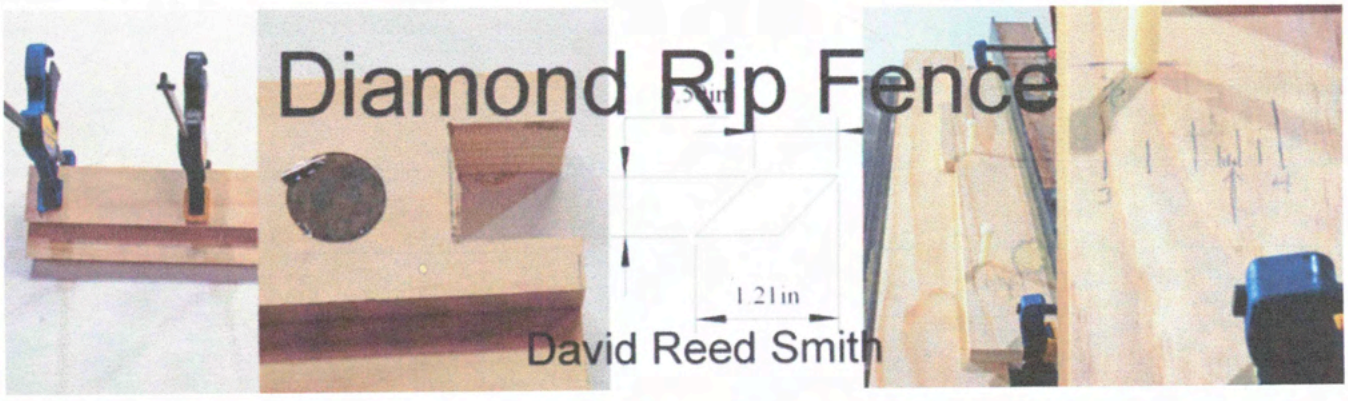

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Diamond Rip Fence as 4 page pdf

Introduction:

This article describes making an auxiliary rip fence for cutting diamond staves for making diamond Christmas ornaments. What seemed like a pretty simple idea in theory didn't work out easily in reality, as this one is the fourth version. The basic idea was to make an auxiliary fence that completely captures the cut-off stave to make angled rip cuts safer. I started out using a fence that was angled to match the stave. That worked as long as the fence stayed down on the table saw, and the stock was identical to the fence thickness. Otherwise lateral pressure tended to make the stock ride up the bevel of the fence leading to off-size or tapered staves, so this one uses a right angled fence. A splitter seemed to be necessary to prevent kick-backs. A fence mounted splitter on one version meant I couldn't shift the fence, and a saw mounted splitter seemed a bit much to expect people to make, so this version uses a slide in half fence for the first rip.

Briefly, two main components make up the fence; a straight fence 1/2" thick, the thickness of the stave stock, and a 3/4" thick cover that captures the off cut and the table saw blade. The fence stock is glued up. Magnets are added to help keep the fence down on the saw, and notches cut to allow the auxiliary fence to be clamped to the table saw fence. Depth adjusters are made from nylon bolts to allow the use of slightly under sized stave stock without it rattling about. A blade guard is added to keep fingers further away from the blade. After finding the appropriate setting of the table saw fence a spline is added as a splitter, which greatly reduces the tendency to kick back. The last step is to make a half fence for the first rip cut so stock isn't wasted.

Making the fence:

The first step in making the Diamond Rip Fence is to prepare the two main components. I started with 3/4" thick Radiata pine, but any 3/4" thick stock will do. Two 6' long boards at least 4" wide will suffice. The completed fence pieces should be as long as your table saw is deep, in my case 28". The base piece, which serves as the fence, should be planed to the thickness of the stave stock you plan to use. I suggest 1/2", as that yields a nicely sized ornament. As Radiata pine is a reasonable wood to start making ornaments with until you get used to doing them, plane a whole board to that thickness. Then crosscut the board to 28" and rip that piece to yield a piece 2-1/2" wide. It needs to be around that width so that the auxiliary fence will lie stably on the table saw.

Next crosscut a 3/4" thick board to 28" long and then rip it to 4" wide to make the cover piece. The fence stock pieces are shown in Fig01.

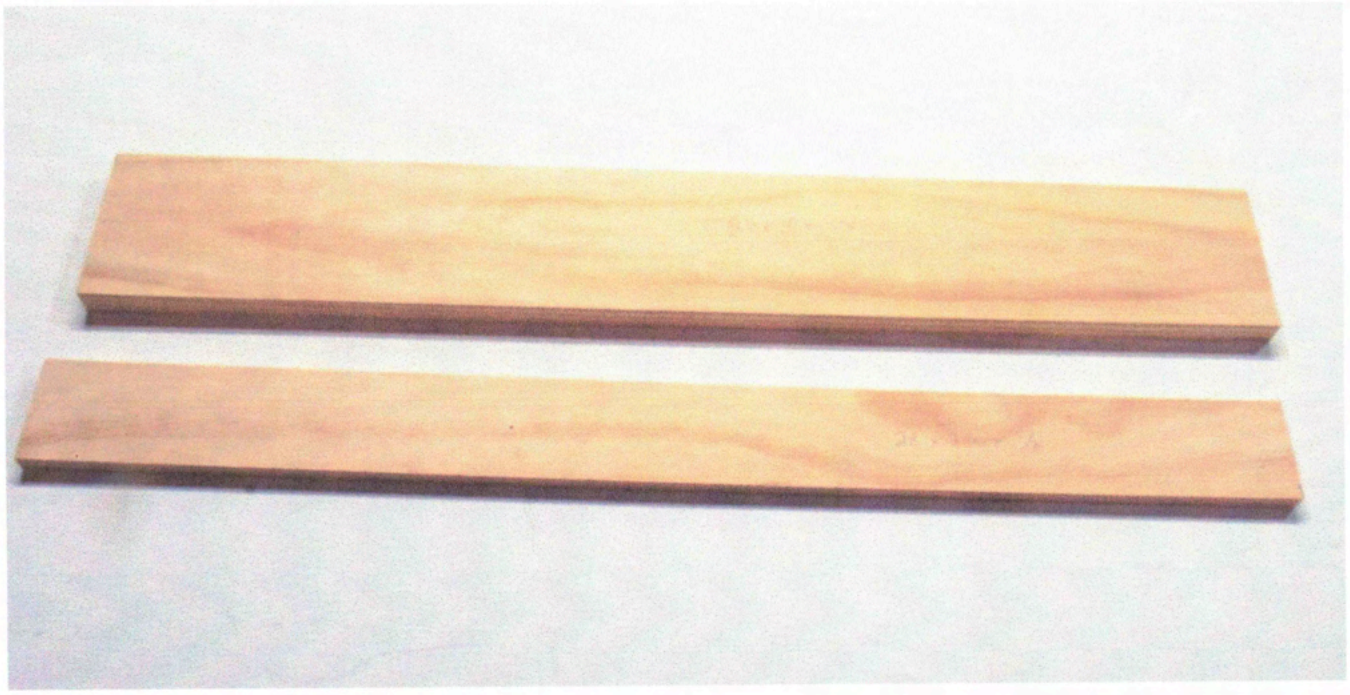

Fig01: The fence stock pieces after crosscutting and ripping to size.

Glue the two fence stock pieces together, being sure that the long edges on one side line up. Use an adequate number of clamps, as in Fig02, and allow the glue to cure.

Fig02: Clamping the fence stock while the glue cures.

I found that clamping the auxiliary fence to the table saw rip fence tended to lift the outside of the auxiliary fence as the clamping pressure tended to be high on the auxiliary fence. Putting a slight bevel on the auxiliary fence helps prevent this. Set the blade to a 1° angle and rip saw the auxiliary fence to a slight bevel as in Fig03. This way clamping the auxiliary fence to the rip fence with force the auxiliary fence down on the table saw.

