THE ADAM

Part 1: The dial a

by John F

Legitimate lantern?

An acquaintance recently showed me a lantern style clock, pictures of which I enclose. I had no opportunity to take adequate photographs or to examine it closely, and I failed to take a photograph of the dial, which had the usual rather plain brass circular chapter ring soldered to the front case plate. The main point of interest as you can see are the posts with cast female figures. Have you ever seen anything similar? Any idea of the date? Could it be a fake?

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Figure 1. Letter to Clocks *magazine, October 2002.*

Figure 3. The clock as received.

Figure 4. The clock after cleaning, and with a restored chapter ring and hand.

Mention any type of clock—lantern, longcase, bracket, English dial or carriage clock for instance—and its general form and features can be readily visualised, but as always in horology there are exceptions. The clock which I have

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named the Adam clock, for reasons that will become clear in Part 2, is one of these exceptions. Not only is it a unique lantern clock, but it is also unique as a piece of folk art.

Its recent history begins with a letter in the October 2002 issue of *Clocks*, page 6, entitled ‘Legitimate lantern?’ and

M CLOCK
and movement

Robey, UK

Figure 2. The restored Adam clock (right) compared to a mid seventeenth-century London lantern clock.

ends with the query 'could it be a fake?' However, the photographs were so poor that it was difficult to make out much detail, **figure 1**, and it is not surprising there was no response.

Seven years later it had passed into the hands of a dealer and appeared for sale on eBay, described as 'Dutch or maybe Scandinavian'. A successful bid was the start of a long period of research that involved delving into many disciplines outside horology, and ended up with a study of extreme Puritan ideology, witchcraft and the belief in evil spirits. It soon became apparent that horology is not just about gears and cogs.

After detailed research a stage was reached when it was thought that the true significance of the clock might never be discovered, so an article was published in *Antiquarian Horology*, September 2010, to record the facts as they were known at that time. Experts in a wide range of disciplines had been shown images of the clock, but no-one was able to provide a convincing explanation.

Then in 2015 a visit with the Derbyshire Archaeological Society to the ancient church at Ilam in the beautiful Manifold Valley on the southwestern side of the Peak District provided the breakthrough that was needed. The Anglo-Saxon font is especially interesting and its date has been disputed, but one of the members was able to identify all but one of the carved figures and provide a reliable date.

