

SMALL WOODEN PATTERNS FOR MODEL ENGINEERING

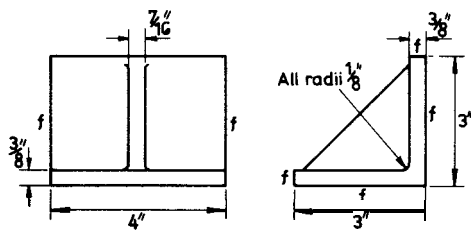
by Syd Pipe (Australia)

Part III

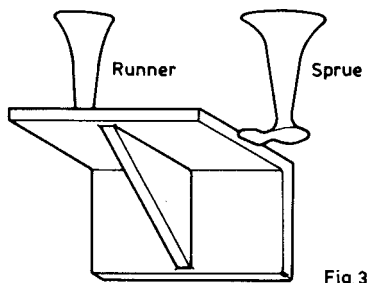
Construction Methods

Fig. 2 is a drawing of a simple angle plate. This would probably be cast in the drag as shown in Fig. 3 with a sprue and a riser in the cope. Some shrinkage could occur along the horizontal top face, resulting in depressions and possibly a little porosity near the riser. Any impurities could also collect on this face. It would be wise to allow a little extra metal for machining to counter these possibilities.

The first step in making the pattern would be to draw it up with its machining allowance, Fig. 4. Select timber of adequate size for dressing; the grain should run parallel to the longest side of the pattern. Cut two pieces, one for the side which will be cast at the top. This piece will finish with both broad faces parallel and the second piece should be large enough

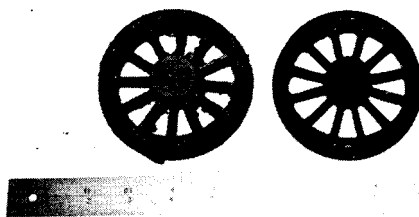


ANGLE PLATE: matt. c.i. Fig. 2



CASTING BEFORE FETTLING

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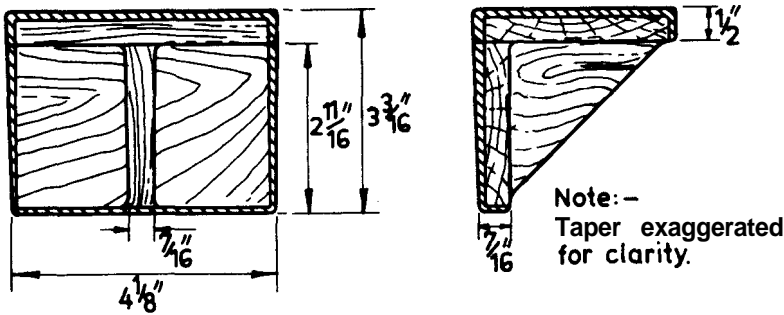


The pattern (right) and a casting (left) for a small locomotive or tender wheel.

to make the other side and the gusset piece. (There are several ways of making up this pattern, the one which appears to be the simplest with hand tools is described.) The second side and gusset will be tapered across the broad faces.

Plane one face of No. 1 piece smooth. Mark the top of a surface plate with a few strokes of the lumber crayon. Rub the planed face of the timber on the surface plate over the crayon marks, which will bring up the high spots similarly to checking a metal workpiece for scraping flat. With the plane iron set to cut very finely, remove the high spots marked by the crayon. Continue marking up and planing off until the desired flatness is achieved. Next plane one edge square to the finished face. Mark the finished face and the finished edge to indicate that they are to be referred to for later dimensional checks. Working from a contraction rule for cast iron, set your marking gauge to the width of the top face, i.e. 3 in. plus about 1/16 in. for dressing off later. Plane this edge square to the line thus marked. Reset the gauge to the finished thickness, i.e. 1/2 in. (contraction), and mark the workpiece along both edges and both ends. Carefully plane down to these marks. Scribe a centre line across both faces and both edges, squaring off the original reference face and edge. Put this piece aside. The second piece should be dressed on one face and one edge similarly to No. 1 piece and marked up for reference as before. Next dress to 2%

Machining allowance 1/16" except top face of 1/8"
Dimensions shown are minimum size.
Widths increase with taper



DRAWING OF FINISHED PATTERN

Fig.4

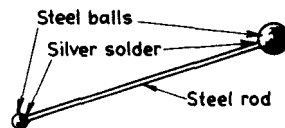
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in. (contraction). From your pattern drawing, scale off the widest edge, i.e. at the joint with piece No. 1. (Given a taper of 1/8 in. per foot per side, this would be about 1/16 in. total for 3 in. wide, making the width of this edge 1/2 in. approx.) Mark the thickness all round at 1/2 in. contraction, and plane to the marks. Set your gauge at 15/32 in. and mark along each side of the bottom edge giving a finished width of 7/16 in. Carefully plane off each wide face, tapering from the 1/2 in. edge. When you are planing to a scribed line it helps if the line is accentuated by running along it with the chisel point of your lead pencil. When using your gauge along the grain, ensure you keep a firm pressure on the face you are gauging from. Draw the gauge towards you and scribe lightly, otherwise the roller or scribing point may follow the lie of the grain and introduce an error.

