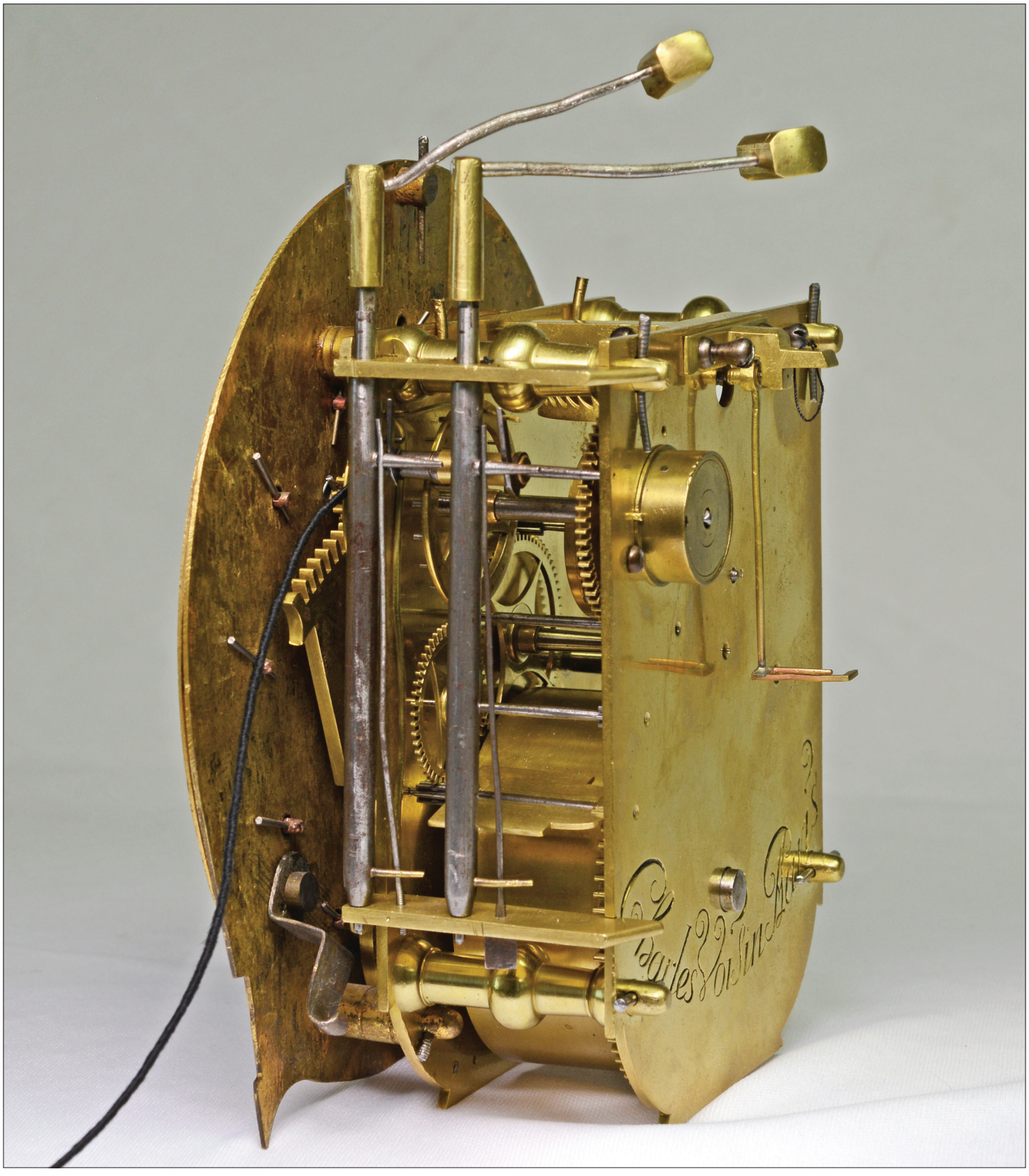
OFFICIAL JOURNAL OF THE BRITISH HOROLOGICAL INSTITUTE

The Horological Journal

AUGUST 2021
www.bhi.co.uk



A New Type of Watch Mainspring Winder

An Easily-Made Alternative to Conventional Winders

Michael Glen

The recent articles on mainspring winders by Justin Koullapis ('Mainspring Winders, Compiling all the Sizes' and 'Mainspring Winders, Modifying a Bergeon Set for Easier Use', *HJ*, May and June 2021) led me to think that readers may be interested in a mainspring winder that I developed for my own use. About two years ago I was in the situation Justin described: wanting to go further with my interest in watch restoration, but not being in a position to invest in a full set of mainspring winders. Having purchased one Bergeon winder to progress the project I had in hand, I encountered a number of issues when using it:

