

Damn Lubricators! – Mike Brown

As a lot of you will know, I have a Polly 5 that I have generally been very pleased with. However there has been one bugbear with it that has been driving me mad – the lubricator. How can such a simple mechanical device cause so many problems and be so frustrating? The Polly design is very simple, a shaft is made to oscillate by a lever driven from the valve gear as in most designs. On the shaft is an eccentric that acts against a simple plunger pump. A spring loaded clack valve is fitted to the pump output (see below).



It is possible to adjust the effective length of stroke of the pump by adjusting the clack valve assembly in or out. In theory it is a great design, very difficult to fault - but.... The first irritation was that the rotating shaft leaked. The sealing is by an O ring on each end of the shaft on the outside between the case and the arm on one side and a collar on the other. Unfortunately I just could not make this seal, despite endless adjustment and new O rings. The next day after running, the oil was always drained to the level of the shaft with the consequent mess everywhere. Adding an inner collar and O ring to each end eventually cured the problem, but why did the original arrangement not work?

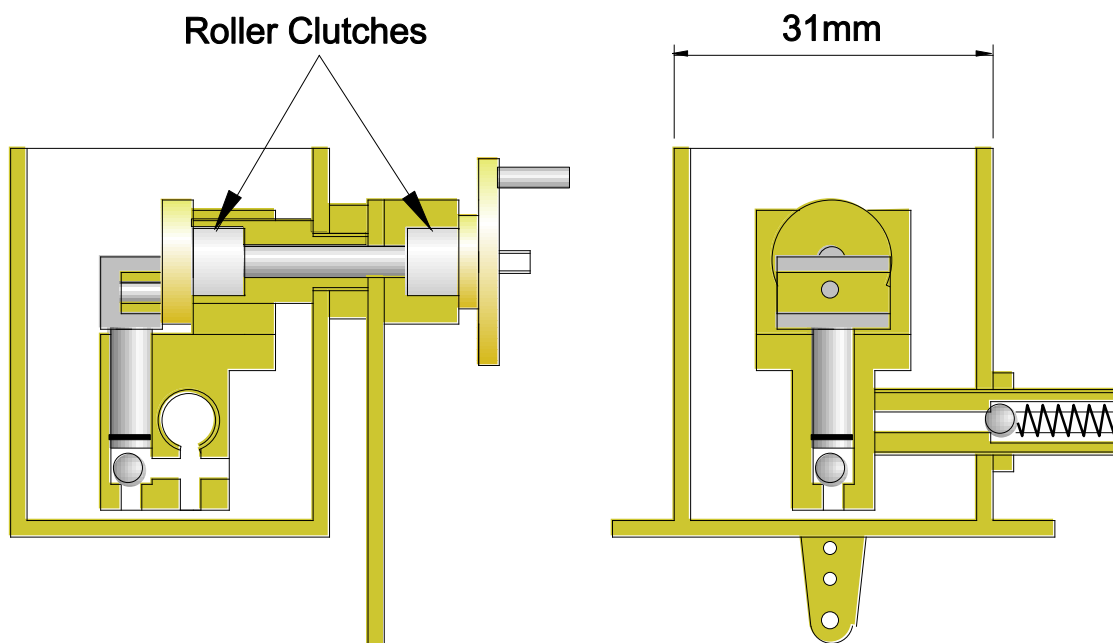
After working reliably for about two years the pump suddenly stopped working. On inspection it pumped oil just fine on the bench, but it would not work on the engine. After a lot of messing around and trouble on the track I concluded that the second clack valve must be faulty. Indeed when I took it off it seemed very black inside and possibly jammed. The second non return valve on the Polly screws into the main steam tee that leads directly to the cylinders. The valve is very close to the underside of the smokebox. My theory was that the valve was getting very hot when the engine was sitting. This seemed to be corroborated by the fact that the problems always seemed worse after running on the portable track when long periods of “sitting” around had occurred. In addition a theory was put forward that the club oil I was using might contain tallow, and that tallow did not like high temperatures. As my problems seemed to start around the time that Eric had bought a new lot of steam oil, this seemed to be a reasonable possibility. I changed to different oil that Bill Perry kindly gave me, cleaned out the valve, and everything worked great - for a while! Eventually the old problem started again and despite many dismantling and cleaning sessions I could not maintain reliable operation. Eventually I gave up with the valve, discarded it and I made a new inline valve that I fitted some way away from the smoke box. Of course everything worked fine for a while and then - back to square one, the lubricator packed up yet again. So now I really had no idea what the problem was. Was the oil or the valve anything to do with it, was there some intermittent problem with the lubricator or am I just cursed?

