A LARGE EUROPEAN IRON CHAMBER CLOCK

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A large weight-driven iron chamber clock is discussed. It originally had trains of only two wheels. Changes to the balance escapement and motion-work have resulted in the dial being repainted to read counter-clockwise. Analysis of the paint indicates a date prior to 1650 and a name on the frame suggests a Polish origin.

The clock shown in Fig 1 is an interesting example of a large domestic clock made solely of forged iron, apart from later modifications. In Germany large early iron clocks are sometimes called *Klosteruhren* (monastery clocks), although they are more likely to have been used in a castle, manor house or large farm, rather than a religious building. The striking train has only two wheels and a fly. Similarly the going train would originally have had only two wheels with a crownwheel-and-verge escapement and a balance, later converted to a short verge pendulum and subsequently to its present tic-tac anchor escapement. These changes are almost inevitable on a pre-pendulum clock and any early example that has not had the escapement updated needs to be examined very carefully to establish its authenticity. In the nineteenth and early twentieth centuries fake copies of Gothic clocks and very early iron clocks were made from authentic wrought iron using the correct smithing techniques, which means that they are now very difficult to distinguish from the real thing. The author is satisfied that the clock is genuine and this has been confirmed by analysis of the paint on the iron dial. The most noticeable unusual feature is the anti-clockwise direction of the hour numerals. This can be explained by changes to the balance escapement and motion-work, the latter due to the method of letting off the strike on early clocks.

Fig. 1. Large iron clock with iron dial, standing 23in tall. The hand is a restoration.

PROVENANCE: THE METZENBERG COLLECTION

This clock has some interesting twentieth-century provenance, having been in the collection of Leopold Metzenberg of Chicago (Fig 2). His grandfather, Levy Metzenberg, like

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Fig. 2. Leopold Metzenberg of Chicago (1870-1952), probably about 1920-25, when he was active as a traveller and collector of watches and clocks. (Photograph courtesy of Howard Metzenberg)

many nineteenth-century Prussian Jews, left Lissa (now Leszno), in the province of Posen (Poznan), now in Poland but then part of Prussia. (Leopold Metzenberg always regarded himself as Prussian/German rather than Polish. The family's origins are of significance when the possible area where this clock was made is discussed later.) Levy was in Dublin in 1844 when a son Isaac, Leopold's father, was born. The family moved to Glasgow, where Leopold was born in 1870, but by 1880 they were in Chicago. Isaac was a traveller and dealer in watches, selling them to stores. He also repaired customers' watches, at which he was very skilled, and his horological interests were also acquired by his son Leopold. After marrying the daughter of another Jewish family from Lissa, Leopold Metzenberg eventually became an executive of Sears, Roebuck & Co, the American mail-order catalogue and department-store company. He was Vice-President of Merchandising, responsible for buying very high-quality items like watches and jewellery until his retirement in 1930. He became very prosperous, living in style in a large house in the most fashionable area of Chicago, where he developed a passion for antiques, especially watches and clocks. Leopold made forty trips to Europe, mostly before he retired, where he acquired 570 watches (this figure probably includes clocks as well) for his collection.[1] Although he kept a large amount of correspondence with people in Europe, it is said that he had great remorse that, having lost much of his money in the Depression, he could not afford to do more to help people escape from Nazi occupation. He destroyed all the letters, leaving only the envelopes with the names of the correspondents.[2]

In 1926 another executive of Sears, Roebuck & Co, Julius Rosenwald, a philanthropist and Chairman of the company, pledged $3 million for the reconstruction of the crumbling Palace of Fine Arts as the Chicago Museum of Science and Industry, which opened seven years later. After the death of Leopold Metzenberg in 1952 a large part of his collection was stolen and his estate donated much of what survived to the museum, with just a few items remaining with his family. Some of the items donated to the museum, most of which had probably been kept in store, were 'de-acquisitioned' in 2009 and 2010 and sold at auction, including the large iron clock considered here.[3]

1. *Popular Mechanics*, Sept 1950, pp. 89-92, 'A Doctor for Old Timers'. Available online at Google Books. Fifteen decorative watches are illustrated in colour, some are ascribed with dates and country of origin, but none with the name of the maker.

