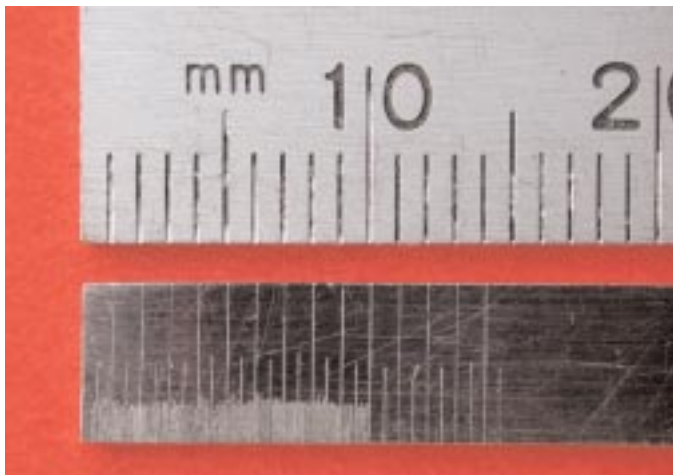


Home Made Tools, 2

Richard French continues his description of useful tools that the watchmaker, particularly the amateur, can make.



1. A homemade rule marked at 0.1mm intervals compared with a standard 150mm rule

THERE IS A TENDENCY to think that tools should be bought not made, which may be true of everyday household tools, but not watchmaking where a much greater variety is needed and where they need to be well suited to the job in hand. Any task that proves difficult is a candidate for either a tool or a jig, and reference should be made to the many books available, which describe the tasks and illustrate the tools needed. Being essentially small and suited to hand working, the items needed are generally straightforward to make. The first tool to be described, a fine steel rule, continues the measurement theme of the first article.

A Fine Steel Rule

Although many replacement parts are made by direct comparison with the broken part, this is not always possible and often the broken part is not the original and may not be correct. It is therefore useful to be able to make absolute measurements when needed. A standard six-inch engineers rule has graduations marked every millimetre which are themselves about 0.2mm wide,



2. Marking the intervals using the lathe lead screw calibration.

which is not much use when making measurements on a balance staff being turned in the lathe. The rule shown in, 1, has graduations every 0.1mm, made in a machine lathe using a scriber with a fine point, using the lathe lead screw calibration to obtain the 0.1mm spacing.

The rule is made from a piece of 1mm gauge plate, 100mm by 6mm. The first step is to make the scriber from 4mm silver steel, with the point taper turned. It is then hardened and tempered to light straw and the point ground with an Arkansas stone as the scriber is rotated in the lathe in a collet. A fine hard point is needed. The gauge plate slip is held down on the lathe cross slide, 2, with a clamp (omitted from the photo for clarity). The scriber is held in a holder, in the three-jaw chuck, and can be swung down onto the surface of the rule by rotating the chuck. The scriber must be firm in the holder.

With the scriber point trailing and pressed on the rule, the cross slide is moved one millimetre across. The scriber is then raised and the cross slide returned. The saddle is advanced by 0.1mm by the lead screw and the next mark made. Longer marks can be made at 0.5mm and 1mm. It is important to start the marks exactly at the end of the rule, which should be finished square and true before starting. To avoid backlash error, only move the lead screw forward. The whole process must be completed without disturbing the rule or the scriber. Although the rule is 100mm long, only 10mm really needs to be calibrated.

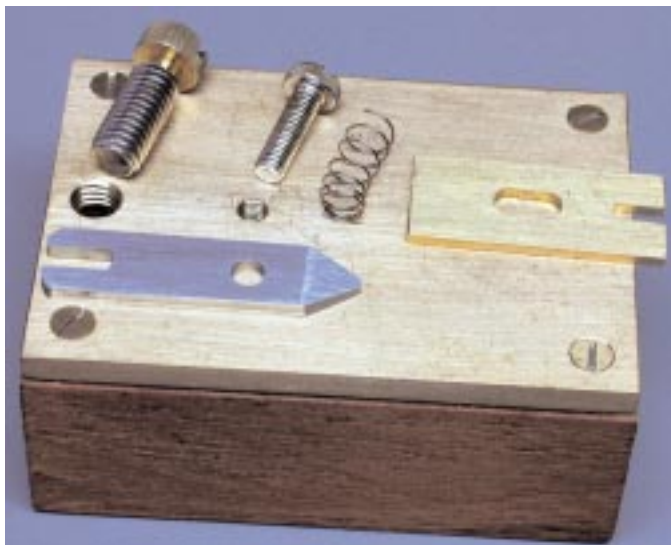
Balance Cock Finger Plate

I find it difficult to hold a balance cock upside down on the bench while undoing the stud screw and opening the curb pin boot to release the balance spring. There is a nasty tendency for the cock to fly away and the spring to become distorted or even tangled. It is a lot easier if the cock is held in a finger plate, 3, where it is secure and also raised up so that the stud screw is accessible.

It is also convenient to be able to pick up the finger plate to inspect the balance and spring. The balance spring can be adjusted by removing it from the balance and securing it in the cock by its stud. With the cock held in the finger plate the spring is adjusted to lie correctly between the curb pins with the spring collet centred over the jewel hole. Both hands are free to work on the spring and the left hand does not suffer the strain of holding the cock steady for long periods.



3. Balance cock finger plate holding a wrist watch cock.



4. Parts of the balance cock finger plate.

The finger plate, 4, has a central screw to clamp the finger down on the cock foot. An outer shoulder screw pushes up for added pressure to stop the cock moving. The coil spring (from a ball point pen) holds the finger up ready to receive the balance cock and the notch in the brass piece accommodates the index tail on modern watches. In most cases it is necessary to place a packing piece under the index at the curb pins to prevent it from sagging down or popping off the cock when the boot is opened. In pocket watches the cock is often stepped, requiring a thick packing piece under the foot, 5. A collection of packing pieces made from off cuts builds up as new cock designs are worked on.

