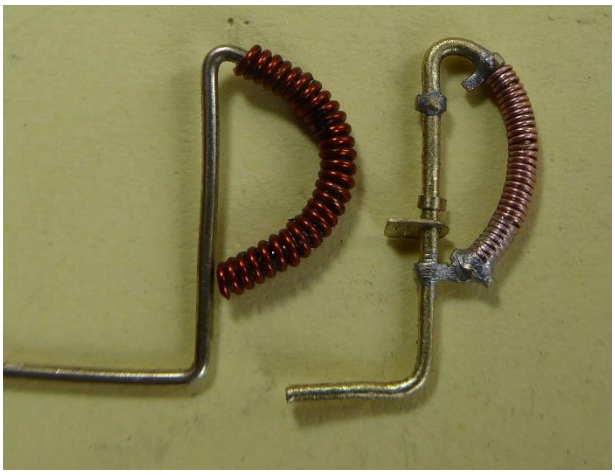
# ‘S&DJR Avonside 0-4-4T No.31 – Some More Finishing Details, Part 2’.

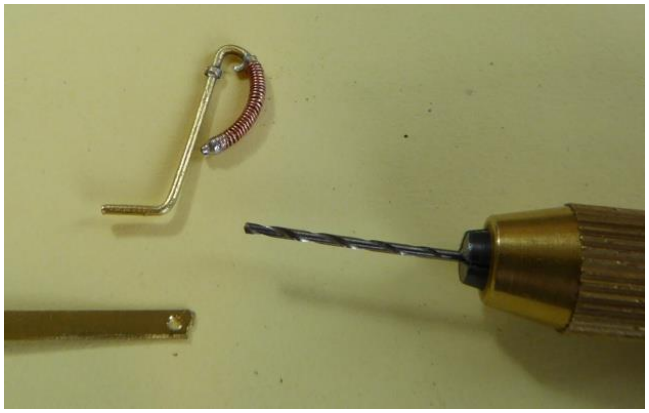
## Vacuum pipes, upgrade



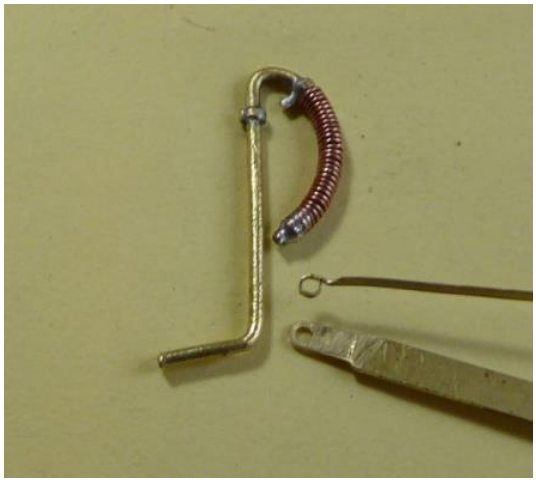
Over the last couple of decades, I have had numerous run-ins with vacuum pipes, and conclude that they are something of a poor relation in model terms – despite their highly prominent position in that all-critical front-end view. Whitemetal castings may bear good detail, but are rather delicate; brass castings are beefier, but harder to modify without leaving evidence. I now tend to use the above type of relatively basic trade offering, as they offer a simple yet strong foundation for adding extra detail.

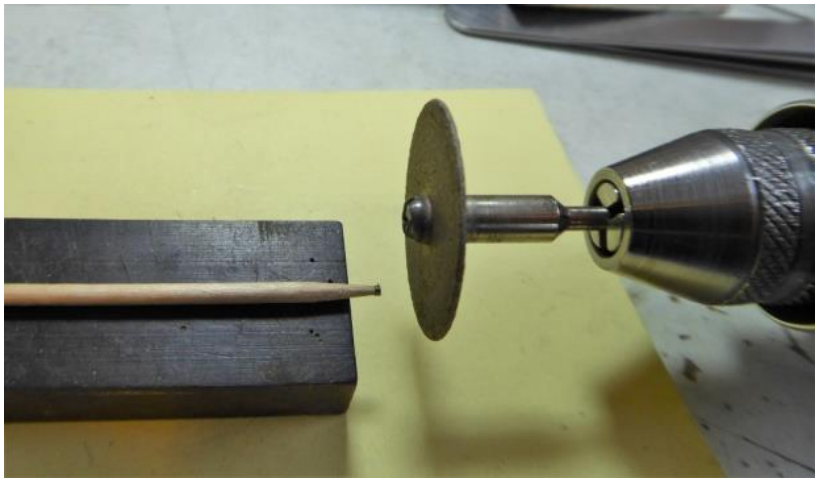
On the left, a ‘before’ and ‘after’ comparison of how I tackled the Avonside vac pipe hose fittings – I used the basic brass up-stand shape, which closely matched the desired outline, but discarded the over-heavy ‘hose’ section. Note that the modified version has not yet been fully fettled of solder.

On the right, the process illustrated; starting with an easing of the top curve-down, before thinned boiler band strip is clamped around the foundation wire to create joints and hose clamps. A finer replacement ‘hose’ is added from 0.15mm/6thou copper wire. Note that, before the lower hose clamp and up-stand bracket were added, a platform bracket and ferrule ring had been threaded on loosely (fabrication method below). The right-hand assembly has now had the excess brass strip ground back, to complete the joint on the up-stand section, and the upper hose clamp has been trimmed – but it could do with further refinement. Photos are very good at highlighting where further work is required!