2. Information from Howard Metzenberg, Leopold's great-grandson. See also http://genealogy.metastudies.net/ZDocs/Cassirer/Cassirer_Falk_Miscellaneous/pages/87.html

3. Items from the Metzenberg Collection sold by the Chicago Museum of Science & Industry at Christies NY in December 2009 and June 2010 included: Tompion paired-cased silver watch No 2934, a harp-shaped Swiss watch for the Chinese market *c.* 1810, a silver pair-cased watch with mock pendulum and moon phase by John Torbock Manchester *c.* 1690, a triple-cased quarter-repeating enamel watch for the Turkish market by Edward Prior No 28925 *c.* 1814 and a reproduction early oval watch made about 1850. Clocks sold by Leslie Hindman Auctioneers, Chicago, in May 2010 included: a German horizontal table clock by Jacob Wideman, Augsburg *c.* 1590, an anonymous table clock, a *Telleruhr* (plate clock), a Dutch *stoelklok*, several French clocks and the Prowent clock discussed here.

Fig. 3. Front of the all-iron movement with just the original wheels and the later dial wheel. Note the slim baluster-shaped pillars and the pin on the going greatwheel to let off the strike.

Fig. 4. Rear view showing the countwheel with slots on the outer edge, gear teeth on the inner edge and offset crossings. Only two wheels and a fly in the striking train.

THE MOVEMENT

Figs 3-6 show the movement without the later brass wheels and pallets of the present tic-tac escapement. The posted-frame consists of two flat open 'plates' fixed to the top and bottom of vertical flat baluster-shaped corner posts by square nuts. The lower ends of the posts are extended to form feet, while the upper ends of reduced diameter hold the bell strap with four smaller square nuts. The thick heavy bell, 6in diameter and weighing 4.8lb (2.2kg), has simple ringed decoration on the top and is held on the knobbed finial with a square nut. The total height of the clock is 23in. The rectangular dial, 13¾in tall and 8¼in wide, just overlaps the movement which is 8⅜in wide by 9¾in deep. There is no indication that frets, side doors, rear cover, a hanging hook or spikes ever existed. The clock is too heavy to be suspended safely by a hook and spikes, so it is likely to have sat on a wall bracket, possibly

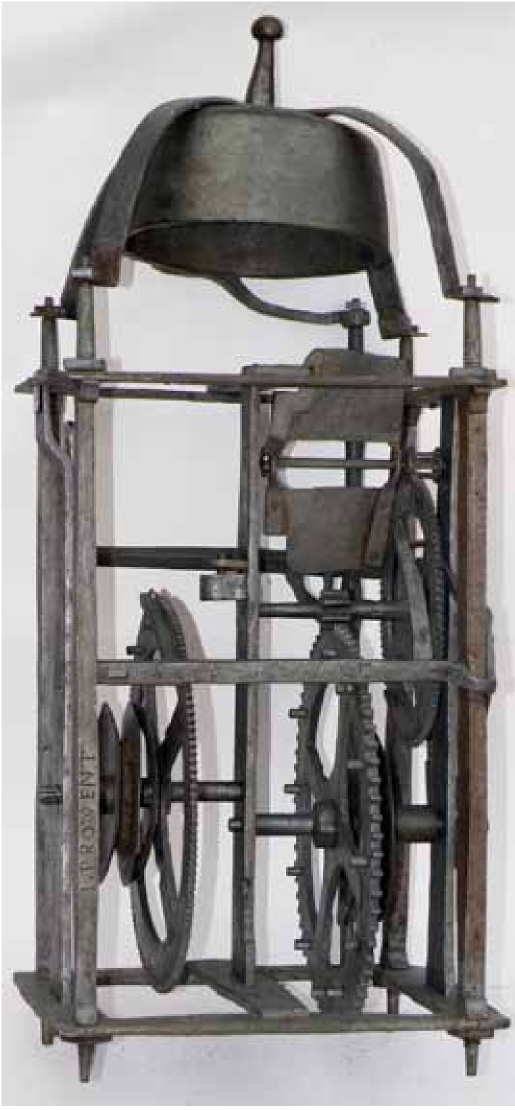

Fig. 5. Right-hand side with the single-arbor strikework. The bridge for the crownwheel of the original balance escapement survives on the central movement bar. Above it is the bottom block with an adjusting screw for the crownwheel of the replacement short pendulum escapement. The name 'I, PROWENT' can be seen on the left-hand pillar.

Fig. 6. Left-hand side showing the hammer head on the outside of the bell and the vertical shaft. The missing hammer spring and hammer stop ('counter') have since been restored. Note the large sheet-iron fly.

steadied by a hoop attached to a couple of empty screw holes on the rear movement bar, which are otherwise not readily accounted for.

