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Rescuing a Gothic Clock

Part 1 – The Frame, Striking Train and Strike-Work

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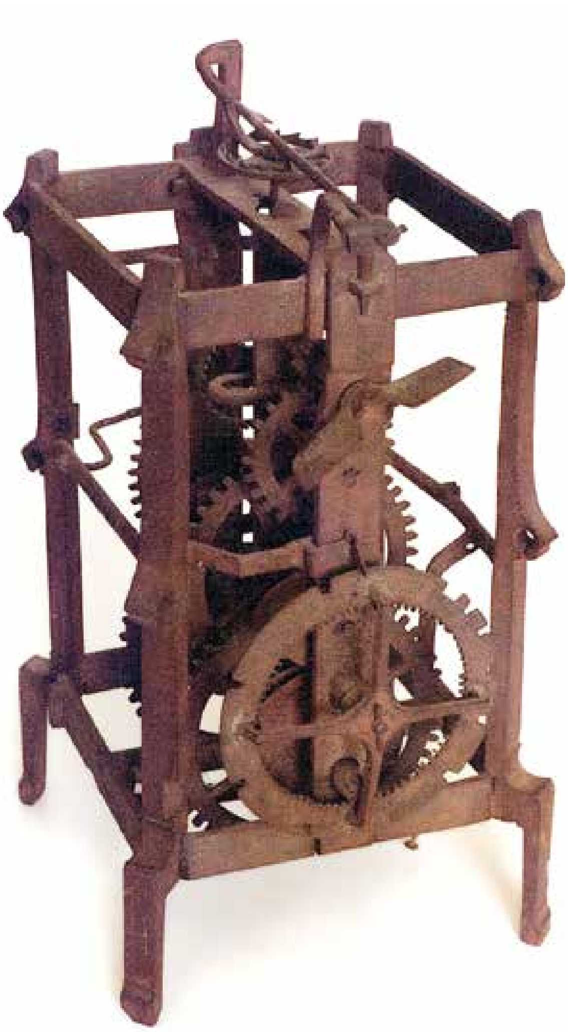

