DOUBLE-SI

An Italian he

John Robey, UK

Figure 1 (right). Heavy iron Italian clock with a brass dial.

Figure 2. The clock before cleaning. Photograph by Chris Hooijkaas.

Italian clocks show more variety in their patterns of striking than those from any other European country. Also, as well as using the usual countwheel or rack-and-snail to count the hours, they often use what is called 'whizzing-work', but that will have to wait for another time. Disregarding clocks that strike or chime the quarter hours using a separate train, British and German clocks normally only strike I-XII hours twice a day, with a passing half-hour being unusual. French clocks often include a single strike on the half hours with either a passing strike or via the striking train, while Comtoise clocks from the French Jura region repeat the hour a few minutes later.

Part **1** of **2**

Italian clocks can use a variety of systems, including 24-hour striking,

X STRIKING

avyweight

Figure 3. The rusty movement in 2015. Photograph by Chris Hooijkaas.

with dials to match on early examples. These cause serious problems for both the clock's user and its maker. If it is late in the evening and the clock strikes in another room—was that 18 or 19? Also it is a challenge for the clockmaker, who has to make the striking train much more accurately and also provide enough power for the total of 300 strikes each day. In comparison there is almost half that number (2 x 78 =156) for a day divided into two 12 hours. This is why we all now use the the double-12 hour day.

But like Comtoise clocks, Italian clocks often include repeat of the strike a few minutes after the hour, known as *ribotta*. Of course this doubles the number of strikes and hence the power requirements, and halves the duration. Instead of making the striking train run slower and doubling the weight, a more fundamental solution is often used. An

Figure 4. Cherubs above the chapter ring and a later date.

Figure 5. Wedge and staple for holding the top of the dial.

Figure 6. The wrought iron frame.

Figure 8. 'Carmino Boha' crudely engraved on the plinth.

Figure 9. The movement bars with bosses on the central bar.

Figures 10 and 11. Central movement bar: front (left) showing the potence for the verge crownwheel and a recess for the pinion, and a rear view (right).

Figure 7. Weight-driven Flemish Renaissance clock, about 1580, with an iron frame.

alternative to striking the full 12 hours with the repeat is to divide the strike into four sequences of six hours per day, plus the repeat. Sometimes the dial shows only I-VI hours, but more usually it is a normal I-XII hour dial.

Not all clocks with double-six striking have *ribotta*, but many do. The first part of this article discusses a clock of about 1680 with a 12-hour brass dial, double-six striking, *ribotta*, an alarm, and a movement made completely of iron. The second part will describe a clock with an iron frame, brass wheels and the same combination of dial, strike, repeat and alarm, but made about a century later.

The clock shown in **figure 1** is very unusual and extremely heavy. If clocks were classified by their weight, then this one would come near the top of the list at a hefty 15 pounds (6.8kg). It is a posted-frame clock made entirely of iron, apart from the 12-hour engraved brass dial. There is double-six striking with *ribotta* and a verge escapement. The wheels are excessively thick and the whole construction is heavily made. When discovered in the Netherlands in 2015 it was very rusty and had not run for a considerable time, **figures 2** and **3**.

Italian lantern clocks from the eighteenth century have single-sheet brass dials, but this clock has a separate chapter ring that overlaps the backing plate. There are small fleur-de-lys half-hour markers and dots for the alternate quarter hours. An inner ring of 1-12 Arabic numerals indicates the number of hours before an alarm rings, with 1 at the top rather than the more usual 12. The top of the dial plate is engraved with a pair of charmingly naïve winged cherubs with their eyes looking as if they are wearing swimming goggles, **figure 4**.

Between them is the crudely engraved date 1750, which cuts into the cherubs and is clearly later. It perhaps signifies when the clock was given as a wedding gift. A peg on the lower edge of the dial fits into a hole in the bottom plate, in the English manner, but the top is held by a method not seen before. A thick wrought-iron wedge passes though both a gap in the top of the frame and a staple riveted to the rear of the dial, **figure 5**. The hands and bell are restorations.

Figure 12. The going train.

Figure 13. The very thick going greatwheel with crossings worn by the winding click.

Figure 14. The going greatwheel assembly; left: ribotta pins and tabs for setting the hand; centre: the greatwheel; right: rope pulley and spring click.

Figure 15 (above left). The assembled going greatwheel.

Figure 16. The going second wheel with a very steeply tapered arbor.

Figure 17. The contrate wheel with a steeply tapered arbor.