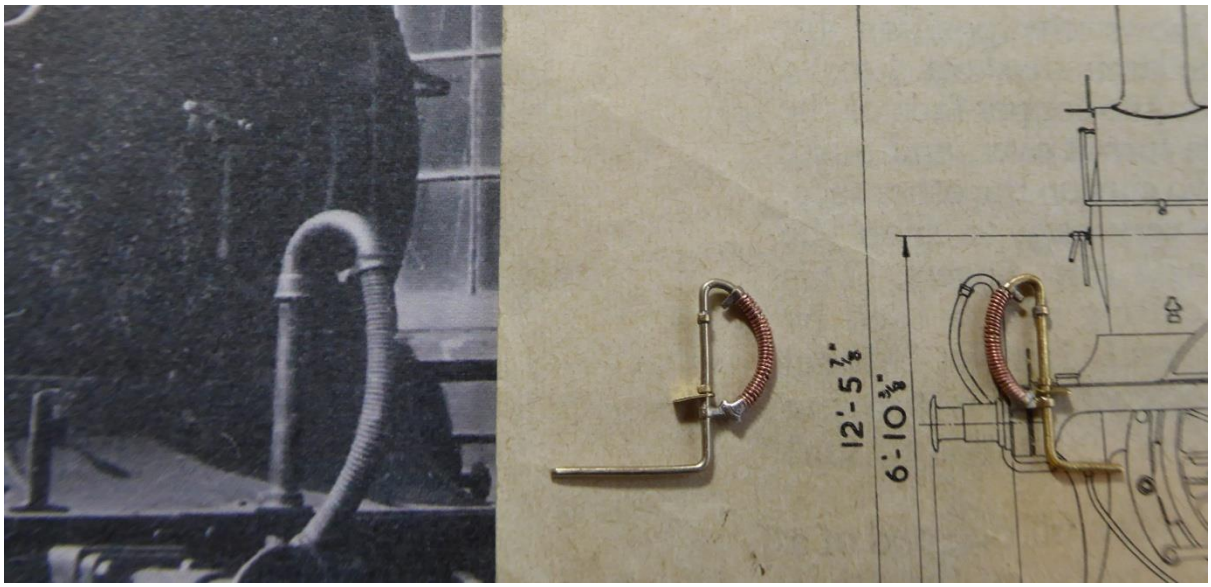


In making the platform fixing bracket, the left hand photo may seem a *‘statement of the bloomin’ obvious’*, but what is not obvious is that *I drilled the hole first, then trimmed the item to correct width….* This is better illustrated in the second photo, where it is evident that the hole was slightly off-centre in the brass strip, and I had to grind away more on one side than the other. I now always tackle holes in thin strip this way, after too many experiences of finding a centre-marked hole has mysteriously drifted to one side – often bursting out to spoil the item. Non-centred drill bits seem to have become more common? Anyway, the excess strip material effectively limits distortion of the hole during drilling. Three rivet heads have been embossed, using the trusty Mk1 eyeball and my old pair of compasses from schooldays….





The second part of the platform bracket was a ferrule ring to sit on top of it, formed from thinned boiler band strip, seen on left. I could have used fine brass tube, but did not have a suitable type to hand. The right hand photo illustrates how I would cut off such a tube section, then mount onto a cocktail stick before grinding the section back to the desired thickness. When grinding, I would actually position the disc so that contact with the item being trimmed was at the rear, where the disc was rotating towards the workbench – if the cocktail stick snaps (totally un-necessary!), the remnant plus component may stay 'local', rather than flying off to some remote location…..

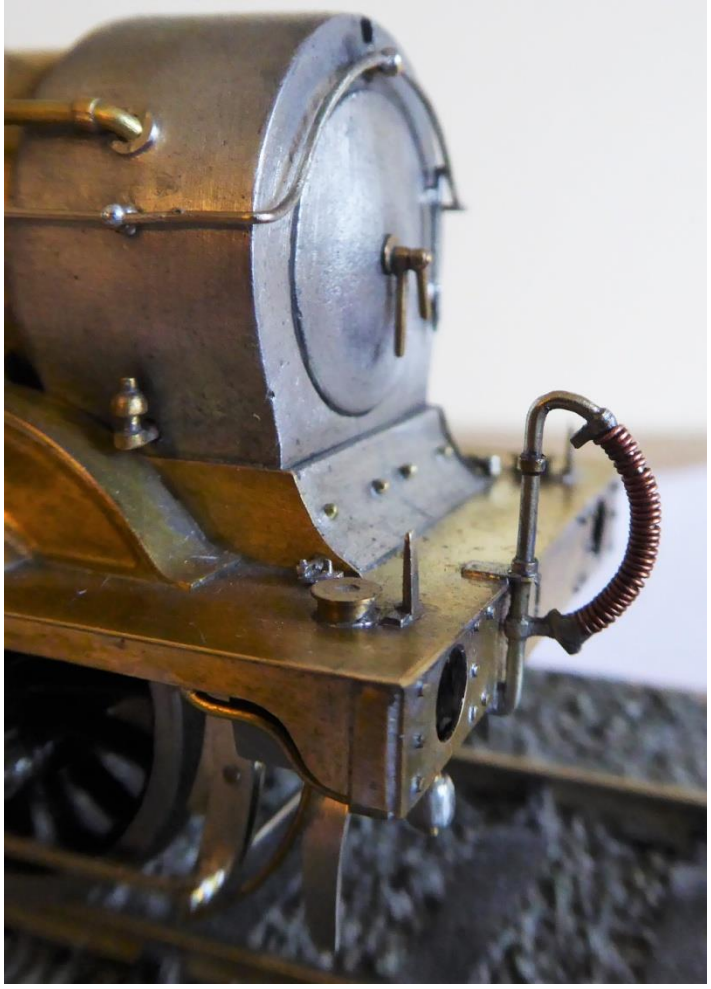



To finish this section, here are the refined vacuum pipe up-stands compared with a photo of No.31 and the Tom Lindsay drawing, from a 1966 Model Railway News. This is where the process began, by assessing that the basic component had potential to match the desired outcome. Now, in 7mm scale I would be tempted to add that lip at the base of the joint in the up-stand; but in 4mm? No, on a moving train in a 4mm landscape, I can live without it quite happily. (I think.)