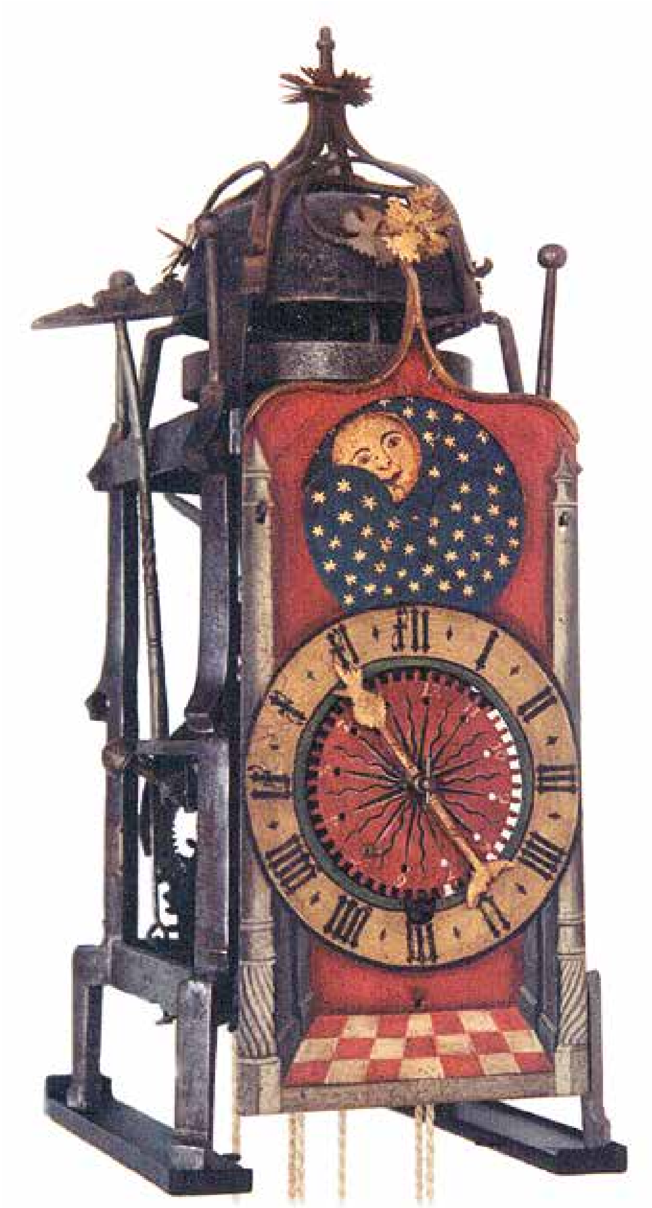

Figures 1 and 2. An early Gothic clock before and after 'restoration'. The escapement, balance, hour wheel, dial, hand, tinials, hammer, bell and bell frame are all new. (Photos: Derek Pratt)

The title of this article has been deliberately chosen, as it is not about a simple restoration and definitely not conservation, but a sympathetic conversion of a much- altered movement into an attractive and working clock. Members of the conservation lobby, and those of a nervous disposition, might like to skip to another article. If presented with this clock the museum approach would be to leave it with all its additions and imperfections, but that was something that did not appeal to me. When the former curator of horology at a national museum was asked what they would do if they were given an important Tompion with a piece of orange box nailed to the base (an unlikely scenario but it was a hypothetical question), the reply was that they would not remove the offending piece but persuade the donor to remove it before presentation! I have no qualms about the work done on this movement as photographic and other records were made as the work proceeded. New parts have been made to match those that would have been there originally and while they look the part an expert would be able to identify them. Where appropriate new iron parts, such as the fly, were

Figure 3. Movement as received with crude additions to use it as a small turret clock.

Figure 4. Most of the excrescences removed to show the conversion to anchor escapement and a crude universal joint for the leading-off work.

made by forging, though my limited smithing skills had to be supplemented by more filing than the original clockmaker would have used. This is horological rescue, not fakery.

It is the rescue of an interesting example of a type of clock that was widely used in Europe before the introduction of the pendulum. Though not rare or with technical sophistication, it is a type not often found in Britain outside museums. Many readers may not be familiar with Gothic clocks, although comparisons are made with English lantern clocks, especially where there are constructional or technical differences. The most obvious difference is that Gothic clocks are made completely of iron and the movements are like miniature turret clocks, while lantern clocks are made largely of brass.

There are three important points to make about these clocks. Firstly, there are very few completely original Gothic clocks, even in major museums throughout Europe: many have been restored back to balance after 'updates' to pendulum, sometimes with new (or at least repainted) dials and bell frames. **Figures 1 and 2** show before-and-after images of a Gothic clock rebuilt by the late Derek Pratt. While he is justifiably renowned for his fine watchmaking, one of his other interests that many are unaware of was early iron clocks. This one is not untypical of the transformation often made to these clocks in recent times.

Secondly, there are many fakes and reproductions, some quite convincing but also 'fantasy' clocks made in the nineteenth century which bear little resemblance to genuine items, and the collector needs to be aware of this. The third general point to make is that there are two 'schools' of Gothic clocks: Germanic, from Germany, Austria and the German speaking areas of Switzerland, and French/Flemish. The former have square sub-frames at the bottom and top of the movement, while the latter have a top plate held to the pillars with wedges, as well as other detailed differences.[1] In general a balance was usual and most foliots are incorrect reinstatements. Original foliots are normally only found on a very few French/Flemish clocks, usually large examples.

While the pillars of early Germanic clocks, such as that shown in **Figures 1 and 2**, are of rectangular cross-section with decorative 'noses' and are fitted to both the top and bottom sub-frames with dovetail joints, on the clock described here the pillars are simple flat iron strips, forged to shape and riveted to the sub-frames to form a solid structure that cannot be dismantled. This indicates a late clock, probably made in the early seventeenth century. As received, **Figure 3**, there had been very amateurish attempts to operate it as a small turret clock. The bell was supported by fencing wire, the rope pulleys had been replaced by motorcycle chain sprockets jammed in place with lumps of wood (how it was intended

Figure 5. The riveted frame with the later supports for the warning arbor removed and the hammer spring reinstated. Note the holes for the ends of the bell frame.