The 'plates' have been made by forging iron strip into flat open rectangles with cross-strips riveted to the top and bottom plates to support the central movement bar. Each of the three movement bars swells out near the base with lugs fitting into holes at the bottom and notches at the top fitting into slots and held with wedges.[4] The top of the front movement bar is stepped forward so that the dial can be fixed to it by

4. Although this method was used on English lantern clocks and thirty-hour longcase clocks, it is different to German iron clocks with top and bottom plates (as opposed to Gothic clocks with open frames at the top and bottom). In the German system a horizontal tab fits into slots near each end of the front and rear movement bars and is held by taper pins, with only the central bar using the 'English' method.

Fig. 7. The going greatwheel with a correctly formed join of the crossings to the rim.

Fig. 8. A join with part broken off showing the end of the crossing fitting into V-notches filed into the inner edge of the rim.

a single screw and by a lug into a central hole at the bottom. The pivot holes for the going greatwheel and the pinion end of the fly have later brass bushes, but originally all the pivots would have fitted directly into the iron bars.

The rims of the iron wheels have been forged from flat bar into circles and the joints, which can be detected, forge welded. To make the spokes (crossings), a bar was split from each end and opened up to form a cross, which was then forged flat. At first glance the ends of the crossings appear to be fitted into dovetailed recesses in the rim. However, a slag inclusion has caused part of one of the joints to break away and reveal the actual construction. The ends of the crossings have been split in two along their thickness and each side riveted into V-notches filed on the inside edges of the rims (Figs 7 and 8). Although the ironwork looks quite crudely made it is actually well forged by a competent smith with only a minimum of filing. The wheels run concentrically with virtually no wobble.

Both greatwheels have flat-spring winding clicks acting on the crossings, with separate weights for each train. This type of click is only occasionally found on German clocks, but it was used on early Flemish/Dutch/French iron clocks, English lantern and thirty-hour longcase clocks, as well as some Polish turret clocks.[5] The duration is about 12 hours, depending on the weight drop, typical of balance-wheel clocks. The striking train survives as it was made, with only minor modification or repairs (Fig 9). The striking greatwheel is the largest wheel in the clock, being nearly 9in diameter, and has twelve hammer pins. These pins would have originally also provided overlift, but an off-centre disc has been added to the arbor of the locking wheel to give more positive action (see later for a discussion on the striking system). The fly has been fabricated from sheet-iron vanes riveted to wrought-iron side strips. Its energy is dissipated when the train stops suddenly by a ratchet and spring, as often used on turret clocks. The fly arbor appears to be original although it now has a lantern pinion, probably replacing a worn-out solid pinion of the same count.

As usual on early Continental clocks the slots and the gear teeth of the countwheel are both cut round the rim, in this case the slots being on the outer edge and the teeth on the inner edge. Offset crossings are necessary as normal crossing would interfere with either the pinion or the detent. This arrangement was only used in England on early turret clocks, with early domestic clocks invariably employing a separate gear wheel riveted to the countwheel. Instead of a four-pronged pinion of report filed into the end of the greatwheel arbor, as often found on early clocks, there is a separate pinion. Although it is a later replacement it must have the same number of teeth as the original, otherwise the countwheel would not rotate correctly and the strike would be out of sequence. The wheel and pinion counts are as follows:

fly		-	9
locking wheel	100	-	6
greatwheel	72	-	12 (12 hammer pins)
countwheel	72		

The heavy hammer head, which swings

5. Information on Polish clocks from Dr Grzegorz Szychlinski.

Fig. 9. The striking train of just two wheels and a fly. Note the later off-centre disc on the second arbor to provide overlift. The lantern pinion on the fly arbor is a later repair.

Fig. 10. The present going train with later brass second and escape wheels and tic-tac anchor pallets. The greatwheel arbor has a four-pronged pinion of report. Instead of the pulley being held together by rivets, four fingers on the sleeve are riveted into slots on the cheeks and hub.

horizontally on a vertical shaft, has a hole through the centre, which appears to be deliberate, not a fault in the metal. Perhaps this was for a cord that could be pulled to one side to provide very simple, but effective, silencing at night.