### Vacuum pipe fitting, pipe runs, grease separators – and 'sandwich' buffer beam ends!

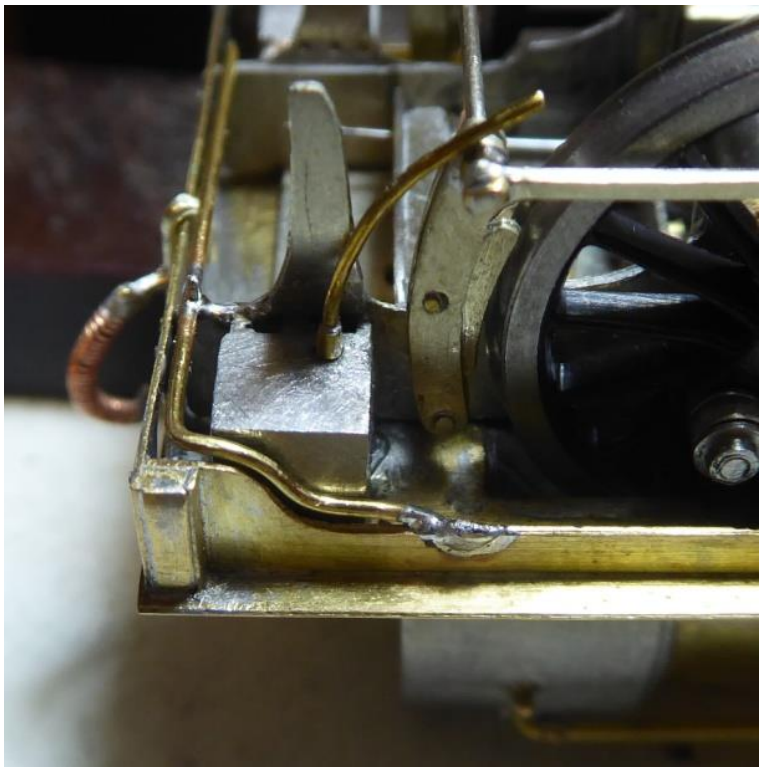
The vacuum pipe up-stands are associated with piping runs which may or may not be evident, depending on prototype. The Avonside examples snaked under the right-side buffer beam ends and behind the angle iron (aka 'valance'), only briefly re-appearing to by-pass the rear sandbox.  They made up for this 'coyness' by sporting not one, but two grease separators – bulbous housings appended to branch pipes below the main run.

I will start this section with a pair of photos which demonstrate the more complicated front vac. pipe run as completed, and an underside view to illustrate its execution more clearly, before enlarging on the method.



The photos also handily show how the steel/timber/steel sandwich buffer beams were created, by the addition of profiled sections of shallow ‘U’ brass section behind the steel front plate, with a representation of the rear steel facing added using brass shim. In the left photo, the front-end grease separator can be seen below the nearer buffer location. A ‘preview’ of the continuous front handrail, to be described later, is also evident, and the valve chest cover casting is (at last) trimmed down and epoxied in place between the raised frames.

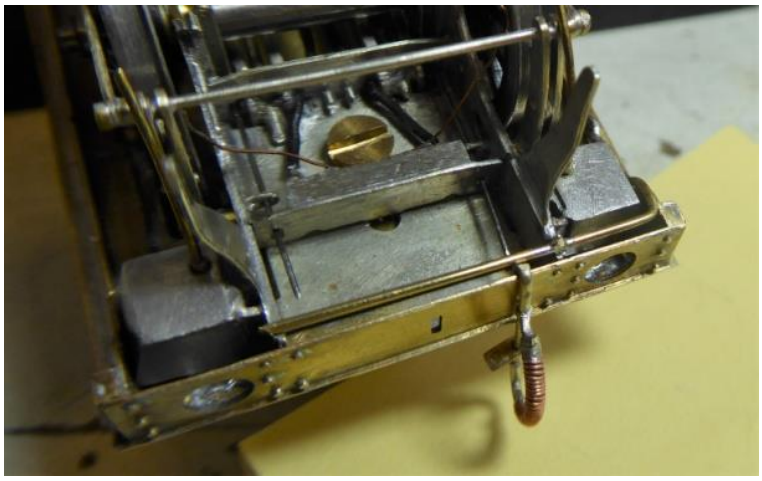
The right-hand photo, above, illustrates how the model’s pipe up-stand is shaped at the base so that it stands clear of the buffer beam when soldered in place behind it; the representation of the pipe run is then soldered *behind* it.

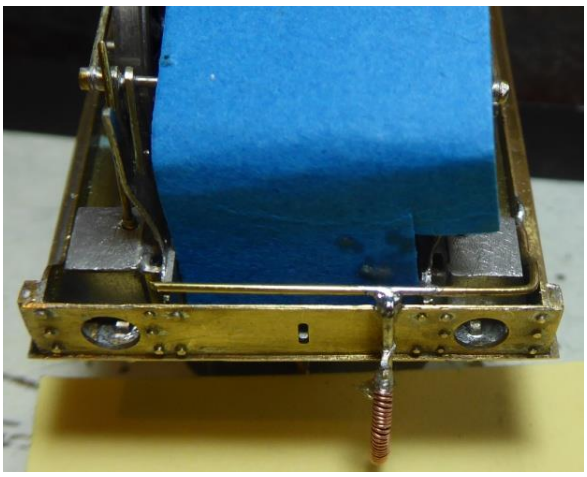


Turning to the construction of the front pipe run, the brass wire had to ‘appear’ from behind the angle iron, curving forwards and *outwards* to run clear of the sandbox casting (I actually had to shave a smidgeon off both castings to get an easy fit for the chassis, after fitting the pipework). After echoing the curve at the front of the angle iron, the pipe run then had to turn to run just behind the buffer beam and just below it, matching photos.

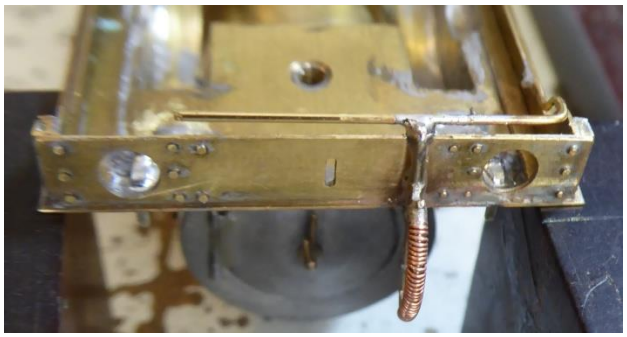
Having formed the wire to shape, it was tacked to the angle iron as seen here, then eyed-in and adjusted until I was happy with the fit. At this point I had a brainstorm and also tacked it to the chassis……..where-upon a little voice in my head asked *‘Now, why have you done that…?’* Fortunately, with hindsight I can say that a) I don’t know and b) it wasn’t such a bad idea after all. The error meant that, before unsoldering this joint, I could slide the front vac. pipe between the buffer beam and the firmly soldered pipe run, to hold it in place while soldering in position behind the buffer beam. The right hand photo illustrates how I ground a shade off the rear of the bottom bend, to allow the above operation. It also reminds us that, once the up-stand was soldered behind the buffer beam, the loose-fitted platform bracket and its ferrule could be positioned and soldered in place.