Figure 6. The movement bars with extensions riveted to the top when converted to anchor escapement and one on the central bar for an internal fly. The brass bushes are repairs. Note the holes where supports for the dial, and cocks for the crownwheel and balance were originally fitted.

to be wound is anyone's guess), there was a crude anchor escapement, leading-off work and the striking had been converted from nag's head to warning. Clearly a museum or conservation approach would not appeal to most collectors.

The Frame and Movement Bars

The first task was to remove all the recently added 'junk' so the extent of the alterations could be assessed, **Figure 4**. It should be noted that the following descriptions and photographs are not necessarily in the order in which the work was carried out. The main frame was found to be almost untouched, apart from extra supports for the added warning arbor, **Figure 5**. The balls on the ends of the finials appear to be separate and forced on and not forged integral with the pillars. The sub-frames are 5¾in (146mm) square at the top and 6¹⁄₁₆in (154mm) square at the bottom, the pillars being 12in (305mm) tall. The three movement bars had been mutilated at the top and additional pieces riveted on to accommodate the arbor of the anchor escapement and an internal fly, **Figure 6**. These were removed and the tops reinstated by welding on mild steel pieces and filing them to shape. The dovetails at the bottom of the front and rear bars which hook on to the lower frame were intact, **Figure 7**. The brass bushes are later repairs and if not excessively worn they were left, but any that needed rebushing were replaced with mild steel. Though technically inferior, iron pivots running in iron holes are quite satisfactory on these and later iron clocks.

Figure 7. Dovetail hooks at the lower end of the rear (left) and front (right) movement bars. The rear bar has its original post for the countwheel, the front bar has a replaced post for the hour wheel and a support for the dial.

Figure 8. Restored movement bars and top and bottom cross bars.

The original top cross bar had been replaced with a thin strip during the conversion to anchor escapement, so a new one was made with tenons in the ends that fit into the existing slots in the front and rear bars and held with taper pins. A tenon on the central bar fits into a slot in the top bar (taper pin not necessary), while an original tapered tenon at the bottom fits into a mortice that had been forged into a thicker section of the lower cross bar. **Figure 8** shows all five removable bars after restoration, including the cocks for the crownwheel and balance (see Part 2) and the arm that holds the top of the dial.[2] The assembled frame and bars, including the top cock and gallows for the balance suspension (see Part 2) are shown in **Figure 9**.

It should be noted that no screws are used on Gothic clocks — only taper pins or wedges. In comparison an English lantern clock of the same period has a total of 17 screwed connections, including those securing the hammer spring and stop, balance cock and frets. While the frame of this late clock is riveted together, the 11 components of the frame of the earlier type of construction are held rigidly together using dovetail joints and just two taper pins.

The Striking Train and Strike-Work

The first Gothic clocks were made long before the introduction of the single-weight Huygens' loop system. Separate weights for the going and striking trains were the norm on German pull-wind iron clocks, even until the nineteenth century. Lantern clocks also used two weights until English clockmakers enthusiastically adopted the Dutch system for all type of pull-wind domestic clocks. Both greatwheels had lost their winding pulleys so they had to be made. There is wear on the crossings indicating that a circular spring click had been there originally. While this is the usual type of click found on English and French pull-wind clocks, it is not common on Germanic iron clocks, which usually have ratchet teeth cut into the edge of inner shroud of the pulley and a pawl fixed to the wheel rim. This suggested that the movement had been made towards the western side of Germany. The replacement circular clicks were forged and filed from mild steel, hammering imparting sufficient springiness – heat-treated carbon steel is quite unnecessary.

Figure 9. Assembled frame after restoration.

