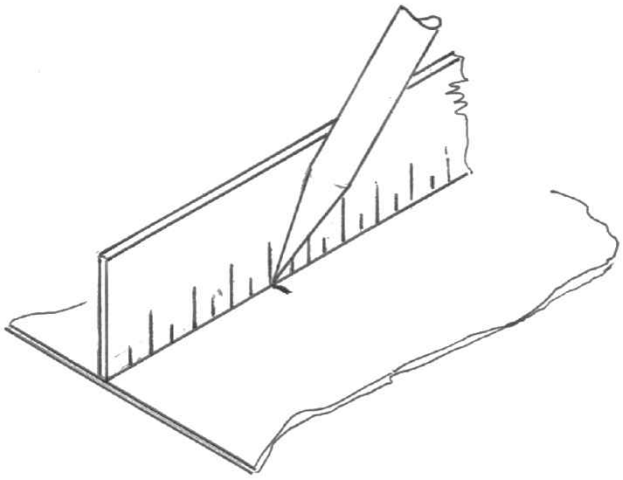
HINTS 'N TIPS

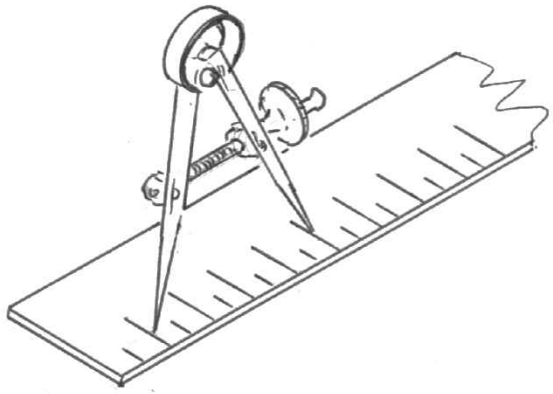
Bob Alderman ©2009

LITTLE THINGS TO HELP YOU ALONG

Basic marking out.



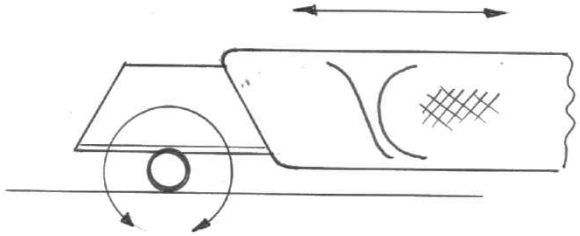
Always transfer a dimension mark from a rule with the scale against the surface to be marked. It will avoid parallax errors from the thickness of the rule.



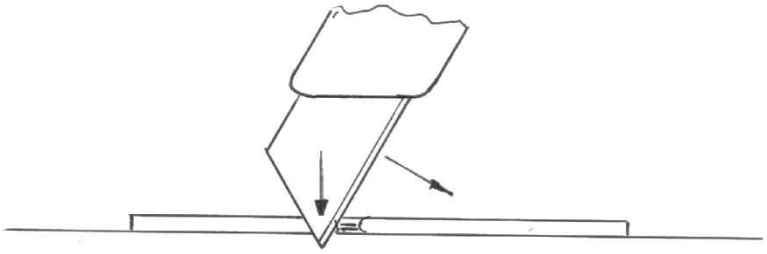
Take dimensions from the rule with dividers and transfer to a marked line.

Cutting

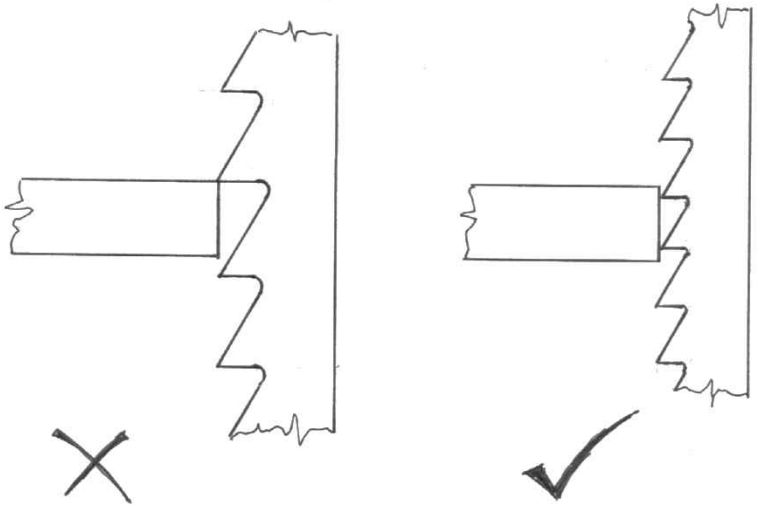
To cut tube roll it under a Stanley knife blade to create a groove then snap off on the groove.



If using a Stanley knife to cut etch tabs push the point into a soft(ish) surface next to the tab and then rotate to shear through the tab.

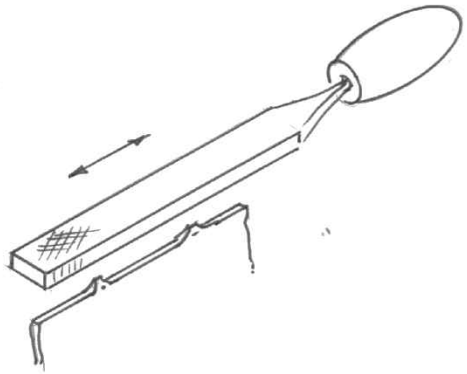


When using any saw on thin material ensure that at least two teeth are in contact with the edge.

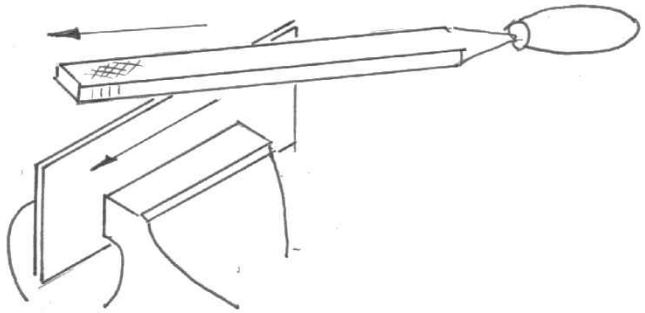


Filing

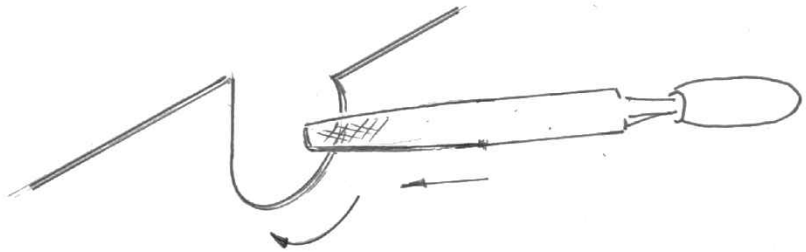
Use a large file, 6” fine cut to remove etch tabs and cusps. Use the edge of the metal to limit the depth of cut.



When filing the edge of a sheet, metal or plastic, move the file diagonally across the edge at the same time moving from right to left, or vice versa if left handed.

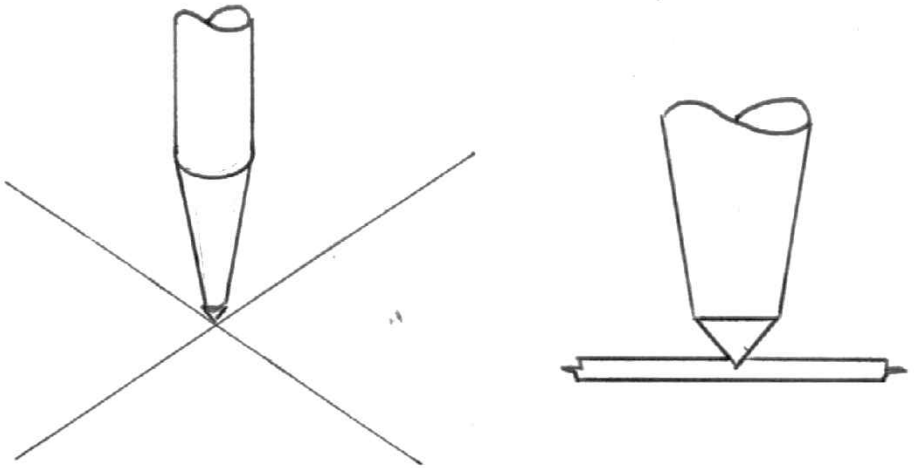


For a circular internal shape use a half round file in the same way, on the diagonal and along the edge.

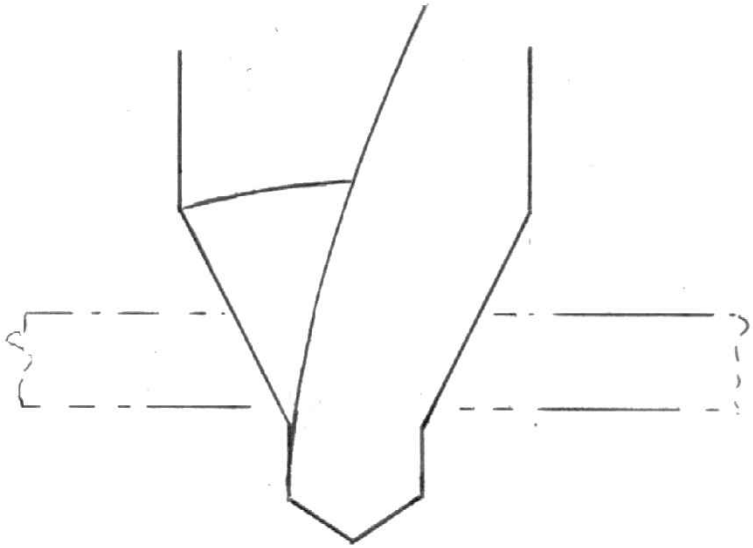


Holes.

Always centre pop the position of a hole. The dimple locates the drill point and should prevent it wandering.

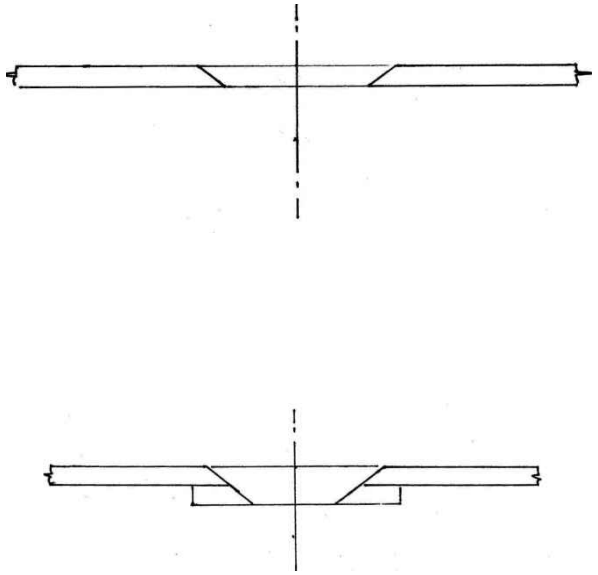


If drilling a large hole in thin sheet material then use a lathe centre drill. After starting the hole the taper progressively enlarges it. Finish with a broach or taper reamer.

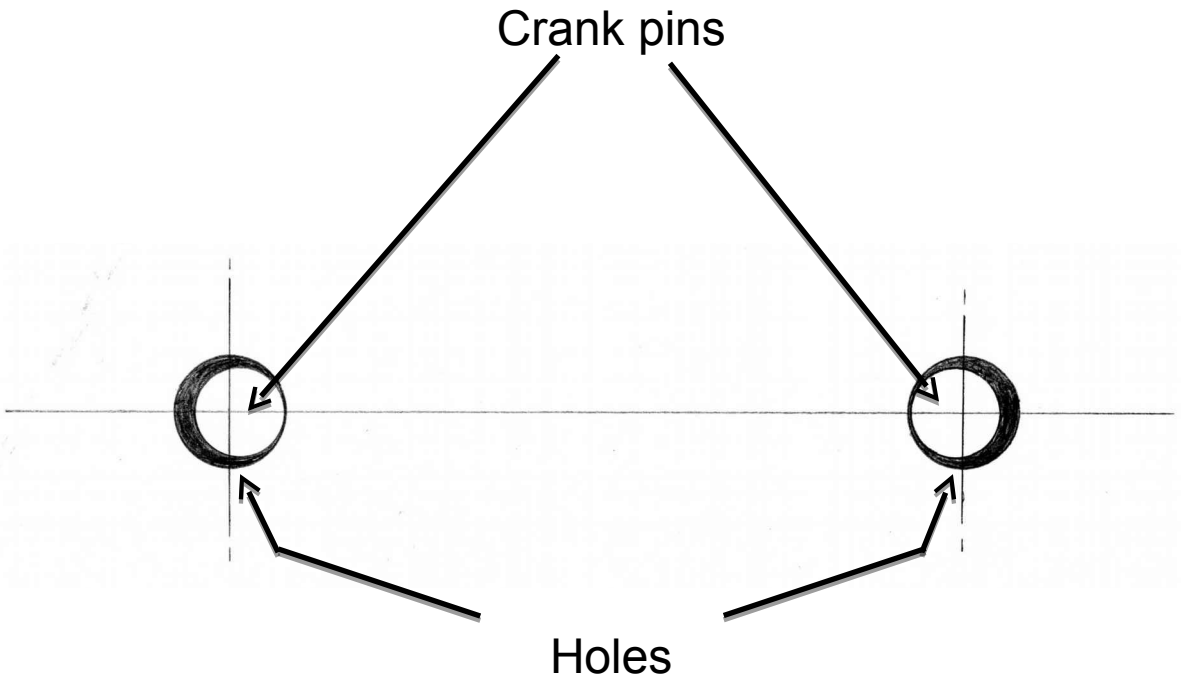


Holes.

Holes in thin metal cannot always support a countersink. Add a doubler to give more thickness.