As an aside, the left photo, above, clearly illustrates the ‘sandwich’ buffer beam illusion again.





The photos above illustrate the positioning of the vac. pipe for soldering, and how it is neatly trapped in place between buffer beam and the unintentionally frame-soldered pipe run. They also demonstrate the rather tight clearances available for the pipe run, around the sandboxes.  On the right, a piece of card creates a flux-shield during the soldering of the vac pipe behind the buffer beam and at the pipe run junction, here awaiting trimming and fettling.



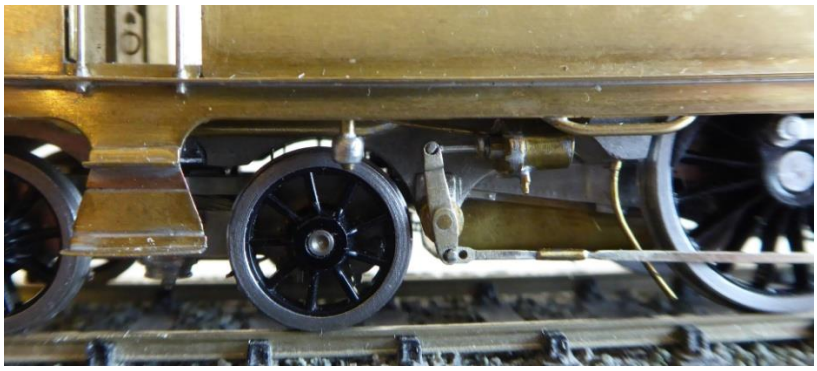
I was slightly concerned about the subsequent un-soldering of the temporary joint between pipe run and chassis member, but having used 145 solder, the combination of a hot temperature-controlled iron on the joint, with a damp sponge on the vac pipe joint, meant that the chassis was freed with no untoward events.

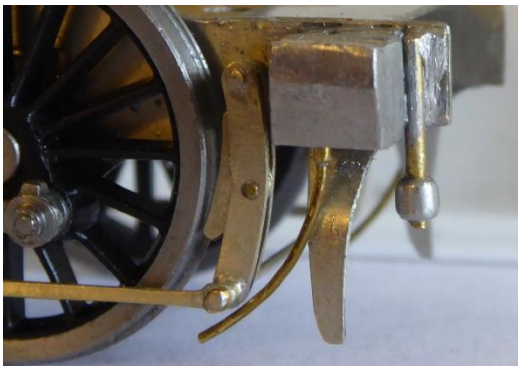
Referring back to the right-hand photo heading this section, it is clear that there is still work to do in removing excess solder which leached up between the front of the buffer beam and the up-stand; I ought to have ‘stopped’ this route with a sliver of Vaseline-d card or similar. I suspect that a de-soldering wick will do most of the clean-up required, or a fluxed strip of etch waste to draw the solder away…..

Now, to complete this section on vac. pipes and pipe runs, I will illustrate the construction of the Avonside’s two grease separators:

The separator rather resembles a curling stone minus its handle, mounted at the end of a section of pipe.
The spares box yielded a suitable whitemetal casting (a tender water filler vent); a slice of this was drilled and soldered 100deg to a brass wire; the assembly was then mounted in my craft drill and shaped using dental burr, steel engraver and emery paper.
A finished example is at the bottom of this view.

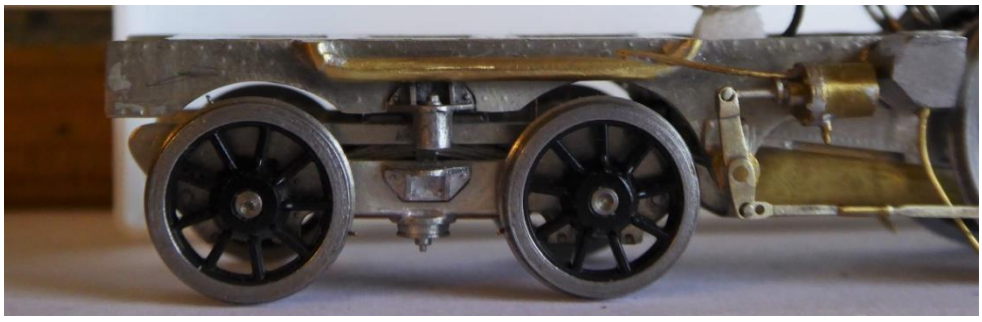
The photos below show the two grease separators installed; the rear one in a hole drilled in the footplate beneath the cab, set in a little way from the angle iron so that the bulbous ‘body’ does not fall outside the angle iron. There is plenty of clearance between the separator and the leading bogie wheel, despite appearances here. Further forward can be seen the vac. pipe run emerging to by-pass the rear sandbox. On the right, the front separator was securely soldered to the frames ahead of the leading sandbox; when the body is in place it appears correctly to descend from the front pipe run which then sits just ahead of it.





### Side tank inter-connections

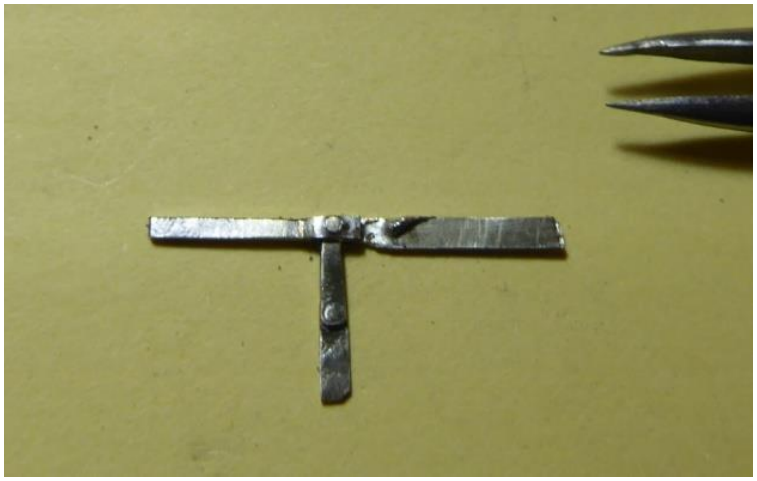
Barely evident in the last photo, even from this low viewing angle, is a large diameter pipe which links the side tank with another water tank underneath the coal bunker. Its absence from the model would hardly be a glaring error, but I chose to add these features on each side, knowing they were there and *potentially* visible.



