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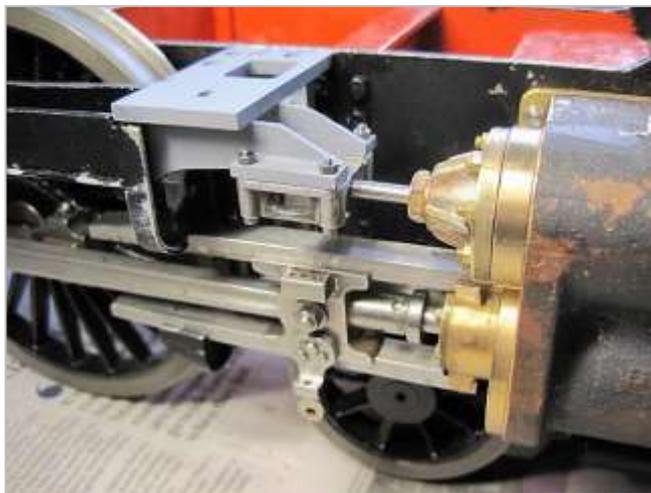
“Royal Scott motion parts”

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What have you got On The Bench? asked the Ed: well at the North British Loco Pulborough Works I have a 3½” gauge Royal Scot that is advancing more rapidly than expected since practically all other (non-liquid) enjoyment was withdrawn for most of last year. Even so, the engine advances very slowly mainly due to its complexity, not so much from difficult manufacture but the almost impossible task of fitting the bits into the available space. I “sus” it out on the drawing board, make a part, find it fouls, hack and add, then finally make it all over again.

Recent bits included the girders that support the expansion links, really quite simple but supported by the motion bracket at the front and another at the back. The motion bracket is located alongside the front of the leading coupled wheels so the real thing has a complex casting that bolts on ahead and then curves back outside the wheel. I spent hours silver soldering together funny shaped pieces of steel until it fitted. Then I made the bracket for the other side but forgot to hand the girder fabrication and got two RH sides!

Making the valve spindle guides to look realistic was fiddly but the real challenge was the arch shaped support from which the outside ones hang. Of course they not only have to look right and let the combination lever pass between them, but they need to be accurate as the guides must lie on the centre line of the valve spindles at the correct inclination. I ended up silver soldering the side plates together with sacrificial spacers that were cut away once the supports for the guides were in place correctly.



In the second photo, also note the arm bolted to the LH crosshead that drives the (dummy) air pump. Practically a week’s work due to its complicated shape that skirts the lower slide bar support before curving in to the centreline of motion to connect to the spindle, but at the same time set

back to accommodate the long stroke. I made a number of mock-ups before bashing out the final part, one can be seen on the bench alongside the bogie wheel. Does anyone wonder what a crosshead driven air pump is for?



LOCOMOTIVE AIR PUMPS

Of course, engines had air pumps (say you Brighton men), they were used for the Westinghouse Brake and went “Chong-chong! chong-chong!” when blowing up the brake. But wait a minute, most lines used the vacuum brake, certainly on the LMS (excluding a line in Scotland and another at Tilbury), so why did the Scots need to compress air? Actually, they didn’t, these pumps were used to extract air from the brake pipes when running but they are often referred to as “vacuum pumps”. Of course, a vacuum is absolutely empty space (i.e nothing) and it cannot really be pumped around like water. In fact they are low pressure air pumps, but even so why are they needed?

It all goes back to Swindon and its Wonderful Ways. In 1889 the government passed a law making it compulsory for the railway companies to fit Automatic Continuous Brakes to their passenger trains. This was a big pain for the companies because they had a limited time in which to fit equipment to absolutely every single passenger carriage, and they possessed quite a few. The American air brake was very good and well-engineered, while the vacuum brake was much simpler but less effective and a lot cheaper.

Of course, the two biggest companies in England (LNWR and GWR) settled for the vacuum system thereby tipping the preference for all the big concerns and most others. As the Swindon approach to engineering was rather special, they did not merely decide which commercially available brake to purchase but set up a team (J Armstrong and G Churchward) to design their own vacuum brake with some regard for its effectiveness and maintenance. The design of the parts was to a better standard.

A decision was taken to work at 25” of vacuum (2 psia) rather than the usual 21” (4 psia) increasing the effective differential pressure by 20%.

There was no problem in creating the lower pressure with the large ejector but the small one, used to take out air leaking in while running, had more work to do. The engineers decided it would be more economical (less steam) to use a simple crosshead driven pump that would automatically remove the air on the run and this became a standard GWR arrangement. Who can remember standing on a Western platform when an engine backed down slowly making a strange sound like “Pssst-pah! Pssst-pah!”? This was the sound of the air pump mounted under the RH platform to the rear of the crosshead.

Fine, and the LMS? The biggest railway, the LNWR, went for the standard vacuum system nevertheless Mr Scrooge the Chief Accountant was convinced there would be savings in coal if they made and installed their own air pump driven off the RH crosshead (inside and unseen). Even better they could make it themselves for next-to-nothing at Crewe using the Swindon drawings, free of charge in exchange for the rights to the LNW water trough. Somehow or other the Scots were built with pumps although the Midland did not use them. Possibly because the Claughtons they were to replace had them or because the design project was called "Improved Castle" and a Castle was used in the 1926 exchange, anyway NBL thought they were wanted. Their use continued with the Baby Scots and the Taper 5XPs until the mid-1930s when they fell out of fashion and were removed in favour of the MR combined ejector. The bolt holes on the LH crosshead remained visible for years.