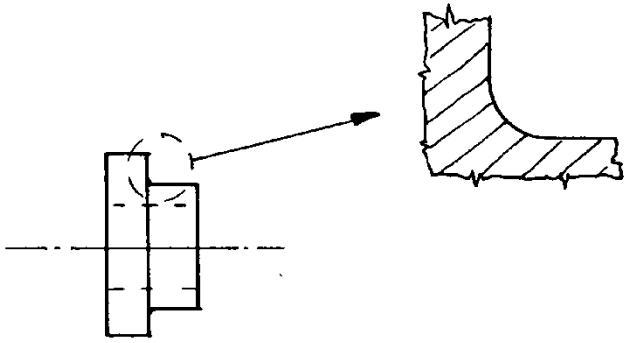
Holes in coupling rods. Are they on the same centres as the crank pins?



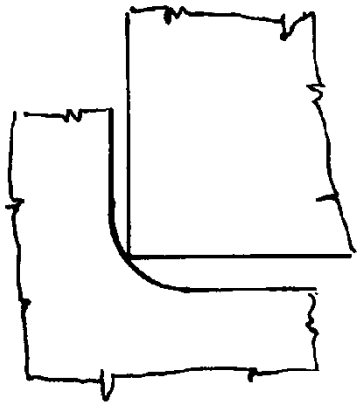
Close examination of the rod on the crankpin will show a dark crescent either outside, as above, or inside of the crankpin. This indicate whether the holes are too close together or too far apart. Only a few thou will show. Always enlarge the hole round DO NOT elongate.

Chamfers

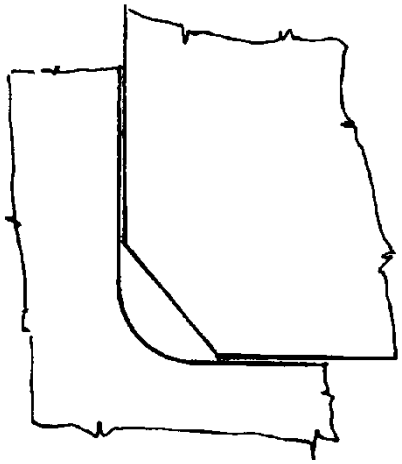
Turned items like axle bushes will always have a radius in the corner, large or small.



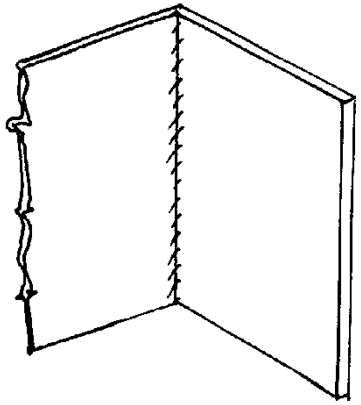
This will prevent the item properly seating in its hole

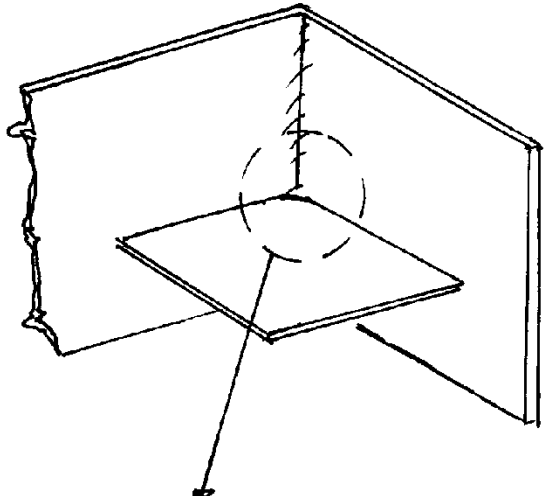


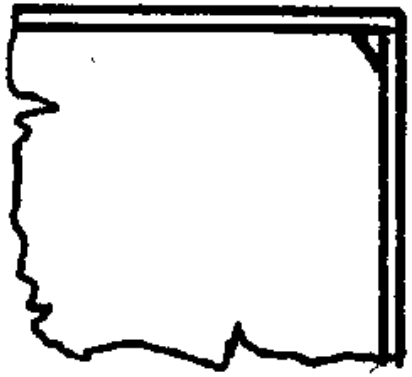
Break the edge of the hole with a chamfer this gives room for the radius. Use either countersinking tool or a drill at least 3x larger than the hole.



Chamfers

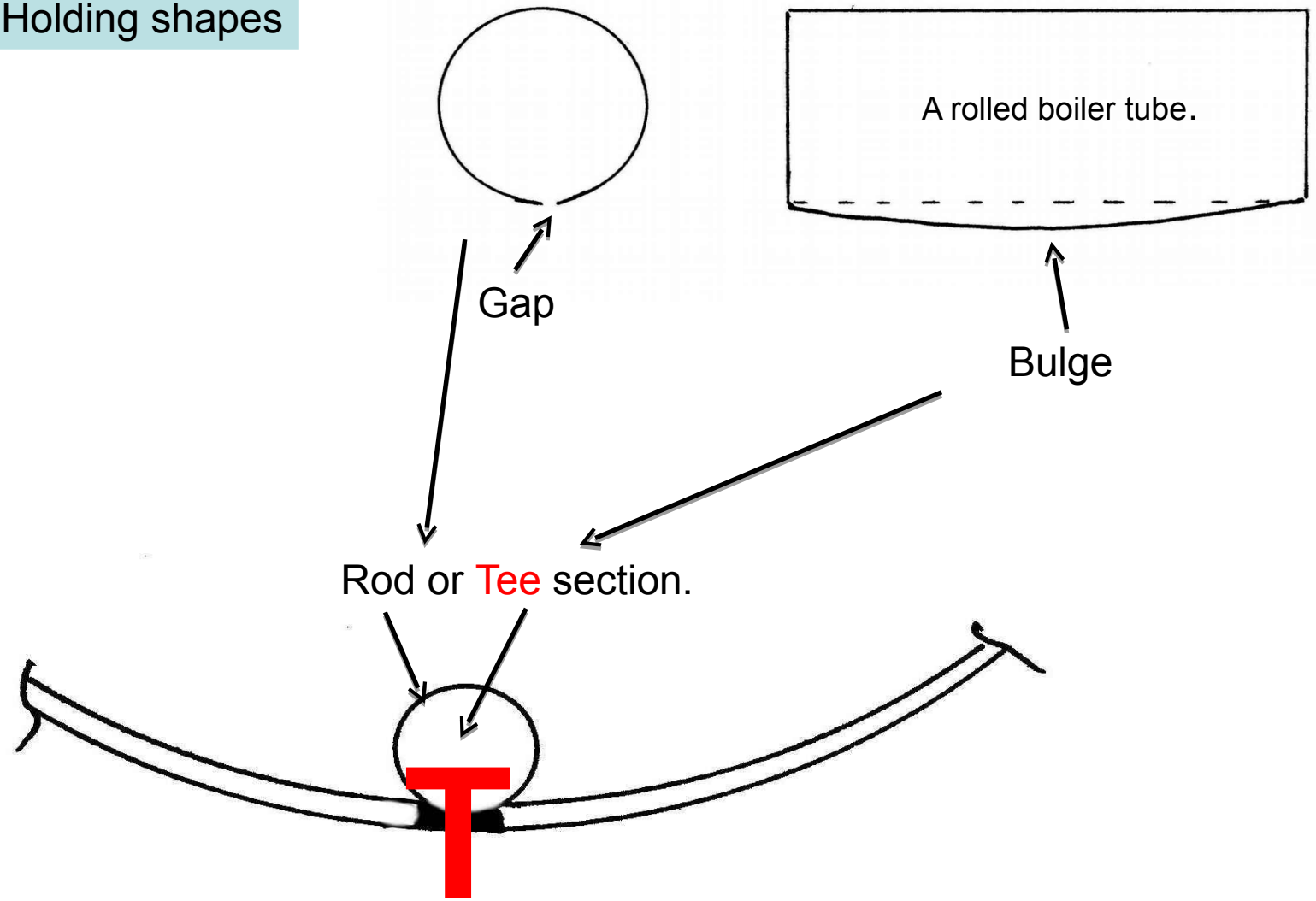






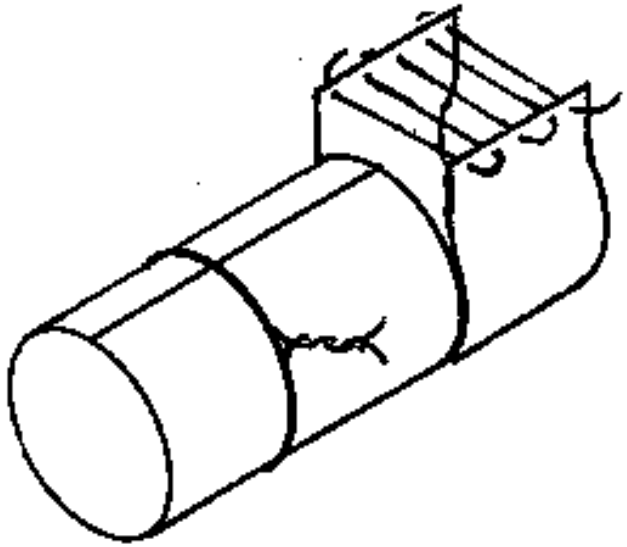
When fitting parts in thin sheet often a solder fillet will prevent a part sitting into a corner.
Break the corner of the part to allow it to sit neatly into the corner.

Holding shapes



Gap filling

Holding shapes

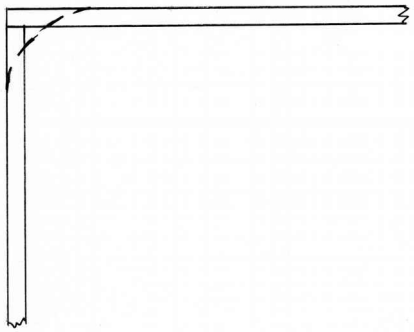


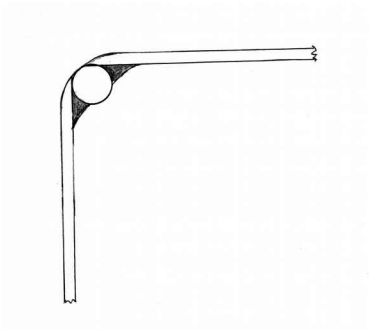
Stitch with soft iron wire (florist's wire)

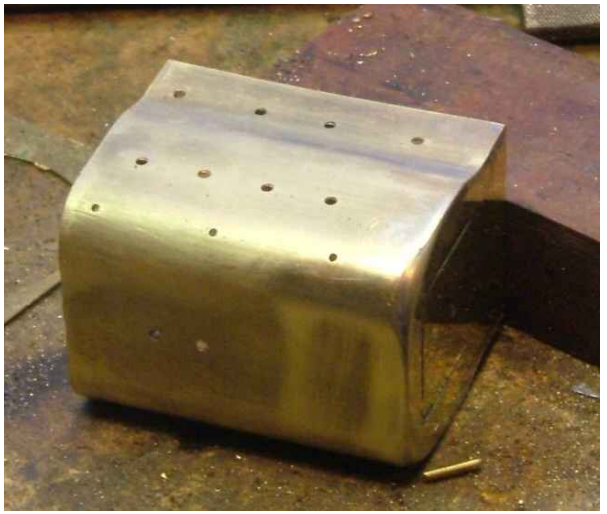
Locate a smoke box wrapper with a self tapping screw whilst forming the shape.

More gap filling

Firebox shoulders often need a larger radius than the thickness of the sheet will allow.
Add brass rod into the corner with a generous fillet of solder.
Form into a curve to match the profile of the front of the box.



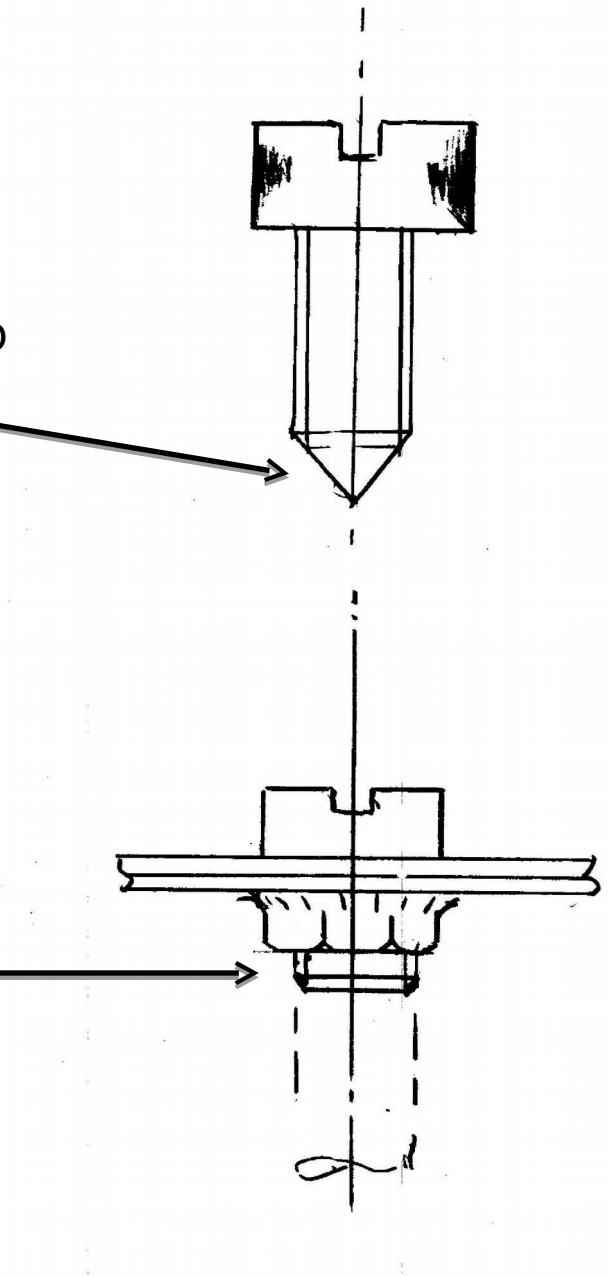




Chassis fixing screws

To help the screw enter a hole deep in the chassis add a point.

The screw only needs to be long enough to pass through the nut! Cut off the excess.



