OFFICIAL JOURNAL OF THE BRITISH HOROLOGICAL INSTITUTE

The Horological Journal

AUGUST 2020
www.bhi.co.uk

A Justin Vulliamy Chiming Clock

Making New Parts Along with Conservation Work

Jim Arnfield FBHI

Some months ago, I was asked by a collector to have a look at a movement by Justin Vulliamy with a request to get it into going order, **Figures 1 and 2**. It was fitted into a brass tube in the manner of many eighteenth-century French clocks, with a vitreous enamel dial, glazed bezel and pierced rear door, both hinged on the left, reinforcing the view that it was made to replace the movement in a fine French clock. The long-lasting dynasty of Vulliamy clockmakers is notorious for often having replaced clock movements with movements of their own manufacture, as 'improvements'. The present owner possessed only the movement and had no information about the history. This could be an example of such a replacement. Judging by the filled holes in the backplate, it was probably originally fitted with a verge escapement, and made in about 1780. It is presently fitted with a new, beautifully hand-made platform escapement from about 1850. Although the movement was in generally good condition, the main problem was that the balance was completely missing. All three gut lines were broken, so I knotted the going train line in order to apply some power to the train so that tests could be done.

The first job after examining the movement was to count the going train, which turned out to be of the very unusual 15,430 bph. Luckily, whoever removed the balance had replaced the cock, from which the required balance diameter was seen to be about 25 mm overall. As the quality of the fully-jewelled gilded platform is very high, a well-made compensation balance was required. After an extensive search of my own and others' old stock, nothing suitable turned up, so it was decided that a balance assembly would have to be made.

Work started on a piece of EN8 steel by drilling and boring a small hole in the centre and machining a circular slot to be filled with brass to a depth a little deeper than the rim of the finished wheel. A brass ring was then turned to fit loosely into the slot, **Figure 3**, coated with borax paste, then heated to bright red to melt the brass and fuse it into the slot. The disc was returned to the lathe and the all steel side turned away to reveal the brass, and the steel turned away from the OD. Next, the disc was held on the anvil on edge and then hammered all round to compress and harden the brass, **Figure 4**. Then more turning to finished thickness, diameter and sink out the centre. The balance arm was made by milling excess material from the base with a tungsten carbide cutter in the milling spindle, **Figure 5**. The rim was slit to allow the two segments to move in response to temperature changes, **Figure 6**, and then trued to correct any distortion caused by the stresses of cooling and hammering. The balance staff was made next, followed by a succession of four test rollers necessary to get the ruby pin at the right radius to get a clean

Figure 1. The movement as received.

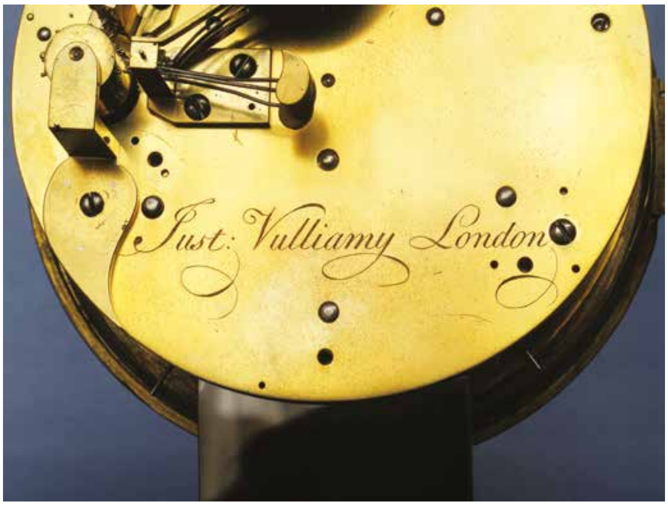

Figure 2. The Vulliamy signature.

action with the lever fork. Then a succession of balance springs was tried until one was found that gave a suitable gaining rate. A slotted brass ring was turned from which wedge-shaped weights were cut, similar to early chronometer balances. These were machined down to get the balance and spring to time and can be moved along the rim of the balance to adjust the temperature compensation. The balance spring was salvaged from a gas lamp time switch. Gas lamps were used to light side roads until well after WWII; workers were

Figure 3. In making a new balance, a slot was turned in the steel disk, to be filled with a melted brass ring.

