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Making Your Own Tools 5

Machine Microscope, Clock Line Clamp and a Wheel-Cutting Machine

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Machine Microscope

These, two of which are shown in **Figure 1**, are like telescopic sights, with cross hairs. The first (upper, with morse taper fitting) was so useful I made another (lower, with R8 fitting) for my milling machine. Kits[1] are available from Hemingway.

The only difficulties with these are focusing and lighting the target. Initial focusing is assisted by the short lengths of ball chain (as used for bath plugs), which can be seen in the pictures. The chain is cut to the appropriate length during construction, after which it is used to set the approximate distance prior to fine focusing by eye. Use of the chains is an idea I got from the old Minox spy camera, which used a similar chain to set the right distance from a document being copied.

The lighting problem was overcome by the use of a ring light, **Figure 2**, which was bought from eBay for about £20, and is also useful with cameras for close-up work. One of the microscopes is shown in use in **Figures 3**, in which it was used to find the centre of a part prior to offsetting and carrying out an operation involving dividing. The dividing head is the one described in the *HJ* (November 2022).

Is it worth the trouble? Definitely; having made and used the morse taper one for use on my lathe, I had no hesitation in making the R8 one when I got a milling machine. They are not as easy to make as some of the earlier items mentioned in this series, in particular because they require some fine screw cutting, but they are worth the effort as both have proved useful.

Figure 1. Two machine microscopes.

Figure 2. The LED ring light.

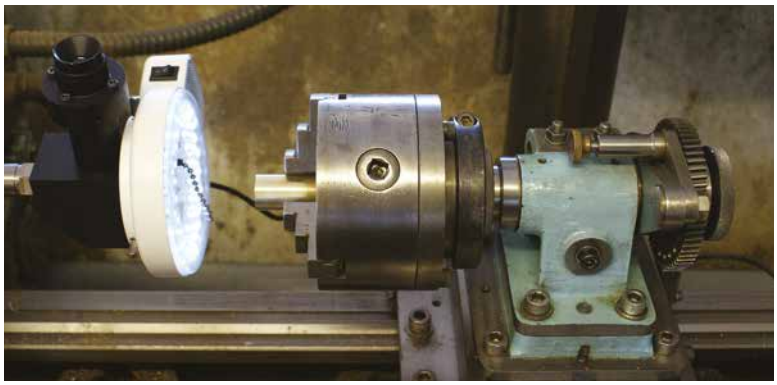

Figure 3. Microscope in use, light on.

Wheel-Cutting Machine

This machine, **Figure 4**, was made to a design that appeared in five parts in the *Horological Journal* between February and June 1979. At that time there were other designs and kits available for wheel engines, but I chose to make this one on the grounds that it was more sturdy than some and it used tapers, both in the major bearing and for the mandrels, **Figure 5**, which screwed into the main spindle to carry the wheel blanks. I considered this to be preferable to those that used a grub screw to secure the mandrels, as the use of a taper makes concentricity of the wheel to its hole more certain.

I made a number of blank mandrels, which could be machined as required, along with an adaptor for my lathe, **Figure 6**, with which this could be done. The adaptor,

which is of Schaublin L20 pattern, was made prior to the mandrels mentioned above, and the taper bored using the set-up described below. **Figure 7** shows a ratchet cut on the machine using a shop-made fly cutter. The finish achieved requires no further work.

At this point a note on the turning of tapers is apposite. Two things are clear: that the male and female tapers must match perfectly and that, to ensure this, both must be made without disturbing the angle at which the top slide of the lathe is set. As I recall, I turned the male tapers in the conventional manner, but bored the matching female ones with the boring tool set to cut at the back of the work and the lathe running in reverse. While it was set up I made all of the matching parts that I expected to need.

Is it worth the trouble? Probably not, unless you intend to cut a lot of wheels. The division plates, which used to be provided by Chronos, are no longer available, though it should be fairly easy to adapt the machine with a stepper motor and use a rotary controller with it instead. If I were setting out to cut wheels now, I would be inclined to do so with a lathe. The process is described in detail in the book *Wheel and Pinion Cutting in Horology*[2] by J. Malcolm Wild FBHI.

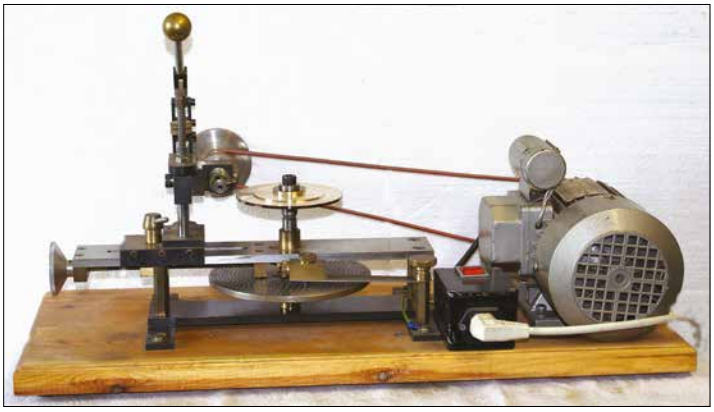

Figure 4. The wheel-cutting engine.

Figure 5. The mandrels.

Figure 6. Lathe adapter.

Figure 7. A completed ratchet on the machine.

Clock Line Clamp

This, **Figure 8**, was given to me by Colin Walsh, my colleague in the Harrison Project team. It was made from a clothes peg and a section of plastic waste pipe, lined with self-adhesive green baize. **Figure 9** shows it in use.

Is it worth the trouble? Absolutely yes! I wish I had thought of this years ago when I was dealing with longcase clocks on a regular basis. It is a much more elegant solution to securing the lines than the bits of masking tape I used.

Figure 8. The clamp.

Figure 9. The clamp in use.

REFERENCES

1. Hemingway Kits, *www.hemingwaykits.com*, ref. HK 171X.
2. Wild, J. Malcolm, *Wheel and Pinion Cutting in Horology* (Crowood Press Ltd, 2001), ISBN 1 86126 245 0.