I decided to start from scratch with a new lubricator. The Polly lubricator has a side exit from the tank, most commercial lubricators have a bottom exit. I did not want to move the tank from its present location, but under the tank position there is not much room before fouling the valve gear, so a bottom exit lubricator would be a problem. The easiest answer seemed to be to make a new lubricator to fix in the existing position and piping but with a different mechanism (I know that Keith Jones is tearing his hair out reading this shouting "use a displacement lubricator you fool"). I had a look round at the conventional ratchet/pivoting cylinder designs from LBSC, Don Young, etc, but I did not like what I saw. I do not like the ratchet mechanism, the minimum adjustment is one tooth at a time, this means that near the limit of adjustment (where most people seem to set them) the increase of feed changing from one tooth per cycle to two teeth increases oil feed by 100%. No wonder it is difficult to get the oiling right. Another problem is that for part of the cycle both ports are covered, as we are using oil not steam, this must cause the cylinder to lift from the valve face (ever so slightly). I accept that in practice it will make no real difference, it just does not feel right. Finally there is the spring holding the cylinder and port faces together. If this is not adjusted correctly the pump will either leak or potentially cause excessive wear. Now I accept that many thousands, maybe hundreds of thousands of these designs have been used, and for the most part they have given nothing but excellent reliable service - however I just don't feel right about them. As it's my loco if I want to try something different (and waste a lot of time and make myself look stupid) I will!

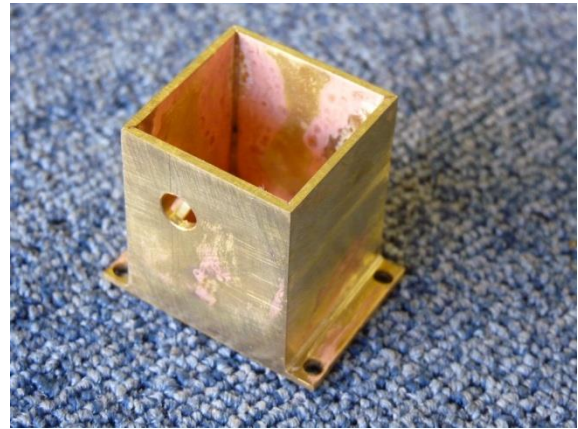


The inspiration for my new pump came from my old motorbike collection, several of which are fitted with a plunger oil pump. The photograph shows a modern replacement for a Triumph Tiger Cub made by Morgo. The rectangular block fits onto a crank pin, and also into slots in the rectangular heads of the pump plungers. Thus, as the crank rotates, the block drives the plungers up and down as the block slides from side to side. This neatly solves the problem of having a fixed cylinder combined with a very compact pump. Out came the CAD system (2D Design of course) and the arrangement below finally appeared. The pump uses roller clutches from Polly. I know not everyone is keen on roller clutches but I have met a

couple of people who use them and swear by them so I decided to go for it. The plunger has a slightly larger diameter than I would have liked at 4mm. However this was dictated by the smallest Viton O ring I had in stock. It was fairly easy to incorporate the required ball valves into the pump body, making for a compact design.



Construction was pretty straight forward resulting in the pile of bits shown below.

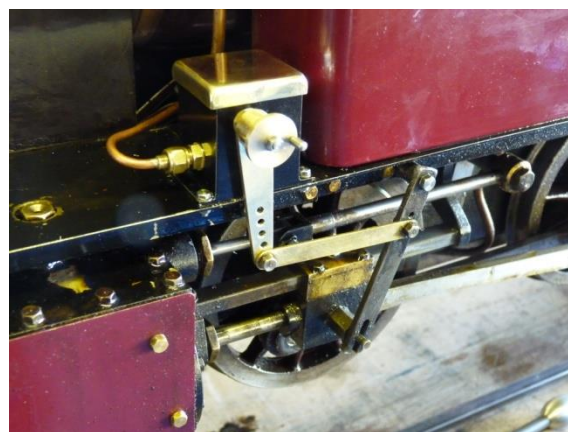


When the innards were put together they looked as below.



Well actually they didn't, I have cheated a bit and left out a minor (?) mistake. Originally the two piece body of the pump was a simpler one piece affair. Feeling very pleased with myself (and forgetting that pride comes before a fall) I proceeded to put all the bits together. Almost immediately I experienced (in the words of the great Homer Simpson) a DOH! moment, as it suddenly dawned on me that I had designed something that could not be assembled! After much doom, gloom and muttering I set to and redesigned the body in two parts as seen. On assembly everything worked as planned with the plunger moving up and down nice and smoothly, the slider moving from side to side in a very hypnotic way, and the roller clutches allowing rotary motion from almost imperceptible reciprocation.

The pump is now fitted to the loco (see below).



The burning question now is "does it work?" The lubricator has now done significant service on the track and amazingly I can report complete satisfaction.