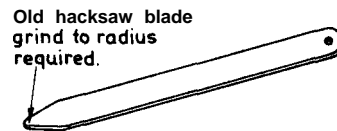
Next cut the piece for your gusset off No. 2 piece and put it aside. Mark the centre line around No. 2 piece. (We are being a bit pedantic here but this practice pays dividends when the job is more complicated). Take both No. 1 and 2 pieces with the centre lines mated and 1/32 in. allowance proud for dressing along the joint edge. Clamp together dry and hammer a 1 in. nail through the top piece and about 1/8 in. into the bottom piece. Unclamp, apply glue to both mating faces, replace on the nail points, check correct positioning, re-clamp, nail up and punch the nail heads below the surface. When the glue has dried sufficiently, 20-30 minutes for PVA glue, dress the proud edge as a continuation of the taper of No. 2 piece. From the centre-line at the bottom of No. 2 piece, measure off 2 in. on either side, with the protractor set at 1/2 deg. project lines from each side to the top face of No. 1 piece. Continue these lines square across the top face. This is where your disc sander comes in: sand back to the marks. Cut the gusset to fit, ensuring that the taper runs in the right direction. Glue up. A strong rubber

band and a suitable packing piece will make a convenient and adequate clamp.

Allow the assembly to dry thoroughly. Put a couple of nails into the gusset for extra security. Gauge the width of the top face allowing a few thousandths for taper and plane off tapered using the protractor to check. The next step is the fillets. These can be laid up by several methods, the simplest being to use ready-made wax fillet material obtainable from patternmakers suppliers. These are durable enough for a few castings but damage easily. If these are your

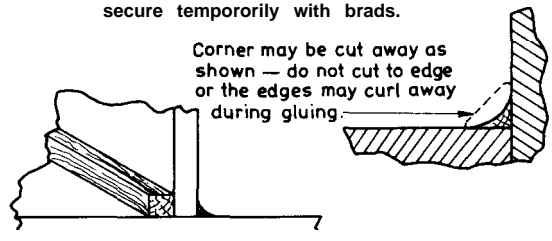


Tool for rubbing in wax fillets



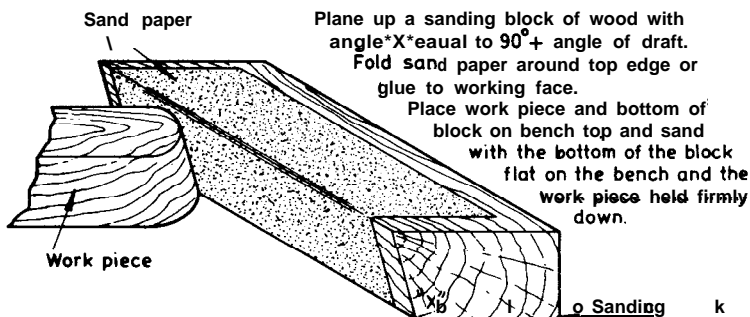
Tool for forming automobile body filler into fillet

Glue filler piece into corner and secure temporarily with brads.



METHOD OF FORMING WOODEN FILLETS.

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METHOD OF SANDING BY HAND TO MAINTAIN CORRECT ANGLE OF DRAFT

choice, give the pattern a coat of shellac and sand back the raised grain. Shellac takes about 15 mins. to dry. Place the piece of fillet in position and rub firmly into place with a spherical tool of the correct radius. (See sketch). A smidgen of light lubricating oil or neats foot oil on the tool will prevent the wax sticking to it.

Plastic wood or automobile body filler make very durable fillets, Which add to the strength of the pattern. They are messy to apply and require clean up after hardening. Plastic wood can be moulded in with a spherical tool wet with alcohol, (methylated spirits). Body filler can be roughly applied, then brought to shape with a piece of old hacksaw blade or similar tool, ground to the required radius. The tool is used as a strickle while the filler is still plastic. The technique requires a little practice. In either

case the material should be left to harden before final clean up. If you don't care for any of these methods, you could make wooden fillets. Glue pieces into each corner and cut back to radius with a suitable gouge or spoon gouge. This is not a difficult job if you are careful to choose each piece with the grain running coincidentally with the direction you are carving.

Once all fillets are in, the edges of the pattern should be hand sanded to a radius of about $\frac{1}{32}$ inch. Fill all nail holes flush. Apply at least three coats of shellac, sanding back any raised grain between coats. After the final coat rub down lightly with steel wool for a smooth finish.

This description has taken longer to write than the pattern would have taken to make. The object of all this verbiage was to point up the value of thinking the job completely through, the main point being to decide, often with the advice of your friendly foundryman, how the job will best be cast. Then produce a drawing of the pattern accurately to size, with draft and machining allowance, from which salient dimensions can be scaled. The foundry may choose to cast this plate in the cope, which would ensure sounder metal in each face. If so the pattern would still serve.

Continued

Below: Pattern Maker's chisels and gouges, with a 12 in. rule for comparison of size. Left: this photo shows the method of paring using a pattern maker's chisel. The chisel is controlled by holding the handle against the neck, and the job can be viewed while the paring is in progress.