Figure 4. The balance after hammering the brass.

Figure 6. Slitting the balance rim.

employed to wind the eight-day spring-driven time switches and service the lamps. Hundreds of thousands were scrapped in the 1950s when electric lighting was installed, making the mechanical time switches available at very little cost then.

Now that the platform was working well, **Figure 7**, the movement was completely stripped for cleaning, fixing damage and making other missing parts. Several of the brass springs operating the strike work were either missing or broken and other minor parts were bent. The rack-strike work is not of the usual warning pattern, but has the non-warning 'flirt action' similar to striking carriage clocks. Flirt action generally uses levers that rapidly flick the strike work into action, compared with normal strike work that comes into play fairly slowly. In this clock, one of four pins in the reverse minute wheel contacts the tail of a spring-loaded lever and progressively drives it against a spring. When the pin leaves the tail, the lever 'flirts' up, hitting and latching up the quarter rack hook, allowing the rack to fall on to the quarter snail. The clock sounds all four quarters before the hour is struck. As the quarter rack falls further into the snail at the hour, it contacts a pin on the hour rack hook letting the hour rack drop. The hour train is held until released by a lever moved out of the way when the quarter rack is fully gathered, **Figure 8A**. An interesting feature in the strike work is that the ends of the gathering pallet arbors are threaded to take nuts to secure the gathering pallets rather than drilled for retaining cross-pins or the pallets being a light drive-fit,

Figure 5. Milling the balance arm.

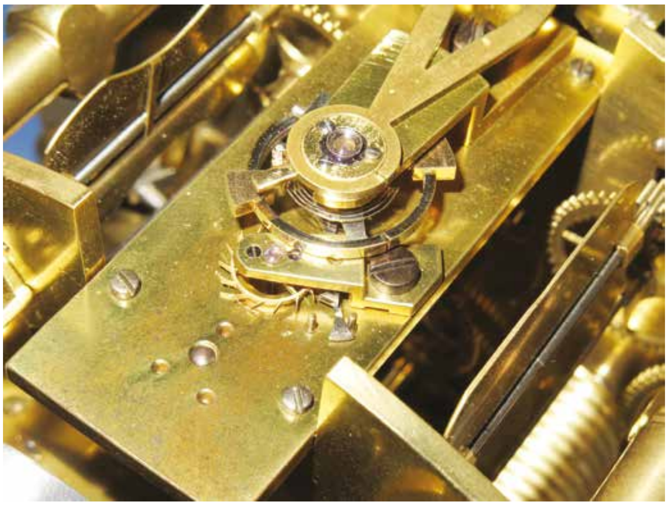

Figure 7. The completed platform.

Figure 8B. The nuts were both missing so new ones were made. This top quality movement was generally in very good condition, showing that it had had very little use from new, so minimal attention to pivots and holes was necessary, **Figure 9**. Assembly was very difficult because of the tight spacing of the English-sized components in circular plates of 140 mm diameter, and a special tool had to be made to get the centre arbor rear pivot into its hole. The mainsprings were old and possibly original. The going and hour strike springs were re-used, but the quarter spring had a crack near the outer end, so this was re-ended, but proved to be too short to run the clock for eight days. The clock was stripped again to fit a new spring in the quarter barrel and after a few adjustments it runs very well. In a conversation with the owner reporting progress, we discussed how the movement would be displayed. It was agreed that a black Perspex (acrylic plastic) base and mounting, covered by a glass dome, would be constructed to house it.

The base was a simple turning job out of 15 mm sheet, with a rounded polished edge and a groove to take the glass dome. The mounting column was made from 5 mm sheet by cementing the mitred corners with Tensol 12 adhesive to make a box section the same width as the spacing of the two lower movement pillars. Perspex blocks were cemented inside

Figure 8A. The under-dial work. Several springs had to be made.