ANNEALING AND BENDING

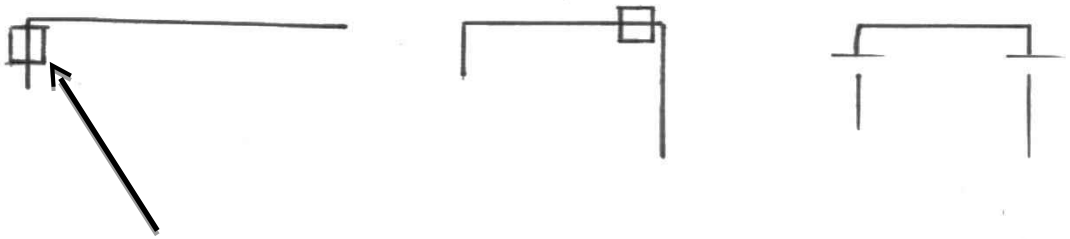
It’s not necessary to anneal the whole piece of brass, a heated stripe where the bend will be will do.

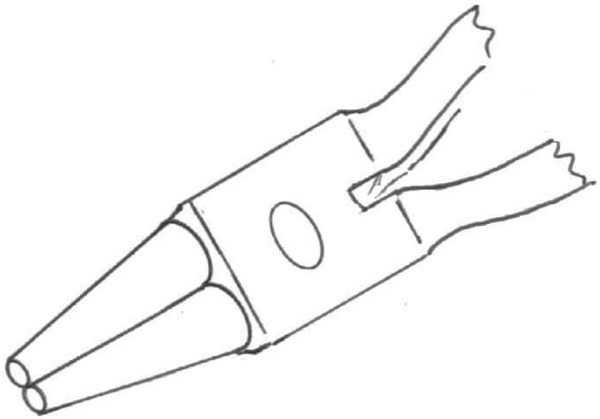
In the bending bars. Note the steel rod taped in place for a radius.

Radius formed.

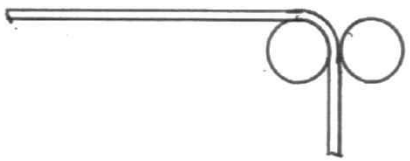
Bending wire

Flat nose pliers making right angle bends. If you leave one leg longer its easier to fit into the holes – one leg at a time.

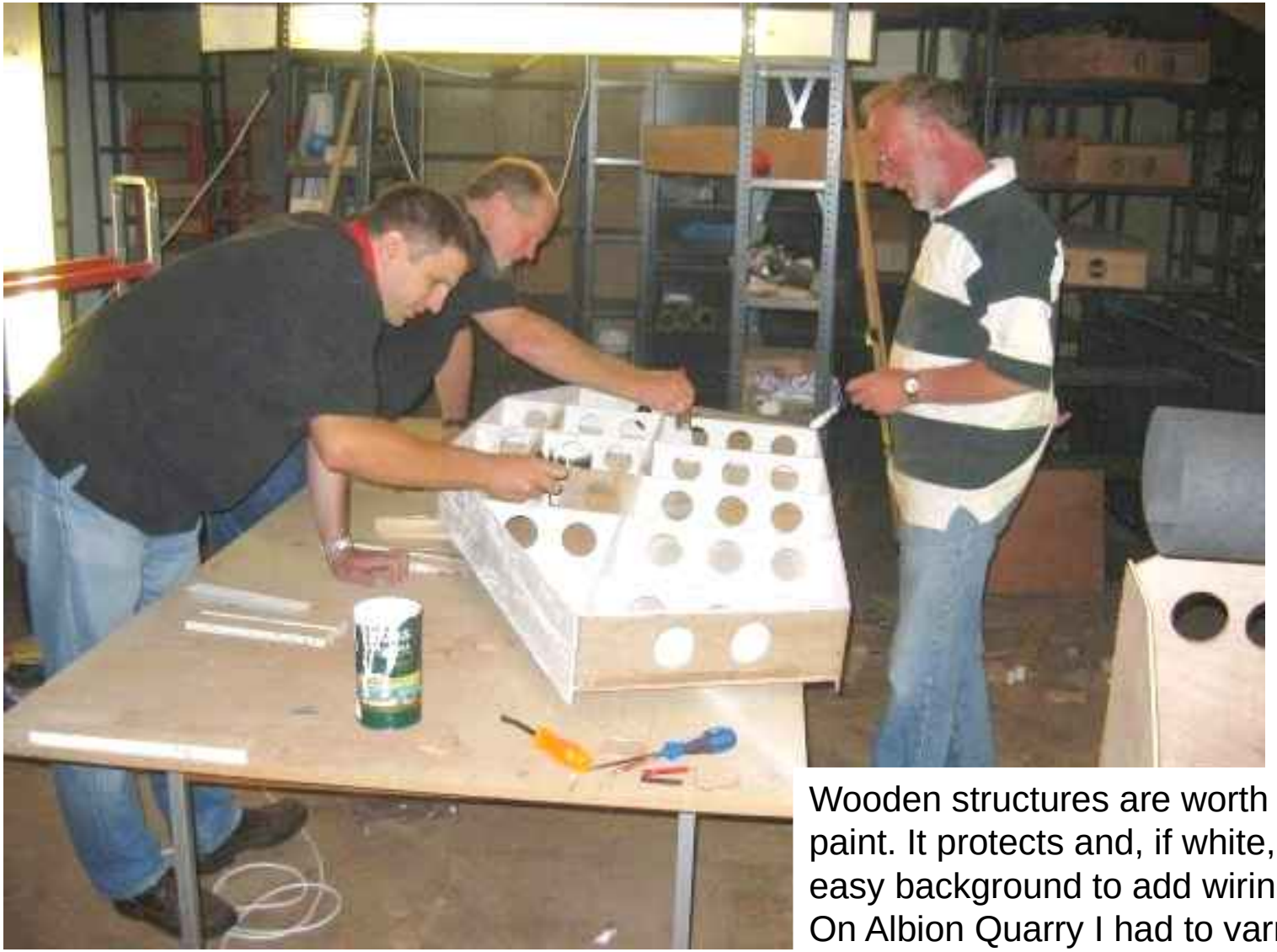




Round nose pliers for radiused corners.

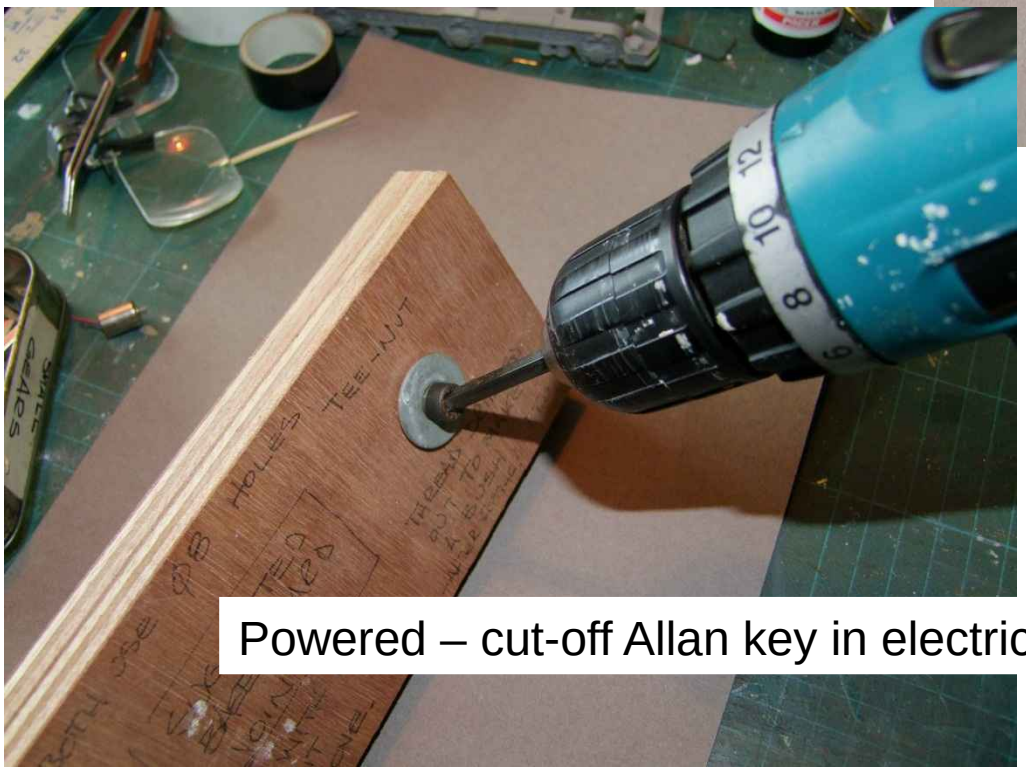


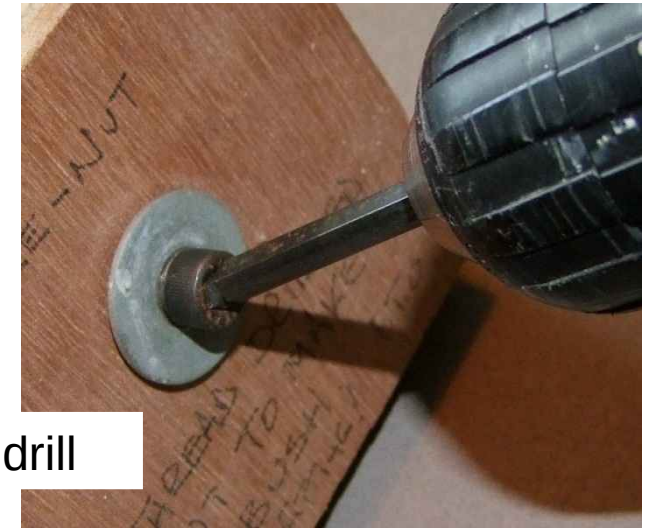
A bit on baseboards.



Wooden structures are worth a coat of paint. It protects and, if white, makes an easy background to add wiring etc. on. On Albion Quarry I had to varnish underneath after wiring – it was growing mould!

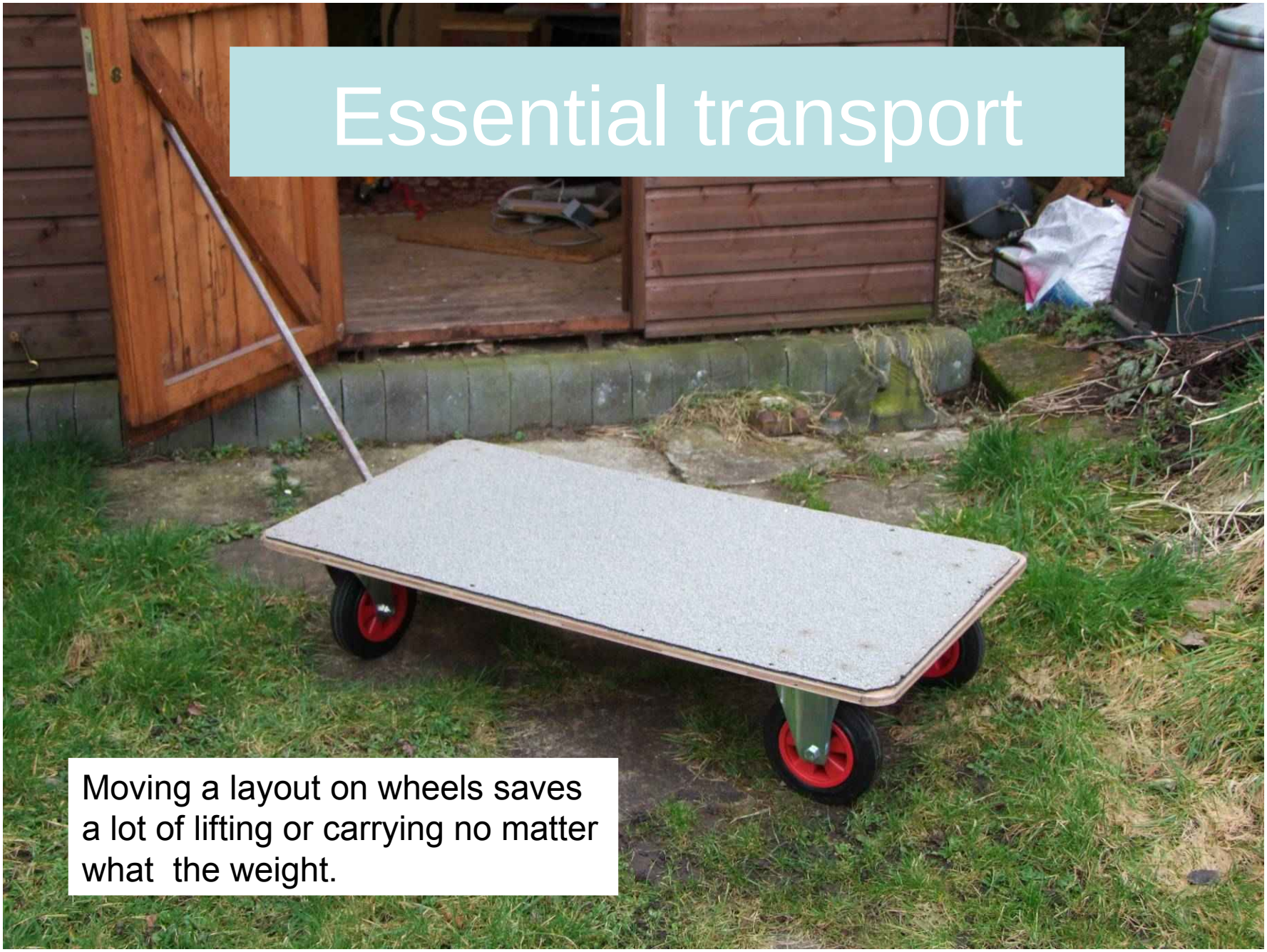
Joining base boards





I standardise on M6 Allan headed machine screws for **all** joints

Essential transport



Moving a layout on wheels saves a lot of lifting or carrying no matter what the weight.

Whatever you make do not end up handling it like this!

Assembling valve gear on the model

- This a step by step illustration of assembling Walschaerts etched valve gear as supplied for a Gladiator “Patriot”.
- The aim is to produce a set of sub-assemblies that can be made up as free units. They can be taken off whilst the cylinders and motion brackets are painted.
- If milled rods are used the same processes hold true.