After reading the report of the visit I

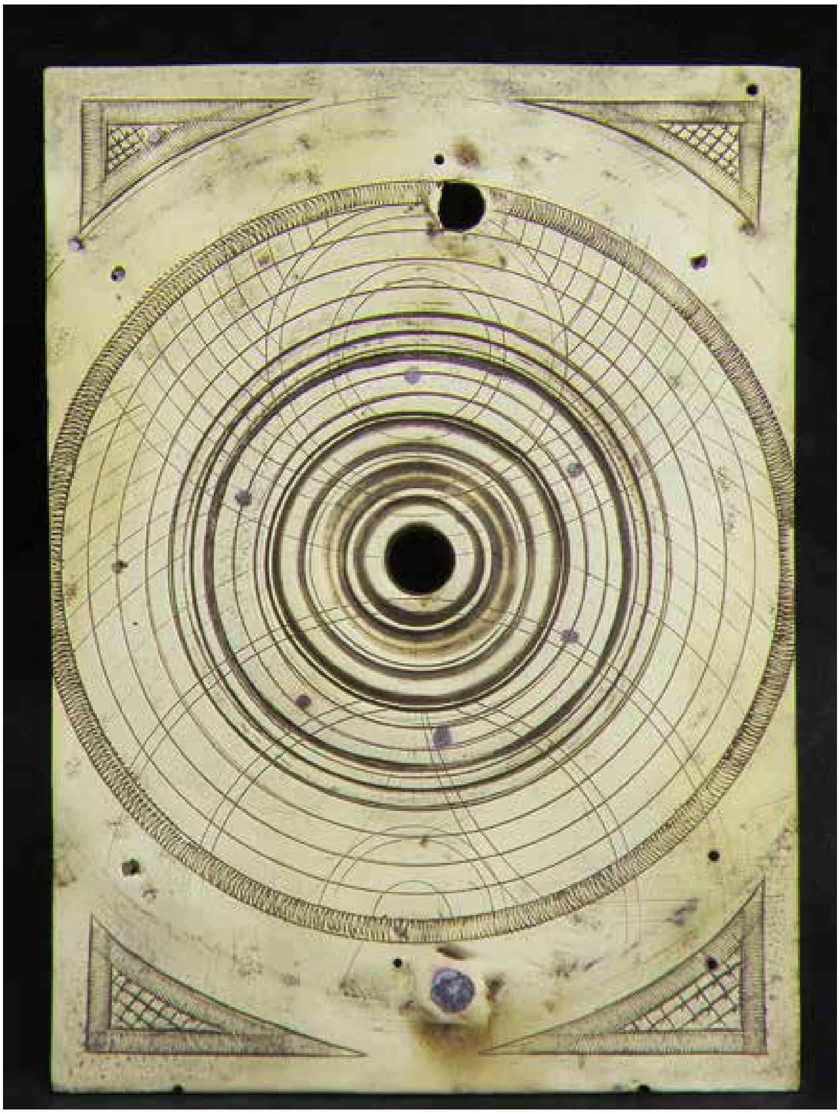


Figure 5. Front of the dial, decorated with deeply scribed circles, overlain with several sets of lighter circles. The corners and the inside of the chapter ring have wigglework

Figure 6. Rear of the dial with the insertion of a thicker central section.

realised that this was the person to ask, and after sending detailed images she could explain all the features that had puzzled me for so long. It is another example of 'it's not what you know, but who you know'. Further consultation with experts around the world confirmed the identification and resulted in a supplementary article in *Antiquarian Horology*, December 2017, followed in December 2020 by a suggested probable maker. The first part of this article will discuss the movement and the changes it has had over almost 400 years, while the second part will concentrate on the decorative aspects of the frame, and Part 3 will consider where, when, and by whom it might have been made.

The Adam clock is shown after restoration in **figure 2**, next to a standard London lantern clock of about 1650, so that its uniqueness can be appreciated. The clock as sold on eBay had a very tarnished chapter ring, a very poor hand and a single side fret, all recent, **figure 3**.

When the chapter ring was removed it could be seen that the size of the original chapter ring was delineated by wigglework decoration. This type of simple engraving was done by 'walking' a broad graver across the surface of the brass, and is usually associated with clocks made by the Quaker clockmakers of North Oxfordshire in the first half of the eighteenth century, but this clock is almost a century earlier.

The original chapter ring would have been only ½in (12.7mm) wide, much narrower than on any other known English lantern clock, so a replacement was made to suit. The relatively recent hand was replaced by one made from a piece of old wrought iron in a simple early style. After the pillars had been cleaned to reveal the details of the cast-brass figure on each corner, the clock looked as shown in **figure 4**.

The vendor's claim that the clock was Dutch was soon dispelled after the opinion of an experienced Dutch collector was sought, and a Scandinavian origin was also thought very unlikely. The general opinion was that the movement was English, even though the dial and pillars were quite unlike anything seen on a normal English lantern clock.

It is to be regretted that the original frets are missing, as these might have provided some dating evidence. All that can be said is that they were unlikely to be of a standard pattern, as the holes for the fixing screws are much closer together than usual. The side doors and rear cover are missing.