1. While I had picked the size closest to the watch barrel in question, it still seemed to me to be compressing the spring excessively when it was wound into the tool prior to injection.
2. While winding the mainspring into the tool, it was very easy to slacken the downward pressure on the handle, allowing the spring to escape catastrophically from the tool!
3. As I got to the end of winding, and the bridle of the automatic spring was being pulled in, it sometimes stuck or became quite hard to turn. Attempts to peep under the disc of the winder handle to see what was happening again resulted in disaster.
4. Finally, removing the winding arbor was fraught with difficulty. The handle is wound in reverse to disengage the hook, but it is difficult to be sure this has happened, and the grip of the spring on the arbor makes the handle and disc difficult to remove even when the hook has disengaged. Justin's modifications of the Bergeon tools addresses this problem.

I decided to try and make my own mainspring winder, using a different approach, and see if some of the above issues could be avoided. Similar to the Bergeon winders, my new design has a winding barrel with raised neck and slot, and a plunger, but the winding arbor is inserted from the other side of the spring. The barrel, plunger, arbor and handle are all separate items, and two new elements are added: a cap and an 'injection base'. The parts are shown diagrammatically in **Figure 1** and the parts as manufactured in **Figure 2**. The tool assembled with the mainspring in and ready to wind is shown in **Figure 3**, and **Figure 4** shows how the injection base is used.

I have found this tool does resolve some of the issues mentioned above. The injection base allows everything to be lined up and held in place while injecting the spring, so the reduced neck of the winding barrel can sit on top of the watch barrel, rather than inside it. This allows the internal diameter of the winding barrel to be more accurately matched to the internal diameter of the watch barrel, and the mainspring has to be compressed less to insert it.

The cap, which is held on to the projecting arbor with a grub screw during winding, keeps the mainspring safely in place during the operation. However, it is possible at any stage to remove the cap carefully and see how the wind is going. Another grub screw in the winder barrel keeps the plunger secure, so there is no risk of accidentally pushing the plunger up and prematurely ejecting the spring.

When it comes to removing the arbor, the cap is removed and the mainspring held in place with a thumb or finger. The handle is reversed to release the hook and the arbor pushed up, and out of the tool. There is no disc or handle crank to get in the way and there is a clear view of the mainspring and the hook. One has to be careful to keep one's thumb on the spring, however.

The original winder took about three days to make, but I should point out that this was one of my first lathe projects. I have found that it is not necessary to make all new winder parts for every watch. The arbor (2.98 mm diameter) fits most of the watch mainsprings I have been working on, so this handle, cap and arbor can be used with different size barrels, plungers and bases. Watch barrels with different internal diameters sometimes fit in the same injection base, as the injection base fits outside, around the teeth of the barrel. The compatibility of the actual winding barrel and plunger with different watch barrels appears to be about the same as for the Bergeon tools. As long as the internal diameter of the winding barrel is slightly less than the watch barrel internal diameter, it works.

Making the Mainspring Winder

The tool was made on a small lathe of Far Eastern origin, 300 mm between centres (Chester UK DB7V). Brass rod of nominal 10mm, 16mm and 25mm diameter was used for all the parts except the arbor, which was made of nominal 3mm diameter bright steel rod.

The winding barrel was made first, with the internal diameter about 0.5 mm less than the measured internal diameter of the watch barrel. So for a watch barrel of, say, 11.7 mm diameter, a 10 mm hole is drilled through a length of 16 mm diameter brass rod. This is then opened out to 11.2 mm diameter with a mini boring bar. The wall thickness of the winding barrel is then reduced for the last 2 mm of its length (or a little more than the height of the spring) for a final wall thickness of 0.6 mm. A piercing saw and a fine file were used