The frame, **figure 6**, has Doric pillars that depart considerably from Classical architecture, not known on any other seventeenth-century rural iron clock. Similar iron pillars are known on a Flemish weight-driven clock of about 1580, but without the moulded iron plinth and cornice, **figure 7**.

The bottom plate has a stepped and moulded plinth with a similar moulded cornice to the top plate, of a design normally only seen on gilt-brass Renaissance spring clocks. These mouldings are separate frames attached to the flat plates. The round pillars, with square capitals and supported on elongated square-section baluster plinths, are also of a style normally only seen on early clocks.

There is no evidence of brazing and even if iron strips rolled to the correct cross section were available, a great deal of skill was necessary to forge the frame. In comparison the components of a brass frame would be cast in sand moulds using wooden patterns, and their finishing would have been considerably easier than this iron frame. The pillars are firmly riveted to the plates, with short finials at the top, but no feet. 'Carmino Boha' is very crudely engraved on the front of the plinth, **figure 8**. This is probably not the name of either the clockmaker or the original owner, but the surnames of a couple who received the clock as a marriage gift in 1750. In which case it would have been about three generations old and may have been a treasured family heirloom passed on to the next generation.

The very thick movement bars show more of the many unusual features of this clock, **figures 9** to **11**. The front and rear bars have curved side arms in the form of a fleur-de-lis. Instead of the normal practice of offsetting the arbors of each train, they are exactly in line and bosses are riveted to each side of the central bar to accommodate the pivots. Since the crownwheel sits so close to the central bar a recess has been chiselled in the front face to provide clearance for the pinion.

The wheels are very heavy and thick, **figure 12**, ranging from almost $^{1}/_{4}$in (5.7mm) to $^{1}/_{3}$in (7.6mm). The greatwheels have four crossings; the rest of the wheels have three crossings and all have separate rims, though the join is so well made that it is hardly visible. The winding clicks have worn the crossings of both greatwheels, **figure 13**, though the pinions show little wear and have possibly been replaced, replicating the original extreme taper and diameter of the wheel arbors of up to $^{9}/_{16}$in (14mm).

Single-handed clocks usually use a 12-pointed starwheel to let off the strike every hour, but to repeat the strike each point would have to be double. There would simply not be enough room for the tip of the nag's head to fall after the strike on the hour. The solution is to let off the strike from the greatwheel, which rotates once an hour or, as here, in two hours. Also the clutch spring for adjusting the hands has to be a friction drive with the greatwheel, instead of the hour wheel.

This is achieved by a hollow greatwheel arbor with a shaft passing through it and the pinion-of-report fitting on the front end. At the rear of the greatwheel is a friction bar with two pairs of pins for letting off the hourly strike and *ribotta*, and a flat ring with two tabs to adjust the hand manually, **figures 14** and **15**. The hand has a fixed connection to the pins that let off the strike, and a friction connection with the greatwheel itself.

Since a large hour wheel engages with a small pinion-of-report, trying to adjust the friction bar by moving the hand would

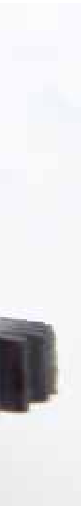


Figure 18 (top left). The contrate wheel with three crossings.

Figure 19 (top centre left). Going pinion-of-report.

Figure 20 (above left). Striking pinion-of-report.

Figure 21 (above). Restored hour wheel with pins to act as internal teeth.

Figure 23 (far left). The striking train.

Figure 24 (left). The third wheel with a locking pin.

Figure 22. Verge and pallets (right), rear cock (top), front cock (bottom), and crownwheel top cock (centre).

require too much force and something would be damaged. The solution is to move the friction bar directly using the two tabs provided for the purpose. Part 2 shows an alternative method of adjusting the hand from the dial where the clock is in a case and sides of the movement are less accessible.

Collectors of English lantern clocks like to see the wheels fitted to tapered arbors without the use of collets, but on this clock the sturdy construction and the tapered arbors are taken to an extreme, **figures 16** to **18**. The eight-leaf pinion-of-report does not have the usual square hole fitting on to a square filed on the end of the arbor. Instead there is a four-lobed aperture, **figure 19**, fitting on to the similarly shaped front end of the shaft through the greatwheel arbor.

The striking pinion-of-report is formed from the solid end of the greatwheel arbor, **figure 20**, and both fittings have been formed by a chisel, not a file. This technique is used elsewhere on this clock and appears to be unique to clockwork. The wheel counts and the clock's dimensions are shown in the panel on page 32.