I had appropriate diameter brass tube to hand, and had to solder in some brass rod before bending to shape, after annealing the sections to be bent, then trimming to be flush with the top of the frames. The ends of the pipes have NS etch waste spacers to set them out from the frame sides, otherwise they would foul the casting for the prominent bogie buffing pads.

These pipes should really come slightly below the top of the bogie wheel arches in the frames, but as I envisage some local gradient changes I did not want to risk the bogie wheels shorting on them, hence they are set a tad high. The generous clearance visible in the photograph is greatly reduced when the weighted body sits on the sprung bogie!

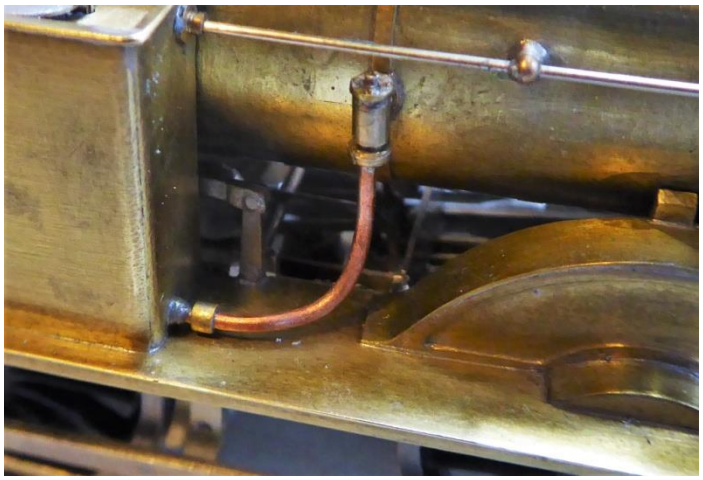
## Reverser lever



The plummer blocks and reverser weighshaft on No.31 were incorporated in the Rumney chassis kit, leaving just the reverser lever linkage and crank to be represented on the bodywork, emerging from behind the RH side tank. I could not find an etched component in the JM kit for the Avonside, so had to fabricate this myself.

I wanted to ‘suggest’ that the reverser linkage continued away behind the LH side tank, rather than having a tell-tale soldered joint between this component and the tank front. This required that the fixing at footplate level should be sufficiently strong, and I decided on a notched edge to the footplate, with a rear overlay on the reverser crank extending down below footplate level, to permit a substantial joint.

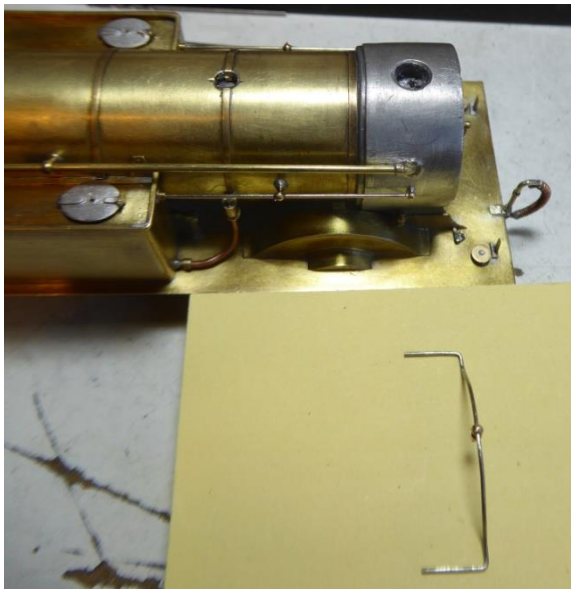
The photos above illustrate the use of 0.4mm NS wire and etched NS strip from Palatine Models, doubled to create a ‘forked’ joint with a dummy weighshaft end at the lower end of the crank. A ‘handle’ of excess Palatine strip was useful in holding, profiling and fettling the component during assembly with 296deg solder. After the removal and trimming of this excess, the over-long ‘stalk’ behind the reverser crank allowed easier positioning of the component within a filed slot at the inner edge of the footplate, for soldering in place with 145 solder, after which the excess was ground nearly flush to the underside of the footplate.



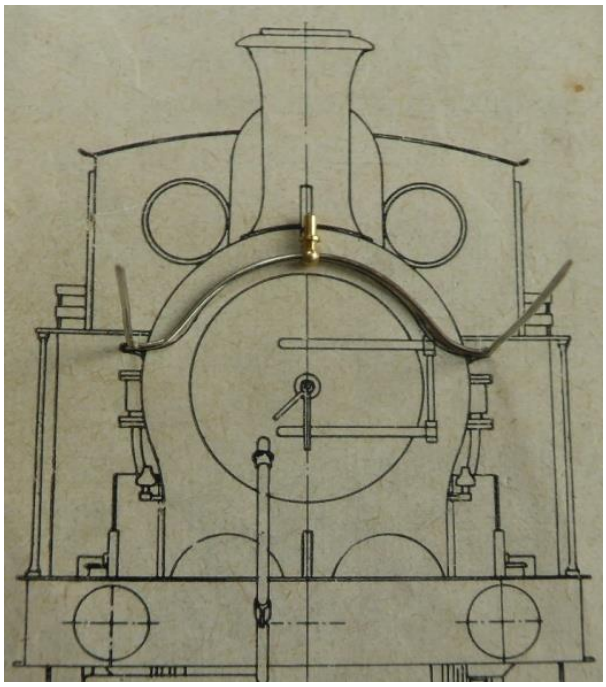
Here is the reverser crank installed, sitting close against the reverser weighshaft mounted on the chassis, and ‘disappearing’ at a distance behind the side tank.