Before starting

- Tools – Xuron cutters, files, cutting broaches, small drills, a small piece of mdf board.

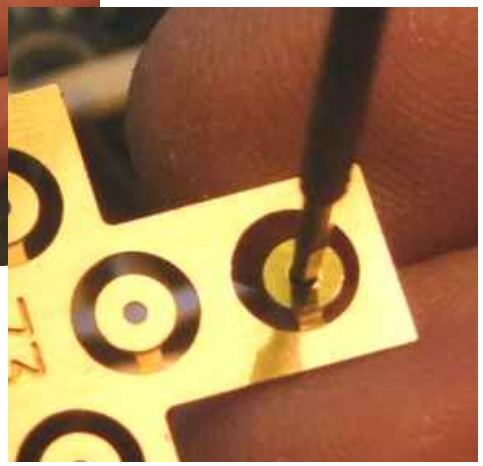
- Solder – 188, your favourite flux*, Carr's Solder Mask.

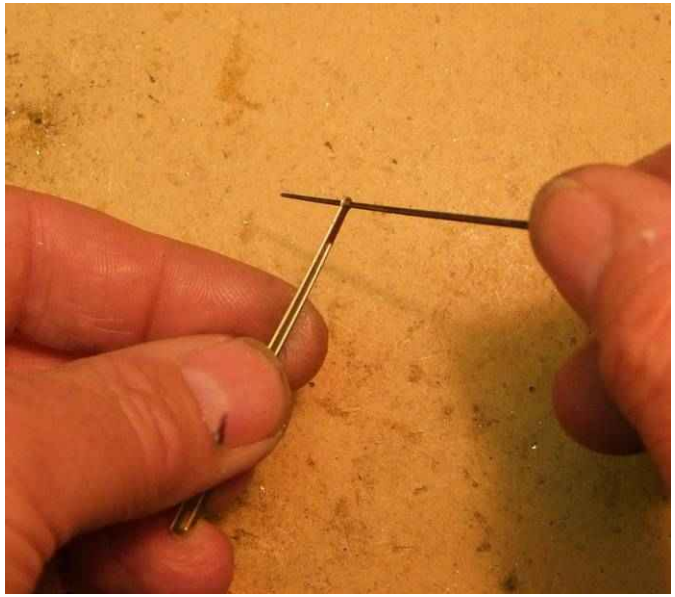
* *Paste flux has its advantages as it doesn't run.*

Using the tools and some other suggestions.

Opening up holes.

Try to do this with the part still attached to the fret; especially small components. Use a sharp drill but leave the final sizing to a cutting broach. This works in two ways especially if there is a small surround to a hole. It not only cuts the hole but also expands it.

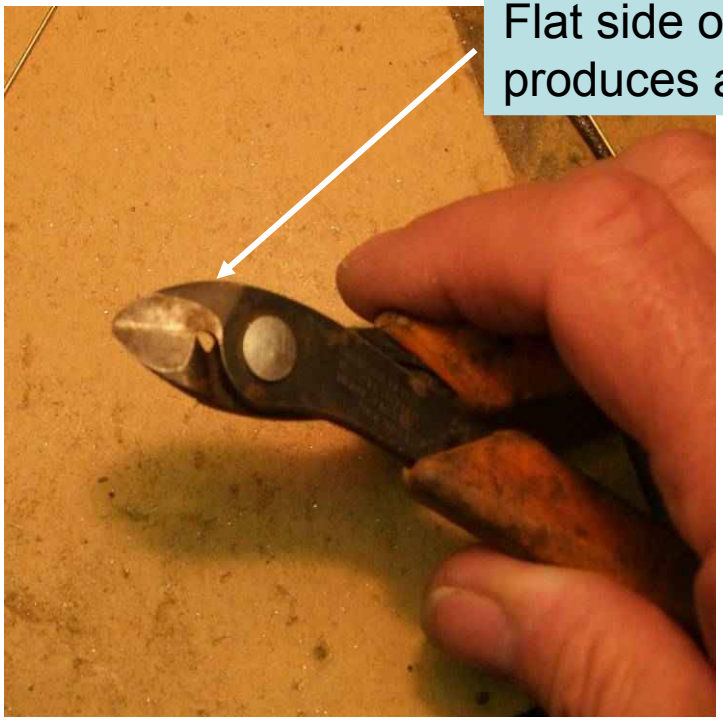




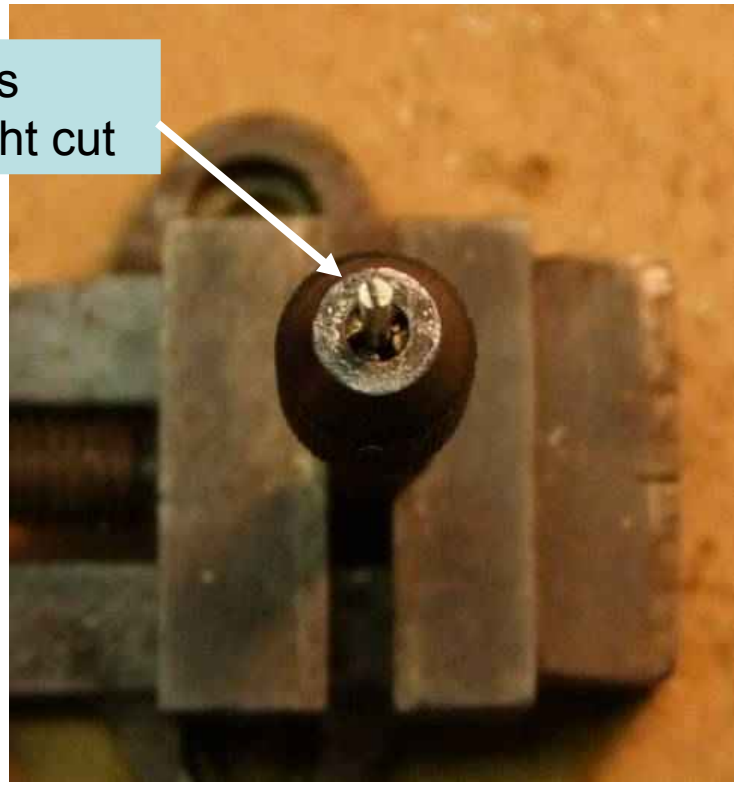
Using the tools and some other suggestions.

Trimming wire pivots.

Ideally use a Xuron cutter for this. This tool produces a cut that is square across the material. Use this feature to leave an end that requires minimal finishing.



Flat side of blades produces a straight cut

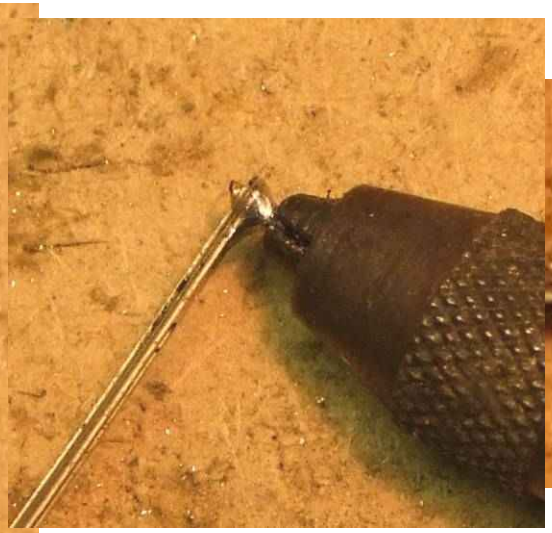


Using the tools and some other suggestions.

Sometimes when soldering a wire pivot an excessive fillet of solder can be formed. This can be removed by re-melting and flicking the solder off – YOUR RISK!

Alternatively it can be machined away with a pin vice.

Tighten the jaws onto the pin but not too tight. Rotate the pin vice on the pivot pin pressing down and it will machine away the excess solder.

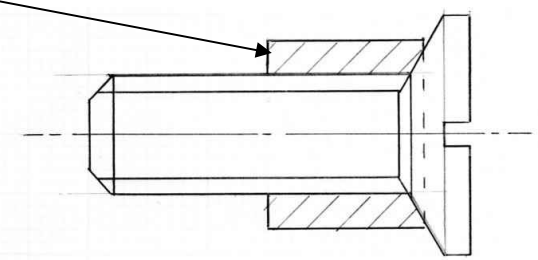


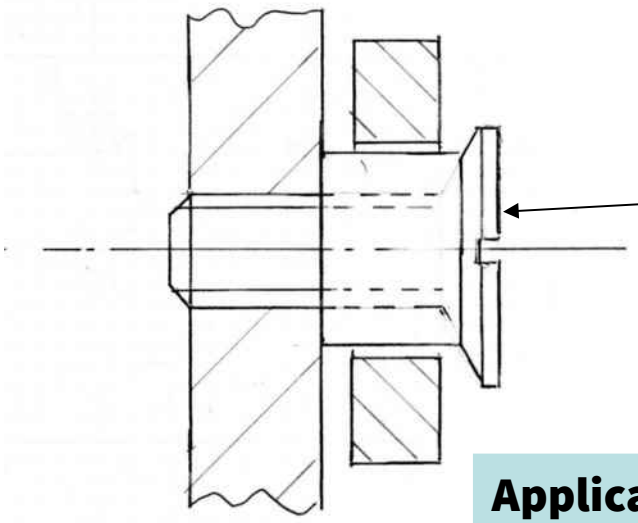
Using the tools and some other suggestions.

Shouldered screws are useful in several applications.

These can be made by sleeving brass tube over the screw of choice. The tube usually needs to be drilled to clear the thread. Tapping the tube to match the screw thread is not worth the effort!

Brass tube sleeved over the screw and soldered.





The shouldered screw can be tightened down leaving a rod free to run on the tube. This makes a joint that can be undone.

Applications- behind a crosshead, on a return crank etc.

Using the tools and some other suggestions.

At every step along the way

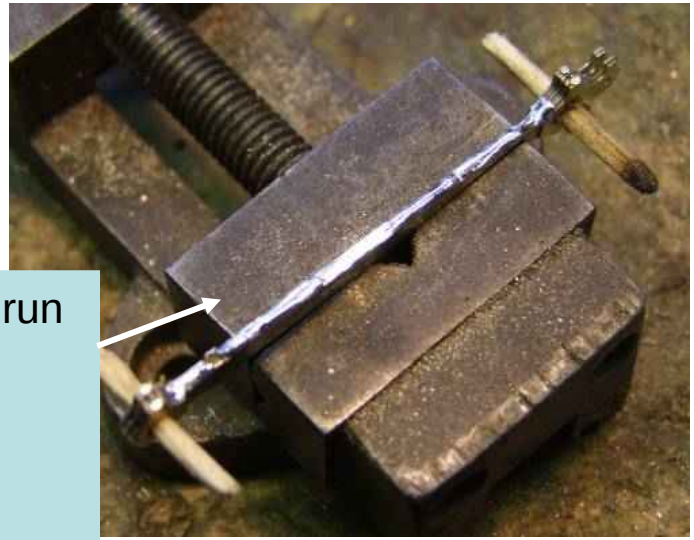
CLEAN THE COMPONENTS.

I wash the parts in hot water then scrub them with a kitchen cleaner called *“Barkeepers Friend”.* It is slightly abrasive and renders the surfaces matt. It washes away better than similar cleaners. It can be found with other domestic cleaners in most supermarkets.

Step 1

The chassis should be complete with wheels in place before starting on the valve gear.
Set up the axle centre based on the coupling rods using a jig or jury axles spaced from the rods.
Make up the rods by soldering the appropriate laminations together. The same applies for any of the motion components.

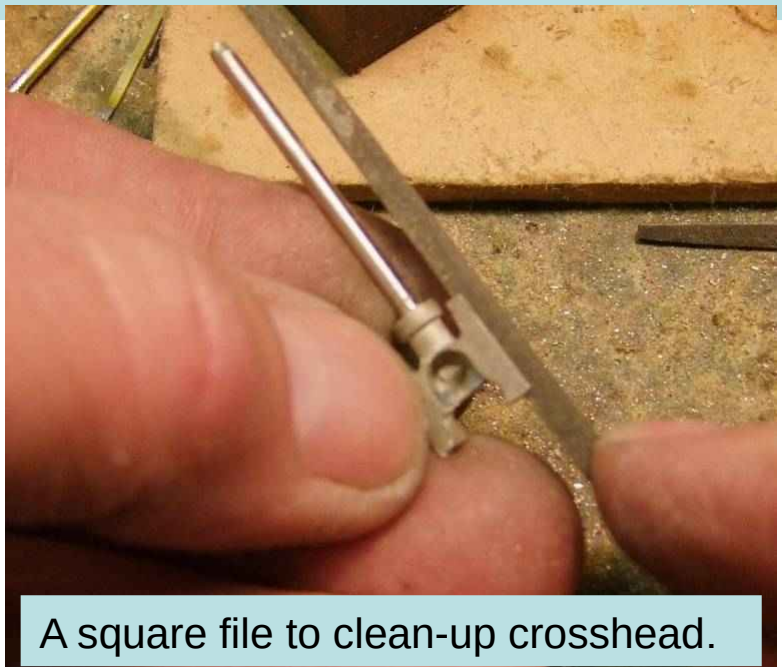
Two rod laminations pinched in the vice ends located with match sticks. Match sticks are good as they are soft and will fit the holes exactly when pushed in.



Laminations soldered together. Edge fluxed and solder run along edge.
Repeat both sides and run around the ends.
Clean off excess solder to make the edges square to the sides.

Step 2

Make up the cylinders ready to accept the slide bars.
Prepare the slide bars and crosshead. Clean up the slidebars filling the working faces; similarly the crosshead. Keep trying the crosshead in the slide bars. Ensure the slidebars are parallel and in plane one above the other. It helps to break the corners where the crosshead runs. The aim is to get the crosshead to slid freely in the slidebars. Ideally it should drop out under gravity.