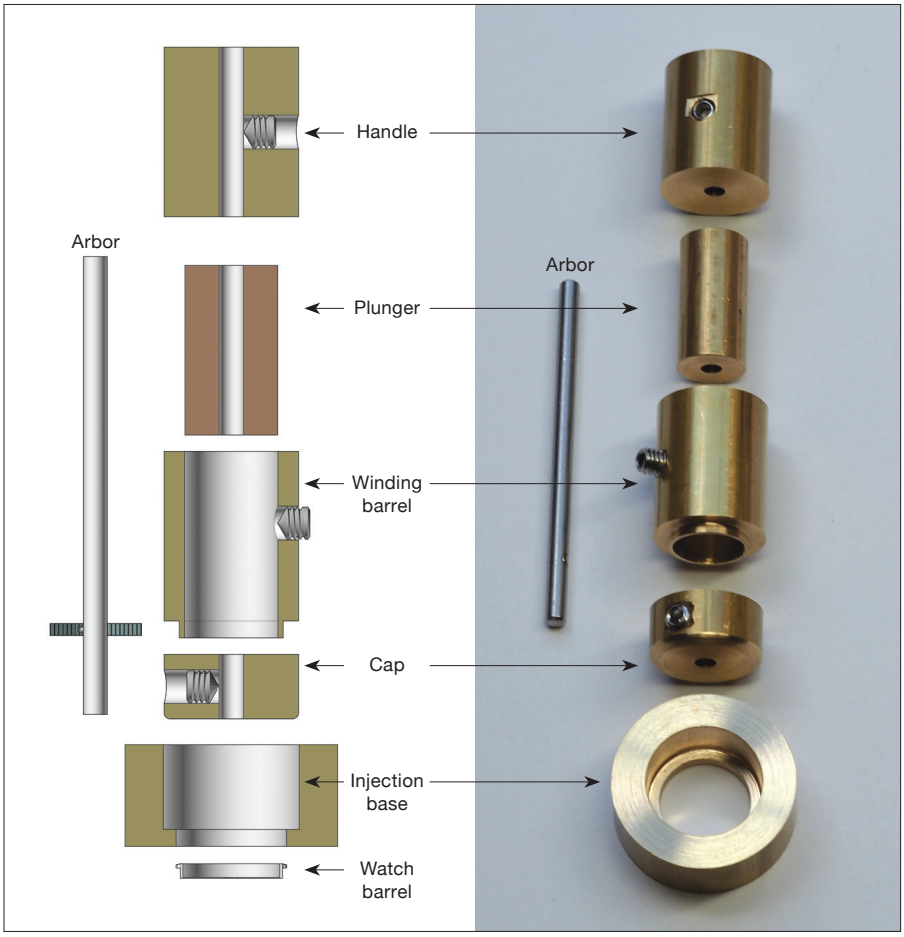


Figure 1. Parts of the winder before assembly.

Figure 2. Parts of the winder as manufactured.

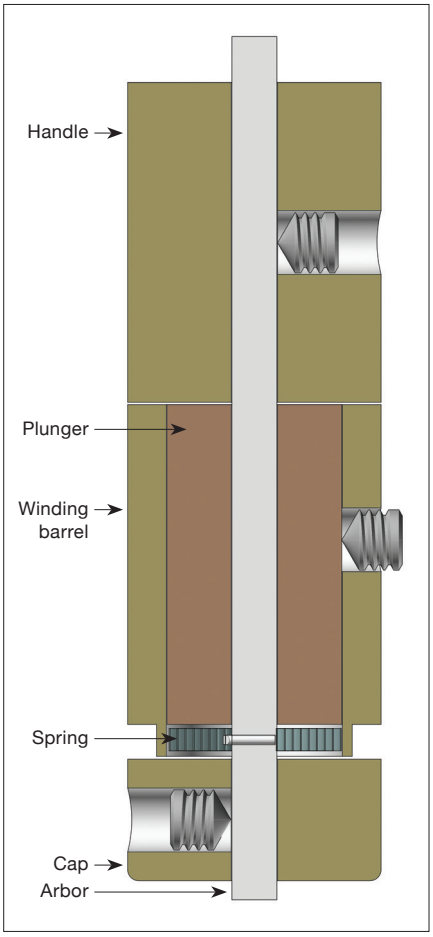


Figure 3. The tool assembled with the mainspring in and ready to wind.

to form the opening in the reduced wall of the barrel for the spring to pass through. The sides of this opening were rounded to help springs pass through the slot in either direction. The wall of a Bergeon winder is typically about 0.3 mm thick, but as the new winder sits on top of the barrel rather than in it, the thickness is less important. Also, if the barrel is later opened out a little to suit another watch barrel, the thicker wall can accommodate this.

The plunger was turned down from 10mm or 16mm rod to suit the winding barrel, and the centre drilled to accept the arbor. The cap and handle were similarly produced as a simple drilling and turning exercise. The injection base is from the 25 mm diameter rod and was drilled and bored to 16mm diameter to receive the winding barrel, except for the last 2 or 3 mm. This end length was opened out to receive the watch barrel, testing the fit around the watch barrel sitting on the bench.

