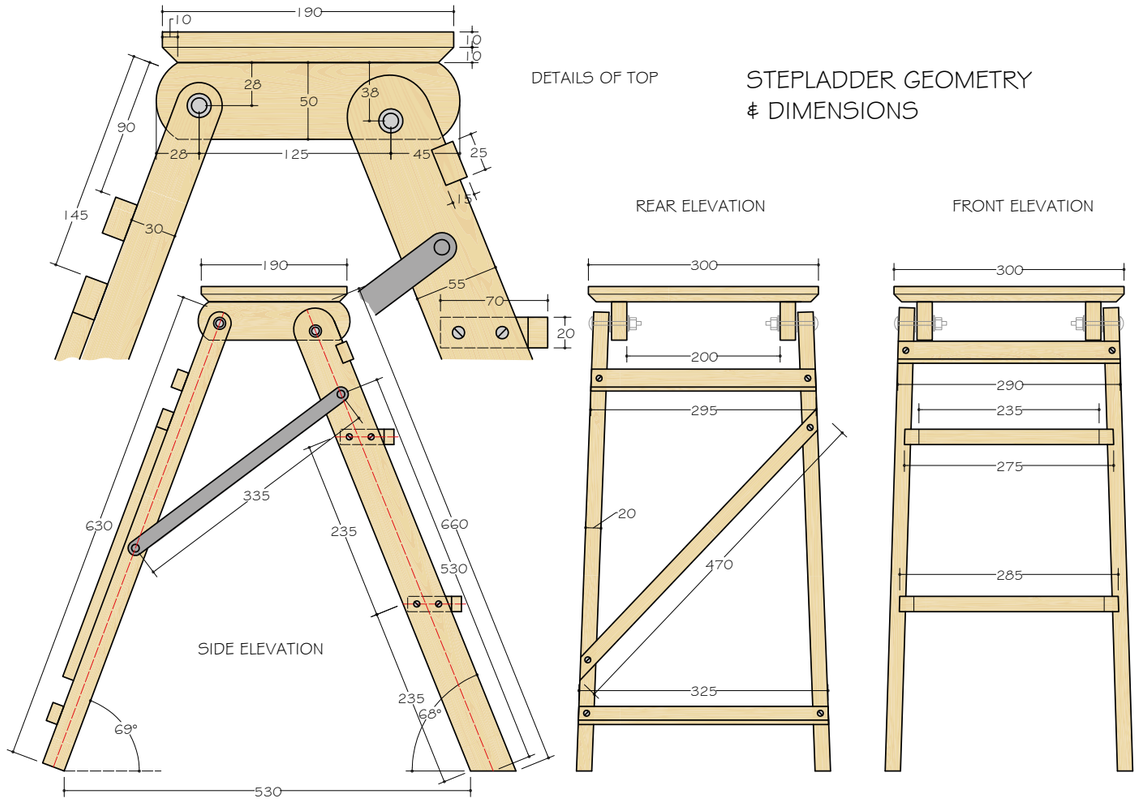
This is a first for me – I have never made a stepladder before, but in the immortal words of my daughter, Meredith: 'How hard can it be…?'



Ripping the parts

6 Lay out all the parts on the prepared boards, avoiding any knots and other defects – not good in a ladder. With a marking gauge, mark out all the widths of the parts.

7 Starting with the step supports, straight-grained and 60mm wide, roughly rip to size. It is always best to cut matching parts from the same area of the board. Plane down each part to the gauge lines.

8 As this was my first time making a pair of steps, I made a ⅕th scale model – this afforded me the opportunity to look at angles and also meant I could position the support bars in the correct location. If you change the height of your ladder and want the steps to close, you will need to find the support bars' attachment locations.

Making the step housing or dado

9 Set the bevel gauge to 68° and mark the location of the centre of each step. Don't forget to include the top and top supports in the overall height, as per the diagram. Strike a knife line on one side of the step, then place the step on the line and mark the width of the step housing. This method will ensure that the joint is tight.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10 Mark the position of the second step and repeat the process. Use the first step support to lay out the position on the other support. I am a firm proponent of taking measurements from the actual piece rather than measuring. With the marking gauge, measure down 8mm and mark the depth on the edge of the board. This is the base of the housing.

11 Deeply score the lines and then, with a chisel or marking knife, remove a V-notch on the waste side. Do this on each line.

12 Now, with a crosscut saw resting in the V-notch, saw down to the baseline. Take your time and frequently check the exit side so that you don't cut too deep.

***Note:** a simple tip to keep the saw perpendicular is to look at the reflection in the saw blade – the wood and its reflection should be coplanar.*

13 Remove the waste with a chisel. Work from both sides to avoid breakout.

14 Now mark and saw off the foot angles. These must match the angle of the steps.

15 Finally, lay out the rounded end with a compass and saw off most of the waste before cleaning up the end with a block plane.

The top

16 The top is made from a single board, 300mm x 190mm, with grain oriented parallel to the longest edge. Edges have a 10mm chamfer that takes the dimensions to 280mm x 170mm.

17 Housings for the leg supports are cut into the underside of the top and are positioned the width of the step support from the chamfer. ➤


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18 Remove the waste in the same way as for the step housings. I used a small router plane to speed up the removal.

Assemble the steps

19 Measure and cut the steps to width. The width is the length of the step housing plus 12-15mm that protrudes at the front.

20 Add a small thumbnail profile.

21 Dry-fit the steps with screws, drill pilot holes and countersink.

The step supports are angled out. Note the angle of the back supports is different to the front angle. Position the holes in the top of the step supports and the back supports, as per the diagram. Drill all the holes. All the pivot points are held together with 50mm x 5mm-diameter carriage bolts with a washer placed between the wood surfaces and the nut to lessen wear. I used two bolts to hold the metal support measuring 40mm x 6mm, locking all the nuts with threadlocks. Locknuts would work too.

Tip- If you need to cut bolts to length, thread a nut on to the bolt prior to sawing. This way, any roughness in the thread is sorted by removing the nut.

22 Install what I call the 'splay stops' – a bar that rests up against the underside of the top support when the steps are opened and stops the front legs sliding out.

23 Mark the location of the splay stop on the leading edge of the step supports. Pair the step supports and remove the waste.

Finishing up

24 I have always eased sharp edges with a couple of passes of a block plane, but I recently discovered a simple technique which involves rubbing the edges with a burnisher. This works perfectly well on softwoods, but I'll stick to my block plane for hardwoods. Reassemble all the parts and glue and screw them all together. Secure the back supports in place.

You can leave the steps natural or, if you prefer, finish with a couple of coats of stain. And there you have it, a small, sturdy stepladder that will provide years of use and raise your woodworking skills to greater heights. ■


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