Figure 8B. A close up of the new retaining nut on the hour gathering pallet.

Figure 9. The movement part-assembled.

Figure 10. The finished job under its new dome.

the column to take screws fixing the column to the base, and to provide invisible fixings for two brass hooks to hold the movement pillars to the top of the column which was shaped to form a firm seating for the movement, **Figures 10–13**.

As the movement is about 250 years old and in generally good condition, it was decided with the agreement of the owner not to refinish any of the parts, but to clean it conservatively. An exception was the area on the back plate containing the Vulliamy signature which was covered with etched-in fingerprints, **Figure 14**. A minimum of refinishing was done to the plate and some of the etching is still just visible.

The restoration of this movement was an interesting and challenging job with much time being spent on deciding what to do for the best.

Review Notes

The process of peer review often raises extra information, comments and observations about a submission to the *Journal*. Sometimes these are not suitable for inclusion in the text, or indeed the author may not agree to do so. So that reviewers' input is not lost to posterity, it has been decided from time to time to include additional information in the form of Review Notes, such as what follows.

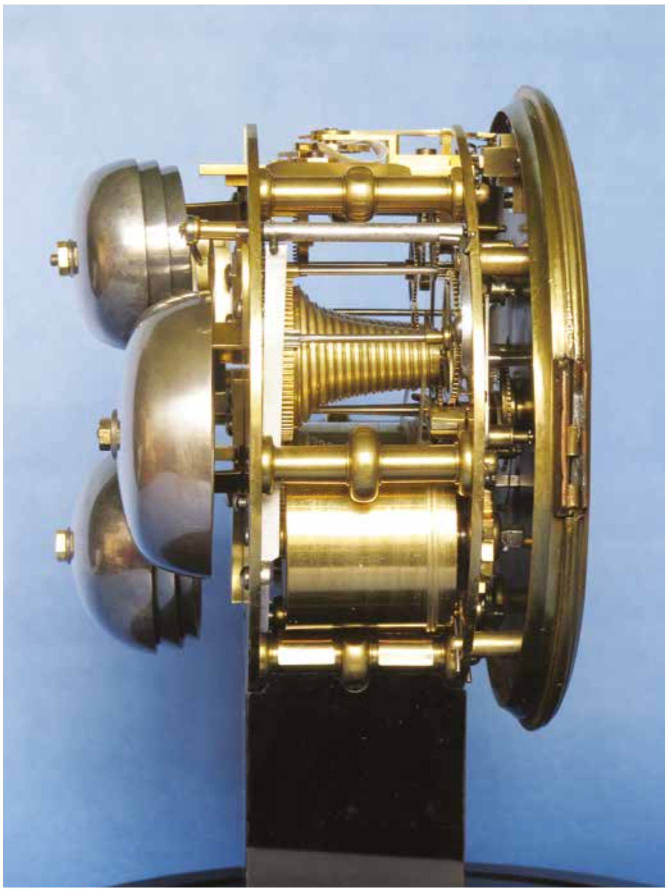

Figure 11. The hour-strike side.

Figure 12. The quarter-strike side.

Figure 13. The rear of the clock after conclusion of the work.

Figure 14. The back plate as received, including heavy fingerprint staining.

In the opening paragraph, the author mentions in passing that the bezel and rear door are hinged at the left, the implication being that the origin of the clock is French. The reviewer wanted to clarify if this meant the 'absolute' left of the clock, or the relative left as you look at each face. The author replied that it meant 'as you look at each face'. Indeed, he has observed from experience that English clocks hinge on the right and continental clocks on the left, a fact not immediately self-evident.

In commenting about the origin of gas lamp time switches, it was unclear if 'side roads' was really meant, or if it was a typo of 'road-side'. The author recounted that 'almost all main roads were lit by electricity before WWII', and that gas lighting was, in the main, a feature of side roads.