

Taking his time



David Cottrell

Left: independent watchmaker David Cottrell photographed for QP in Somerset.  
Below: his Pocket Watch No 1



Inspired by George Daniels and Roger W Smith, self-taught  
watchmaker David Cottrell is going it alone

*By Jonathan Redmore / Photographs by Max Miechowski*

From past centuries to present, watchmaking achievements in the UK always seem to have been the activity of special individuals imbued with intellectual brilliance, a high dose of endless, almost ornery stubbornness and a “carry on and get the job done” mentality. Think of John Harrison, an 18th-century carpenter who devoted his life to creating the most accurate pendulum clocks, seafaring chronometers (and later pocket watches), for which he would receive national recognition and a monetary reward only a few years before his death. For just one example of Harrison’s determination, consider he spent 19 years of his life perfecting one clock alone: the H3. Most remarkable is that Harrison taught himself all the necessary mathematics as well as advanced metalworking techniques in order to accomplish this.

In more modern times, we look to Dr George Daniels, whose incredible passion for the art of mechanical watchmaking spurred him to spend his life searching for the ultimate escapement, the creation of extraordinary pocket watches and writing the primary English language textbook systemising watchmaking through only basic tools and machines.

And of course, every serious watch collector today will be well acquainted with the creations of Roger W Smith — Daniels’ only pupil. After Smith presented his first wristwatch to scrutinise, produced after several years of toil, Daniels told him that it was not yet good enough, and Smith, instead of being disheartened, went back to the bench and spent several more years perfecting a second pocket watch that would later impress Daniels so much that he accepted Smith as his first and only apprentice. It is almost as if being stubborn, unafraid of challenges, wanting to do it alone and possessing endless amounts of patience are central characteristics of the very best of British watchmaking. And it’s these qualities that perfectly fit newcomer to the British watchmaking world, David Cottrell.

Cottrell is a somewhat elusive, solitary figure who has little desire for the spotlight. I was only made aware of his existence via

Instagram when he posted information about a tourbillon pocket watch he was creating using the methods featured in Daniels’ famed tome. After more than a year of emailing back and forth, and several failed attempts to synchronise a meeting to see his project firsthand, I finally had a chance to meet him face-to-face in a rolling hillside landscape some 30 minutes outside of Bristol, where he lives in a picturesque cottage with his wife Hillary. It was clear right from the start of our interview that it would be impossible to measure Cottrell using any of the usual yardsticks from within the watch industry, and it is this aspect that makes his personal story and work so intriguing to follow for collectors.

Cottrell’s father worked as a car mechanic following WWII, based in the South Wales valleys. During this period, most of the cars were still pre-war and required a singular degree of ingenuity and lateral thinking to keep them on the road. Raised in this environment — growing up among tools and silently absorbing his father’s expertise — it’s not surprising Cottrell picked up an innate ability to look at mechanical problems in an unorthodox way. Already as a young boy he was competent at adjusting brake drums, assisting his father with dismantling and assembling engines and building model gearboxes.

Working on a Meccano model set on the kitchen table, he would sometimes before school the next morning find it fully assembled by his father, who had silently finished it at night after returning home from work. From this mechanically-suffused childhood, Cottrell’s schooling was followed by an apprenticeship making high-precision gauges, cutters and complex machinery at BorgWarner UK. He then studied engineering at Kingston Polytechnic after which he worked in IT as a business consultant specialising in manufacturing planning, material management and costing. However, the desire to continue making things with his hands meant that Cottrell always had a home workshop, among

other things, to make parts for his dirt track racer. “My first racing car was a Hillman Imp that was converted to a dirt-track racer with the help of my father while I was still an apprentice toolmaker,” Cottrell says. “Later, I managed to acquire a single-seat Formula Vee that has since gone through a number of rebuilds.”

With personal history and abiding interest in the mechanical, it was only natural that a nudge in the right direction would set Cottrell on the path to develop another skill, one that would take up all his time and energy and challenge him in an entirely new way.