The winding barrel, handle and cap were all cross-drilled and tapped to receive 4 mm diameter stainless steel grub screws.

The arbor was cross drilled 0.6 mm and a short piece of 0.6 mm MIG welding wire pushed through to form the hook. The wire was secured on one side with a spot weld from a Lampert PUK TIG welder, but could equally well be soldered. The projecting end of the wire was then formed with watchmaker's files to provide a left or right handed hook, **Figure 5**.

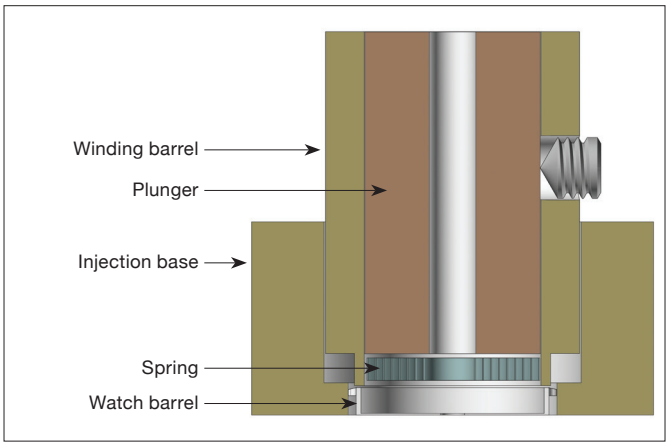


Figure 4. Winding barrel in the injection base, ready to inject the spring.

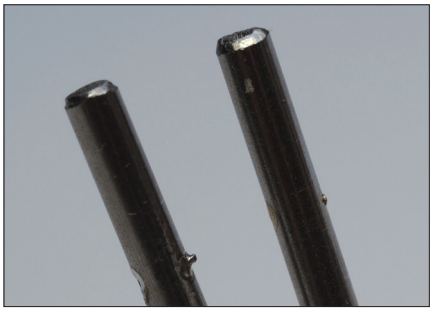


Figure 5. Winding arbors made from 3 mm steel rod, cross drilled to receive 0.6 mm MIG wire, shaped with a file to form the hook.

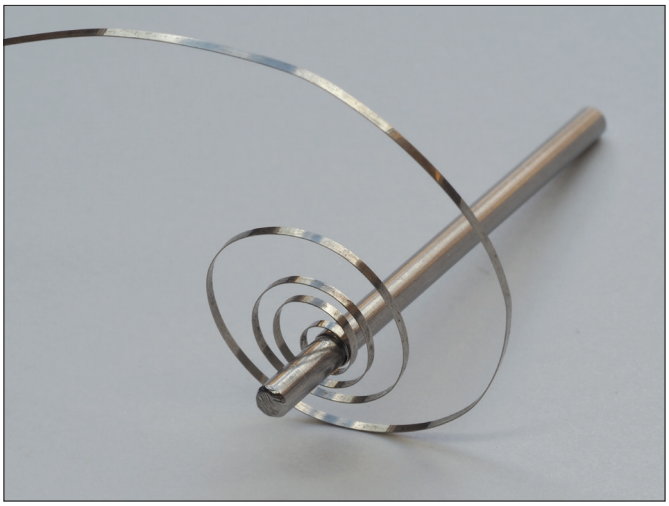


Figure 6. The spring is hooked on to the arbor.

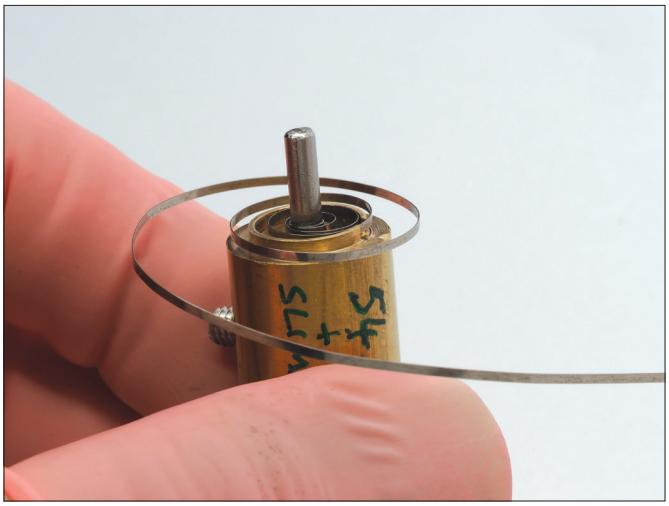


Figure 7. The arbor and spring are placed in the assembled winding barrel and plunger. The grub screw in the barrel keeps the plunger in place.