The finial on the top of the narrow iron bell frame has been cut off. Possibly it was made like this, as a traditional turned brass finial would have appeared rather incongruous when associated

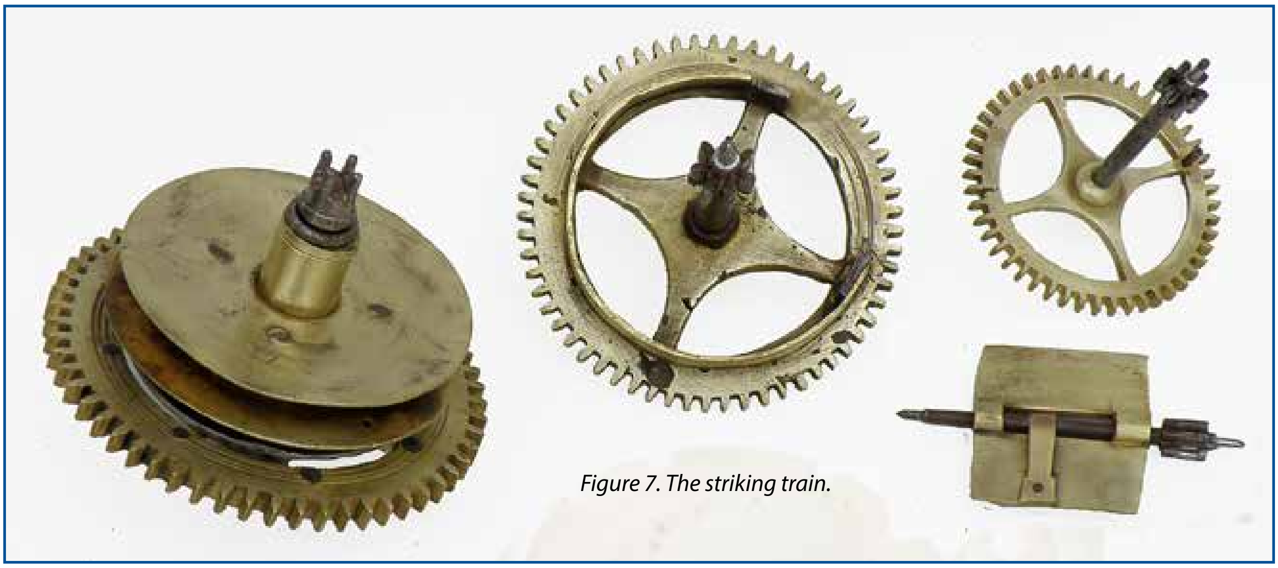


Figure 7. The striking train.

Figure 8. Teeth of the striking great wheel show considerable wear, and punch marks indicating they were cut and rounded by hand.

with the figurative pillars. The heavy bell is 6in (152mm) diameter, compared with $5^1/_2$in (140mm) for the bell of a standard mid-seventeenth century lantern clock and the rim is $^1/_4$in (6mm) thick.

The unsigned brass dial is $6^1/_2$in (165mm) tall and $4^3/_4$in (120mm) wide, decorated with deeply scored concentric circles, overlain with three sets of more lightly scribed circles, **figure 5**. It is clear that the person who made the dial did not possess engraving skills and relied on simple scribed lines for decoration.

The centre is a disc of thicker brass soldered in place, **figure 6**, the join coinciding with one of the heavily scribed circles. This separate piece does not perform any practical purpose, and it is likely that the circles were scribed so deeply that they cut through the thin sheet and a repair was made by adding a thicker central section. Both this disc and the thinner main part of the dial appear to be re-used pieces of metal.

The corners have a simple 'wigglework' border filled with cross-hatching, while the inner edge of where the original chapter ring would have been is marked by a wigglework circle. There are six small holes where the chapter ring was intended to have been riveted to the dial sheet, rather than using pinned feet. They have never been used for this purpose, and the method finally chosen for fixing the dial to the frame made these holes redundant. There are a couple of other small holes in the dial plate of unknown use.

The rear of the dial has signs of a few plugged holes, which are a further indication that it was a re-used piece of brass. A new chapter ring was made from an old scrap brass dial to fit the space between the wigglework, and engraved with squat Roman hour numerals of the type found on early clocks. There is little room for even a simple quarter-hour track.

An unforeseen consequence of using corner pillars of the type shown here, rather than the conventional turned pillars with larger square bases and tops, is that the dial cannot be fixed to the movement in the usual way. Conventional pillars allow the dial to be set back by about $^3/_{16}$in (5mm) from the edges of the plates. It is held by two pins through holes near the front edge of the top plate and by either something similar at the bottom, or, more usually, by a central lug on the bottom of the dial sitting in a hole in the plate.