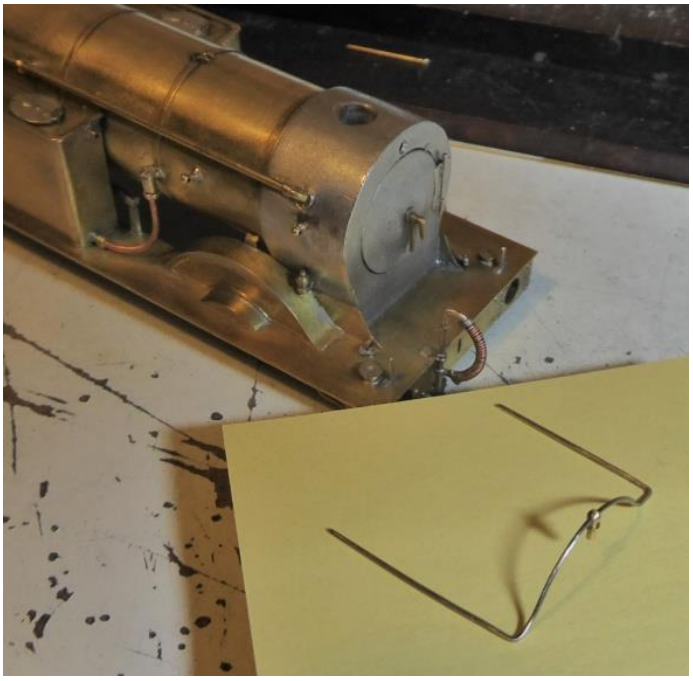
## Front (continuous) handrails

Although the Pre-Group modeller can often avoid the labours of complex external valve gear, and some of the more acute examples of cylinder/bogie fouling situations, not to mention the more exuberant expressions of post-Edwardian external loco plumbing – there *are* occasional down-sides. The continuous, sweeping, front handrail is one of these, and I do not look forward to their production. However…..



Broadly, my approach now is to form the front section from an over-long length of 0.45mm NS wire, providing enough excess to ease the bending and forming operations of the complex front curves. Once I am satisfied with the shape, the excess on both sides is trimmed back and squared off, at such a length that it occupies two-thirds of the smokebox handrail knob, as seen above. The rearward, straight, sections of handrail are simply made, and fitted first, only entering the smokebox handrail knob to one third of its diameter. A 145deg solder 'dab' at the next rearward knob will hold these sections in place until the front section is fitted, both sections being soldered at the leading knob in one operation. In the case of No. 31, with a cast whitemetal smokebox, I will use 100deg solder.





On the left, the front handrail section is well on the way, with the smokebox front handrail knob 'trapped' by the sharp corner bends. This may not happen in all cases – forthcoming 'big sister', Vulcan 0-4-4T No. 55, has a single front corner bend, rather than the two-stage bend of the Avonsides, so a slightly enlarged hole in the knob may allow it to be fitted after the bends have been formed. I ought also to say that the hole in the smokebox front should be countersunk, so that the handrail knob base is recessed flush with the smokebox - but *do check* your own prototype.

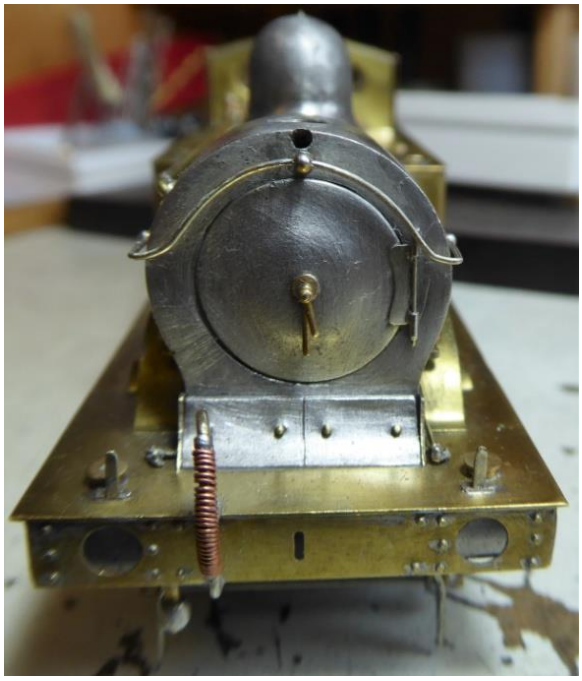
While it would be possible to form the front profile first, and then create the rearward bends, I prefer to work round the profile from one side. I found that the other method frequently revealed inconsistencies between the geometry

depicted in a drawing, and the actual geometry defined by the fitted handrail knobs. Firstly, it is quite likely that the *actual* smokebox diameter, *plus* the handrail knob offsets, do not precisely match the scaled prototype dimension. Secondly, the drawing may be in error; this otherwise excellent Lindsay drawing, for instance, depicts the *cylinder fronts* below the smokebox door, rather than the chest *covers* with their paired knobs. Further, the conventional pair of strap hinges shown here match neither the original Johnson door's plate hinge, nor the later Deeley straps with attenuated front handrails. I only noticed the latter error last year when I began this model - 39 years after I acquired the drawing! It also depicts a *centre* lamp iron which these SDJR engines never carried, and cab roof rainstrips which angle outwards, rather than being vertical, as clear from all photos. Food for thought, there….. The answer is to have as many photos of your chosen engine as you can get hold of.

The advantage of starting the forming process at one side is that the handrail wire can be set in a knob, the first right-angle bend formed, then the upward curve correctly 'eyed-in' relative to the smokebox diameter and door diameter on the actual model. This will enable the finished item to *look right*, even if its resultant dimensions may not exactly match the scaled drawing.

Subsequently, it is admittedly quite a tedious and iterative task to form the front profile in the handrail, trying to compromise between drawing and model. It is particularly important to aim for a symmetrical form, both in the arc of the handrail and especially in those corner bends – it is all too easy to create bends that fit the geometry, but can be seen to be different. The right hand photo, above, illustrates - hopefully - a symmetrical job, with both sections of rearward handrail having been bent to lie flat against the pad.

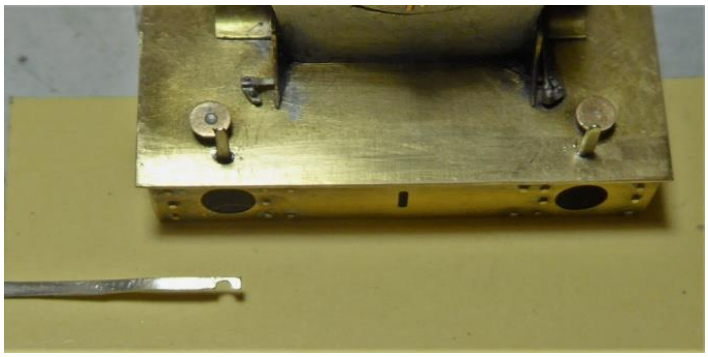
I use both round-nosed and broad/narrow flat-nosed pliers, for the forming. It is probably worth trying a few dummy runs to get the feel of how the NS wire responds to bending, before you tackle one of these – practice always helps.