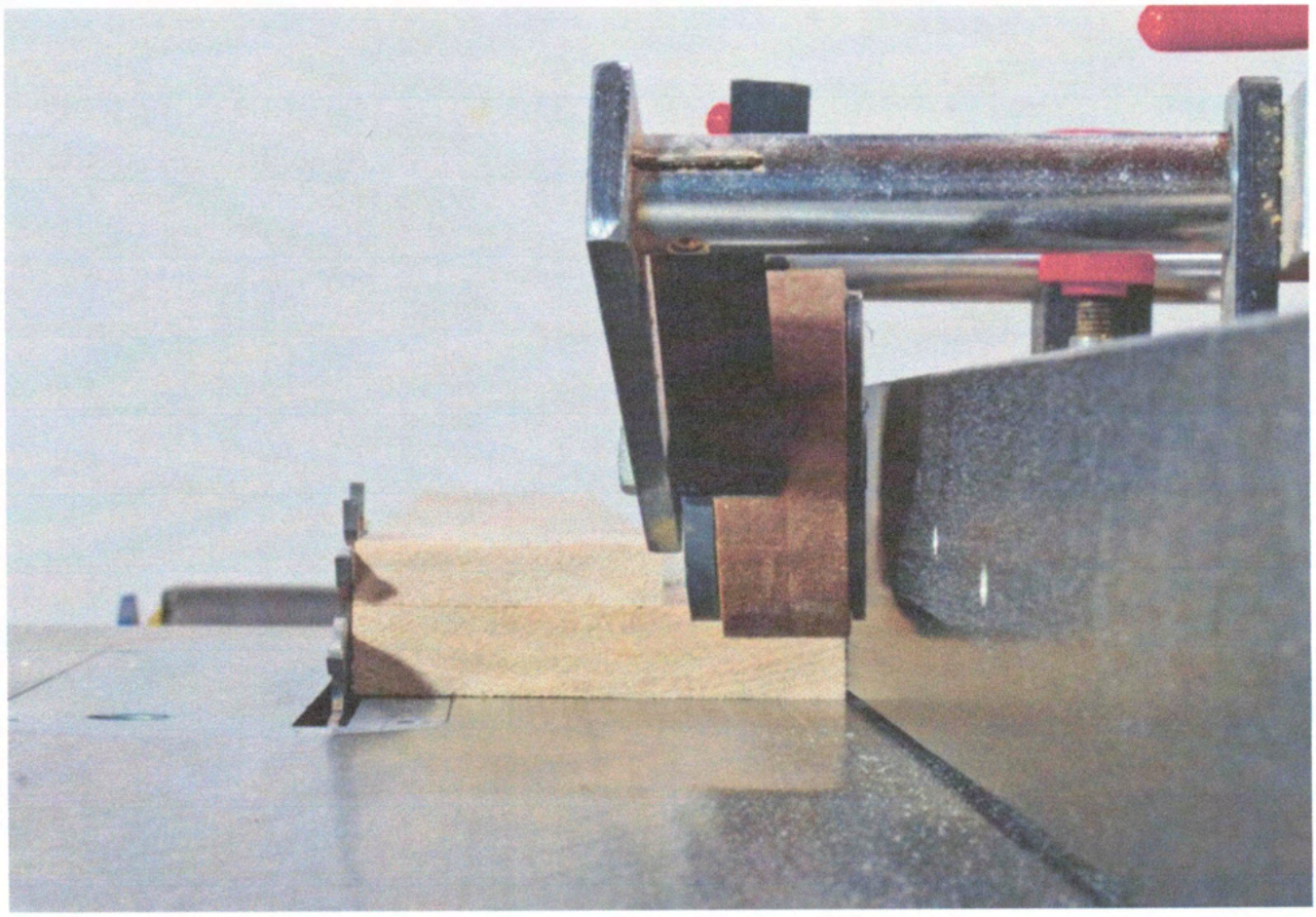

Fig03: Cutting a 1° bevel on the auxiliary fence.

Just because this isn't rocket science doesn't mean that redundancy is a bad idea. To further help the auxiliary fence stay down on the table saw, add a pair of 1" rare earth magnets. On the bottom of the auxiliary fence, about 3" from each end, drill a 1/8" deep hole with a 1" Forstner bit as in Fig04. Glue the magnets in place with CA glue as in Fig05. I recycled the magnets from prior jigs, so they look a little shady with the plating flaking off, but they still work fine.

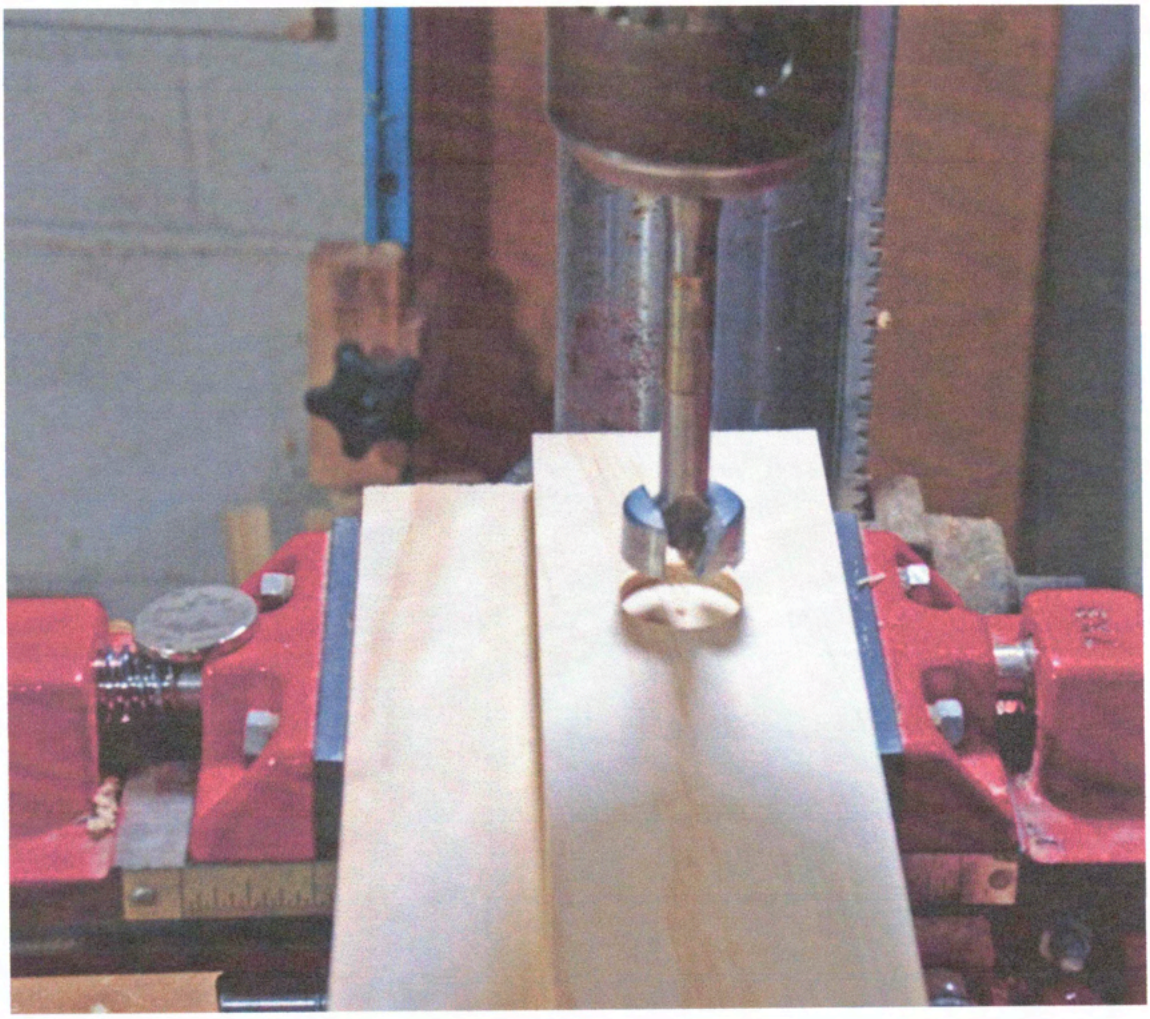

Fig04: Drilling holes for rare earth magnets.

Fig05: After gluing the magnets in place.

At each end of the fence, lay out notches that the head of the clamps you plan to use will fit in as in Fig06. Then cut the notches out with a band saw. The completed notches are shown in Fig07.