Very unusually the going weight hangs on the right so that the greatwheel rotates clockwise, and the shape of the crownwheel teeth confirms that this was originally intended. This arrangement is known on just a very small number of clocks, including one drawn by Leonardo de Vinci. To achieve clockwise rotation of the hand, the missing hour wheel must have had internal teeth. A conventional internally toothed wheel with offset crossings, as often used on the countwheels of early iron clocks, was initially made. But it was then found that not only was there not enough room behind the dial, it would not fit between the pillars. The alternative solution was a contrate wheel made as a disc with backward facing pins, and this meshed satisfactorily with the flat pinion-of-report and avoided the space and clearance issues. This type of wheel with contrate pins was very occasionally used for clockwork and was the method used in the restoration, **figure 21**.

The verge and crownwheel are supported by sturdy iron cocks screwed to the top plate, **figure 22**. The rear cock overhangs the cornice so that the pendulum can clear the alarm. The original pallet arbor survives, but the pendulum rod and bob are restorations.

The striking train has the usual three wheels and a fly, with an overlift cam on the second wheel and a locking pin on the third wheel. The countwheel has a separate gear and is divided to strike 1, 1, 2, 2 … 6, 6, for double-six striking with *ribotta*. While the going greatwheel rotates once in two hours, resulting in a duration of about one day, the striking greatwheel rotates once an hour, necessitating twice daily winding, which is not very convenient.

Striking is by the usual Continental warnless nag's head system and the strike-work arbor is on the left-hand side, which is opposite to the usual arrangement. The locking and overlift detents are on one arm and the countwheel detent at the rear is on another, **figure 25**. The missing spring on the nag's head has now been replaced.

The extraordinary over-engineered vertical hammer shaft is on the right, again opposite to the conventional layout. It is not the usual round-section rod, but forged with a central semi-circular section, instead of a simple short arm pushed by the link on the hammer-tail arbor. A vertical hammer spring riveted

Figure 25 (far left). To left: auxiliary hammer spring; left: strike-work arbor with nag's head; centre: vertical hammer shaft; top right: hammer head; bottom right: horizontal arbor with hammer tail.

Figure 26 (above). Massive hammer head resembling a sheep.

Figure 27 (right). Components of the restored alarm.

to the bottom plate acts on a short arm, while another arm at the top stops against a screw under the top plate. A further hammer spring that also acts on this arm is probably a later addition.

Another special feature of this clock is the massive hammer head, the undersurface of which is formed and engraved to represent a sheep's head, **figure 26**. This indicates the clock's rural origin and contrasts with the sophisticated design of the pillars and plates. Since it is hidden from view it may have had some special significance for the original owner.

The missing alarm was located on the rear movement bar and has now been restored, **figure 27**. The alarm verge sits very close to the movement bar and a clearance slot for the lower pallet has been chiselled into it to allow the top pallet to be inserted through the 'keyhole' in the top plate. The complete movement is shown in **figures 28** to **32**.

This clock was thought to be unique until another similar slightly smaller clock appeared, though now fitted with an inappropriate bell frame, dial and hand of

WHEEL COUNTS

Going train

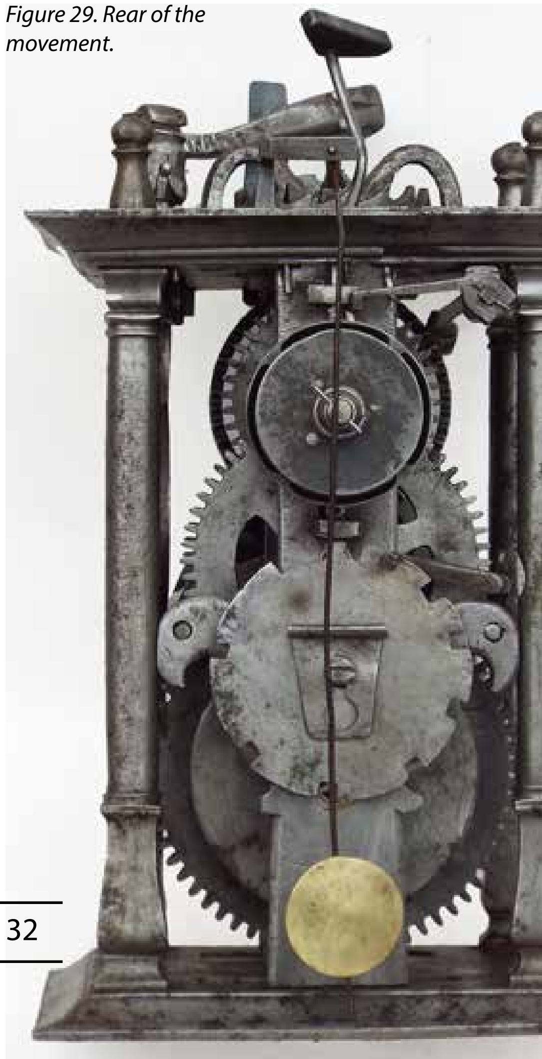
crownwheel	17	6
contrate wheel	44	7
second wheel	56	8
greatwheel	64	8
hour wheel	[48]	