The central movement bar shows evidence for both the original balance and a later verge escapement for a short pendulum. The bridge into which the crownwheel pivoted survives, as does evidence for the broken off bottom block for the balance arbor. Not enough remains to determine whether the balance hung from a thread or was supported by an end 'stone' as in English lantern clocks. Just above the bridge are the bottom block (with an adjusting screw) and a rectangular hole for the potence of the replacement crownwheel of the short pendulum escapement. The verge pendulum probably hung at the rear of the movement, rather than in front of the dial in the German manner.

The final update to the going train was to add a sub-plate to the rear of the front movement bar with new second and escape wheels of brass and tic-tac pallets. With the pallets being below the top plate a pendulum at the rear was impractical and two wires hang down either side of the arbors to act as an internal pendulum. These are not threaded and small bobs (now missing) may have slid on these, held by friction. The use of a bob on either side means that there is no need to crank the pendulum rod to avoid the arbors and allows for beat adjustment. The present going train (Fig 10), with replacement wheels and pinions in brackets, is:

escapewheel	(45)	-	(8)
second wheel	(60)	-	(12)
greatwheel	150	-	4
hour (dial) wheel	48		

The pinion of report is the usual four prongs filed on the end of the greatwheel arbor. This drives the dial wheel, which is made of forged wrought iron. The teeth are on the outside of the rim, which has been riveted to its three-spoked crossings. All the other wheels have four spokes. While clearly of some age it is probably later.

A reasonable escapewheel count for the original two-wheel train would be 37 teeth and a 6-leaf pinion, requiring a balance beating approximately 1.95 seconds, but it might have been even slower.[6]

STRIKING AND THE ANTI-CLOCKWISE HAND

Hour striking is by the single-arbor warnless system commonly used on German and Dutch clocks. Warned striking first appeared about 1490,[7] after which Italian, Flemish, French and later British clockmakers preferred this two-arbor system.[8] In Britain before this date the warnless system was only used on turret clocks, there being no locally made house clocks.

With the warned system the striking train is unlocked when the lifting piece is raised, but is held temporarily (warned) until the lifting/warning detent falls. Warnless striking has a similar arrangement of four detents or arms, some of them having slightly different functions, but all are fixed to the same arbor. The train is unlocked as before and without special provision uncontrolled striking would continue for several minutes until the lifting and locking pieces fall. The unlocking and almost simultaneous fall of the locking piece is achieved by a hinged tip to the lifting piece (Figs 11 and 12), gravity operated on turret clocks and large domestic clocks, as here, but spring loaded on smaller clocks. In England this is known as a nag's head, but in other countries it is called various parts of different animals. In Germany it is a stork's beak (*Storchenschnabel* or the common variant *Storchschnabel*) or sometimes a pelican's beak, while the Dutch call it a goat's foot (*bokkepoot*) or a sometimes a deer's foot.

On early iron clocks the strike is let off by a pin on the greatwheel, which revolves once per hour, rather than by a twelve-pointed starwheel rotating with the single hand. The

6. The musical clock dated 1598 by Nicholas Vallin, now in the British Museum (illustrated in *AH* Sept 2011, p. 37), has only two wheels in its going and striking trains. The crownwheel has 59 teeth and the balance has a beat of 2 seconds. Two clocks in the *Almanus Manuscript* also have trains with only two wheels: Clock 19 has a 37-tooth crownwheel and a beat of 2.4 seconds, while Clock 11 with a 35-tooth crownwheel has a very slow balance beating only 3.2 seconds. Gothic clocks often have balances with a beat of about 3 seconds.

7. J.H. Leopold, *The Almanus Manuscript* (1971), p. 19, note 1.

8. J.H. Leopold, 'Almanus Re-examined', *Antiquarian Horology* 27/6 (Dec 2003), 665.

Fig. 11. Striking arbor with the nag's head and locking detent. The later overlift arm is riveted to the countwheel detent. The vertical hammer is in the foreground, with the hammer tail on its own arbor above it.

Fig 12 (left) Detail of the nag's head with gravity return

advancing lifting pin contacts the nag's head, which hinges upwards until it reaches a stop. Further movement of the pin now raises the lifting piece until the train is unlocked. Striking commences but immediately an overlift lever raises the nag's head clear of the pin and allows it to fall back on the trailing side of the pin, relocking the train after a single blow. Multiple strikes are controlled by the usual countwheel, as with warned striking.