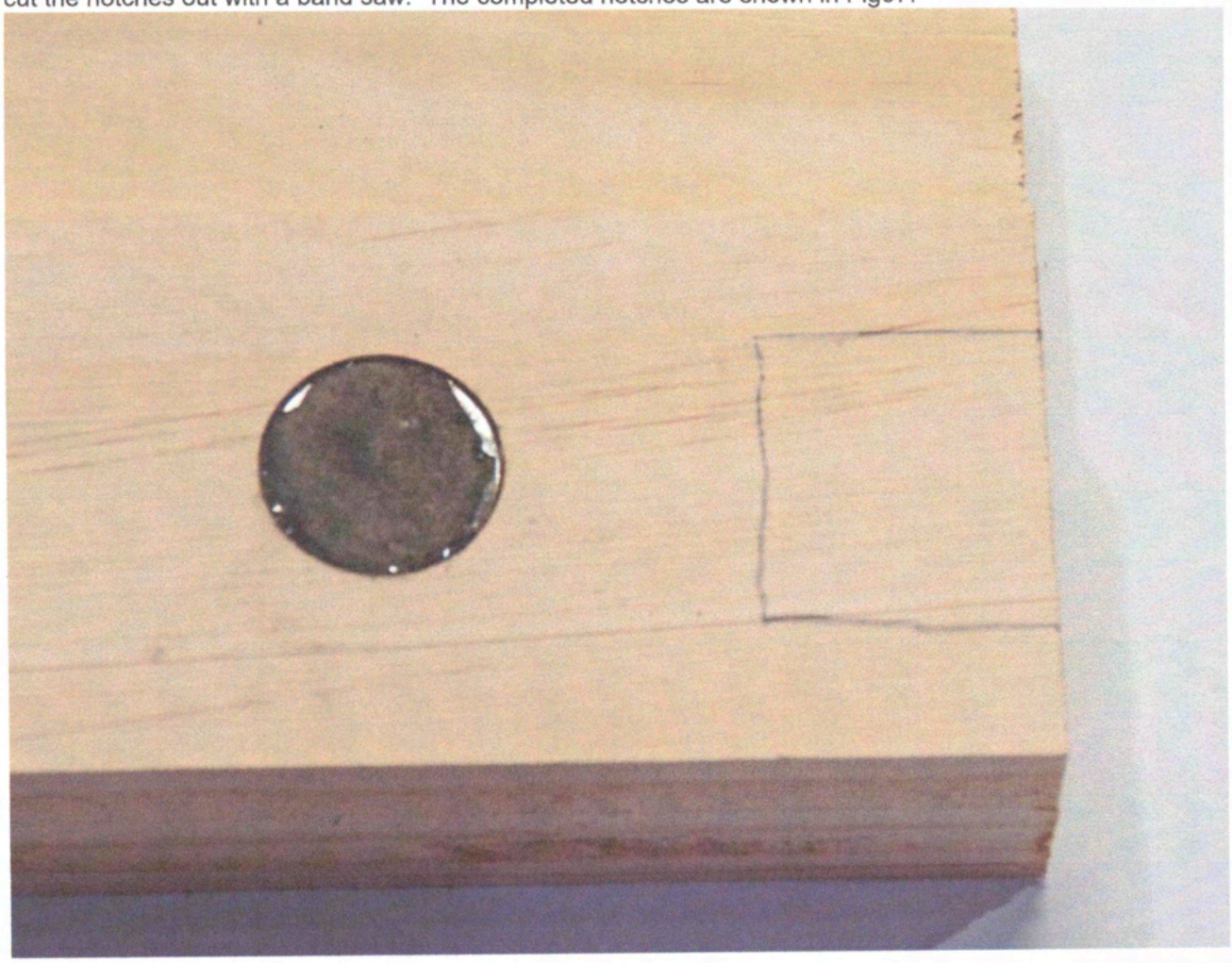

Fig06: Layout of notches for clamping the auxiliary fence to the rip fence.

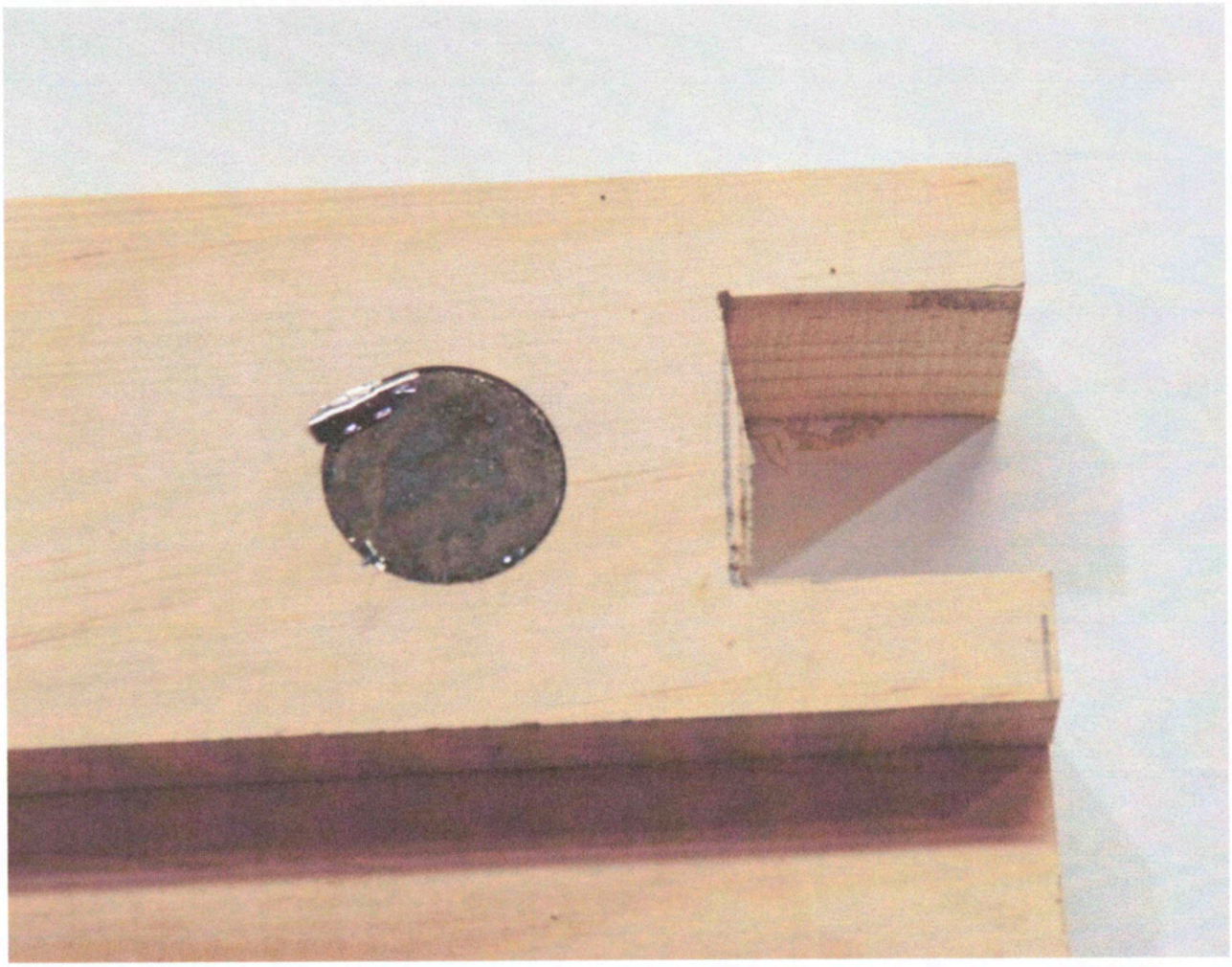

Fig07: After cutting the notches out.

Set the angle of your table saw blade to 45°s and raise the blade slightly higher than 1/2". Place the auxiliary fence on the table to the right of the blade so that you can locate the position of depth adjusters. They both should be 7/8" from the left edge of the auxiliary fence, one just in front of the blade and the other about half way between the blade and the front of the saw as in Fig08.

