

Charles Frodsham & Co. – High-End Watchmaking

In keeping with the traditional work of the great chronometer maker Charles Frodsham (1810-1871) of London, a team of exceptionally skilled watchmakers has created a wristwatch with a double impulse escapement, developed from the plans drawn up by George Daniels. Stefan Muser is the recipient of one of the first examples – and goes to collect his watch from London in person.



For a few months now the first wristwatches made by the manufactory Charles Frodsham & Co. are being delivered – much to the delight of the customers, including some who have ordered their chronometer over ten years ago. Among the first to receive his new Frodsham watch is Stefan Muser, the owner of our auction house – his 18K red gold watch with «Roman» dial can be seen here. The leather strap of these watches with tang buckle is usually punched with one hole only when the new owner collects the timepiece in London; this means that the watch fits the wrist of its owner perfectly and exclusively – to all intents and purposes the ultimate symbol for the unique pleasure of owning a Frodsham timepiece.

True to tradition

Simon Frodsham is the youngest descendant of the watchmaking dynasty Frodsham. He has always keenly observed the projects of Philip Whyte and Richard Stenning, who lead the company named after his great-granduncle into the 21st century with custom-made pieces and restorations for discriminating collectors. The workshop stepped into the breach when famous watchmaker Derek Pratt was taken seriously ill and was unable to finish the replica of John Harrison's ground-breaking H4 chronometer. The Frodsham team postponed other projects and devoted themselves to completing the revolutionary chronometer in time for the 300-year anniversary celebration of the «Longitude Act» which Harrison's H4 had once won. At the same time the Frodsham specialists



Zirconia ceramic dial

were working on an exact replica of the H3 chronometer, which also had to be completed for the longitude exhibition on July 11, 2014.

In view of these projects, the words «full employment» seem to be a euphemism – but they explain the 10-year silent period after the surprise preview of the first Frodsham wristwatch in 2008.

A single source

Simon Frodsham and the two owners and directors of Frodsham & Co., Philip Whyte and Richard Stenning, had this concept of a «purely British» top-quality wristwatch in the back of their minds for quite a while. Eventually it was the aforementioned Derek Pratt who gave the «impulse» for the technical design of the watch movement - which was, in fact, the «double impulse» chronometer escapement by George Daniels, which had so far never been used in a wristwatch movement. Daniels had fitted several pocket watches with it and Derek Pratt had been able to build a tourbillon with a double impulse escapement; but even that had been used in a comparatively large pocket watch movement - so those two brilliant makers followed the «downsizing» project of the Frodsham team with great interest.

The chronometer escapement

The chronometer escapement as perfected by Thomas Earnshaw was at one time the key to British supremacy in the field of precision watchmaking. Charles Frodsham & Co. too owed their success in the 19th century to this «detached» escapement, where the transmission of the impulse to the balance is short and frictionless; this means that the balance can swing unhindered by any contact with the movement (via lever and escapement wheel). However, therein lies the problem of the chronometer escapement: An impact at the wrong moment can stop the balance, which will not restart on its own. This type of escapement also offers no protection against a perceptible «gallop», i.e., the occurrence of several impulses during a beat. While the system works perfectly in shock mount and gimballed marine chronometers, it quickly reveals its inherent limitations in portable timepieces. Abraham-Louis Breguet attempted to solve this problem by designing a second, reverse impulse instead of a singular impulse, a kind of «forced impulse» with two escapement wheels so to speak. The main problem of his «échappement naturel» was the tricky adjustment of the tooth flank tolerance for