Overlift can be achieved by three methods: the hammer lifting pins, by a slope on the locking detent running on a locking hoop, or by a cam on the second wheel arbor (Fig 13). The earliest clocks, including horizontal table clocks, used the hammer pins, but the favoured later method was a cam (called in German a *Herz* or heart, from its shape) with a slot to allow the overlift lever to drop and the system to relock. If, as here, the cam is on the same arbor as the locking wheel, then there is only one slot (*Einfach-Herz* or simple heart), but if the cam is on the next arbor it usually has two slots (*Doppel-Herz* or double heart). Note that, like a countwheel, the overlift detent does not lock in the slot, locking being by a separate detent acting on a pin on the second wheel. Only a hoopwheel performs the dual action of overlift *and* locking. On this clock overlift was originally by the hammer-lifting pins raising an overlift arm riveted to the locking arbor. This arm has been removed and replaced by an extension riveted to the countwheel detent contacting an off-centre disc, acting as a simple heart, fitted to the second (locking) arbor. Since the movement of the overlift detent on the heart is greater and the heart moves faster than the pins on the greatwheel, the action is more positive, so it was a sensible modification. Nag's head warnless striking is more reliable than is sometimes suggested.

As well as signs of the missing original overlift lever, there was once an arm, since removed, that may have had a pull cord, to trip the strike and synchronise it with the hour hand. On later clocks there is often a decorative piece, usually spring loaded, so that simply pressing it lets off the strike. There does not appear to be a generally accepted term for this, but it is sometimes known as an *Auslösehebel* (trip lever) or *Auslöseflügel* (trip wing) in German, and a *hek* (gate) in Dutch.

Since the strike is let off by a pin on the going greatwheel and not by a starwheel, the hand has to be fixed. The only way it could be set to show the correct time and still strike at the hour, was to disengage the pallets from the crownwheel. Holding the counterweight end of the rope allowed the train to run in a controlled

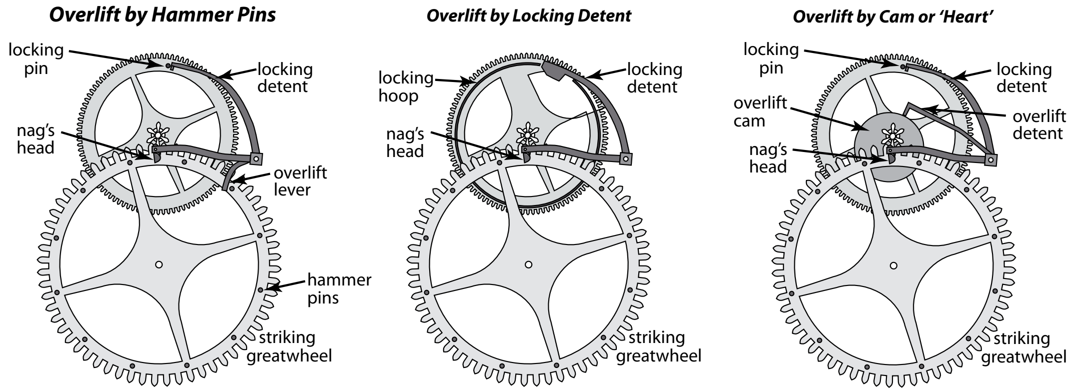

Fig. 13. Three methods of providing overlift for nag's head striking. A two-wheel striking train and an eccentric disc as a cam is shown, as on the Prowent clock. With three-wheel trains locking is on the third wheel with the cam (often with two slots) on the second wheel. The countwheel detent, on the same arbor as the other levers, is not shown. The nag's head is lifted by a pin on the going greatwheel (not shown), not, as it might seem, by a pin on the striking greatwheel.

manner. Gothic clocks sometimes have a short lever to lift the balance for setting the hand. On this clock remnants of a rivet on the left-hand side of the top plate indicate where such a lever was pivoted. A corresponding empty rectangular hole in the bottom plate was probably for a return spring. If the clock was positioned high up to give maximum weight drop this lever might have been operated by a pull cord, in which case a return spring to lower the balance back into engagement would have been highly desirable.

Several suggestions have been made to explain the counter-clockwise dial, but all were rejected until the solution became obvious. Might there have been a rotating dial as used on some so-called 'monastic alarms'? Was the clock used like a small turret clock with leading-off work to a remote dial and extra wheels to reverse the direction of the hand? There is no evidence that the dial sheet is not original, or that there was a remote dial. It was even suggested that the clock might have been viewed through a mirror (at least one much later example is known), but this is most unlikely.