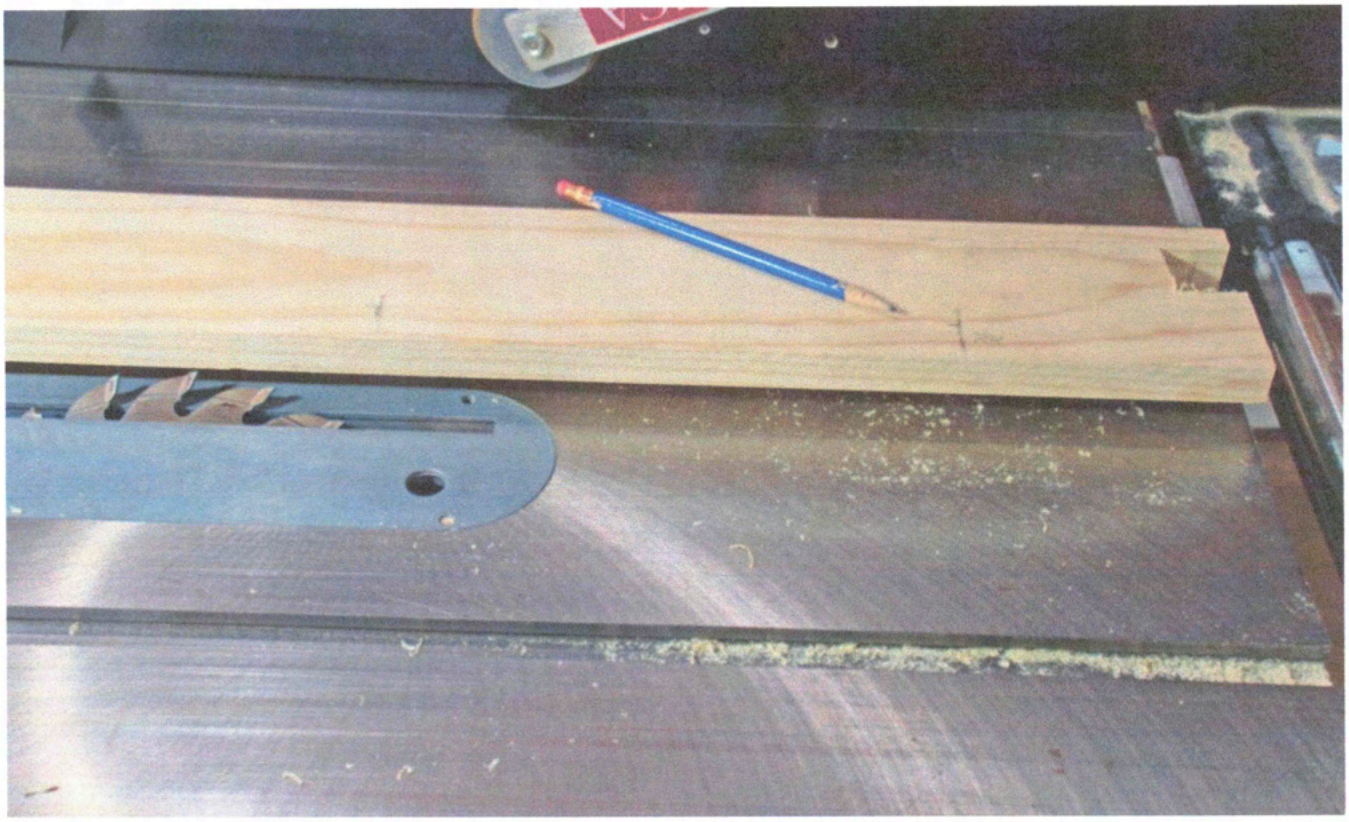

Fig08: Marking the location for depth adjusters.

Drill 5/16" holes at the marks as in Fig09. Then tap the holes with a 3/8" x 16 tap as in Fig10.

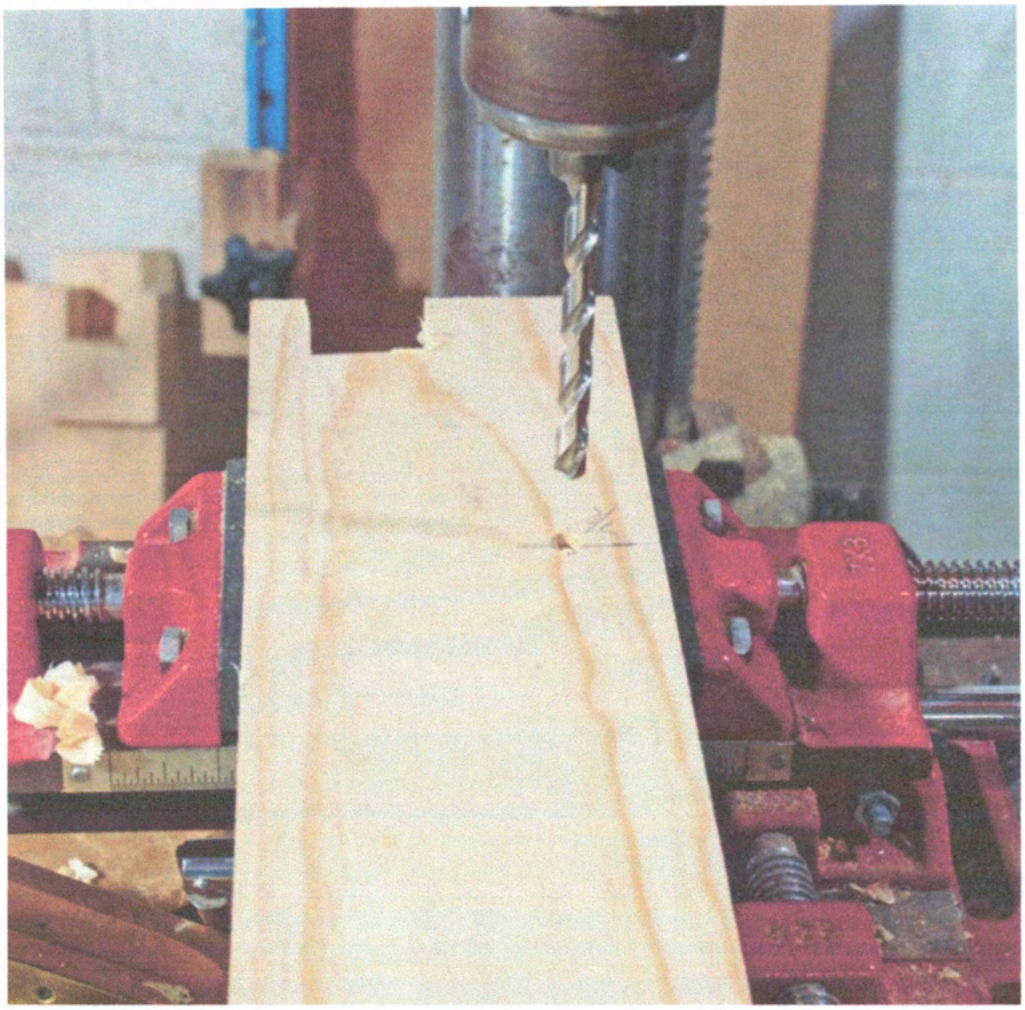

Fig09: Drilling holes for the depth adjusters.

Fig10: Tapping the holes for depth adjusters.

The depth adjusters are made from 2-1/2" long 3/8" nylon bolts. You can modify them by mounting them in a 4-jawed chuck with #1 jaws so that the threaded portion is out. Turn a small dimple in the end and bring up the tailstock for support. Turn away about 3/8" of the thread at the end and then round over the end. Remove the nylon bolt from the lathe, and use a scroll saw or bandsaw to notch the bolt from opposite sides in the portion with the thread removed. The notches should go a little more than half way through. The completed thread adjuster is shown in Fig11.

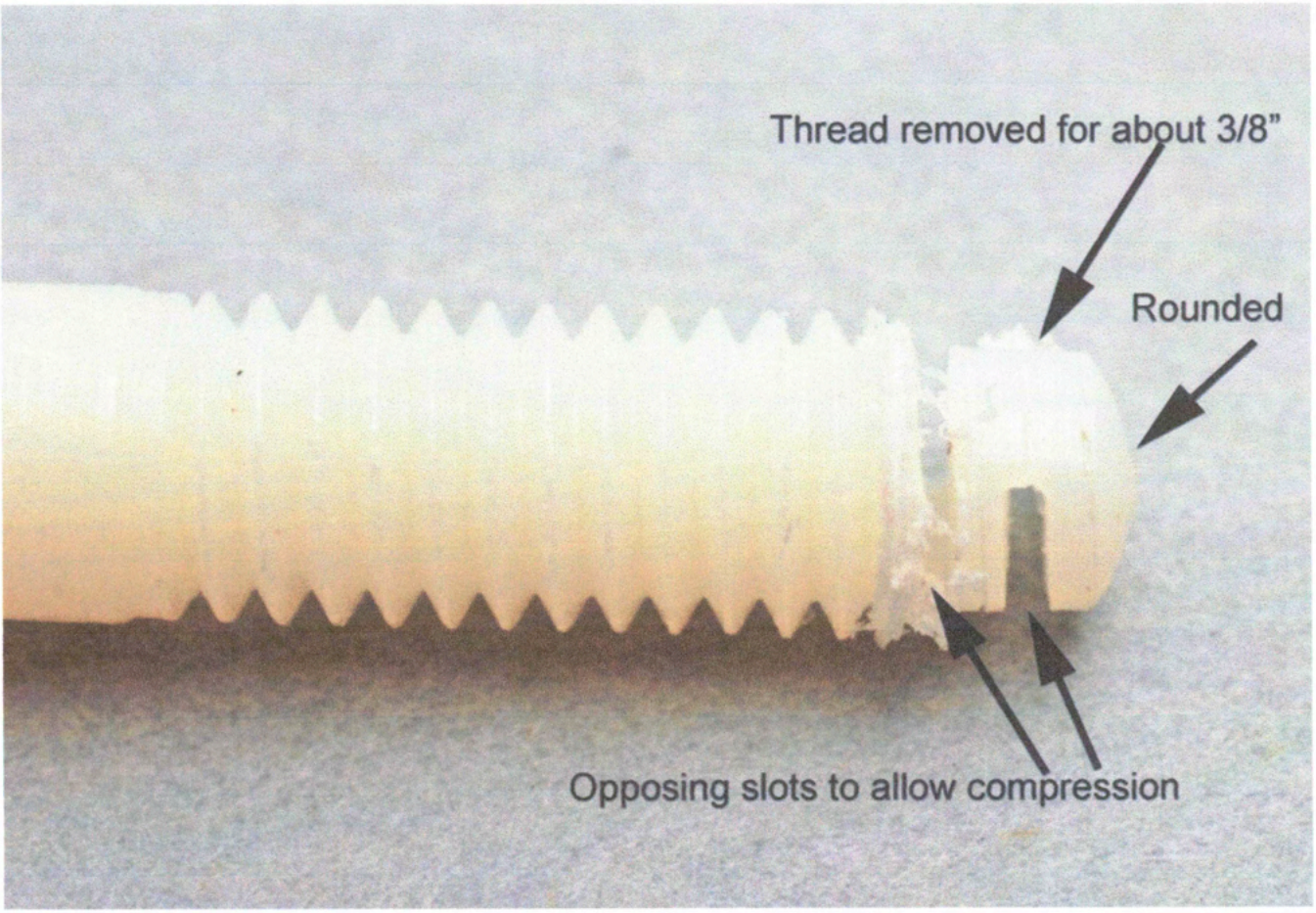

Fig11: The completed depth adjuster.