Since the striking train and its associated levers was largely complete with more parts added than removed, this was tackled next. During conversion from nag's-head striking to warning the external fly had been removed, a brass warning wheel fixed to its arbor and a small internal fly added, **Figure 10**. The conversion to pendulum would have necessitated removal of the original external fly. The added parts were removed and the fly arbor extended to take a large two-bladed fly complete with a small ratchet wheel and click of the type often found on turret clocks. The striking train now consists of just two wheels: greatwheel and second wheel with a single-slot overlift cam with locking on an arm on the fly arbor.[3] This arrangement of only two wheels plus an external fly is not uncommon on medium-to-large Gothic clocks. The wheel counts are:

Wheel Counts	
Fly	6
Overlift Wheel	54-8
Greatwheel (6 hammer pins)	48-6
Countwheel	78

The striking greatwheel is 4.8in (122mm) diameter. As is usual on Gothic clocks, the countwheel has internal teeth and outside slots for the detent to drop into. To give enough room for the pinion of report to mesh positively, the crossings of the countwheel have to be offset. This construction is only found on very early British turret clocks, not domestic clocks.

Figure 10. Striking train as found. Clockwise from top left: greatwheel, second wheel with single 'heart' overlift cam, countwheel with internal teeth, later fly, third arbor with locking arm and added brass warning wheel. Note the wear on the crossings of the greatwheel caused by the winding click.

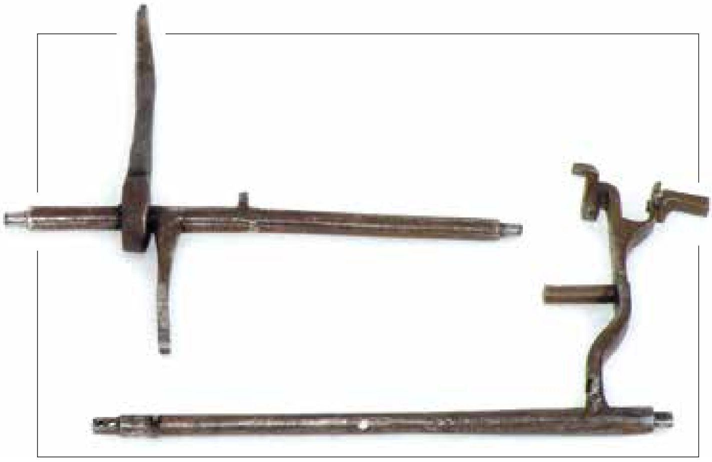

Figure 11. The strike-work as received, top: hammer arbor; bottom: arbor with striking detents, an added link and hole where the lifting piece with nag's head once fitted.

Figure 12. The restored ironwork: hammer (left), fly and its ratchet (centre) and strike-work with the nag's head (right).

Figure 11 shows the strike work and hammer arbors as found. When striking had been converted to warning, the arm with the nag's head became redundant and had been removed, but a hole in the arbor indicated its former position. The arm and nag's head were reinstated. While on small clocks the flipping back of the nag's head is assisted by a small flat spring, on larger clocks such as this one gravity is sufficient. A short horizontal bar had been added to act as a link when the warning detent was lifted. Since this was now superfluous it was removed. The end of the striking detent, which is U-shaped to straddle the rear movement bar, is multi-functional. The lower edge on the left is lifted by the overlift cam, the bent-over piece locks against the arm on the fly arbor, while the extension on the right is the countwheel detent. The hammer had been replaced by an arm to operate an overhead hammer, presumably via a wire link, but the hammer tail and a short arm to link it to the hammer spring remained. A fragment of the original thin flat hammer spring remained riveted to the right-hand side of the lower frame. It would have passed underneath the movement and connected to the hammer arbor by a wire link. This is the usual arrangement for hour-striking Gothic clocks and while a vertical twisting hammer shaft was commonly used on later Germanic iron clocks, it is rare on Gothic clocks and then usually associated with French/Flemish clocks. **Figure 12** shows the restored ironwork. Unlike English lantern and later 30-hour posted-frame clocks, Gothic clocks usually have no separate stop, the thin hammer shaft simply contacts the top of the frame to avoid the hammer jangling on the bell.

In Part 2 the reinstatement of the balance escapement and the fitting of a bell frame and dial completes the project.

ENDNOTES

1. John Robey, 'The Origin of the English lantern Clock. Part 1: Comparison with European Gothic Clocks', *Antiquarian Horology*, 37 (Dec 2016) 511–521.
2. See next month's *HJ*.
3. John Robey, 'Nag's Head Striking', *The Horological Journal*, 153 (Nov 2011) 494–7.