The answer lies in the seemingly unconnected early method of letting off the strike and updates to the escapement. The striking greatwheel rotates anti-clockwise with the weight on the left.[9] To even the weight distribution the going weight is on the right and the going greatwheel rotates clockwise. The countwheel gear has internal teeth, which means that it turns in the *same* direction as its pinion of report. A gear with external teeth turns in the *opposite* direction to the pinion that drives it. Originally the hour (dial) wheel would have been of this type with internal teeth, offset crossings and a hand that rotated in the correct direction.[10] When the clock was updated to a pendulum it was found not to be so easy to disengage the pallets to reset the hand (although it would have been quite feasible to arrange this). The hand arbor was modified so that the hand could rotate with a friction spring (as on English and later Continental clocks). But as this spring would interfere with the offset crossings, the hour wheel was replaced by one with normal crossings and external teeth. This meant that the hour wheel and hand now rotated in the opposite direction and the chapter ring was repainted accordingly.

Having to tell the time from an unconventional dial must have been accepted as a small price to pay for an improved escapement and better timekeeping. But these modifications had other consequences, as now the strike let-off is not synchronised with the hand and a complicated

9. This must be as originally made, otherwise the countwheel would turn backwards and the strike would be out of sequence. Both clicks operate to give the rotations described.

10. A trial gear of plastic with internal teeth was found to mesh correctly with the pinion of report. An unused hole, and with no wear, above the pivot hole for the hand arbor appears to have been an error during making of the clock.

procedure has to be performed when setting the clock to time. When an hour strikes the clock is stopped, the hand is set to the forthcoming hour and, if necessary, tripping the strike until it is in the correct sequence. The clock is restarted at the next hour (actual time). Clocks which have the strike let off by a pin on the going greatwheel, a fixed hour wheel and no means of disengaging the pallets may have to wait up to twelve hours before the hand indicates the correct time. At least having a movable hand means that resetting can be done within an hour, but it is still an inconvenience.

There remains the possibility that it was made as, or converted to, a Jewish clock with a dial reading counter-clockwise. The only such public clock is the well-known one on the Jewish Old Town Hall, Prague, but a few domestic clocks are known. Since they have Hebrew characters, which are read from right to left, the hands rotate in the opposite direction to clocks with Roman hour numerals. There is no evidence that this clock ever had Hebrew numerals, but if so they might have been removed during the dial's two repaints (see below).

THE DIAL

The iron dial sheet appears to be original, the texture on the reverse being very similar to the iron sheet of the fly. It has off-white Renaissance scrolls and foliage decoration painted on a black ground. The paintwork is naïve with an uneven surface, indicating retouching and over-painting. Off-white lines with arrow heads radiate from the centre to indicate the hours and shorter white lines indicate the half hours. The off-white chapter ring is edged with narrow bands of red. In order to ascertain how the present appearance compares with its original decoration, thirteen very small samples were taken from the dial, sectioned and analysed.[11] The main conclusion is that the dial has been over-painted twice, each time following the main lines of the original decoration, but the edges of the original scrolls were more elaborately outlined in some areas.

The first scheme was a dark ground of a greenish black, probably a pigmented varnish or glaze, possibly a type of shellac, rather than a standard black oil paint (Fig 14). The scrolls were painted with a thin oil paint primer, a thicker coat of off-white and then a bright yellow, using the pigment lead-tin yellow. The chapter ring was treated similarly, but with a top coat of pure white lead paint instead of yellow. Samples from the radiating lines in the centre show only the greenish black coating, implying that either there were no lines originally or they had flaked off. The inner and outer borders of the chapter ring were painted with pure vermilion. The whole dial was given a thin layer of varnish.

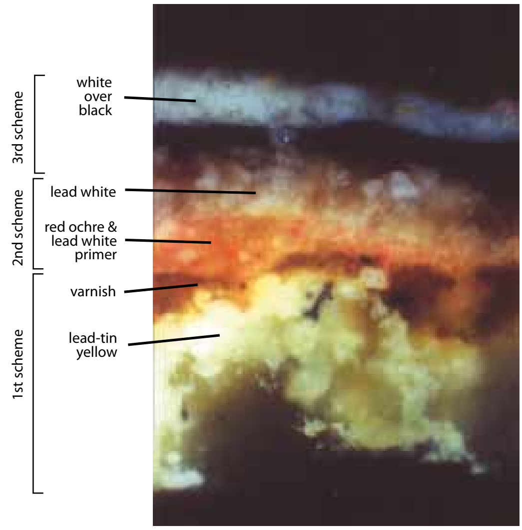

Fig. 14. Paint section through one of the scrolls on the top right of the dial at a magnification of 500x, showing the three different paint schemes. (Photo: C. Hassell)

During the first repaint the dark ground was coated with a black oil paint and the scrollwork was underpainted with a reddish layer of lead white and red ochre then with white lead paint. The radiating lines in the centre were certainly present in this second scheme. The chapter ring was repainted with lead white oil paint and the red rings repainted with pure vermilion as before.