While the cover completely captures the cut off stave and even the blade, to further protect your fingers add a blade guard to the side of the fence. The blade guard should be 7/8" wide and 8" long made from 3/4" stock. With the blade still set at 45°s and slightly higher than 1/2", set the fence to the right of the blade as in Fig12 and mark the location for the guard centered on the blade. The apply glue to the guard and clamp it in place as in Fig13.

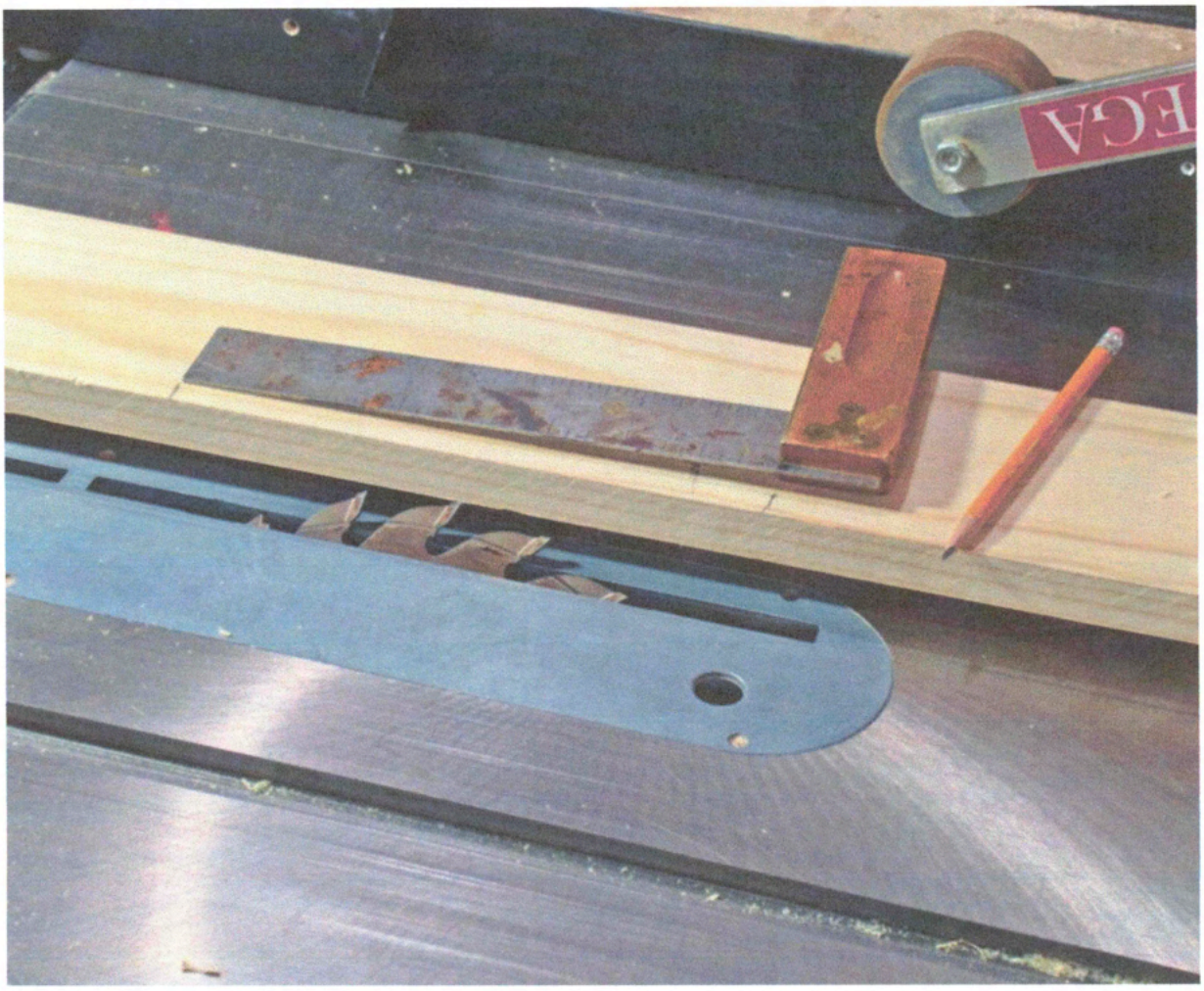

Fig12: Marking the location for the blade guard.

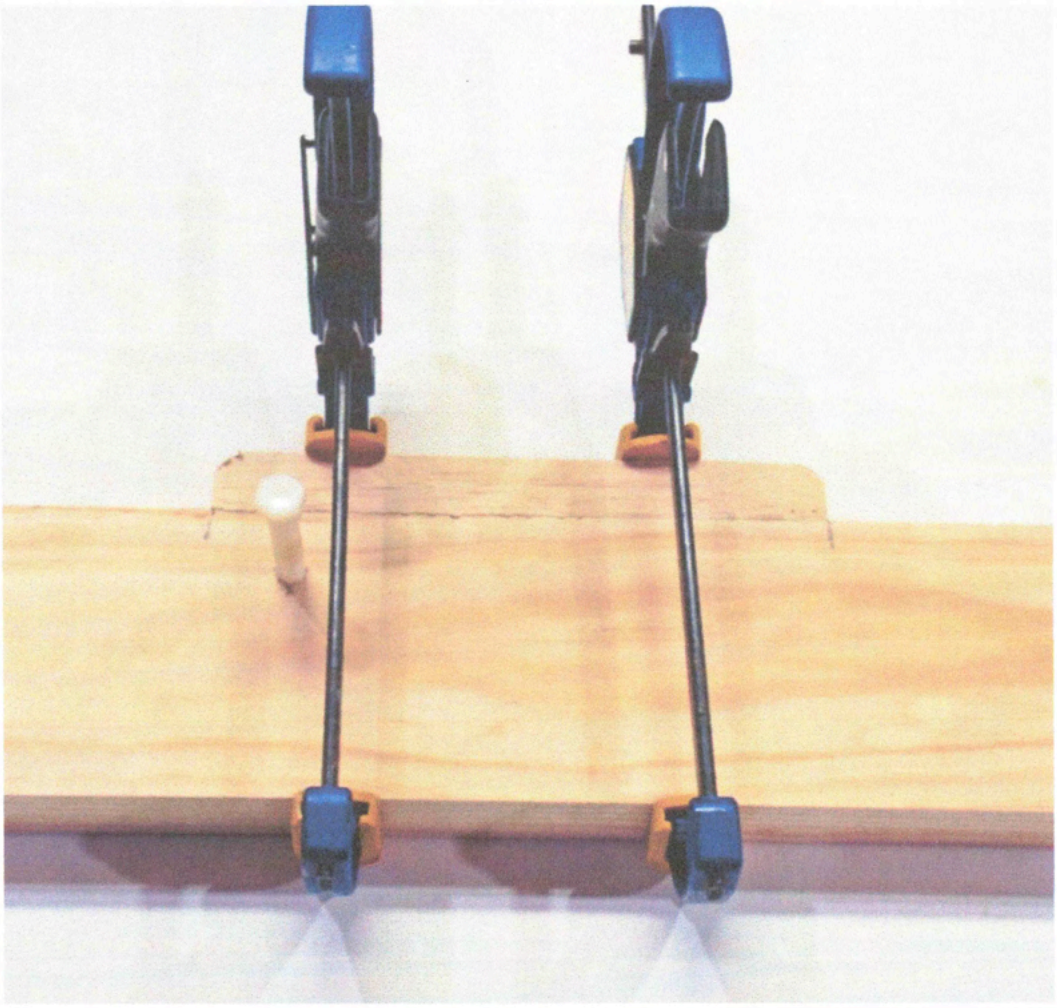

Fig13: Clamping the blade guard until the glue cures.