The dimensions are not critical; in the example shown the brass plate is 52 x 36mm and the wood block is 19mm high, which has proved satisfactory for both wrist and pocket watches. The screws could have knurled heads, but slotted screws are better as they avoid the danger of knocking the balance, which, with only one pivot supporting it, is vulnerable. The finger is made from gauge plate or from mild steel; which is strong enough.



5. Holding a pocket watch balance cock using packing pieces.

Cleaning Fluid Siphon

The fluids in the cleaning machine need to be decanted from the deposit that collects in the bottom of the glass jars. Pouring the fluid out is messy and the sludge swirls up to contaminate the fluid again. A siphon is needed, but the traditional way of starting a siphon, by sucking on the end of the tube is clearly out of the question! The arrangement described here, 6, uses a plastic milk bottle with the plastic siphon tube a close fit through the plastic cap together with a second short tube.

To start the siphon, the plastic bottle is squeezed a little before placing a finger over the open end of the short tube. The bottle is released and as it regains its shape it sucks fluid through the siphon to start it going. After that the finger is removed from the

short tube and the siphon left to run.

Initially I used a large syringe to suck air out through the short tube before thinking of simply squeezing the plastic bottle. The short tube avoids squeezing air through the siphon tube and disturbing the sediment with bubbles. I hesitated to include this rather simple tool, but it works perfectly on a job I used to hate doing; surely one of the reasons for making the right tool for the job.

Microscope Prescription Lenses

I have always envied those who have a microscope and enthuse about how well they can see and what wonderful work they can do. The trouble is that I wear spectacles with correction for astigmatism. This cannot be corrected by adjusting the microscope eyepieces and I do not find it possible to see properly through the microscope when wearing glasses.

It finally dawned on me that it was not necessary to buy special prescription eyepieces as suitable lenses could be cut from your last pair of plastic spectacles. The lenses are fixed to the lathe faceplate with screws through unwanted parts of the lens and a disc cut out from the optical centre that is a push fit in the microscope eyepiece, 7, where they simply add to the existing eyepiece lens. The same could be done with the "give away" second pair of glasses offered these days.

I have now joined the group extolling the virtues of being able to see exactly what is there! But be warned, you will be amazed how poor your work will look and how dirty your cleaned movements appear to be under strong magnification; about 20 times in my case.



6. Siphoning used cleaning machine fluid from a jar.



7. Additional prescription lenses for microscope eyepieces.

Oil Stand

Since an oil stand is in constant use, it should be practical to use and an attractive object on the worktable. The example shown, **8**, was made from a commercial oil cup and set of oilers mounted on a mahogany block. A large piece of pith is fixed to the block with a blob of glue so that it can be replaced when exhausted. The pith holders in commercial oil stands are inconveniently small and soon fail to clean the oiler properly; hence the use of a large disc of pith.



8. An oil stand with a larger piece of pith.

Graver Sharpener

This is a straightforward tool to make; the only point to emphasise is the brass shoe that fits over the graver between the graver and the clamping screw and ensures that the graver does not shift while being sharpened, **9**. The shoe has a shoulder to locate it while inserting the graver.

Since quite a lot of pressure is used during sharpening it is dangerous as well as inconvenient if the graver moves in the tool. The under side of the shoe has a V-groove and the top is flat. If the screw bears directly on the graver it will not stay tight. Commercial tools I have seen do not have this shoe, which is well worth adding to render them satisfactory.



9. A graver sharpener with a safety shoe to avoid the graver shifting.



10. Precision emery sticks with a safe edge.

Emery Sticks

Commercial emery sticks are rather clumsy, with poorly defined edges and no safe edge. The home made sticks, **10**, have strips of emery paper fixed to hardwood sticks with brass clamps. The clamping screws are held in holes tapped directly in the hardwood.

Having fixed one end, the emery paper can be drawn tight with the thumb while the second clamp is done up. Any slack in the paper allows a "ripple" to form in the paper which rounds any sharp edges in the work. With the paper drawn tight this is no worse than with a glued down paper, which does tend to round edges.

Since the clamps are at different distances from the end, a new part of the emery strip can be brought into use by reversing it on the stick.

In order to reach up to a shoulder, the strip can be accurately set next to the edge of the stick. Cutting the strips is tedious and soon blunts the knife blade, but the sticks are better and cheaper than the commercial ones. It is worth using the sort of knife with a series of snap off portions. The straight edge used to cut the strips should have a shoulder to protect the fingertips during cutting.

Selection of Small Tools

A few more tools are shown, **11**. The top row shows a tool for annealing arbors for repivoting and a table with a handle for warming levers in order to adjust the pallet jewels.

Below are a deep movement stand for movements with long centre arbors, a mainspring winder, a classical bolt tool for polishing and a tray for bluing. The long pegwood tools are hollow pushers for watch hands and the boiling out pans are metal bottle tops with wire handles. The thin plastic handle and cap holds a very fine hard steel taper for gauging jewel holes. The jewel hole is threaded on and the projecting taper is measured in the micrometer dial gauge.

At the bottom are a simple oiler, a long wire with a hook for pulling a fusee chain behind the plate pillar and, finally, a set of balance staffs mounted in pegwood with the size marked for gauging jewel holes or for comparison when turning and polishing pivots.

Plastic knitting needles make good handles for mounting pushers made from blued pivot steel, and sewing needles for manipulating balance springs. □



11. A selection of small home made tools (see text).