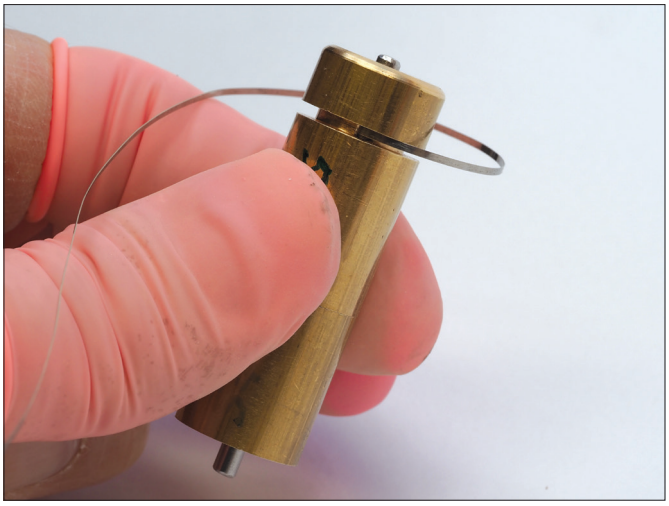


Figure 8. The cap and handle are fitted and the spring wound in.

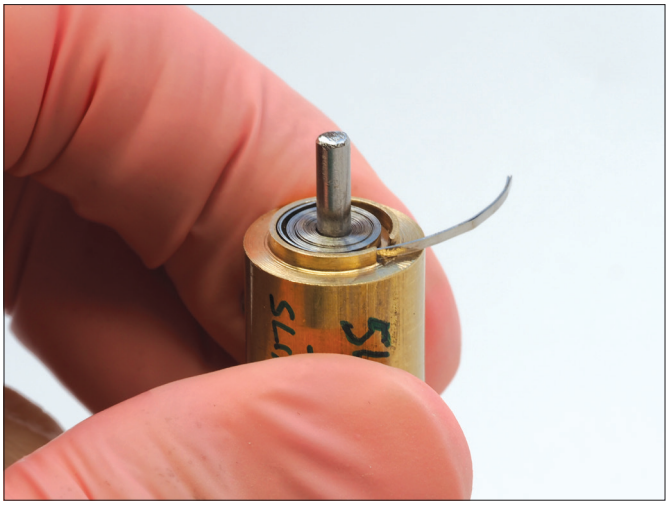


Figure 9. The cap can be removed at any time to see how the spring is winding in.

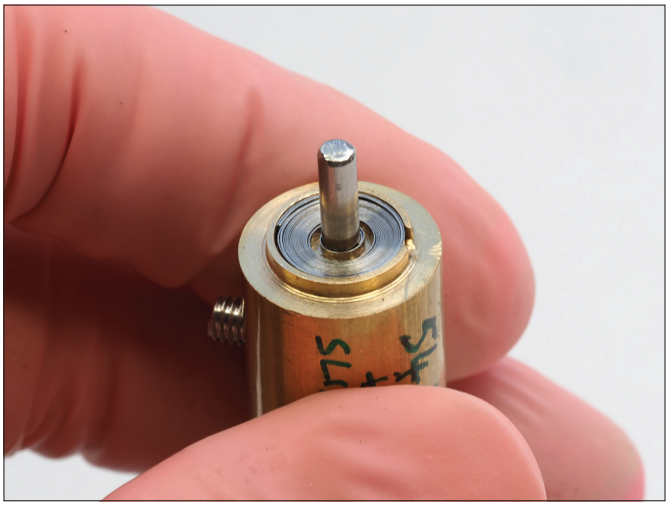


Figure 10. The spring fully wound in.

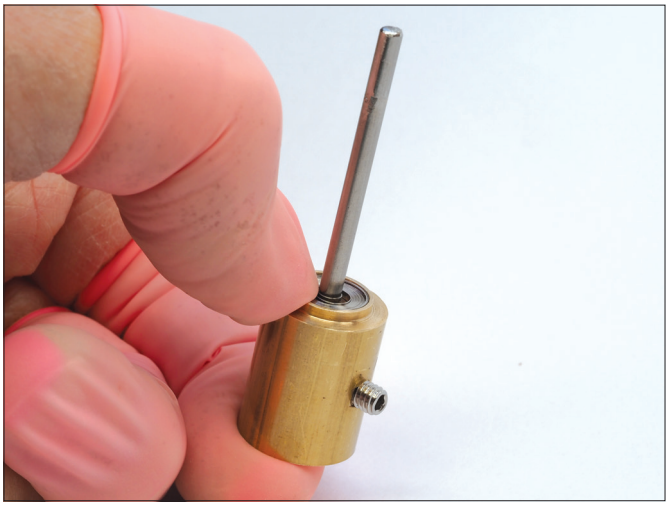


Figure 11. The handle is removed and the arbor extracted upwards, using a thumb or finger to keep the spring in place.