The second repaint (the present decoration) still employed traditional lead white and vermilion, so it cannot be later than the first decades of the twentieth century. It did not prove

11. This was done by Catherine Hassell, paint analyst. The samples were set in polyester resin, sectioned and examined under high magnification in halogen and ultraviolet fluorescent light. Pigments from the different layers were identified using a polarising light microscope at 1000x magnification. A chemical test for lead was carried out on each white layer. A copy of the full report is available from the author.

possible to determine at what stage the hour numerals were changed to read anti-clockwise. The surface of the chapter ring is smoother that the scroll decoration and the original numerals may have been abraded away to avoid a 'ghost image' appearing through the white ground. Alternatively the samples may have missed the underlying original numerals. All the pigments are consistent with a seventeenth-century date or earlier. Lead-tin yellow, found in the original scheme, was used from around 1250 until the mid-seventeenth century, when its use ceased abruptly for no obvious reason. Its formula might have been lost due to the death of the producer.[12]

While this examination has not determined exactly when these changes took place it is reasonable to surmise that the first repaint was when the balance was replaced by a verge pendulum. It is likely that this is when the direction of the hours was reversed. The second repaint was probably when the escapement was changed yet again to the present tic-tac anchor.

THE CLOCK'S PLACE OF ORIGIN, MAKER AND DATE

It is very unusual to find names, initials or dates on the dials or movements of Continental iron clocks of any period,[13] but this clock has 'I, Prowent' engraved on the right-hand front pillar. Regrettably this name (or any variant) is not that of any known clockmaker, nor has it been found as a surname in any European country. It is a very infrequently found surname in America, limited to only about a hundred people, but their country of origin has not yet been determined.

However, the name Prowent does occur as a manor on the outskirts of Kórnik, 22 miles (35km) south-east of the city of Poznan, in western Poland.[14] This area of Poland became part of Prussia in 1772, but reverted back to Poland after World War II. There are no clockmakers recorded at Prowent or Kórnik, but this may be due solely to the lack of records. The present buildings at Prowent have their beginnings in the early eighteenth century, but before then a group of artisans had settled there, including a ship's carpenter, painter, cabinetmaker, locksmith, etc, and in the sixteenth century there was a good casting workshop in Kórnik. Unfortunately, virtually nothing is known about them and no written records survive from that period.[15] The most common type of Polish surname is derived from a place, so maybe the Prowent craftsmen included a clockmaker who called himself after the place, in the same way that the main mercantile agent in Kórnik was Samuel Poznanski, named after the town of Poznan.[16]

As well as being the name of a manor, Prowent is also an archaic Polish word that means the income, such as rent or tax, from a manor, farm, mill, etc. This word, from the Latin *proventus*, has not been in use for the last two centuries, but it does appear in old Polish wills, where is can also apply to the farm or manor itself, not just its income. Many such places would have been called Prowent, but the name has only survived at the one near Kórnik.

We now need to see if the clock has any regional characteristics that can help pin-point its origin. This type of weight-driven clock was made throughout Continental Europe, especially in the Germanic states. However, clocks from

12. www.visual-arts-cork.com/artist-paints/colour-pigments.htm

13. Gothic clocks by the well-known Liechti family of Winterthur, Switzerland, are a notable exception.

14. Wislawa Szymborska, Nobel prize-winning poet, was born in Prowent in 1923.

15. Information from Dr Wanda Karkucinska, Director of Special Collections, Kórnik Library of the Polish Academy of Science.

16. Prowent does not occur in a searchable list (www.herby.com.pl/indexslo.html) of over 800,000 Polish surnames, some very common, others extremely rare, covering 94 per cent of the population in 1990. Nor does it occur in a six-volume compilation of old Polish surnames, primarily covering the period 1200-1600 (information from Fred Hoffman). It may have been a name that has died out. An Internet search has produced no Prowents and there are none on the International Genealogical Index (IGI), possibly due to the limited Central European coverage.