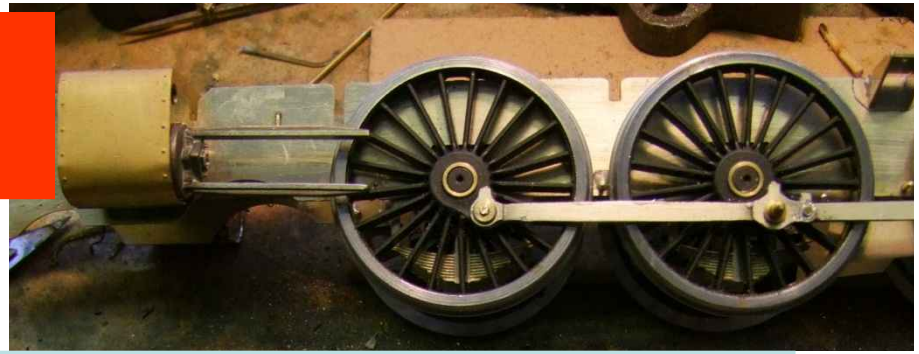


A square file to clean-up crosshead.

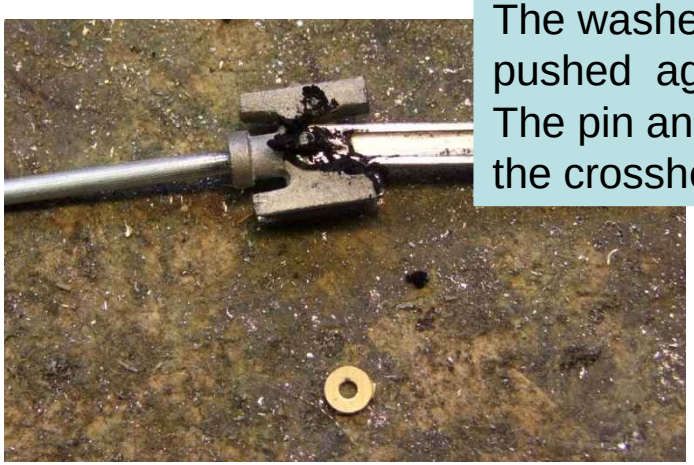
Use a triangular file to clean-up the slidebars. It's stiffer than a flat file so it will not round the running surfaces

Step 3

NOTE
THE DRIVING WHEELS ON THIS CHASSIS USES 10BA TAPPED CRANKPIN BUSHES

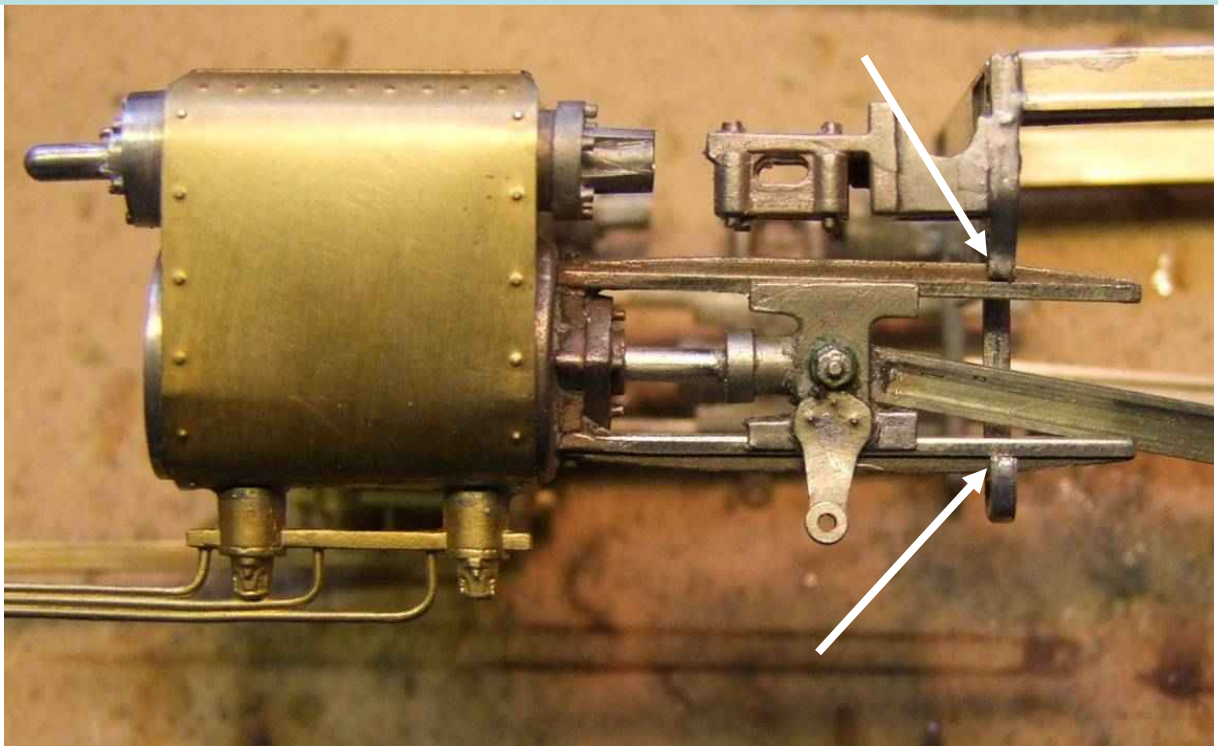


Assembling the Small end.
The pin on the crosshead and hole in the rod are coated with Carr's Solder resist.
The etched washer added and soldered in position.
The washer can float on the solder so needs to be pushed against the rod.
The pin and solder fillet are filed flush to the back of the crosshead.



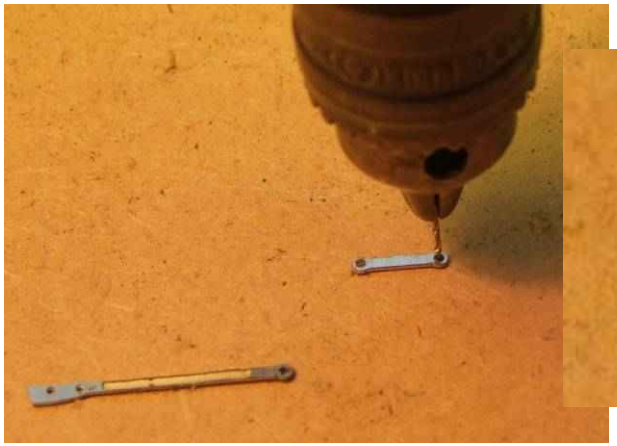
Step 4

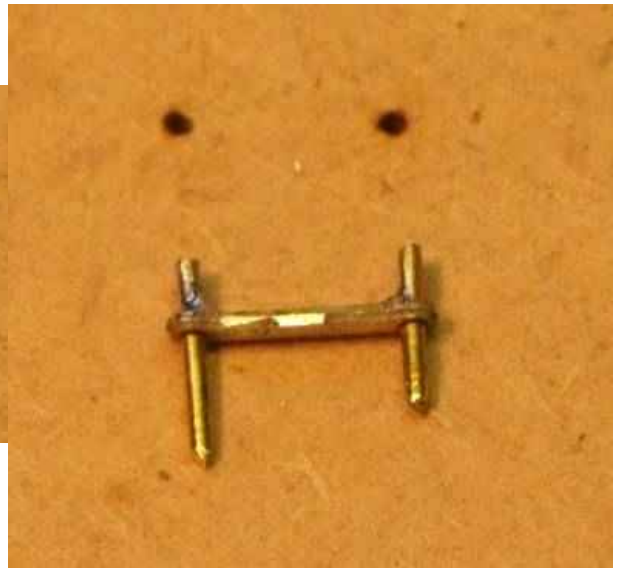
With the Drop Link fitted check the Crosshead fit into the Slidebar/Motion bracket assembly. Solder may have to be removed from the inside to allow the cross head to pass. A coarse fretsaw blade works well; a blade alone manipulated with fingers. And perhaps a little material from the end of the lower part of the motion bracket.



Step 5

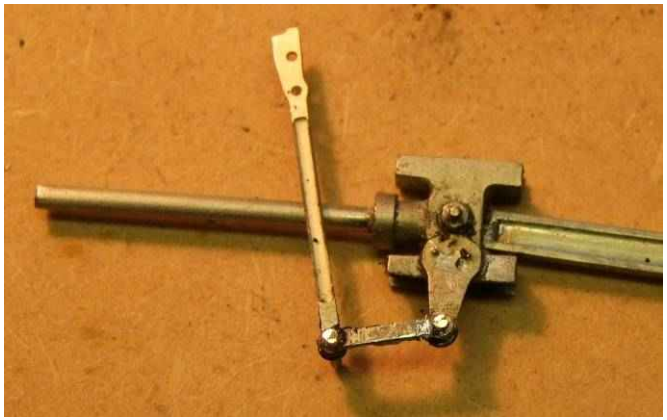
Add the Drop link to the crosshead. Check the crosshead still runs freely in the crosshead. Assemble the Anchor Link (horizontal below the crosshead) and then the Combination Lever (vertical ahead of the crosshead).
First fit pins from 0.9mm wire into the Anchor link. Place the link onto a piece of mdf and drill through both holes, without moving the link, into the mdf. Push a short length of wire through the link into the mdf. It's supported in the mdf..
Solder to the link. Remove and trim the outside face with the wire nearly flush to the link.





Step 5 continued

Fit the Anchor link to the Combination Lever followed by the Drop link. Coat the pins with Carr's Solder resist. Fit the wire into the Combination Lever adding more solder resist if necessary. Fit the etched washer over the wire, flux and solder. Push the washer tight if necessary The resulting joint should be free to turn. Initial stiffness can often disappear if the joint is exercised several times. Repeat for the Drop Link . Note there is a “way round” for the lever with reference to the oil boxes at the top. The off- centre one should be to the front. Trim the wire and solder filed flush to the washer.



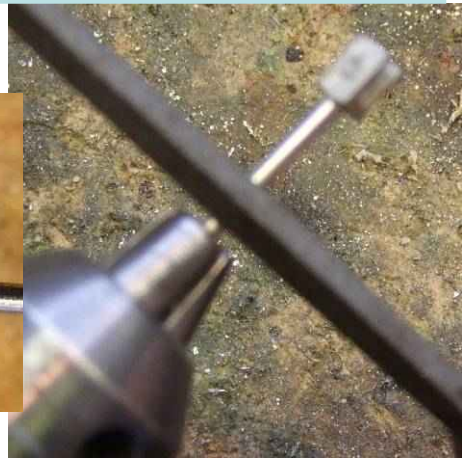
Step 6

Preparation of the valve spindle

The Valve spindle has to run freely in the Valve chest gland and in the motion bracket slide bars.

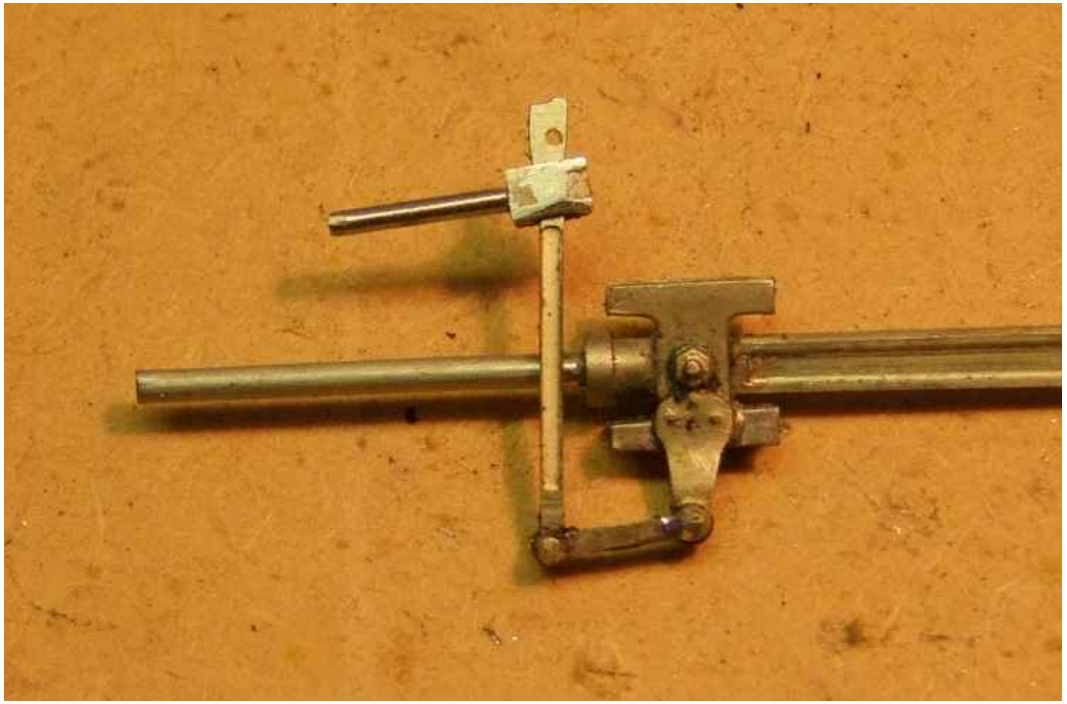
The glands are drilled 0,25 mm oversize to the spindle. The spindle is smoothed and rounded by spinning in the drill and applying a file to the spindle AND AGAINST the chuck. Do it in stages increasing the overhang from the chuck.

The slide bar parts are filed so that they are a free running fit. Both parts will need attention.



