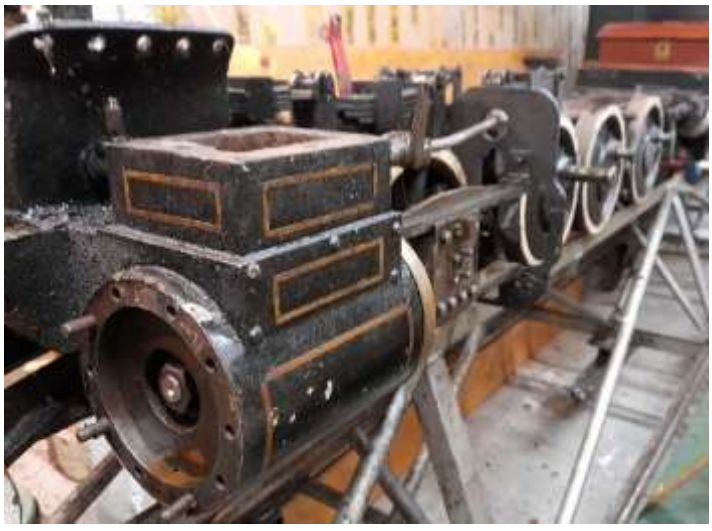
"Old Rube restoration, part 4"

This document was written by Paul Naylor in early 2025 and is the forth article in a restoration project. The articles were published more or less simultaneously in the Frimley and Ascot Locomotive Society newsletter.

Having removed the boiler and clogged up the space in my workshop with it prior to getting it to a boiler man, I realised that I need to do things that did not need much space for the time being. Since I had to remove the side rods and connecting rods to remove the wheel sets (eventually), I thought I would do this at least for the side not facing the wall…

Whilst the whole chassis is liberally coated with steam oil (and as a result has no rust or other issues), steam oil – especially the viscous grade – turns to treacle when it is cold, and when it is cold *and* old it is even stickier, stops every thing from moving freely. As a result, this job was more involved than it appeared. I worked out that the Allen head countersunk bolts holding the pin end caps on were probably right-hand threads on this side, and so I approached the first with a suitable key and trepidation. This one was loose though and confirmed the righthandedness of the threads. The second was already rounded off and was stuck whilst the third (the connecting rod long one) was stuck but yielded to a slight application of the impact screwdriver. The fourth was behind the crosshead at the position of the crank that the chassis was at, and since the treacle had got a grip, I could not move the wheels. The rods and wheels however had some play, so the stickiness was the piston and slide bars. Assuming a major contributor was a stuck piston: not unlikely and since this was the most likely place to have some corrosion, I feared the worst: I removed the cylinder end cover. Fortunately, there was little evidence of rust and seizure so I had a few blows at it with some wood and a large hammer, but nothing moved. Plan B then: try to dissolve some of the treacle. WD40 is quite good for this sort of thing, but the amount needed was costly, so I used my stand by of a mixture of transmission oil (the red stuff) and thinners. Eventually, and after working it into the piston, the gland and the slide bars and crosshead, it moved! A bit more and it freed up well, so that allowed me to remove the connecting rod and then the fourth bolt which was quite easy. The piston rod is held onto the crosshead with, it seems, a riveted over pin so I don't really want to remove this and so I still don't know what the piston packing is…but it seems to be quite airtight. The rounded over second bolt succumbed to some propane heat and some urging. Let's say that I will need a new bolt here…



The rods on this side now repose in a box. This job took two full days.

Musing about the other side (against the wall) I wondered whether these bolts were left hand thread (this is preferred) or right hand. The Allen keys and impact driver would not shift them in either direction though (with modest force owing to the wall), so I still don't know and these will now have to wait until I have space to turn it all round.

What next while I am waiting to 'lose' the boiler? In the pile of bits that came with the engine, there was a duplex steam pump that was a little rusted and seized. I don't remember seeing this on the engine 25 years ago, and there doesn't seem to be any place to mount it in evidence, but the engine itself has air operated brakes…

Taking the pump apart showed it is cast iron throughout, including cast iron piston rings in all four cylinders (two steam and two feed). Not the thing for water methinks, and the fact that that all four cylinders are the same bore, means that it is not going to be a water feed pump. I settled for an air pump… the give-away might be the check valves on the feed side, but these are missing!

Anyway, I took it apart, replaced the valve rods which were corroded with stainless steel ones, polished up the bores and replaced the graphited yarn gland packing with PTFE. Having never handled one of these, I was intrigued how it works. The slide valves on each cylinder are arranged so that they are moved quickly by the top and bottom few millimetres of the main stroke, and there is no lead on the valve. The valves operated by each cylinder switch steam to the opposite cylinder, so when one goes up, the other waits until the first gets to the top and then its valve operates allowing steam into the second cylinder which then moves until it reaches its bottom and sends the first one the other way. Got it?! This means that the steam ways in the block are a bit of spaghetti hidden in the cast iron, and indeed one was solid with treacle which had to be removed. It also means that it is not obvious to me what happens first and some other ramifications (see later). Bit like the chicken and the egg.

I put it back together (the steam side: I left the feed side off until I could see what was happening) and connected it up to my compressor. Yes, well, much air escaping, one or two fairly violent movements and not a lot else.

A lot of the air was coming from small holes at each end of the cylinders (drain holes obviously) and so I set to and made some small automatic drain cocks for these. I also tried to work out the valve settings logically, which gave me a headache. After much tinkering, I got it finally to go and stay going right down to around 20 psi. Still much escaping air though past the valves: I assume that this is a figment of the type as I cannot see how it can be avoided with no lead and the type of valve movement.

Problem over I though and I rebuilt the feed side as well. Air back on and… only escaping air. How on earth do you 'turn over' the engine? It has no wheels to turn, and the only visible bit of the main movement is about 10mm of piston rod between the steam and feed cylinders. Eventually I realised a few critical things: I had to run each side of the engine in separately (ie one feed cylinder at a time by turning the feed cylinder block though 90 degrees) to prove to myself that it was free. Then I had to refine the valve settings which seemed to be very critical, so very small adjustments at a time. When both sides seemed optimised, I then put it together again…much air and some uneven movement.

Finally, it went long enough (slowly) to watch it for a while. I suspect that the next bit gives the lie to the life of this pump: the top of the feed side had two very small (1mm) holes in the top of each cylinder to relieve pressure and vacuum on the non-working side. I decided to drill these out as big as possible (1/4”) and threaded them in case I needed to fit something. Lo and behold! It now worked smoothly and down to quite low pressures: I suspect that it might run much better on steam too. Perhaps it has never worked properly and there never were check valves etc?

I still do not know the order of things and what starts the whole process off. Its seems to be self-starting OK, and I assume that this is down to tiny and accidental differences in the valve setting each side.

I am not sure I want to use this on the loco though, you need brakes to be reliable and I am not entirely sure I would trust this pump to work when required, so it might remain a separate curiosity…and as a result, I have not (yet?) made check valves for the air compressor bit.

If this never worked the brakes, what did? Well, also in the pile of bits are the contents of a much abused and worn-out 12-volt tyre pump, rammed into a box on the tender with a battery….’nuff sed.

I mounted it for looks and convenience, and just maybe there it will stay…but it satisfies my need to have working things!