On the left we see the nearly-formed front section being trialled in place. This process is hampered by the top lamp iron still being a loose fit, and the formed wire is free to move around a bit within the three knobs. However, it is still possible to pick up any significant discrepancies in the formed curves. Finally, on the right we see the trimmed front section soldered in place, as is the top handrail knob. There is still some minor tweaking to be done, but I am basically satisfied with the fit. The smokebox door and valve chest cover are also fitted and note the dome, now epoxied in place, with a top bolt of 0.31mm wire, drilled and soldered in. These items all help in judging the correct central alignment of various additions at this stage.

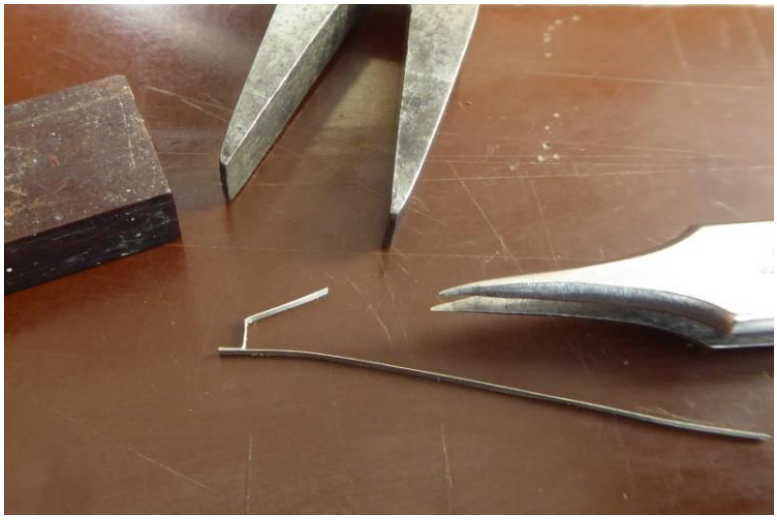
That alarmingly large hole drilled  above the handrail knob results from the need to fit the top lamp iron flush with the smokebox top, on a 'stalk' angled sharply downwards into the whitemetal. A fixing bracket added below the lamp iron will mask the hole, once the unit is installed with epoxy. The fabrication of this top lamp iron forms the next section.

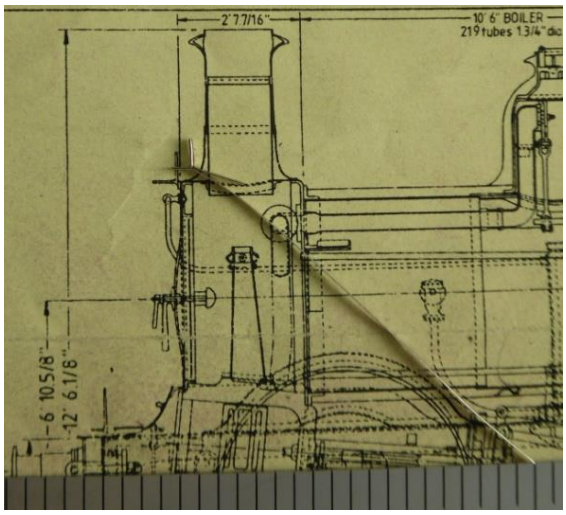
## Front and smokebox lamp irons



The two front platform lamp irons were filed to a rounded profile from suitable waste NS etch strip, formed to an ‘L’ and soldered under the footplate. Their fixing brackets were created from similar strip, notched to fit behind the irons themselves, as seen in the left photo.

The complex shape of the smokebox lamp iron required a different approach, using laminated NS shim to achieve the various bends and provide strength. On the right, I have used a scalpel (No.10A straight blade) to repeatedly score and then break off a strip of NS from a sheet of 4thou shim. Doubled and soldered, this will produce an 8-9thou strip, delicate but relatively strong. The strip was just over 1mm wide, but after folding, forming and soldering, it will be filed down to give a scale 2.5 inch wide lamp iron dimension.






On the left, the strip has been folded back and crimped to create the front prong of the lamp iron, and the process of bending back the doubling of the vertical section is under way. The excess material, as ever, provides a good handle, and limits the ‘ping-ability’ of the item being made.

On the right, the formed but un-soldered lamp iron is checked against a drawing – in this case it is a drawing of the SDJR Vulcan 0-4-4T variant, derived from a Works GA, so perhaps a shade more reliable for detail work than a magazine drawing of unknown provenance. This illustrates the downward angle at which the fixing ‘stem’ will extend into the smokebox.


Here is the soldered and trimmed lamp iron, left, and the Mk I attempt for an attachment bracket on the right, also formed from 4thou NS shim. It was intended that this should be soldered underneath the rearward stem of the lamp iron, but on assembly in this way, I found that the complete item sat too low on the smokebox front. A Mk II bracket was made, similar to that seen above, but with the fixing 'stem' pointing *forwards*, so that it could be soldered underneath the  horizontal prong of the lamp iron itself, see below.

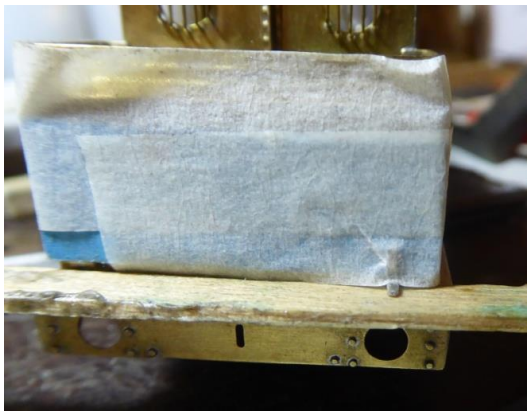

Here is the Mk II smokebox lamp iron, illustrating the rearward, angled fixing stem and the attached cosmetic bracket, with embossed rivets. Apologies for the attached debris, not removed before doing the photography.