That prompt was reading a short piece summarising the life of George Daniels, then-unknown to Cottrell. “Reading the article had quite a profound effect,” he says. “That one man could make all the parts of a watch from raw materials was a revelation and also seemed to be suggesting something of an irresistible challenge.” The life-changing moment was to happen later when Cottrell received a copy of Daniels’ book *Watchmaking* from his wife as a Christmas present seven years ago.

Unaware of Daniels’ statement that “cars and watches are just the same; the only difference between them is that one is bigger than the other,” Cottrell started on his first watch. While his then-available equipment was not exactly promising for the execution of the work described in the book, a large dose of determination ensured that his first timepiece would eventually come together.

As his solo horological voyage progressed, Cottrell had to gather the necessary tools to do the job. Since this first project was a trial run, equipment was acquired and modified as the work demanded. For example: making the lever for the co-axial escapement was quite a challenge until a BCA precision jig borer was acquired, refurbished and modified.

“At one stage, making the lever for the co-axial escapement for the watch looked like a deal-breaker until the modified machine was completed,” Cottrell says.

From his car-mechanic father, Cottrell picked up an innate ability to look at mechanical problems in an unorthodox way



Left: the machine Cottrell dubs the 'Straight-Rose Engine' which he built himself. Below: tools and apparatus in his home workshop

A major hurdle was the need to acquire both a rose- and a straight-line engine — on the continent both are generally categorised as guilloche machines without clear distinctions — for the ornamentation of dials and some of the cases. But the machines Cottrell tracked down were either too expensive, not good enough, or quite often both. After realising that it would be possible to combine the capabilities of both types of machine into one, Cottrell bought a basic machine for milling instead, installed it in his garage and designed it from scratch. He named it “the straight-rose engine”.

The machine took a year to complete and several months to master, but was a fraction of the size of the usual antique rose machines used in conventional watchmaking. Occupying a small section of a table in his workshop, the straight-rose engine is fully capable of combining both rose- and straight-lines. It's also equipped with a motor so that facing and recessing work can be carried out on a dial without the need to set up in a lathe.

One of his invention's more extraordinary accomplishments is that a watch's main dial, together with any recessed sub dials for indicators, can be rose- and/or straight-line patterned from one single, circular slab of metal in one set-up on one machine. A truly remarkable feat of horological engineering, this is quite divergent from the normal practice of handmade, classical dials, comparable to what you might see in old Breguet or Daniels.

In such dials, the maker is faced with the challenge of creating the various rose- and straight-line patterns in several separate sections for the various sub dials, thereafter cutting each decorated slab into the required shape, followed by soldering them all together to form a round dial. Of course, during the process of handling and soldering this tiny puzzle into one perfect unit, there are all the dangers of possible damage, scratches and/or discolouration of the separate parts, making the dial assembly a daring enterprise for any watchmaker.

A perfectionist for small details, Cottrell used his metallurgical experience (of how metals react in tough environments over the long term) to experiment with non-traditional materials for his Pocket Watch No 1. It is an approach that even

David Cottrell crafting watch components in his workshop



## ‘I’m not considering commercial aspects. The moment will come, because I am sure my ideas could work well in wristwatches’

the most forward-thinking brands today might take good note of: for No 1, the two winding barrels were machined from phosphor bronze, a material that possesses excellent wearing properties for a part that is subject to relatively high loads. As a further improvement for No 2, the barrels and train wheels are being made from aluminium-bronze alloy, a material with both excellent wearing properties and a much higher resistance to corrosion and oxidation. It also accepts various surface finishing, making it an ideal material for watchmaking.

You would be right in thinking that for a layman’s first-time “watch experiment”, any form of escapement would already be a formidable undertaking. If you follow the suggestions in *Watchmaking*, however, and then attempt to push the envelope even further by implementing a Daniels co-axial escapement into your design, you are definitely going off-piste. Not one to be deterred, Cottrell decided from the outset to create his tourbillon Pocket Watch No 1 with a Daniels’ co-axial escapement beating at 14,400vph.