The pillars of this clock do not allow the dial and its chapter ring to be set back far enough for it to be held by the usual pins through the top plate. The clockmaker, clearly not foreseeing this problem, had drilled the appropriate holes in the plates, before abandoning them and trying another method. He

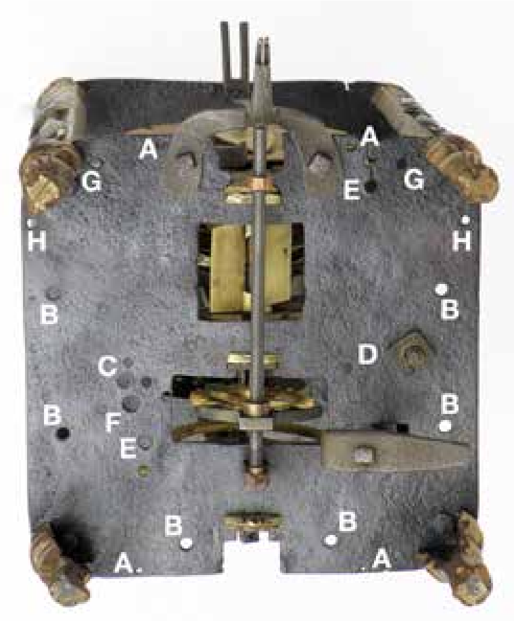


Figure 9. The iron top plate with empty holes. A = pins for holding the dial and back plate. B = frets, closer spacing than usual. C = position of balance cock. D = position of banking pin. E = position of front and back pallet cocks of verge escapement. F = position of crown wheel cock of verge escapement. G = hanging hoop. H = pin hinges for missing side doors.

Figure 10. The four wheels of the going train after conversion to long pendulum and anchor escapement, together with the starwheel and later pinion-of-report and hour wheel.

decided to hold the dial to the front movement bar with two iron lugs or dial feet, one of which remains and the location of the other is indicated by a hole towards the top.

The surviving foot has had its spigot cut off so that the end now just rests on the front movement bar. There are two holes in this bar to take these lugs, but they do not align correctly. They line up at the top if both the dial and the movement bar are turned over, while they align at the bottom if only the dial is turned over. This suggests that the clockmaker was inexperienced and got himself in a muddle when marking the positions of the holes and feet. The mistake was only discovered after the lugs had been riveted in place so the spigots were cut off and a third method of fixing used instead.

The fixing method eventually chosen was a couple of screws through the chapter ring into tapped holes in the front pillars. The chapter ring now traps the dial against the inner edges of the front pillars and there is no need to fix the chapter ring to the dial.

Despite these alternative fixing methods, brought about by inexperience and the consequences of various changes having not been thought through properly, the dial fits neatly between the plates and side pillars. There is no evidence to suggest that it is a later addition or modification.

Like most early lantern clocks the going train has been altered, but the striking train is relatively unchanged, so it is described first. Although the fly and the warn wheel have had their arbors and pinions replaced due to excessive wear, the striking train remains essentially as it was when first made, **figure 7**, with the usual four-pronged pinion-of-report filed on the end of the great wheel arbor. The fly is a later lighter version and the aperture in the iron top plate has been enlarged to accommodate it. The hoop-wheel arbor is steeply tapered and has a turned ring near the wheel, which is fitted directly to the arbor without a separate collet.

Punch marks on the tips of the teeth of the hoop wheel and the great wheel show that they were marked out using a dividing plate, before being slit by hand and rounded with a file, **figure 8**. The wheel counts for the striking train are

WHEEL COUNTS

Going train			Striking train		
escape wheel	[24]	[8]	fly		6
third wheel	[56]	[7]	warn wheel	48	6
second wheel	60	7	hoop wheel	60	7
great wheel	56	21	great wheel	56	4
hour wheel	[36]		(hammer pins)	8	
			countwheel	39	

Later wheels and pinions are in brackets

Figure 11. The hour wheel with alignment marks (left). An iron pin filed flush indicates its former use as a reverse minute-wheel, possibly from a small turret clock. The crossings are of an unusual section for a clock.