Step 6 continued

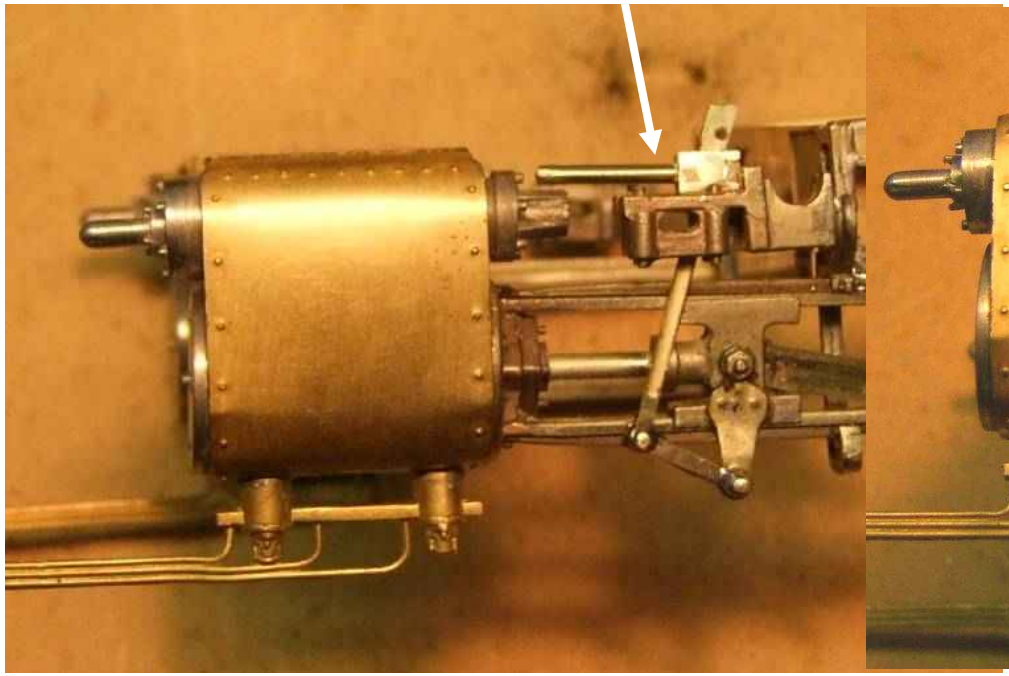
The Valve Spindle is joined to the Combination Lever by pinning through the spindle crosshead. It only needs to be soldered on the inside face.
Ensure the pin is flush on both surfaces.
Note the both Valve Spindle and Piston Rod have been shortened to fit the cylinder assembly.

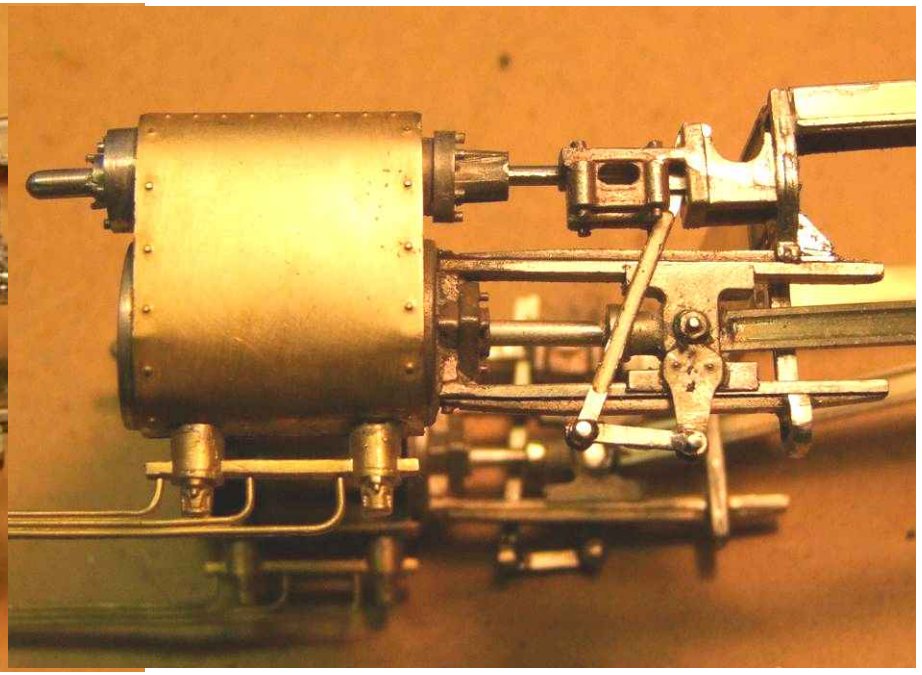


Step 7

Fitting the Cross Head assembly

Fit the crosshead into the slidebars, feed the Combination lever into the Valve spindle crosshead. With the valve spindle at the back of the motion bracket crosshead the end of spindle should be just ahead of the valve gland. Pull the spindle further back , allow it to drop and then insert the spindle into the gland.





Step 8

Assembling the Radius rod, Expansion link and Eccentric rod.

Most kit assemble these items in Mid gear, the expansion link simply rocking driven by the Eccentric rod and imparting no motion to the Radius rod. However some kits provide parts where they can be assembled in gear, usually forward.

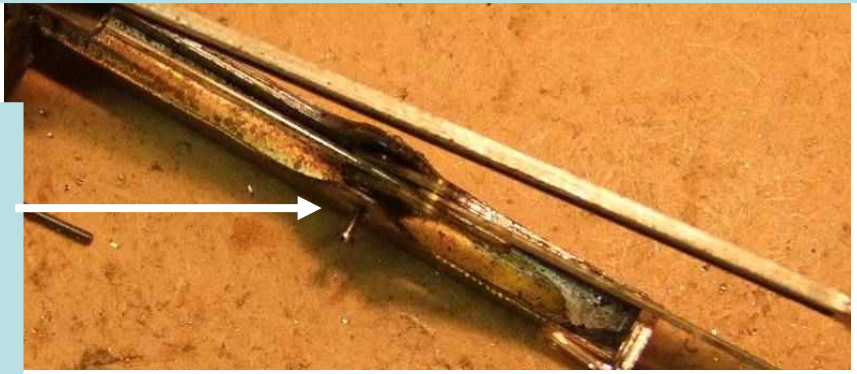
The Radius rod and Expansion link in this kit had relatively large holes for the link to swing on. This lends itself to fitting a tube as the pivot. A bolt can then be fitted into the tube to fix the pivot. The eccentric rod is fitted to the bottom of the link. As it is a yoke it only needs soldering on the inside. A “long” pin, about 3mm, is fitted into the end of the Radius rod to fit the top hole of the Combination lever.

Step 8

The Combination lever pivots on the Motion bracket. Soldering a nut onto the bracket provides a means of fixing the screw. The nut is soldered, in this case, to the inside leg of the bracket.

A cover plate is soldered on the outside of the bracket over the hole used by the screw locating the nut when soldering it place. This hole becomes a recess for the end of the fixing screw when fitting the assembly.

Screw inserted from inside, through the nut and tightened onto the outside leg. Careful trimming of the screw required here.



Step 9

The Return crank.
The parts are laminated and a 10 BA tapped crankpin bush soldered to the end.
This is the main reason why I choose to use 10 BA screws on the crank pins. These provide a secure fixing for the return crank.

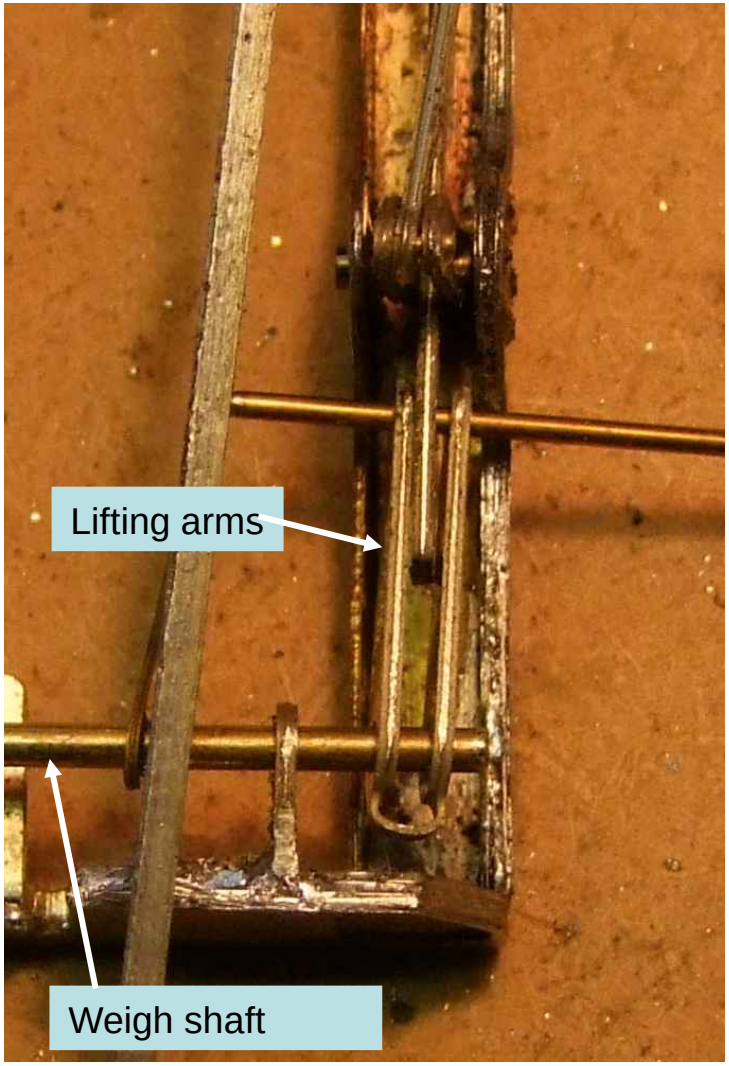
The bush can be floated into position on molten solder. The surface tension tends to centralise it.

Step 10

A shouldered screw attaches the Eccentric rod to the return crank. In this instance it is a 12 BA screw with crank tapped to suit. Trim the screw flush at the rear of the crank.

Step 11

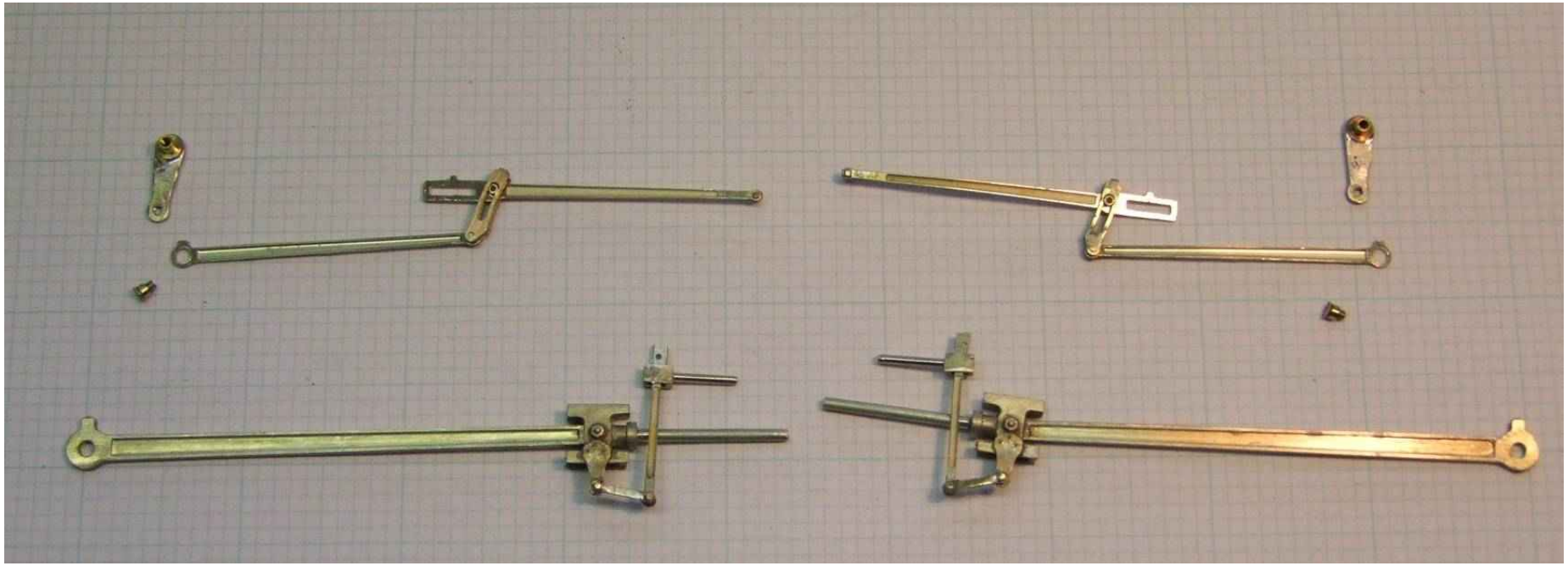
Weigh Shaft and reverser Lifting arms.
The Expansion link is fitted temporarily.
The weigh shaft rod is inserted locating the lifting arms.
These are a pair linked with a half etch web. A second rod is passed through the lifting arm end and through the slot in the Eccentric rod. When happy with the position of the arms solder them to the weigh shaft alone. Remove the second rod and Expansion link. Reinsert the rod so that it spans about ¾ of the gap in the end of the arm and solder to the outside arm. On re-assembly the slot in the Eccentric rod is sprung into the gap.
Trim the weigh shaft where it fits to the chassis



Step 12

Putting it all together.

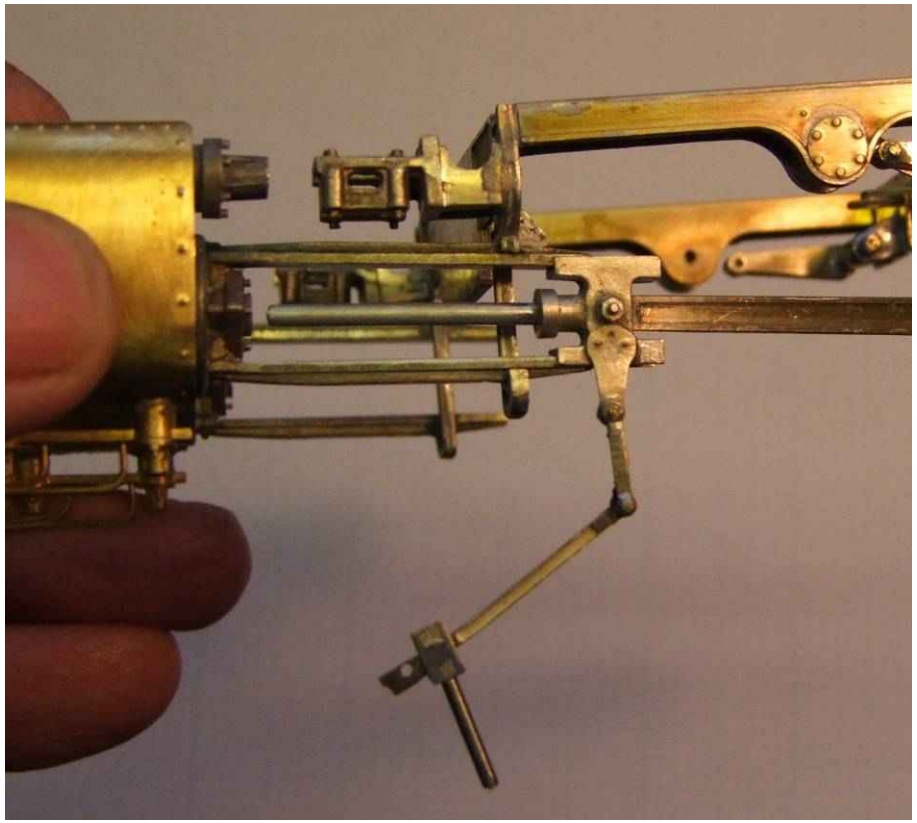
All the parts assembled



Step 12 continued

Putting it all together.

