# The ups and downs of buying a model steam locomotive: Part 4, Valves, wheels and a good puff – Roger Stephen

The end of Part 3 of this saga sounded a bit final because at the time of writing I had decided to struggle through the rest of the season with Princess Marina as she was. However, at the June club meeting Malcolm Beak confirmed that the slide valves should be $^{7}/_{8}$" long, not 1" as shown on the drawings. He also kindly gave me a lump of bronze to make new ones from without the risk of ruining the originals. This spurred me on to continue with restoring the Princess back to health.

I soon made the new valves and fitted them to the Princess. I found that the lead and lap could now be set easily on both sides of the locomotive in mid-gear. However, while the valve movements in full gear were OK on the left side, the right side was impossible to set properly. I suspected that the eccentric rod on that side was too long and yet another trial steaming confirmed that she was better but still not right. My solution was to make a temporary adjustable-length eccentric rod. By playing with both the return crank position and the length of the eccentric rod I was able to get the valve movement correct in both forward and reverse gear. When I had finished valve setting, the new eccentric rod was $^{1}/_{16}$" shorter than the original – not much but enough to make the valve move over the ports properly. I also played with the lubricator linkage to make it pump more oil, more reliably.

The 6th August was a bit of a revelation. Tony Mason had just acquired yet another locomotive (his Speedy) and was keen to try it out, so this gave me the opportunity to try the Princess again. Success at last! Her exhaust beat sounded so much better and I was soon chasing Tony round the track doing consecutive laps without stopping. OK, so she actually ran backwards better than forwards, and she still wasn't quite right, but for over three hours I was racing round the track at an amazing speed. The fun finally came to an end when the left rear crank pin came loose and the left hand piston rod parted company from its cross head when the retaining pin fell out! The right hand one showed signs of doing the same too. Repairs were soon made when I got home using 'Ritelok RT38 Retainer' adhesive (equivalent to Loctite 638), although I now regret missing a good opportunity to take the pistons out for inspection first. I have a suspicion there might not be much packing in them!

At the club puffing session on 14th August the Princess got off to a good start but it was not long before the lubricator packed up again. This time the eccentric had come loose on the axle and the oil supply soon dried up. I also discovered that the driving wheels were not actually tight on their axles and were retained by grub-screws, half in the axle and half in the wheel. The grub-screws were now working loose during a run, allowing the wheels to rotate slightly on their axles. Worse than that, when the head of one grub-screw worked out proud of the wheel and axle it began to foul on the back of the coupling rod.

I found the prospect of dismantling the motion and dropping the driving wheels out of the chassis a bit daunting and other matters took priority until the end of September. I then took my time making a wheel quartering jig from bits of steel I had lying around in the shed and when I finally plucked up the courage to get stuck in I had the wheels and motion off in just a couple of hours. I hit a slight snag here because axles are held in a quartering jig between a pair of centre points in the centre holes in the ends of the axles. In two of my axles I found that the tip of the centre drill had broken off in the hole and was still jammed in there (once is unfortunate but twice is just plain careless?). I could have made new axles but decided to try to salvage the originals, so out came my trusty mini-drill again – plus a set of tiny diamond burrs bought for just £1.25 from a shop in Chesham. After an hour of careful grinding and poking I got both broken drill tips out and was able to re-drill and enlarge the centre holes in all the axles, fortunately concentric with the axle centre lines.

I had taken extreme care to drill and ream the necessary holes in the quartering jig as accurately as possible. This paid off because the first wheel-set dropped into the jig perfectly on a trial assembly, with no need for any adjustments. Before going ahead with gluing the wheels to their axles I examined the axle boxes and eccentrics. The latter are secured by 6BA grub-screws which simply bear on the axles, so I put shallow drill holes into the axles in appropriate positions to give them a more positive and secure fixing.

After careful cleaning and degreasing I was ready to fit the wheels back on their axles using Riteloc RT38 retainer. One wheel was fitted first and left overnight for the adhesive to cure. The lubricator eccentric and axle boxes were then slipped over the axle before applying adhesive to the second wheel and quickly slipping the assembly into the quartering jig. Excess adhesive was wiped away to make sure the axle boxes were not glued to the axles as well! This assembly was then left in the jig overnight to cure. The other wheel-sets were then treated in the same way.

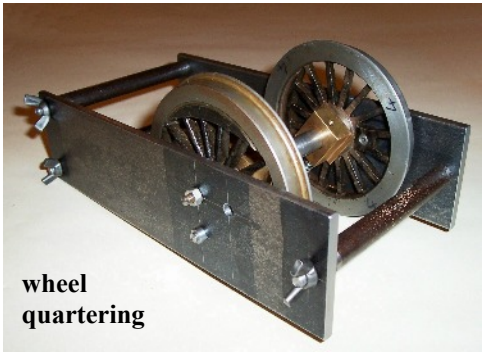
One trick I did use was to fit close fitting sleeves over the leading and trailing wheel crank pins because they were of smaller diameter than those of the main driving wheels. This allowed the same holes to be used in the quartering jig for all three wheel-sets, maintaining quartering accuracy. Finally, I drilled out the old wheel retaining grub-screw holes and glued in short $^{7}/_{64}$" diameter pins to ensure the wheels would not slip on their axles.

Reassembly was straightforward and I reset the valves again, replacing the left hand valve spindle with a stainless steel one because the original was badly pitted with rust! This time I ignored setting the mid gear lead and lap, simply making sure that the valves opened and closed fully, and at the correct time, in forward gear. By chance, valve movement in reverse was quite good too.

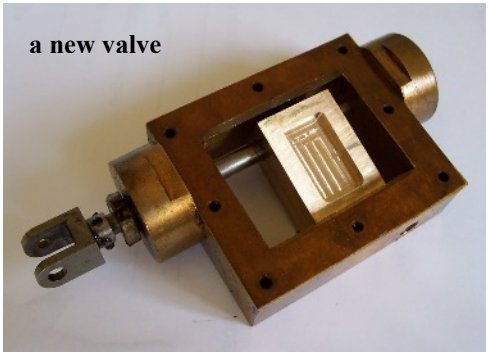
Thanks to Tony Mason and Clive Reynolds, Halloween presented an opportunity to find out if the Princess had been improved. The result was amazing: she steamed faultlessly for three hours, pulling away completely unaided (which she had not done before) and hauled me and two passengers with ease (one passenger for half a lap was her previous best). She nearly repeated this on bonfire night but after an hour and a half the right rear crankpin fell out! That was soon fixed and on 13th November she performed well again.

So, now that my Princess Marina has found her true form at last, all my doubts and disappointments have evaporated and I can honestly say I am happy with my purchase. All I need now is to renew her boiler certificate and think about tarting up her tatty paintwork! OK, there are various other improvements I want to make too, like re-plumbing underneath so that the ash pan drops out easier, moving the by-pass valve to a better position, etc, but these are relatively trivial. The main thing is that she does now run properly.

*To be continued…..*



**wheel quartering**



**a new valve**