The ups and downs of buying a model steam locomotive.
Part 8: Plumbing and boiler cladding - Roger Stephen

Having repaired my boiler and got it tested all I had to do now was put the locomotive back together. Easy! Well, fairly easy. I had been unhappy with the water plumbing arrangements underneath and this was the time to sort it out. The problem was that the axle pump feed and by-pass return pipe both ran right underneath the loco, the former interfering with the suspension springs and the latter making it fiddly to get the ashpan in and out. The hand pump delivery pipe was OK - it ran from the cab, along the top of the running board against the side of the firebox and then up to the top feed fitting. I decided to run the by-pass return pipe in the same way but on the other side of the boiler and run the axle pump feed pipe under the left hand running board. This meant the plumbing was neat, didn't get in the way of anything and had a subtle extra benefit which I will cover when I talk about the boiler cladding. I also decided to move the by-pass valve to a better position in the cab where I could adjust it more easily and mount it more firmly.

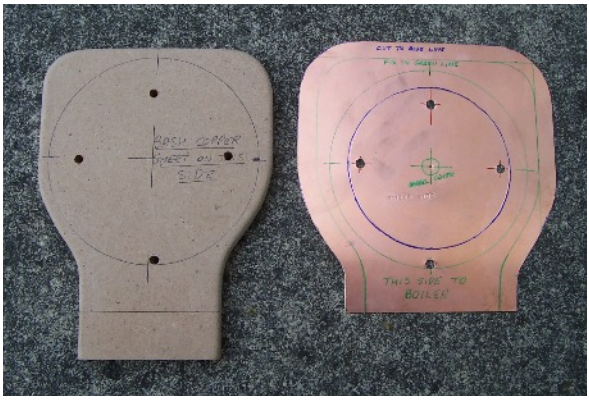
Most of the modifications to the plumbing just meant bending the existing pipes differently and, being thick walled, that was fairly easy. More difficult was bending the new bits of pipe because the copper tube I had in stock was much thinner walled. When I tried bending that with my fingers, even after annealing, it tended to flatten. I tried little pipe bending springs with no success and ended up making a pipe bending jig by sandwiching together several different sizes of 'repair washers' - basically very large diameter washers. This did the trick and I soon had the plumbing done. Now for the boiler cladding.

My home-made pipe bending jig made from a sandwich of 'repair washers'. Just anneal the copper tube, adjust the middle washers until it is a snug fit between the larger outer ones and pull it round with your fingers. Easy!

The Princess Marina boiler is of the 'Belpaire' type where the front half is round and gently tapered and the rear half is more of a rectangular box shape (see photo in Part 5 of this series). I was reasonably happy about the sheets of metal cladding the front and rear halves - they are basically flat sheets folded round the boiler. The bit I was worried about was the transition piece between the front and rear halves. This is a piece of sheet metal flanged one way around the outside and with a big hole flanged the other way in the middle. The existing transition piece was totally useless and I had no option but to make a proper one. But how do you make such an awkward shaped item?

Doing the boiler cladding on a model locomotive seems to be a bit of a black art. I have a copy of Martin Evans' book 'The Model Steam Locomotive' which goes into great detail about every other aspect of building a loco but he glosses over the boiler cladding in just half a page! Not much help, and other books I found were no better. Salvation came in the form of an excellent two-part article by Don Broadley MBE in Model Engineer magazine (30 July 1999 pp153-155 & 27 August 1999 pp273-275). This excellent article running to six A4

pages told me everything I needed to know and more.



MDF flanging plate on the left and the copper sheet blank ready for annealing and flanging.

I decided to make the transition piece from 26swg (0.45mm) copper sheet. By now I had realised that the hole in the middle need not actually be flanged - I could just make lots of little radial cuts round the inside of the hole and bend the resulting 'tags' forward like a broken flange - it would all be covered up by the barrel cladding sheet and a boiler band (all will become clear next month!). However, I did need to beat over a flange round the outside. First thing to do was make a flanging plate 0.5mm smaller than the finished transition piece needed to be. I made mine from 12mm MDF. The main thing is that it should be reasonably hard and have a nice radius all round the front face to beat the copper sheet over. I cut out a transition blank from the copper sheet and bolted it to the flanging plate to hold it in place while I hammered it. So much for the preparation, now for the tricky bit!

The principle of flanging is simple. Anneal the copper sheet, beat it over the flanging plate with a hammer (preferably soft faced) until it work hardens, anneal again, beat it some more, and so on until it is fully flanged. The secret seems to be to anneal the copper properly and not expect it to bend too far before you anneal it again. To anneal the copper you heat it all over to cherry red with a gas torch and then quench it. I found it best to do this in very subdued light so you can see the colour and not overheat the metal - you are getting close when the metal flashes all the colours of the rainbow - very pretty! If the flange starts to cockle you must stop, anneal again and keep going carefully. Eventually I managed to get an acceptable flange 10mm deep but it took about nine annealings! There was a slight rippling on the top corners but it was not bad for a first effort and good enough for me. It was then a simple matter to cut out the hole in the middle and 'flange' that as described above.

Left: Part way through flanging. The top edges are cockling due to beating too far before annealing. It is difficult to avoid with such thin (0.45mm) metal. Right: The 10mm flange round the outside is finished. Just need to cut out the big hole in the middle and 'flange' that.