Figure 12. The iron bottom plate with two extra holes at each side where the ends of the two ropes were attached to double the duration by using pulleys for the weights and counterweights.

identical to those of a typical English balance lantern clock, see panel on opposite page.

Once the pendulum was used for regulating clocks, few balance lantern clocks escaped being converted to either a short pendulum or a long pendulum with an anchor escapement. Some were updated to a short verge pendulum, then to a long pendulum, and this clock is no exception. There are signs on the centre movement bar where the potence for the vertical pallet arbor of the original balance escapement was riveted, as well as the bridge that straddled the verge and into which the rear of the crown wheel arbor pivoted. There are also signs of where the potence for the contrate wheel of the later short pendulum escapement was fixed.

Originally there were winding clicks on both great wheels, but the one on the going train was removed when the clock was converted to operate with a single weight. There has been no attempt to reverse the direction of rotation of either of the trains, so when converted to Huygens loop the ropes would have crossed.

While this is not ideal, there is usually little problem with the ropes getting tangled, provided the end of the weight is well rounded so that the counterweight can slip past easily. The wear on the crossings of the going great wheel from its former click is twice that on the striking great wheel, which implies that when it operated as a balance clock it was used for a long period without the striking being wound.

Simply converting a balance clock to Huygens loop gives no increase in duration.

It may be significant that this clock, despite being unsophisticated in many respects, was regarded as special enough for it to have undergone a couple of major mechanical updates. Empty holes in the top plate confirm the conversion from balance to a short pendulum and then to a long pendulum, **figure 9**. When the going train was converted to a short pendulum the crown wheel of the balance escapement was replaced by a contrate wheel, and in addition a new vertical arbor with a crown wheel.

Normally, when converted from a short to a long pendulum the contrate wheel was simply replaced by an escape wheel with radial teeth and new pallets for an anchor escapement fitted. This clock was converted by replacing the contrate wheel with a third wheel and adding an escape wheel at the top of the train. Hence it now has a going train of four wheels instead of the usual three, **figure 10**. This allowed the use of higher-count pinions and a slower running train, which in turn meant that the motionwork could be altered

Figure 13. Movement from the front with later hour wheel and pinion-of-report to increase the duration.

Figure 14. Rear view with the later iron back cock and crutch after conversion to anchor escapement.

to give a great wheel that rotates more slowly with an increased duration. Technically it was a great improvement, but from a collector's point of view it was a retrograde step.