“At the time the escapement decision was taken, making any escapement was a daunting prospect, so the fact that the co-axial had its own specific challenges was a subtlety that was lost on me!” he says. “While the decision undoubtedly meant it took longer to make the watch, much was gained in skills and improved equipment to do the job.”

Cottrell made Pocket Watch No 1 to see if it could be a viable project, and he mentions his gratitude to Roger W Smith for providing in-depth feedback on his finished timepiece — paving the way for further improvement and developments — as well as Smith allowing Cottrell to use his improved Daniels’ co-axial escapement wheel design for Pocket Watch No 2.

“Many people had made favourable comments about the watch — after all it ticked — but I knew it needed to be better, much better,” he says. “Roger not only made it clear it was not good enough, but more importantly what to work on, and what to improve.”

I expect many further refinements will be seen in the second pocket watch presently under construction and due for completion in the autumn. I’m full of curiosity about this project; I had to enquire more about the specifications regarding Pocket Watch No 2 as it is planned.

The heart of Cottrell’s new timepiece will centre on a four-minute tourbillon beating at 18,000vph. Although slow beat rates have many advocates among independent watchmakers, the industry normally looks upon faster vph rates and fast tourbillon rotations as generally superior, with many tourbillons today built with their carriages turning once every minute (easy for showing running seconds) and beat rates centring around the 21,600vph mark. This is why the idea of a four-minute tourbillon, as used by Breguet in some pocket watches and planned by Cottrell for Pocket Watch No 2, can appear arcane to many collectors. I asked Cottrell more about his decision-making process.

“In Derek Pratt’s book [*Watchmaker*], he mentioned he noticed appreciable wear on the escape wheel of the usual one-minute tourbillons widely used in the industry today. This is because of the way the extra mass of the tourbillon construction needs to be stopped every time it beats. That got me thinking about alternatives to the usual tourbillon construction with the aim of giving the mechanism some additional relevance. By rotating more slowly, the issue of energy and momentum is elegantly resolved because you are not accelerating and stopping something moving as rapidly.

“Because of the physical laws involved, by lowering the velocity you are essentially achieving the same result as if you had lowered the mass of the entire tourbillon unit. However, if you dig into the physics you see that reducing the velocity has a greater impact proportionally than reducing mass. In addition, by having a four-minute tourbillon, you have the carriage, the balance, escape wheel and the fourth wheel suspended in a single unit — a watch within a watch, so to speak. In this manner, it is also possible to suspend the carriage to help isolate

the time-keeping elements from external shock.” The workshop in which all of this takes place is no more than a well-lit spare bedroom that contains the usual watch-making equipment — BCA jig borer, precision lathes and the straight-rose engine. Cottrell also has larger equipment in the garage (aka “the tool room”). This comprises a large milling machine, lathe, fly-press for case making and, most unusually, a precision tool and cutter grinder. Cottrell is therefore able to make everything himself from tooling to watch parts, with the exception of the balance spring and winding spring which he purchases from outside suppliers. This gives him unprecedented economic freedom to do exactly what he wants without the usual stress that new watchmakers inevitably experience, and it also means that he can pursue his goal of perfection and accuracy unencumbered by exterior pressure.

This scenario coupled with a workshop with no telephone number, email or street address listed begs the question: what does the future hold? Is this undertaking of Cottrell’s *ars gratia artis* or can collectors expect something more from him in the future?

“My only goal as of the moment,” he says, “is to concentrate on pursuing perfection in everything I make and constantly learning about watchmaking, challenging myself every day; you can therefore imagine my racer is a getting a little dusty at the moment! How Daniels managed to do both is a complete mystery for me.

“This means I am not considering any commercial aspects at this time. I know that eventually the moment will certainly come when I am ready to take that step, also because I am perfectly sure that my ideas could work well in wristwatches too. But that is all quite a bit further down the road. Right now, my only goal is putting everything new I have learned into my Pocket Watch No 2, honing my skills. No pun intended, time will tell when the next steps are ready for release to the public.” © Follow David Cottrell’s horological adventure @djcottrellwatches