Now determine the setting for the rip fence. We can estimate the distance required by using a CAD drawing of the end of a stave as in Fig14, which shows that that the diamond shaped stave is 1.21" long when laid on a side. Adding 1.21" to the 2.5" width of the bottom piece of the auxiliary fence suggests a starting setting of 3.71" or a little less than 3-3/4", so set the fence there. Lower the table saw blade and clamp the auxiliary fence to the table saw fence. Turn on the saw and raise the blade until it starts to cut into the fence. Cut a piece of 1/2" stock to a length you find comfortable to rip but not so long as to waste a lot of stock. Make a first rip cut to establish a 45° bevel, then make another rip to make a first sample stave. As there is no splitter yet, it possible that the offcut will be kicked back. As the only place it can go is straight back, be sure you're not standing there. Measure the sides of the off cut stave to see if they are equal. You'll probably have to make some adjustment. Lower the blade and move the fence. Raise the blade with the saw running and try another sample stave and measure again. Repeat until the sides are equal.

Fig17: Marking the size of the splitter.

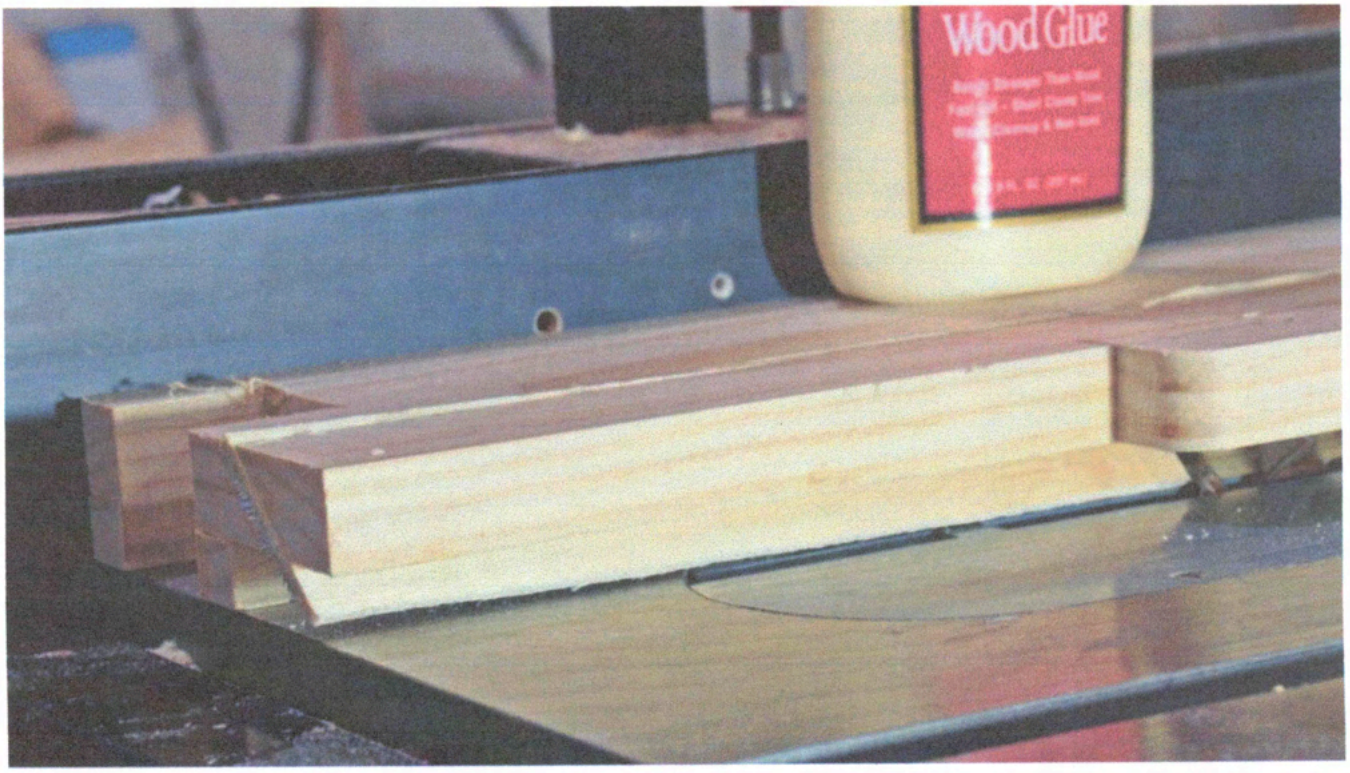

Fig18: Gluing the splitter in place.

After the glue cures, lower the blade and remove the fence. Turn it over and secure it in a vise and use a rasp, file, or coarse sandpaper to taper the lead edge of the splitter and thin it enough that it won't bind in the kerf as in Fig19.

Fig19: Thinning and tapering the splitter.

The splitter makes kick backs much less likely but also means you can't move the fence for the first rip which is a potential waste of a lot of stock. To prevent this, make a half fence for the first rip of each piece of stave stock. Measure from the front of the saw to the blade. Using 1/2" stock, cut an L shaped piece of wood as in Fig20. The inside length of the long arm of the L should be slightly shorter than the distance from the front of the saw to the blade. Using Fig14 again, the width of the long arm of the L should be slightly less than .7" The short arm of the L should be 2" thick and the inside length should be 2". The short arm of the L keeps the half fence from being pushed along the auxiliary fence. Making it a half fence keeps it away from the blade if it rotates away from the fence. Fig21 shows the half fence in place. Just slide it in and against the fence.

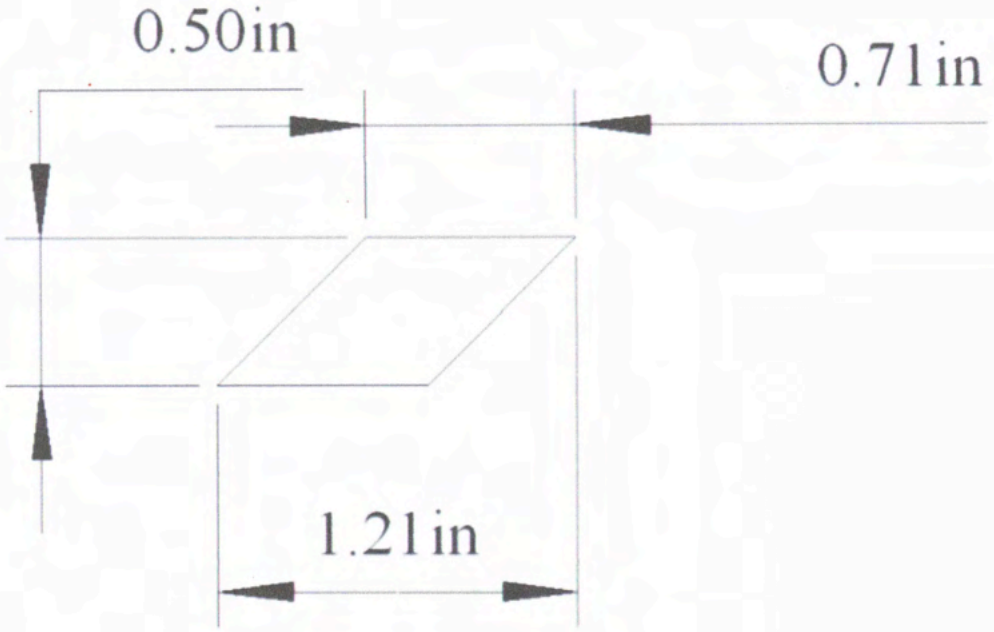

Fig14: A dimensioned drawing of the end of a stave.

The auxiliary fence will feel much safer to use with a splitter. Lower the blade and remove the auxiliary fence. Then raise the blade high enough to cut all the way through the auxiliary fence. Pass the auxiliary fence part way through the blade as in Fig15 to create a slot to mount a splitter. Lower the blade, put the fence back in place and raise the blade to just over 1/2" again. Mark on the auxiliary fence just behind the blade as in Fig16.