Winding mechanism



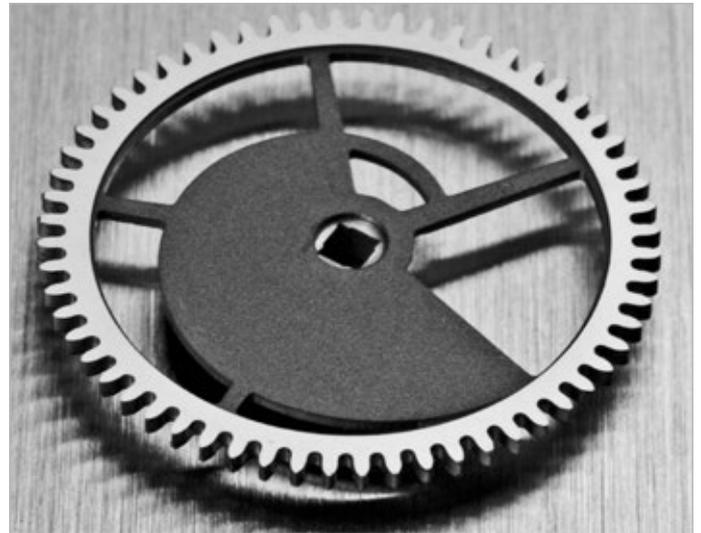
Balance



Lever of the double impulse escapement



Differential gear



Wheel with helical disc for the winding system

the direct power transmission to the movement. In the 20th century George Daniels avoided this issue in his double impulse chronometer escapement by installing not only two escapements but two completely independent gear trains. The watchmakers at Frodsham & Co. recognized the practical advantage of his design and set out to put it into practice.



Wheel train made of hardened gold

A state-of-the-art design developed from traditional models

The movement of the Frodsham wristwatch is – despite two independent barrels and a dual train – very compact. In accordance with traditional designs, the makers planned the barrels and the balance in identical sizes (approx. 13.65 mm); the space required for the crown wind, however, needed a small compromise: To ensure that the subsidiary second in the dial could be placed directly above 6 o'clock, the crown tube had to relinquish its traditional position, so that the crown now sits between 2 and 3 o'clock. Breguet himself always put the functionality of the movement above everything else, which sometimes resulted in slightly surprising positions of the hands on his dials (a legacy that is still kept alive by his modern successors). In any case – while the Frodsham watch displays a resplendent symmetry from the front, the calibre revealed by the large sapphire crystal on the back appears slightly offset and draws the viewers' attention to some extremely sophisticated technical features.



Balance bridge

There is the balance with its four tungsten carbide weights, which is mounted beneath a three armed, polished bridge. The balance spring has a raised terminal curve and is fitted with a proprietary shock protection system, which, due to the minuscule gaps between the endstones and the escapement wheel teeth (30 micrometres), does

not allow for any radial deflection. Lateral impacts are absorbed solely by longer and thinner shaft extensions. The balance has two independent brake systems; one is activated when the crown is pulled out to set the hands, the other stops the movement before one of the two mainsprings has run down and ensures that the escapement is not damaged, a system traditionally used in marine chronometers. The all-or-nothing mechanism guarantees that the movement does not restart before it is completely wound – which it then does independently due to the double impulse escapement. At the heart of this escapement sits the elongated titanium lever, which weighs no more than 0.005 g including the guard pin and the pallets – a total that is half of the weight of a Swiss lever. The Frodsham calibre has 38 jewels and a diameter of 36.6 mm at a height of approx. 5 mm. It runs at a frequency of 21,600 vibrations/h and has a duration of 36 hours. All wheels of the train are cut from high alloy gold, the steel components are highly polished. The wheels of the winding mechanism have grained centres like the movement bridges, with polished rims. A wheel with an integrated helical disc turns between the two barrels and the position of the disc indicates the tension of the mainsprings. The wheel sits at the end of a sophisticated cascading gear set with an an epicyclic differential consisting of two sun and four planet wheel gears. This winding mechanism alone is an engineering marvel.