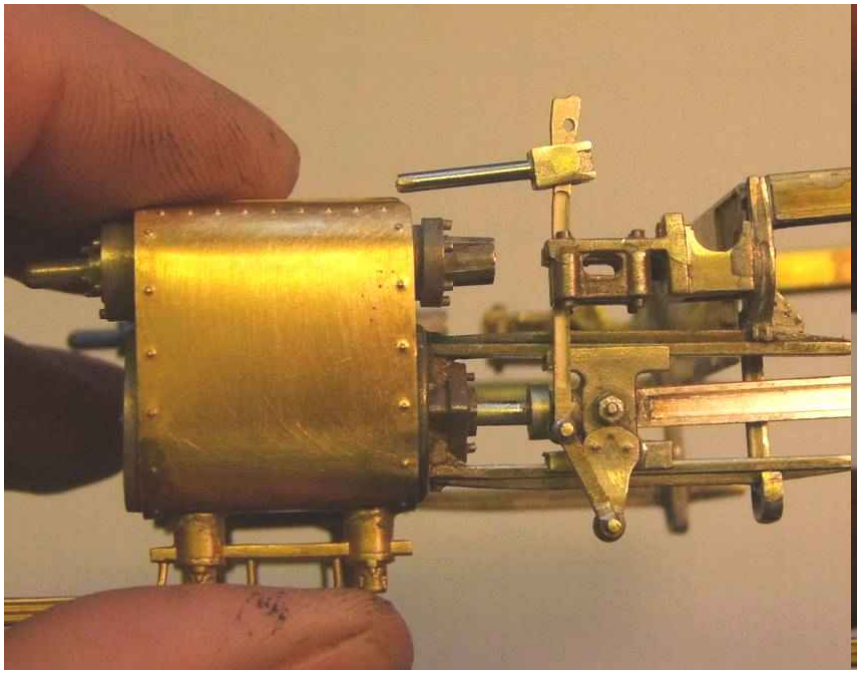
The Crosshead .

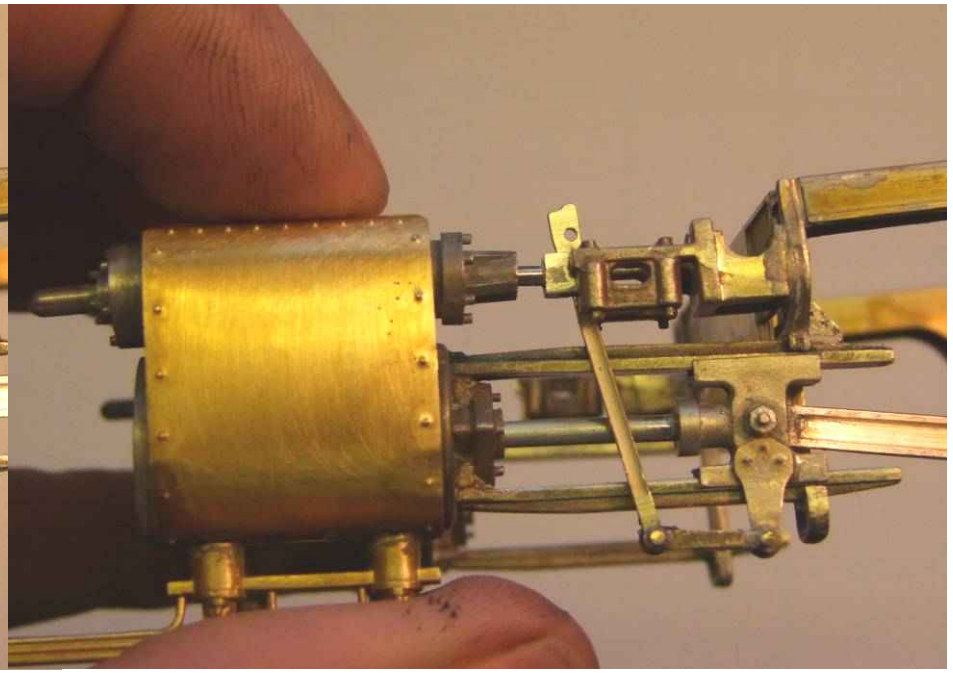


Step 12 continued

Putting it all together.

The Valve spindle

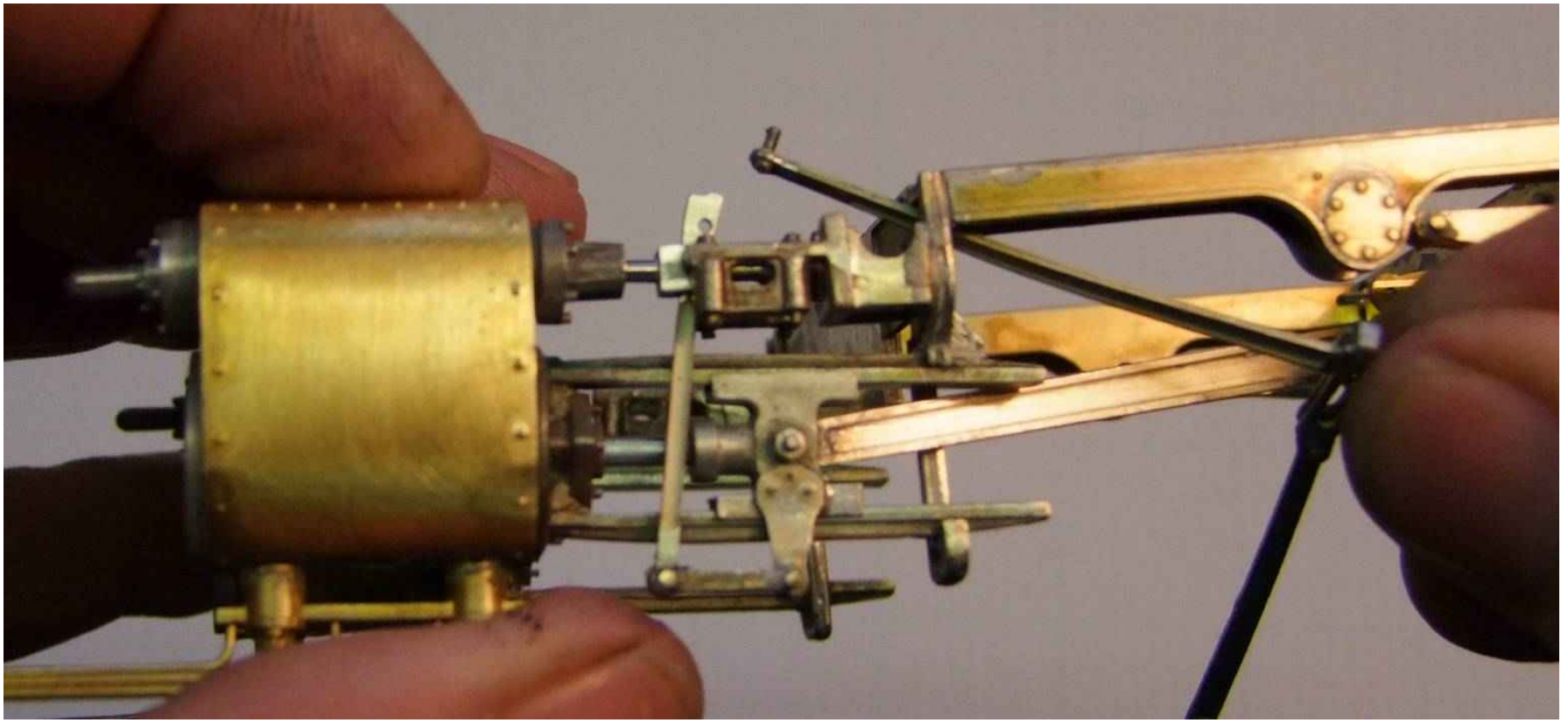




Step 12 continued

Putting it all together.

The Radius rod.

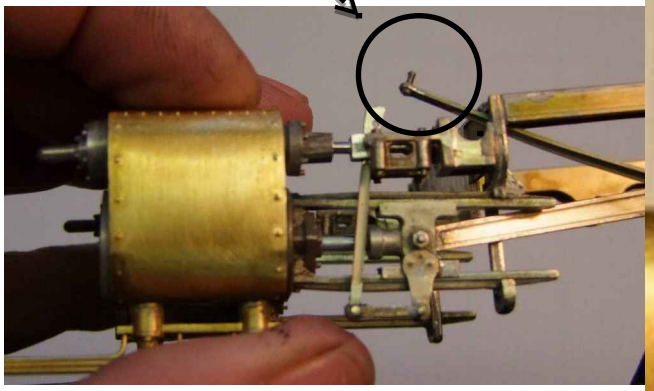


Step 12 continued

Putting it all together.

The Radius rod.

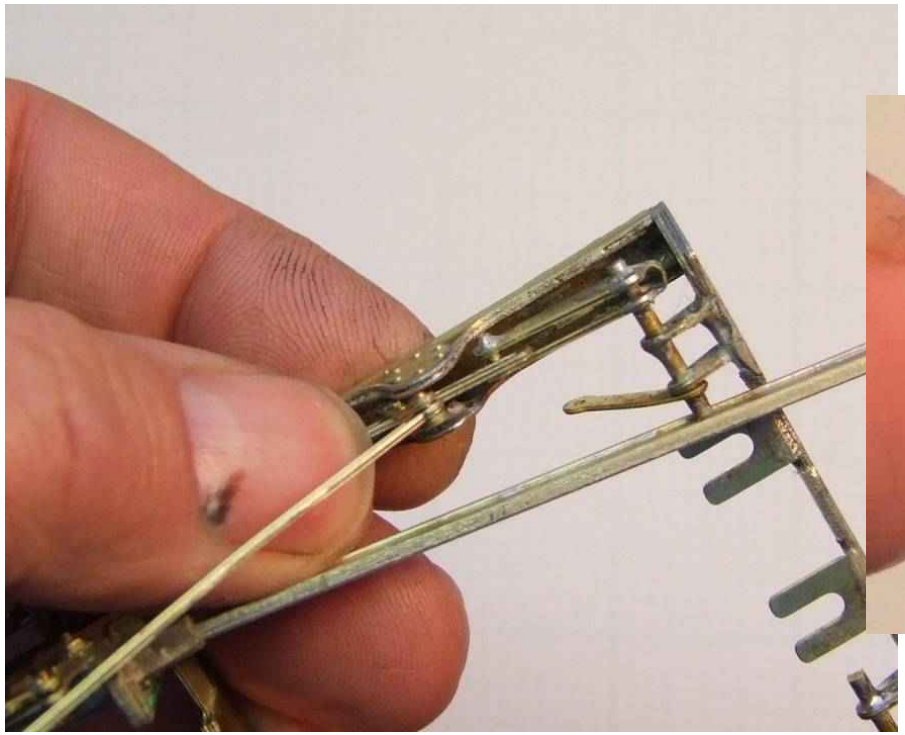
Note long pin.

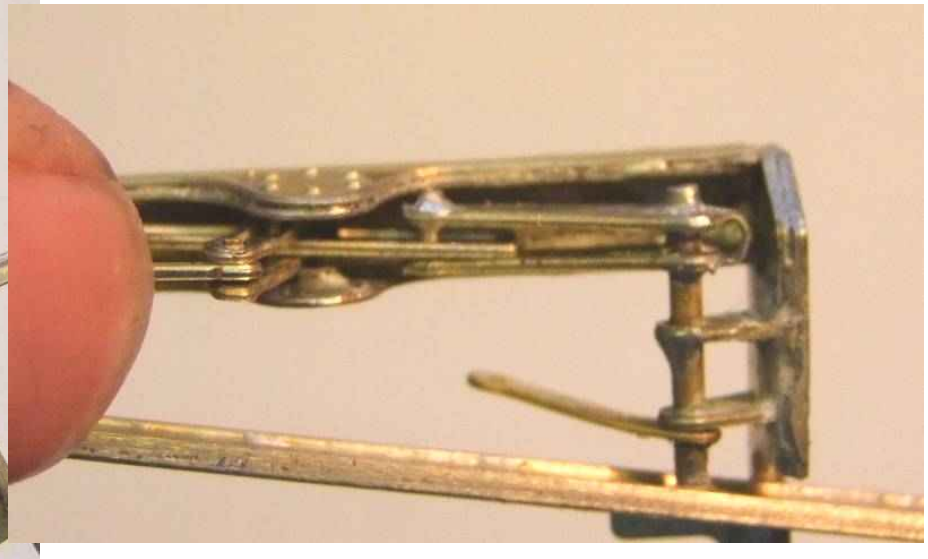


Step 12 continued

Putting it all together.

The Radius rod.