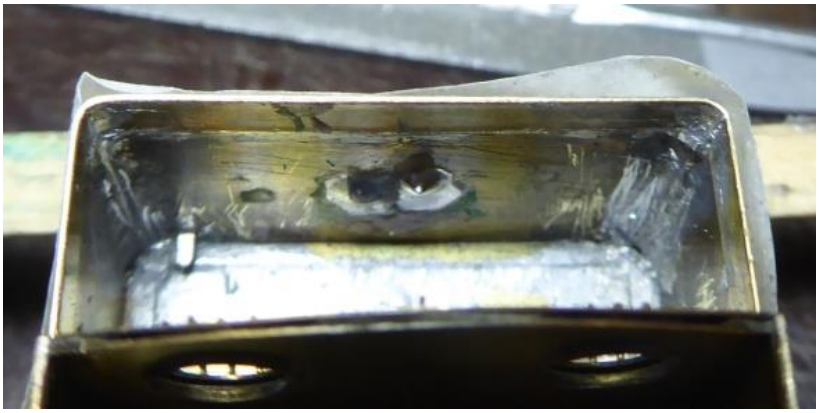

*I am finishing this section with a couple of interim photos, showing the lamp iron loosely installed in the smokebox. It is an exposed location so the final installation will only happen when the chimney has been fitted. This, being a whitemetal casting, is also relatively delicate, so will not be fitted until the buffers, safety valve and whistle have been added to complete the boiler fittings. The views do demonstrate how the bracket will disguise the locating hole behind.*

**Bunker lamp irons, water capacity plate, brass cabside numerals;**

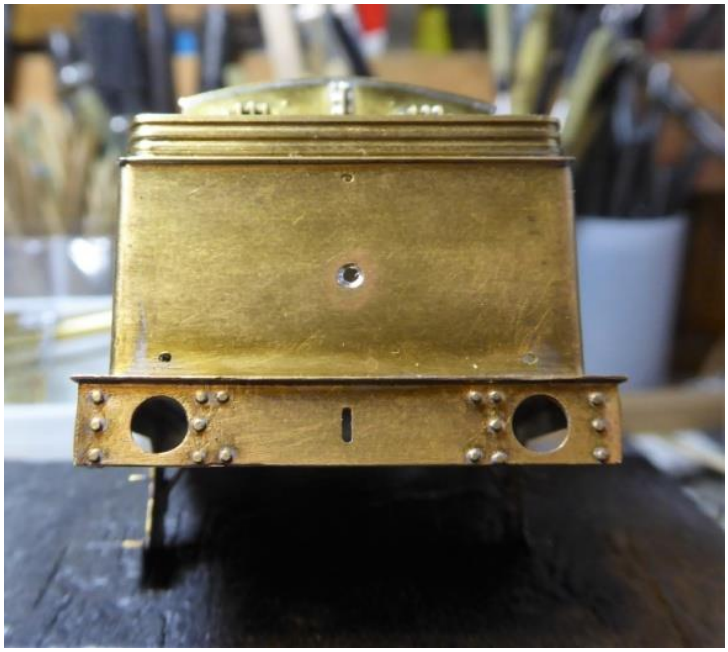
Turning now to the rear of No.31 to conclude this submission, there are three more lamp irons and a water capacity plate to fit on the rear of the bunker, and the '31' brass numerals to add to the bunker sides.

These lamp irons were also formed from doubled 0.4mm NS shim strip, as for the smokebox lamp iron, being in the form of an upside-down 'T'. The 'handle' part of each lamp iron was trimmed back to leave a tail which protruded into the bunker, for neatly hidden soldering.



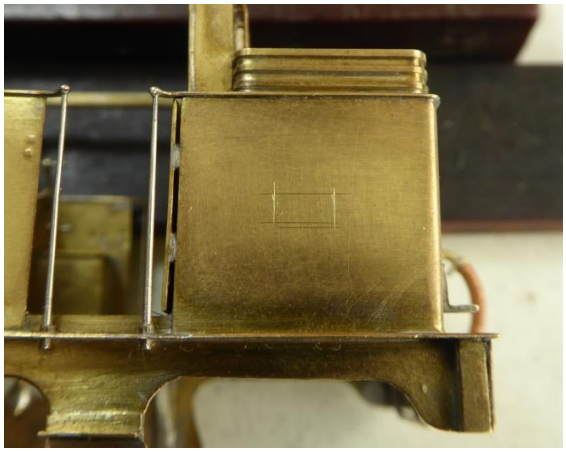


The two lower irons were set up for soldering using thin card spacers taped to the bunker rear, with a handy strip of Costa coffee stirrer ideally suited to keeping the base level. A similar but smaller card/tape solution was used to position the upper lamp iron, spaced out from the bunker coal rails.



This view of the three installed lamp irons shows them awaiting the addition of NS 'brackets' beneath each one, which will be formed as for the front platform lamp irons. Remnant verdigris at the top of the cab rear shows where the beading strip was fluxed before de-soldering, so that it could be added to the roof instead.

On the right, the central hole for soldering on the water capacity plate is prominent, amidst the lamp iron locations. Solder applied to the bunker inside had sealed the hole, before re-drilling through. The etched plate, fluxed, was carefully aligned and held by a balsa strip, while the soldering iron was applied from within the bunker to run the seam.




I will finish for now with No.31's SDJR identity being applied, using Slater's etched brass MR numerals, which include both round-top and flat-topped versions of '3', the latter being appropriate here. On the left is the faintly scribed rectangle to contain the numerals, centred on the bunker side – the curved rear bunker profile makes this a tad tricky to measure accurately. The double-scribing of the bottom of the rectangle was due to my initial elementary subtraction error…..

The applied numerals, right, have not yet been fully fettled of excess solder, so appear less sharp than they will do. Having been happy at the time with the alignment, this photograph shows that the '3' is not as level as it should be. Ho, hum….

That vertical pipe in the cab corner of the bunker? That's an air vent serving the water tank beneath the coal bunker space. Fine brass tubing.

## In conclusion

Well, that's the stage SDJR No.31 has reached, a few days short of Virtual Missenden. I will press on to try and finish the last tasks (safety valve, whistle, bunker lamp iron brackets, couplings, rear guard irons, chimney…) by then. It would be for my own satisfaction (a birthday present to myself on the 16th!), but I must get these contributions away to the team before then. If I get a chance to update before then I will do so!

Many thanks to Mick and the Missenden team for the invite to take part in this 'Virtual Missenden'; it's been rather satisfying to compile the notes and *very* satisfying to see No. 31 draw towards completion for the paint-shop (early 1920s lined blue livery, not too dirty).

I hope that there have been some more tips and ideas in there to inspire readers, either to emulate or diverge from, in pursuit of their own particular targets.

Thanks for reading, and enjoy the rest of your own 'Virtual Missenden'!

Stay safe,

Steve Duckworth

October 2020