An unpretentious beauty with a kick

The Charles Frodsham & Co. team housed their remarkable chronometer movement in a streamlined, sleek case – the comfort of the wearer seems to have been their main concern. At first glance, the only peculiarity is the offset position of the winding crown – a closer look, however, reveals several other remarkable features. The dial has clearly been inspired by a tourbillon pocket watch Frodsham created around the penultimate turn of the century and has an interesting set of hands. The steel hands have an unusual purple-blue hue which is the result of an elaborate thermal bluing process. The hour and minute hands are of equal length, which is very unusual. Their proportions, however, are designed to give the viewer the impression that they are of different length and the tips that they brush the railway track for the minutes are also different. The subsidiary second has another, small railway track with triangle markers; here too the length of the needle like hand was calculated to end exactly between the two rails of the track. The tracks are not printed – their



Richard Stenning punches the strap



fine, metallic finish was created by vapour deposition of chromium oxide. The dial has delicate applied numerals in a choice of Roman or Arabic. The dial itself has a deep white colour – neither polished nor grained – which looks like a special kind of enameling at first glance. The material is actually zirconia ceramic, often used for technical purposes because of its excellent durability and resilience. The material comes in thin sheets and at Frodsham it is polished to a thickness of less than half a millimetre, which makes it slightly translucent. The velvety sheen of the surface is achieved by frosting with very fine aluminium oxide powder. The tracks of the subsidiary second sit on an extra, sunk dial with a deep, chamfered and polished rim. The dial itself has a thickness of 0.9 mm. The high-quality Frodsham workshop is well equipped with machines for milling housings, cutting threads for screwed-on casebacks and precise drilling of crown tubes and lugs. Cases are offered in stainless steel, in 18K white and red gold and in a special 22K yellow gold alloy, which bears the assay mark 916 (for 22K) of the Goldsmiths' Company in London. The softness of the higher gold content is compensated by a two step process, where the case is first cold forged and then hard rolled – which is supposed to make the yellow gold variant even more scratch resistant than the white or red gold version.

Goldsmiths' Hall

It is of course a very special adventure to pick up one's new Frodsham watch from London in person – with the possibility to actually watch the assaying and stamping of the watch at the Goldsmiths' Hall near the London Stock Exchange. What an experience – there are not many people who can say they have done that!



At the entrance of Goldsmiths' Hall

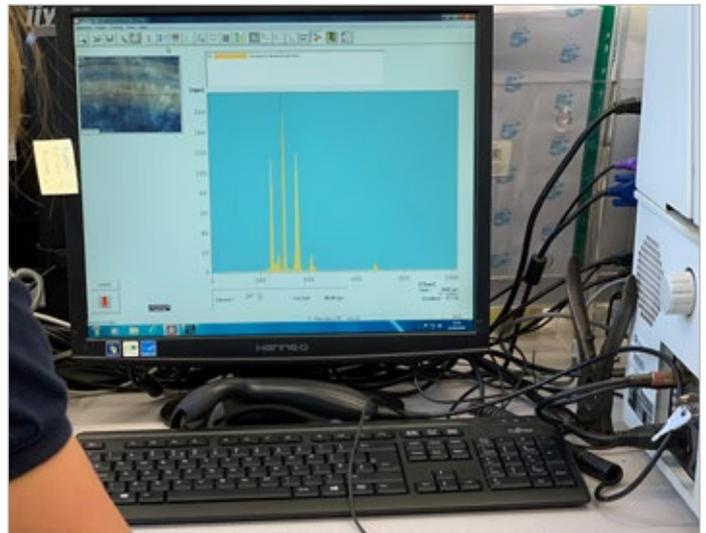


At Goldsmiths' Hall with Philip Whyte





Assaying the gold content



Stamping the case



An expensive indulgence

The extreme attention to detail has its price of course and the high production and finishing efforts only allow the Frodsham team to create 10 to 12 timepieces per year at most. This is reflected in the prices of these gems, which currently start at just under £70,000 before taxes and equates approximately € 83,000 (in stainless steel), not including VAT. A deposit of £ 10,000 is required to join the waiting list. When asked, Frodsham partner and director Richard Stenning was not willing to confirm prices or give delivery dates. The waiting period is currently three years and in addition to day-to-day fluctuations in material and production costs, there is also Brexit – which adds an incalculable extra risk to the exchange rate, i.e. the price of the watch.

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