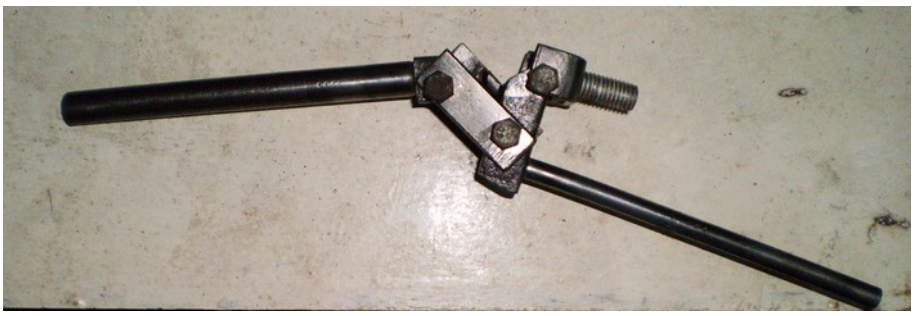
A Belt Tensioner For An Old Cowells90 Lathe

A pet peeve of mine ever since I went to Norwich nearly forty years ago, in 1980 or 1981, to buy a new Cowells90 lathe to replace my second-hand Unimat SL, has been the slapdash approach by Cowells (or even by Perris ?) to the problem of belt tensioning.

The system whereby you have to loosen a clamp bar, push hard on the countershaft bracket while re-tightening the clamp bar may be cheap, but not good engineering, as shown by Cowells coming up in later years with a more elaborate system that now uses a lever-operated cam for belt tensioning.

I had considered upgrading my lathe by getting the relevant parts (countershaft support bracket, countershaft bracket, cam and spindle etc.) from Cowells, but given the prices they charge for spare parts, which must obviously be made of Unobtainium and not of cast iron, and for shipping abroad, I decided to find another way, and enjoy myself designing and making.

I was guided in my design by a belt tensioner I made years ago for my pillar drill, that works on the principle of a lever operated self-locking toggle link, similar of that of the Stanley Mole Grip pliers for instance, or of the breech lock of the Luger P08 semi-automatic pistol.

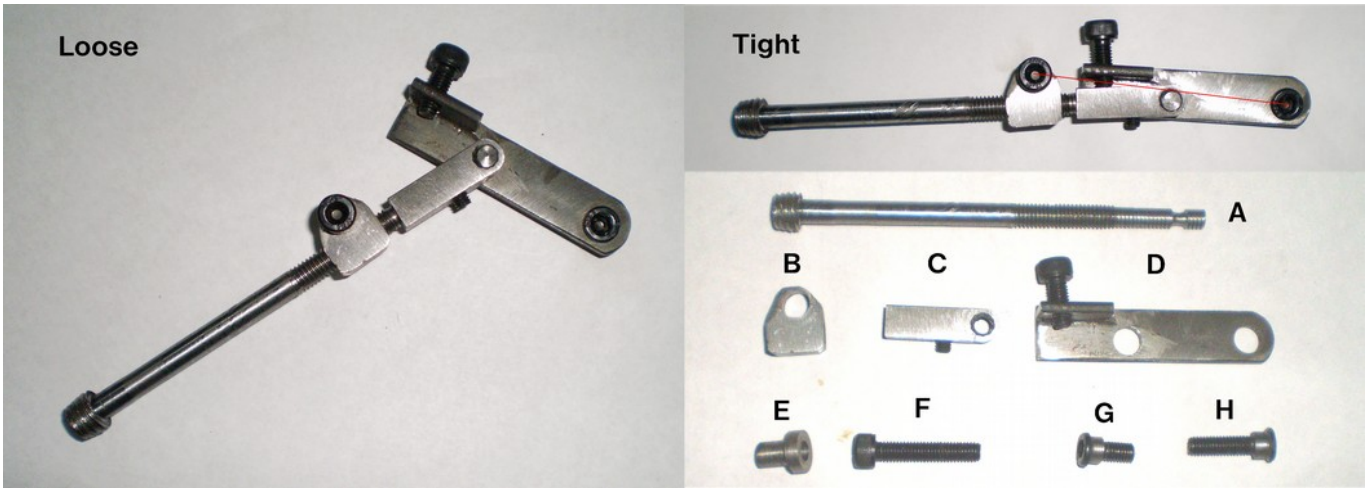


The basic imperatives of my design was that the lathe itself was not to be modified in any way, but that the new tensioner should use the same anchoring points as the original tensioning stay.

This would allow a return of the lathe to its original condition if the new system was found deficient.

This in turn implied that the extreme pivots of the toggle would be M5x80 screws; from then on it took a few hours of insomnia spent ruminating on the problem, a false track that separated the actuating lever from the link length adjustment but also reduced the available adjustment length, and finally the Mark-1 design I have made, which you can see in the pictures.

The red line in the Tight picture explains how the tensioner locks in that position when applied.



(In the above pictures of the assembled linkage the screw (H) is shown back to front.)

The driven link (D) is cut from a piece of 13x3mm angle, with just a small tab of one wing kept as a stop to limit the movement of (B); an M5x8mm screw allows adjusting the stop just past TDC. Two 7mm Ø holes take the pivots (G and H) which are made from M5x16mm Allen screws with the head Ø reduced to 7mm over 3mm of their height. Pivot (H) is screwed into the headstock casting.