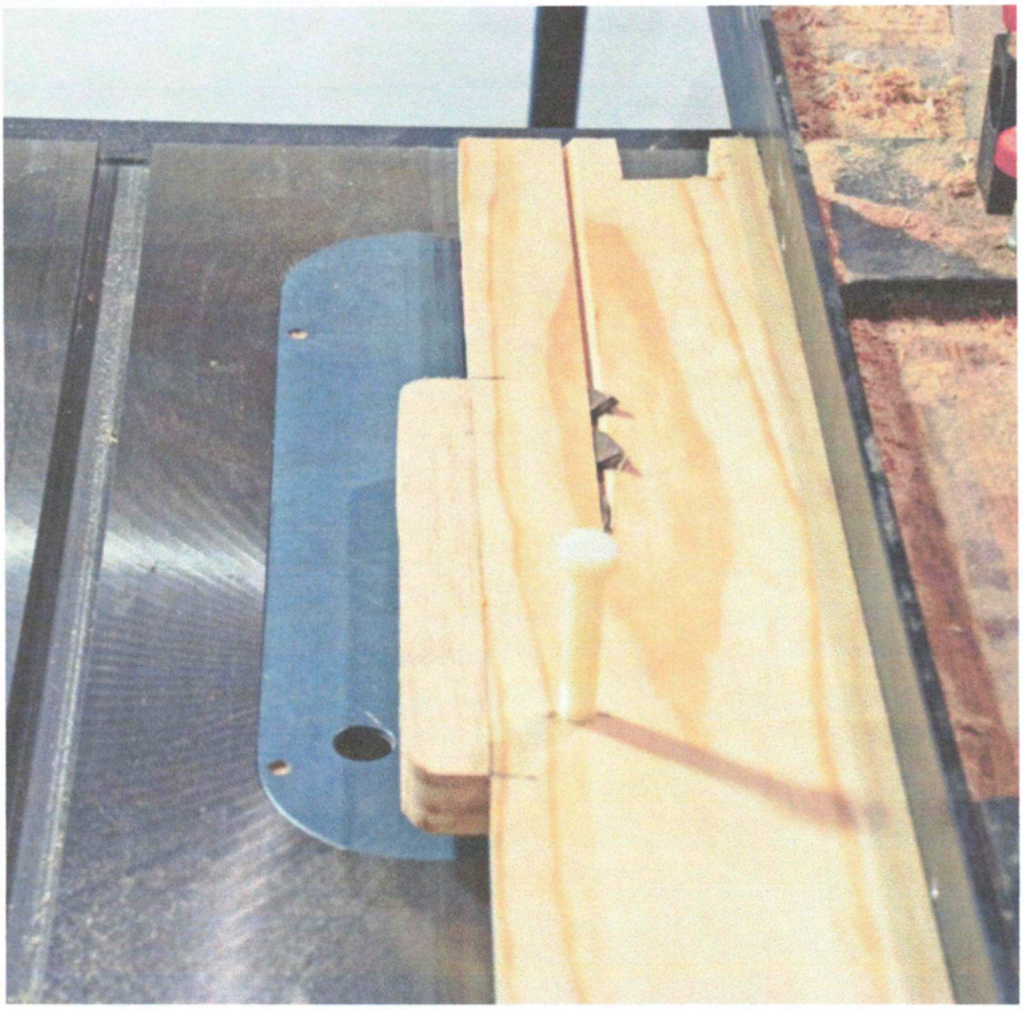

Fig15: Ripping a slot for the splitter.

Fig16: Marking for the extent of the splitter.

1/8" plywood works well for the splitter, but any 1/8" stock will do. I used some salvaged from a clementine box. . Measure to the mark and cut a piece long enough. Slide it in place and lower until it's just off the table. Mark on the splitter along the top of the top of the auxiliary fence as in Fig17. Remove the splitter and cut along the line. The spread glue on the splitter and slide it into place as in Fig18.

Fig20: The completed half fence.

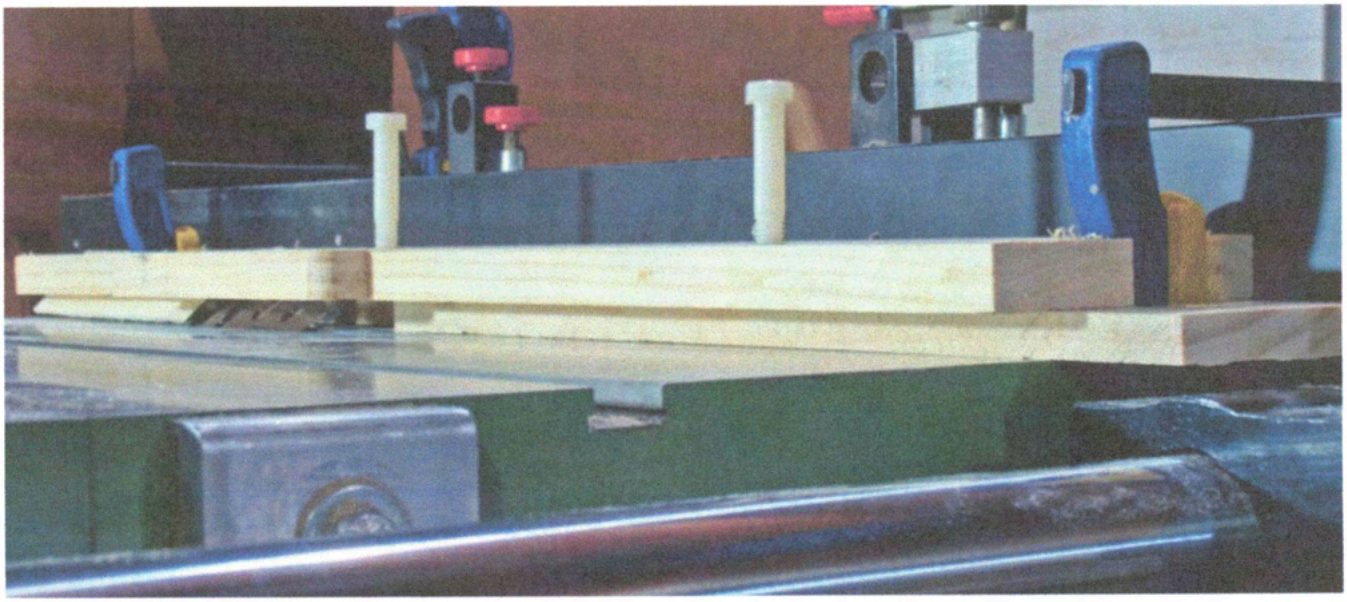

Fig21: The half fence in place.

Before you forget, record the setting of your table saw fence to make using the auxiliary fence easier in the future. I find it easier to use a visual guide, reproducing a large scale ruler with an arrow as in Fig22, than trying to locate where, for instance, 45/64" is.

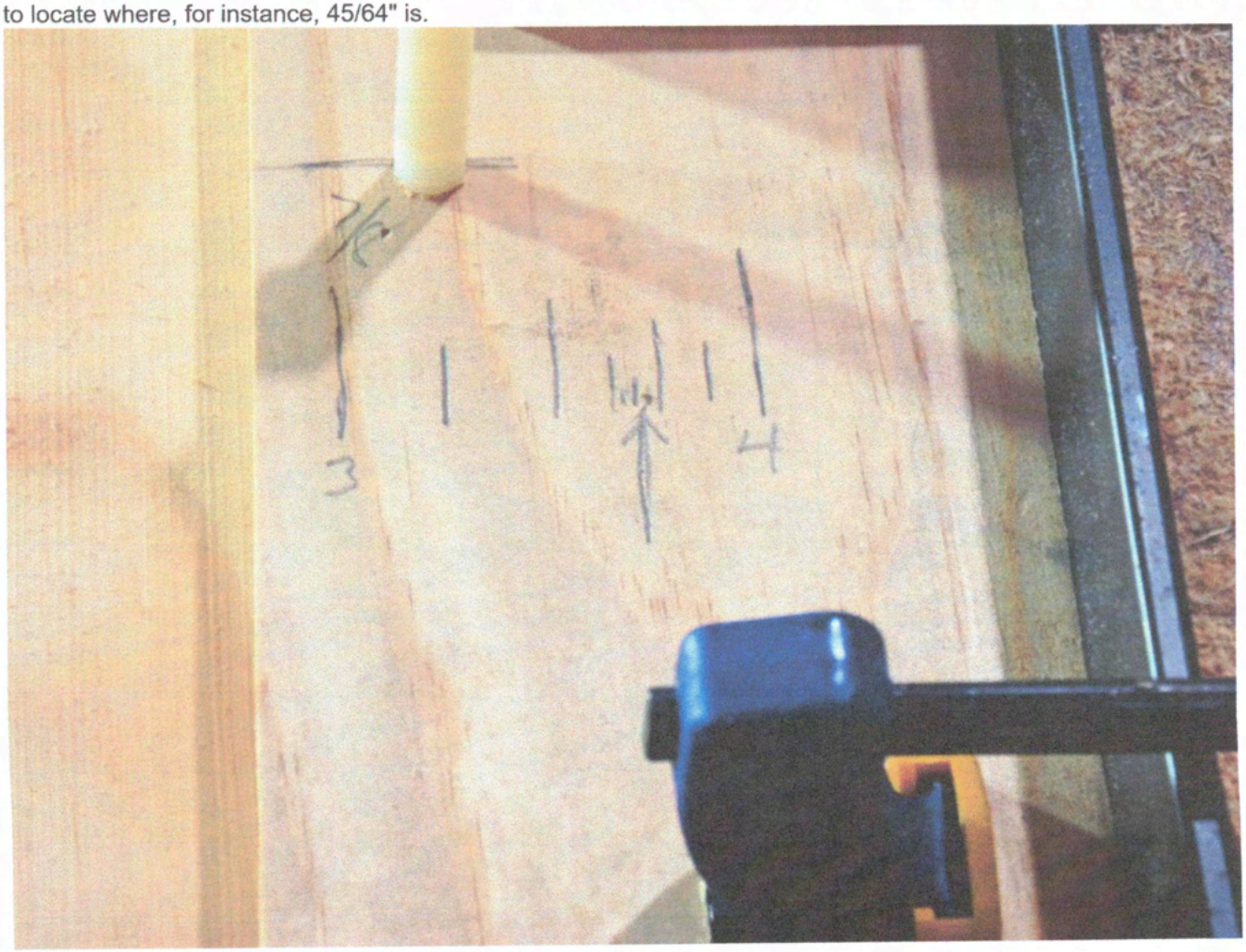

Fig22: A visual reminder of the rip fence setting.