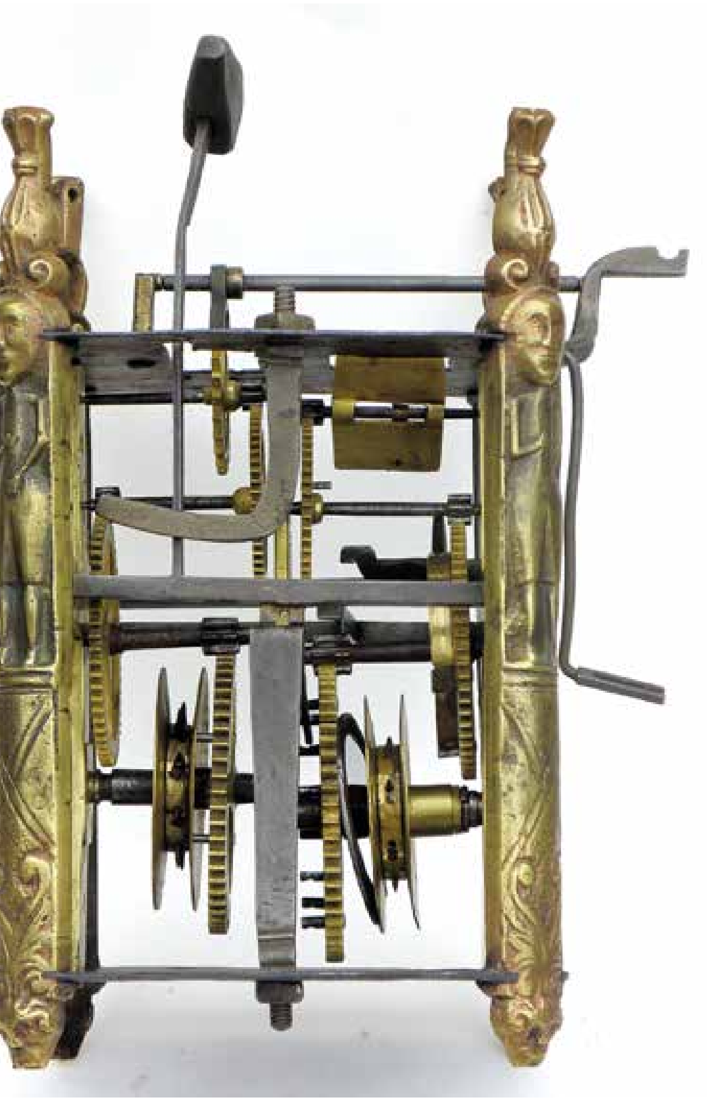
The original pinion-of-report, which would have been four pins filed into the end of the great wheel arbor (identical to the striking pinion-of-report), was sawn off and a new stub end with a square brazed in position. To this was fitted a larger brass 'pinion' of 21 teeth meshing with a new hour wheel of 36 teeth. The replacement hour wheel is marked with dots on the tips of the teeth, indicating that it was cut by hand, and not with a wheel-cutting engine.

The crossings of this wheel are thinner in section than either the centre or rim of the wheel, and are unlike the wheels normally seen on domestic clocks. The rim has the remains of a substantial iron pin which has been filed flush, as well as two registration marks filed either side of a tooth, **figure 11**. It is too large for a normal domestic clock, but may have been the reverse minute-wheel from a small turret clock. The present going train is given in the panel on page 30, which gives 54.8 beats / minute and a pendulum of 46.8in, about 7in longer than on a seconds-beating longcase clock.

The duration had been an issue, both when it was a balance clock and after conversion to a pendulum. Balance lantern clocks only run for an inconvenient 12 hours or so, and efforts were made to increase the duration of this, and many other, lantern clocks. Originally each train would have been powered by its own weight and counterweight. The running time could be doubled by simply fixing all the free ends to the bottom plate and adding pulleys for both the weights and counterweights, which had to be double the size.

On this clock four holes were drilled in the bottom plate through which the ropes could be threaded and held with a knot, **figure 12**. This may even have been done when newly made, there is no way of telling, except that it was before being converted to a single weight and a Huygens loop.

At some stage the proliferation of doubled-up ropes was replaced by a simpler and neater single weight and an endless rope on the now familiar