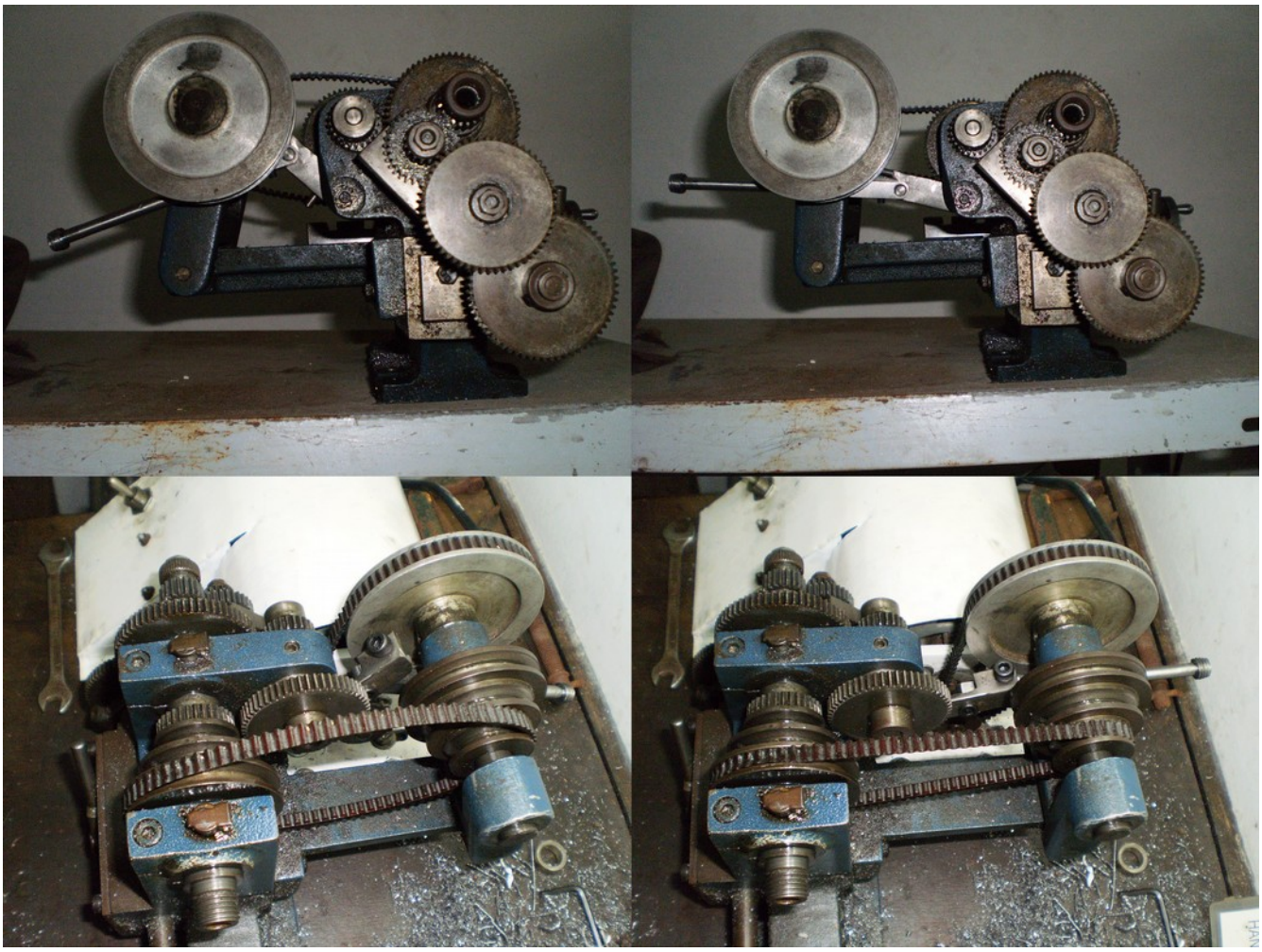
The driving link is made from an M6x100mm Allen screw (A), with its threaded portion extended to 45mm, and then its lower 22mm turned down to 5mm Ø. of an 8mm thick 13mm x 15mm pivot block (C) with an M6 threaded hole to take the threaded part of the (A) screw, and a 7mm Ø hole to take the 7mm Ø pivot bush (E) fixed to the countershaft bracket with an M5x25mm screw (F). The head of that screw has been reduced in height (not shown in picture), increasing the clearance with the reduction pulley as I plan to upgrade this in the future to two-speeds, like the pulleys of the recent 90MEs.
The lower part (C) of the link is a 30mm long piece of 8mm square bar, drilled lengthwise 5mm Ø to take the end of the (A) screw with an M5 hole to receive the middle pivot screw (G). An M4x5mm grub screw engages a groove near the tip of the M6 screw, to prevent it pulling away from (C) when the belt is loosened. The pivot bush (E) has a 3mm thick shoulder to keep all forces in the alignment of the original adjustment stay bar.

The head of the M6 screw has been threaded 10x125 to take a black plastic ball for a handle; but this depends on the vagaries, in pandemic times, of international post bringing me in Darkest Paraguay the plastic balls from far away Cathay.

And for the future: As the leverage of the driving arm is not comfortable in use, it probaly needs a longer arm to apply the necessary tension.

Next job: Turn a longer one from a 150mm length of 6mm Ø rod, to replace (A).

The new tensioner in place,
Top as seen from the end of the lathe, Bottom from the driver's seat;
On the left in the loose position, on the right with the belt tightened.



Comments, advice, queries are welcome at **renaud@olgiati.fr**

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