Using the Diamond Rip Fence:

Try to accurately plane all stave stock so that it will fit the auxiliary fence well and so that you won't have to readjust the rip fence setting. But accidents happen. If your stock is oversized you can re-plane it or add tape as a shim under the auxiliary fence. If your stock is undersized you can use the depth adjusters. As the splitter narrows the range of possible adjustment, do plane carefully.

For the first rip of any piece of stave stock, put the half fence in place and rip the first bevel as in Fig23. Then remove the half fence and cut staves as in Fig24. You may find a push stick of 1/2" thick stock to be handy.

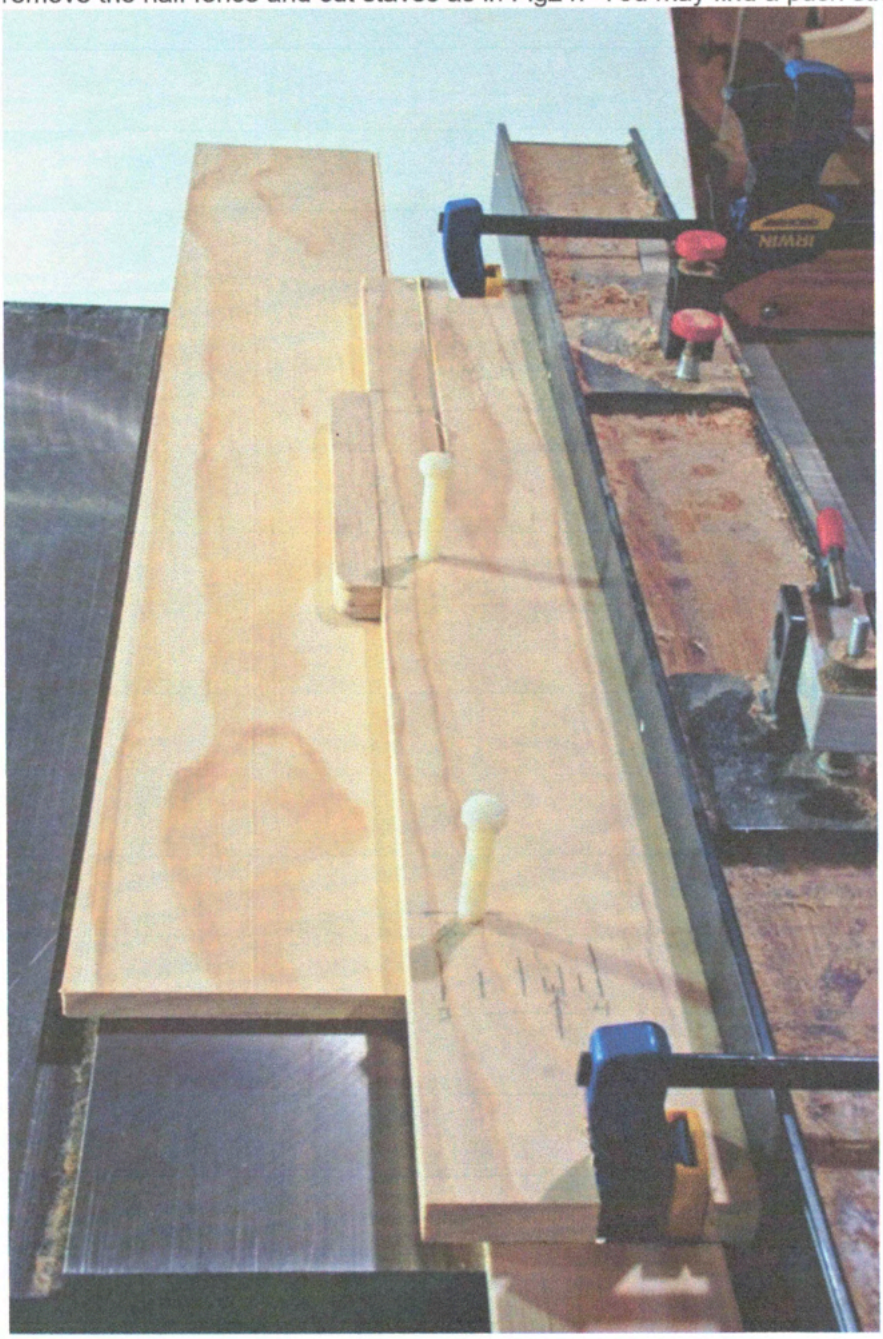

Fig23: Establishing a bevel on the stave stock with the half fence.

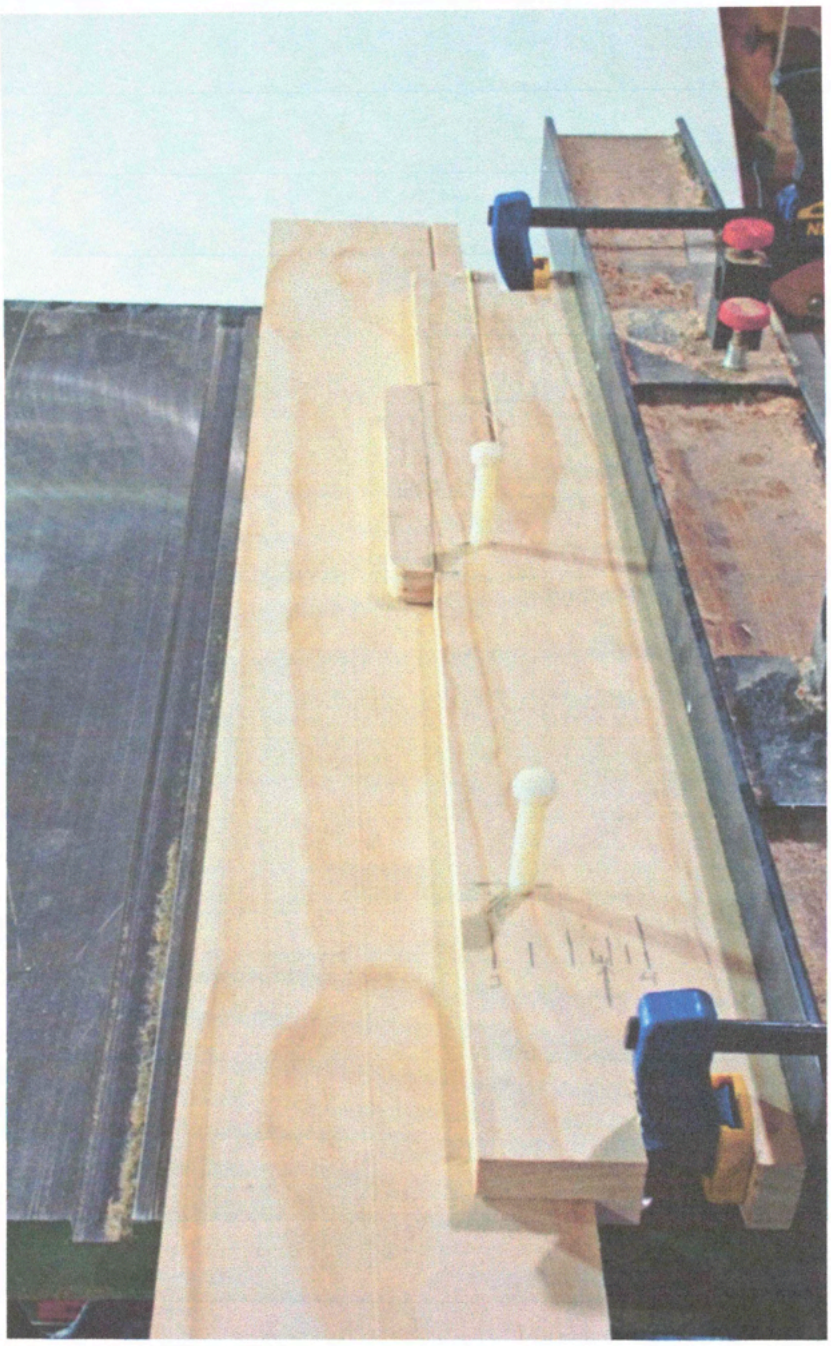

Fig24: Ripping staves with the half fence removed.