A History of Time

Inspired by the The British Museum and BBC Radio 4's project *A History of the World in 100 Objects*, *QP* has decided to ask some leading horological figures to choose one timepiece that they believe has shaped the way we live our lives today. Kicking off this new series is senior curator of horology at the British Museum, *David Thompson*.

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Thomas Mudge's Experimental Lever-Escapement Clock

I am often asked: "What is your favourite clock in the British Museum collections?" I have also been asked many times: "What is the most important timepiece in the British Museum?" And, of course, I am frequently asked: "What is the most valuable clock in the collections?" I am not in a position to answer the third question and the answers to the first two are not easy to settle on. However, if I have to pick one item, which above a multitude of others, stands out as an icon, it would have to be the experimental table clock with lunar indication and lever escapement, made by Thomas Mudge in London circa 1754. This clock, although unassuming in its appearance, is an iconic piece in the story of portable timekeeping and its maker, Thomas Mudge, one of the most celebrated of English clock and watchmakers.

Mudge was born in 1715-1716, and at the age of 14, he was apprenticed to George Graham of London's Fleet Street. As a young boy apprentice, he would have been in the workshop when John Harrison made his now famous visit to George Graham, FRS who, at that time, was undoubtedly the most revered maker in London. In 1738, following the completion of his training Mudge began making watches in his own right. It was at this time that he married Abigail Hopkins.

In 1750 he opened his own shop in Fleet Street and went on to become one of the most accomplished watch and chronometer makers of his era. It was in the latter years of the 1740s that Mudge began to develop a new escapement for portable timekeepers. At that time there were essentially two escapements that were commonly used in watches and other portable timekeepers – the verge and the cylinder, the latter invented by George Graham in 1725. Whilst both escapements had their advantages – the verge a robust mechanism for everyday use and the cylinder, a more refined device for higher precision and more accurate timekeeping – they both had an inherent problem, namely that whilst in motion the oscillating balance controlling the timekeeper was in constant contact with elements of the escapement. The resultant frictions and interference consequently affected the timekeeping.

Around 1715, Graham had invented a new escapement for clocks that greatly reduced the operating angles during which the pendulum locked and unlocked the escapement and during which the escape wheel impulsed the pendulum. This escapement, now know as Graham's dead-beat, was clearly an influence on Mudge's design.

In Mudge's new escapement the action of the pallets with the escape wheel is in many ways similar, but what was revolutionary in Mudge's design was the interposition of a lever between the escape wheel and the oscillating balance. At one end the pallets acted with the escape wheel and at the other the lever imparted impulse to the balance to keep it swinging. The geometry of the lever was such that once the lever had given the balance its impulse it was not in contact with the balance and so the latter was free to oscillate

Thomas mudge (1715-1794).

In the 1750s, Thomas Mudge, began work on a new escapement that was to become, in a modified form, the standard escapement for portable timekeepers up to and including the modern mechanical wristwatch.

undisturbed through the rest of its swing. Hence the name 'detached lever escapement'.

In 1769, Mudge followed the clock with the first ever watch to contain his new escapement. Mudge's watch, today known as Queen Charlotte's Watch, survives to this day in the Royal collections. Following later improvements, simplifications and refinements by those who came after Mudge – particularly Josiah Emery in the 1780s – the escapement is still very much alive and performing well in countless millions of mechanical watches today.

Not content with the first example of his new escapement in the clock, Mudge went further. He added temperature compensation to maintain accuracy in changing temperatures and used a spring remontoire to provide a more constant driving force for the escapement and balance to further strive for a truly precise timekeeper. The timekeeping element is a large diameter, heavy balance wheel, oscillating once per second and pivoted on anti-friction rollers.

The dial of the clock is simple with indications for hours minutes and seconds, but here again, Mudge was striving for excellence. In the arch there is a lunar indication and the accuracy that Mudge achieved for this most challenging of quantities was remarkable. At the time the lunar month was thought to have a duration of 29 days 12 hours 44 minutes 3 seconds. What Mudge achieved through a very sophisticated set of epicyclic gears and worm drives was a period of 29 days, 12 hours, 44 minutes, 3.00127 seconds. To this day, his achievement is still one of the best to be found in lunar gearing. As a further sophistication, the lunar dial shows the time of the moon's southing and there is also a tidal indication.

One of the most appealing aspects of the subject of horology is the fact that any one clock or watch embodies a variety of fascinations. On the one hand, there is the mechanical device within, which lends itself to the study of the mechanics and geometry as well as the ingenuity and precision of construction. Then there is the exterior design of the clock, in this case a plain, almost austere, yet handsome, ebony-veneered case with glazed doors front and back and glazed panels over the top allowing a view of the mechanism in action.

At another level, this clock has an illustrious provenance. On Mudge's death in 1794, it passed to his daughter-in-law, Elizabeth Kingdom, sister of Lady Sophia Kingdom who had married the engineer Sir Marc Isambard Brunel. Sir Marc and Lady Sophia's famous son was the renowned civil engineer and architect Isambard Kingdom Brunel. The clock remained in the Brunel family until early in the 20th century when it passed to a Mr A Mallock, a family friend. In 1933, Courtenay Adrian Ilbert purchased the clock from Miss Helena Mallock and when Ilbert's spectacular collection of horology was acquired for the nation in 1958, the clock passed into the collections of the British Museum.

Further information: www.britishmuseum.org