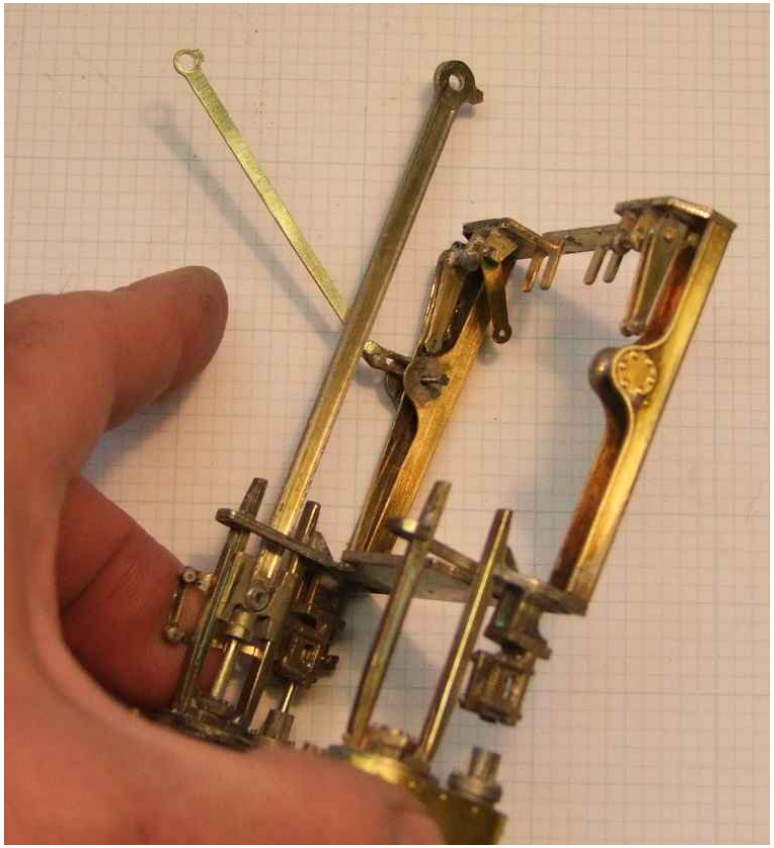




Step 12 continued

Putting it all together.

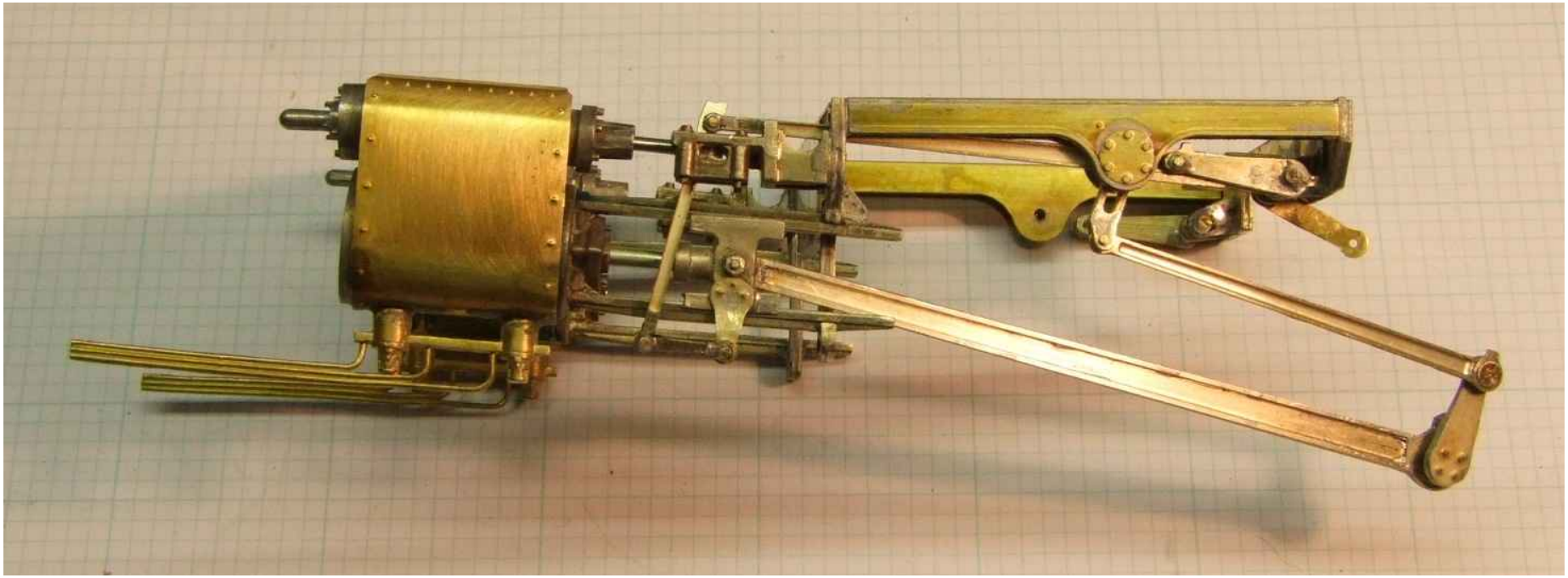
The Expansion link



Step 12 continued

Putting it all together.

The complete assembly

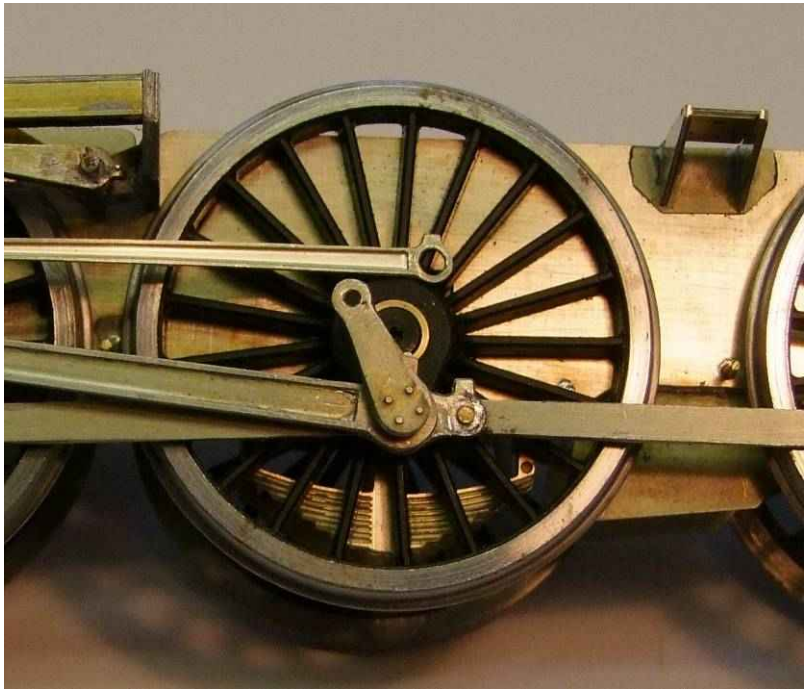


Putting it all together.

…. ***but it's not yet finished!***

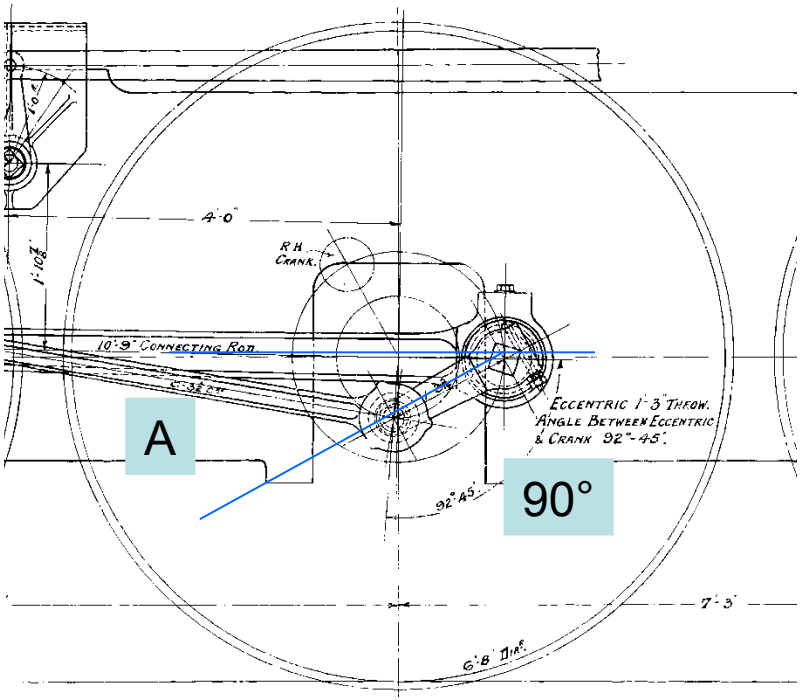
Step 13

Setting the Return crank.
This item seems to create the most unhappiness in the construction of Walschaerts valve gear.
Using the threaded bushes relieves most of the difficulties.

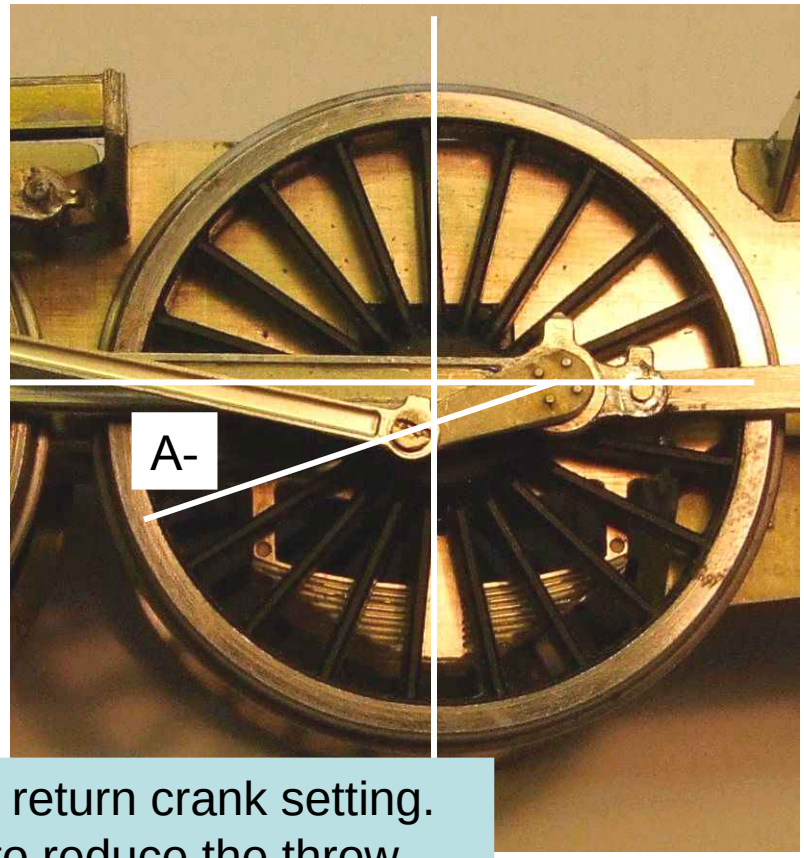


The crank pin screw is cut to length equal to two bushes back to back plus a little. An inner bush provides the bearing for the coupling rod and locks the screw; the one on the crank the bearing for the connecting rod. Without the Eccentric link attached the crank can be fitted to the screw. The crank should tighten onto the inner bush in the position shown. If too early then remove a little material from the end of the screw.

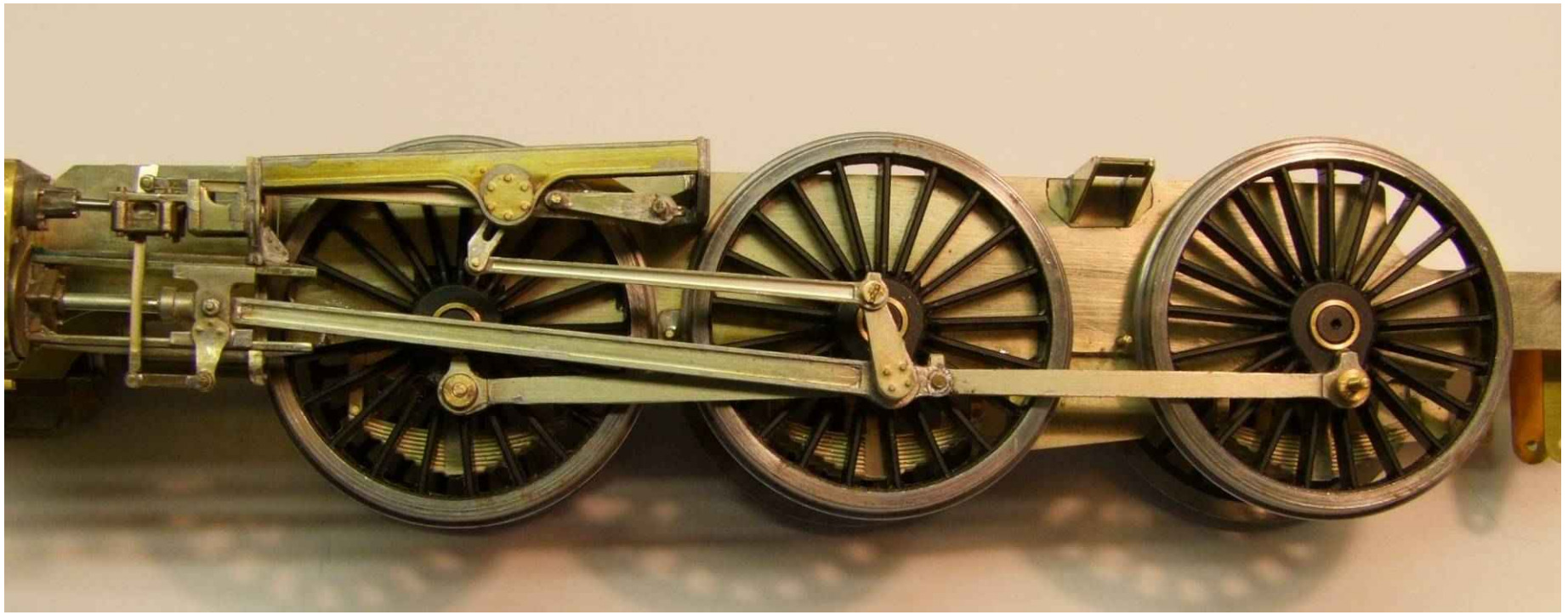
Step 13 continued



A



The left hand illustration shows a prototypical return crank setting. For a model I tend to increase the 90° angle to reduce the throw. Therefore the angle “A-” is around 30°.



FINISHED

If each step has been made free running then, when all together, it still should be!