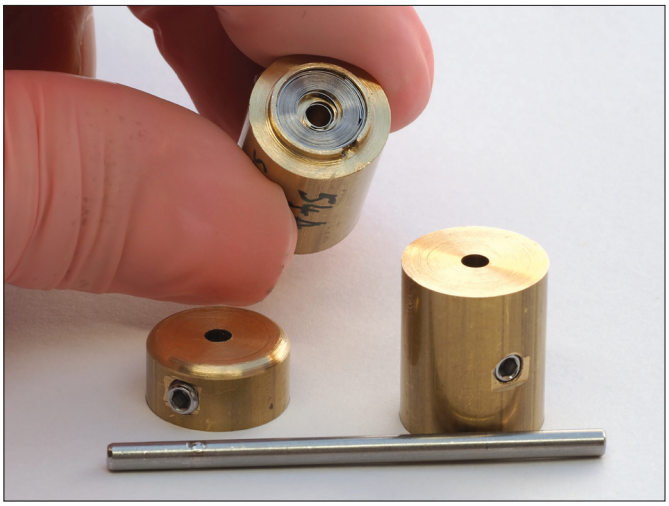


Figure 12. The spring, ready to inject.

Figure 13. The watch barrel is placed in the injection base.

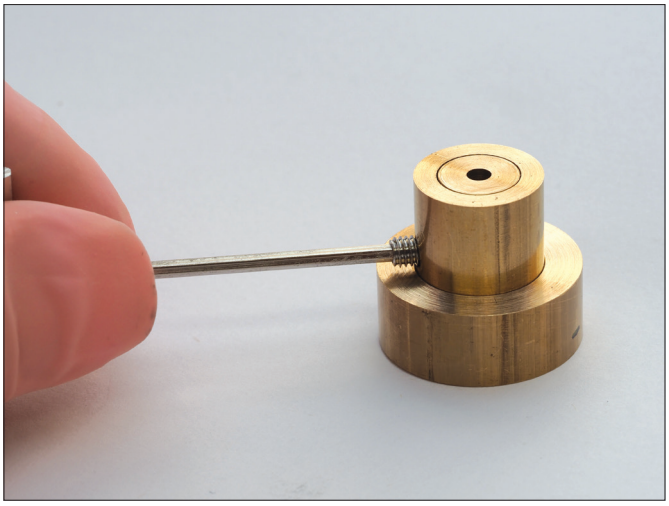


Figure 14. The winding barrel is placed in the injection base. The grub screw is loosened to release the plunger which is then pushed down to inject the spring.

Figure 15. The spring in the barrel.

Conclusions and Observations

The prototype tool has worked successfully on five watches so far. One additional winding barrel and plunger had to be made, plus two additional injection bases. One injection base was opened out a little on the lathe to accommodate a larger barrel.

An obvious improvement would be to knurl the winding barrel and handle to prevent slipping during winding, but it is quite easy to pinch the two sections together to stop them unwinding.

I have made two arbors with left and right hooks. I have found that the hook can be filed to quite a low profile and it still manages to grab the spring. A possible improvement might be to file a flat on the arbor where the hook wire emerges so as to provide a sink area for the spring, similar to a conventional winder.

Overall I am pleased with the result. When the handle and cap are locked in place, the winding process feels really secure and controlled. When removing the arbor everything is easy to access, though of course there is no disc holding the spring in, but this has not been a problem. So far, I have not had any issues with injecting the spring with the winding barrel sitting on top of the watch barrel rather than within it.

Author Bio

Michael Glen retired in 2017 after a 35 year career as an architect specialising in the conservation of historic buildings. He now pursues interests in jewellery design and vintage watch restoration from a small and very crowded workshop in County Durham. 'I am frequently struck by the similarity in the conservation decisions which have to be made in the restoration of watches, and those that are made when working with historic buildings.' He has a particular interest in adapting new materials, and technology to conservation.