17. Fridolin Staub, 2000, *Eine Sammlung alter Uhren* [A Collection of Old Clocks] (2000), pp. 51, 61, 65, 69, 73, 79, 81, 85, 87, 89, 96, 99, 101, 103, 104, 241, 243, 245, 249, 251 and 253.

18. Staub, *Sammlung*, pp. 47 and 55.

19. Staub, *Sammlung*, pp. 57 and 76-77.

southern Germany, the Tirol and Switzerland normally have straight pillars of square (or sometimes rectangular) section,[17] not the baluster shape seen here. Occasionally Germanic clocks have turned round-section pillars, especially if the movement is in a case.[18] Less common are more decorative square-section pillars that swell in the middle,[19] but they are not like those here. Even more unusual are German clocks with decoratively turned and filed iron pillars.[20] The movements of these clocks are all very similar, and the same basic frame construction was used throughout the region into the early nineteenth century. The top and bottom plates are solid rather than the open frame seen here, but solid plates would be less practical on a clock of such a large size. As discussed earlier, the movement bars of Germanic clocks are usually held with pins at the top and bottom and in a different manner to this clock, which uses wedges similar to Flemish, French and English posted-frame movements. The countwheel detent curves round the left-hand rear pillar, an unusual arrangement not seen elsewhere and certainly not found on South German clocks.

The vertical hammer shaft is often found on Continental clocks, but the hammer head strikes the outside of the hefty bell, not the inside as on Renaissance iron clocks. However, the English type of bell strap is normally only used on Gothic clocks and they are usually much more elaborately decorated, rather than clocks with the type of frame construction seen here. The usual arrangement on German Renaissance and later clocks is for a single- or double-legged bell support fixed to another plate above the movement top plate as part of the iron case. The only clock known in the literature with a similar frame construction, bell strap and a vertical hammer striking the outside of the bell has twisted pillars.[21] No place of origin is suggested.

In Poland iron clocks were mainly made in the Zulawy district, east of Gdansk (formerly Danzig), in the north of the country on the Baltic coast, but of course there are always exceptions. The constructional details discussed above effectively rule out a South German/Tirol/Swiss origin, while the warnless striking makes a Flemish/Italian/French origin less likely. Although its place of origin cannot be determined precisely there is enough circumstantial evidence to place it in Poland, perhaps near Kórnik. There is a strong possibility that Leopold Metzenberg acquired it on a visit to the region when visiting relatives in the 1920s. Since this clock seems a misfit in the Metzenberg collection of high quality decorative watches and clocks, could it be that he acquired it from the area where the ancestors of both himself and his wife originated, as a reminder of their Prussian roots?

Simple clocks of this type are difficult to date precisely. It has many features that were used from a relatively early date: two-wheel trains, warnless striking, strike let-off from the going greatwheel, internally-toothed countwheel and dial wheel, as well as the early type of forged iron construction with the wheels having separate rims and crossings. But many of these features continued until much later, in some cases into the nineteenth and even the twentieth centuries. The frames of Gothic clocks are held together by slotted dovetail joints, rivets, pins and wedges, with little recourse to screws. The frames of later Renaissance clocks have top and bottom plates fixed to the corner posts with screwed nuts, as on the Prowent clock. This type of screwed construction was in use as early as about 1500[22] and was a common method by the end of the sixteenth century, so the screwed pillars do not preclude an early date. The important dating evidence of lead-tin yellow used on the original dial decoration indicates a date before 1650. The closest that can be suggested is the first half of the seventeenth century, and while it is tempting to regard this clock as possibly being earlier, this is probably wishful thinking.

ACKNOWLEDGEMENTS

In addition to those mentioned in the footnotes, the author would like to thank the following for comment and information: Ian Fowler, Catherine Hassell, Dietrich Matthes and Howard Metzenberg. Special thanks are due to those in Poland who have provided information: Katarzyna Moskal, Dr Grzegorz Szychlinski and Dr Katarzyna Wozniak.

20. Lothar Krombholz, *Frühe Hausuhren mit Gewichtsantrieb* (1984), Fig. 142a.

21. H. Alan Lloyd, 'Gothic Clocks', *The Antique Collector*, August 1962, part 2, p. 174, Fig 15.

22. H. A. Lloyd, *Some Outstanding Clocks over Seven Hundred Years 1250-1950* (1958), p. 36, plate 30b.