Striking train

fly		6
locking wheel	40	7
second wheel	56	8
greatwheel	64	8
countwheel	42	
hammer pins	8	

Beat	0.45 seconds
Going duration	1 day
Striking duration	1/2 day
Overall dimensions	12½in tall x 6¼in wide x 7in deep (317 x 159 x 177mm) frame: 8in tall x 6in wide x 6in deep (203 x 152 x 152mm)

Figure 29. Rear of the movement.



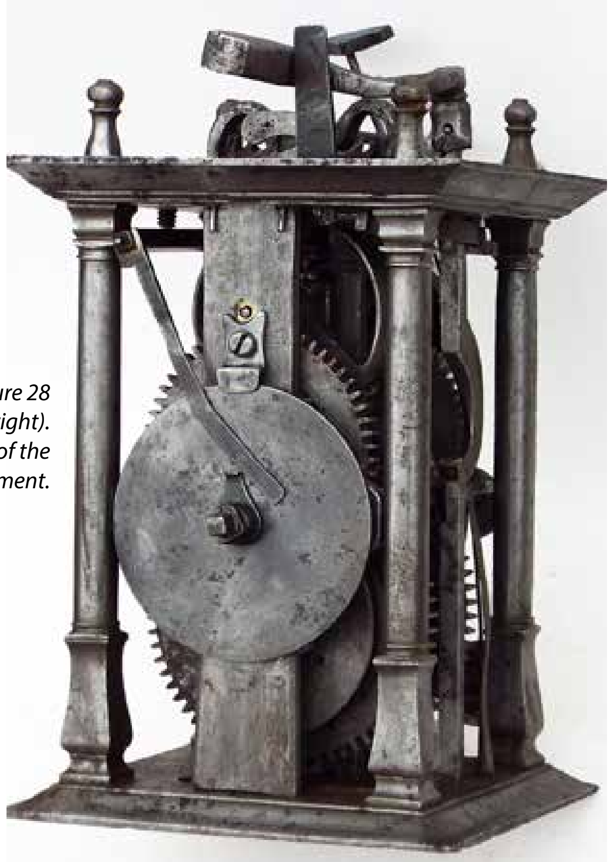


Figure 28 (right). Front of the movement.

a much earlier Gothic design, **figures 33** to **36**. Identical features shown by these two clocks include:

- very heavy all-iron construction, thick wheels mounted on very steeply tapering arbors;
- stepped and moulded cornice and plinth;
- same shape of front and rear movement bars;
- arbors of both the going and striking trains are in line and thickening pieces added to the central movement bar;
- daily winding for the going train, but twice-daily winding for the striking train.

Features that are different are:

- octagonal-section corner pillars with capitals and plinths;
- small squat bun feet but no finials;
- conventional hour wheel rotating clockwise;
- countwheel with internal teeth, external slots and offset crossings, 12-hour strike without *ribotta*;
- octagonal hammer shaft on the left-hand side, strike-work on the right with a decorative manual let-off tab and spring;

Figure 30. Left-hand side of the movement.