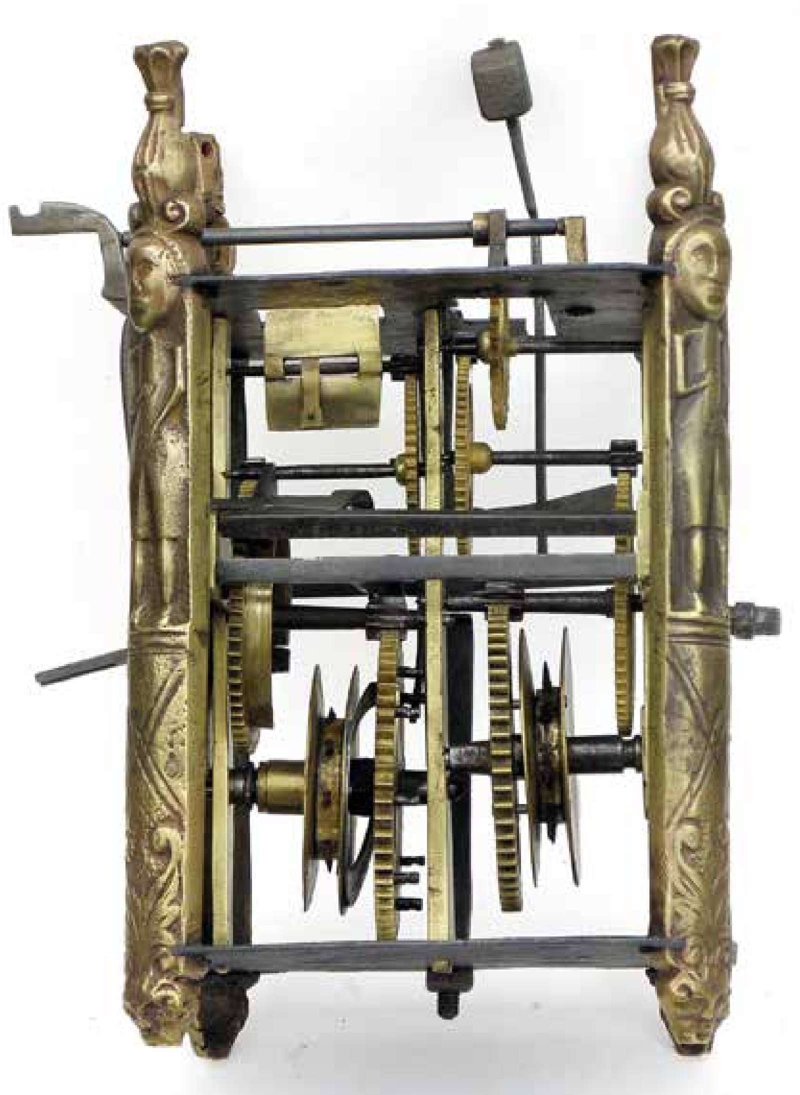


Figure 15. Right-hand side. The hammer counter is crudely formed. The warn and fly arbors and the fly are later.

Figure 16. Movement from the left. The winding click on the going great wheel was removed during conversion to Huygens loop.

Huygens loop system. Simply converting a balance clock to Huygens' loop gives no increase in duration. A single weight that powers both trains will fall half the total drop in 12 hours to drive the going train, and an addition half of the drop for the striking train. Hence the clock will still only run for about 12 hours, rather than the 24 hours obtained by doubling up the weights and counterweights.

To increase the duration of the going train when using a single weight, the motionwork needs to be modified, but this can only be done if, as here, the wheels in the upper part of the train are modified to suit. For a given diameter of spiked pulley, the only components affecting the duration are the counts of the hour wheel and its pinion-of-report. Balance clocks usually have an hour wheel of 48 teeth driven by a four-pronged pinion. Hence, since the hour wheel rotates once in 12 hours, the spiked pulley on the great wheel arbor turns once an hour. With the usual size of spiked pulley the weight drops by about $4^3/_4$in for every revolution of the pulley, resulting in a fall of 56in in 12 hours.

Similar considerations apply to the striking train, where the countwheel, which rotates once in 12 hours, has a 39-tooth wheel driven by a four-pronged pinion. Hence the spiked pulley turns a little slower at 0.8 turns in an hour. For the same drop and pulley size, it would run for $14^1/_2$ hours. This avoids the striking train running down before the going train and the striking getting out of synchronisation with the hand. With a single weight the total duration is about 13 hours

To increase the duration of the going train the 12:1 ratio of the motionwork needs to be reduced, and on this clock the alteration gives a ratio of 36:21 = 1.7, so the weight drops seven times slower. With the striking inoperative the clock would run for about seven days, but if a single weight powers both trains then the duration is reduced to 22 hours. This emphasises that with a single weight the total duration is always governed by the fastest train, in this case the striking train.

The complete movement is illustrated in **figures 13** to **16**, which show the typical English style of cruciform front and rear movement bars.

Next month the identity of the figure on the corner pillars is discussed, as well as the significance of the other symbolic features.