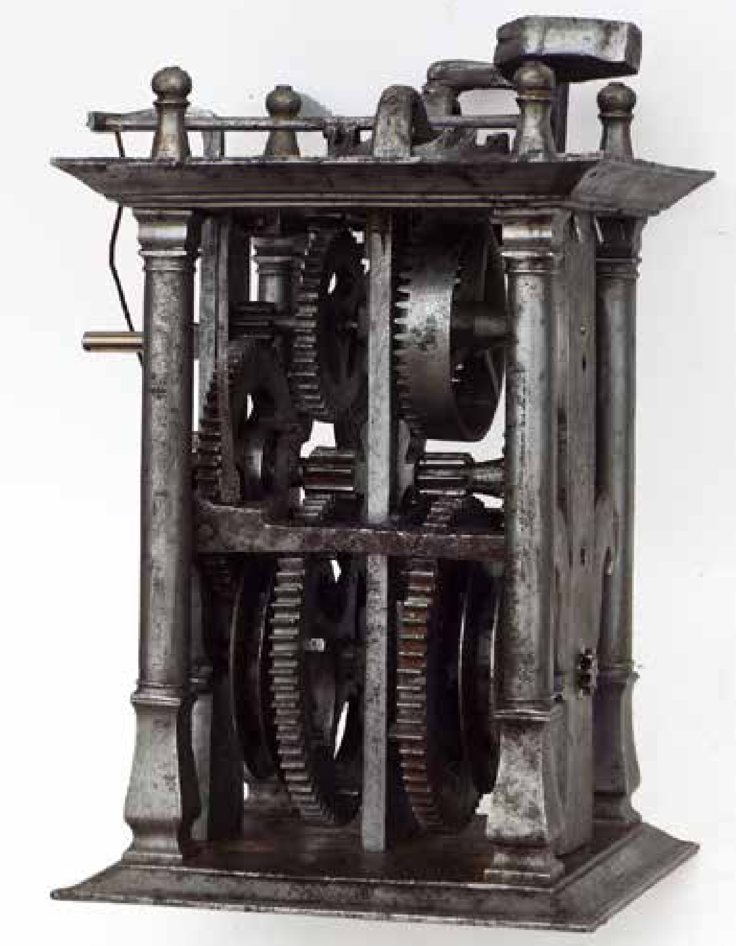


Figure 31. Right-hand side of the movement.

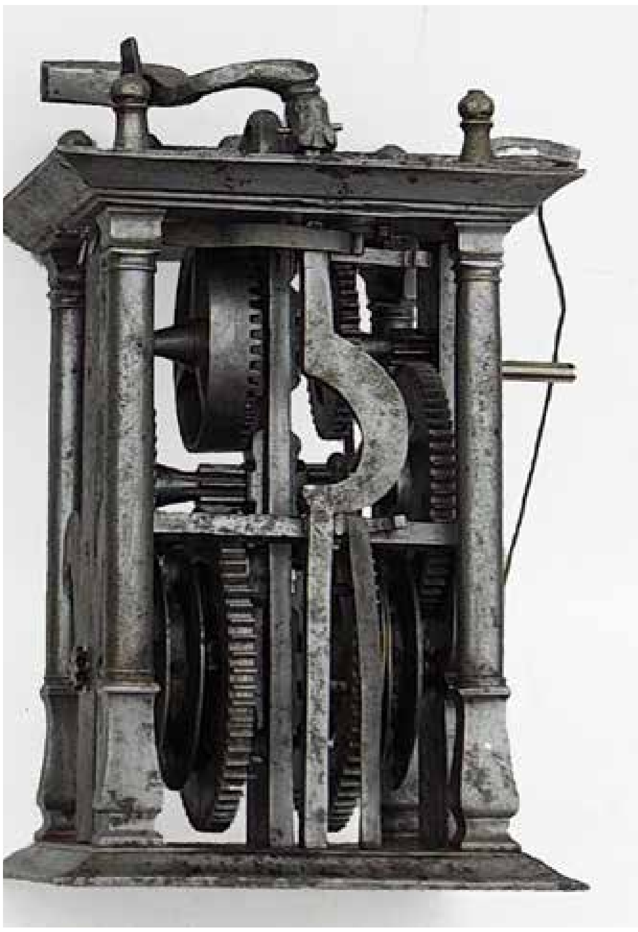


Figure 32. Top view of the movement.

● the inner shrouds of the rope pulleys are dish-shaped with edges that curve over to protect the clicks, a feature known on some Tuscan clocks.

The very idiosyncratic similarities confirm that both clocks were the work of the same clockmaker, while the differences suggest that the clock in **figure 1** is the earlier one. It is likely that the maker of these clocks was a very skilled iron worker, possibly from Tuscany, who had not been trained as a conventional clockmaker. The use of a chisel to form the pinions-of-report and clearance for the lower alarm pallet and the crownwheel arbor and pinion suggest that he might have been a gunsmith or a locksmith. He had seen Renaissance buildings, but had not been educated in the principles of Classical architecture.

Part 2 of this article discusses a later and smaller Tuscan clock that is more typical of Italian clocks. Like this very special clock it also has a 12-hour dial, double-six striking and *ribotta*.

Concludes next month

Figures 33-36 (above right and below). A similar heavy Italian iron clock.