EARLY CLOCKMAKERS' WORKSHOPS
Part 2. The Stradanus engraving

by John Robey, UK

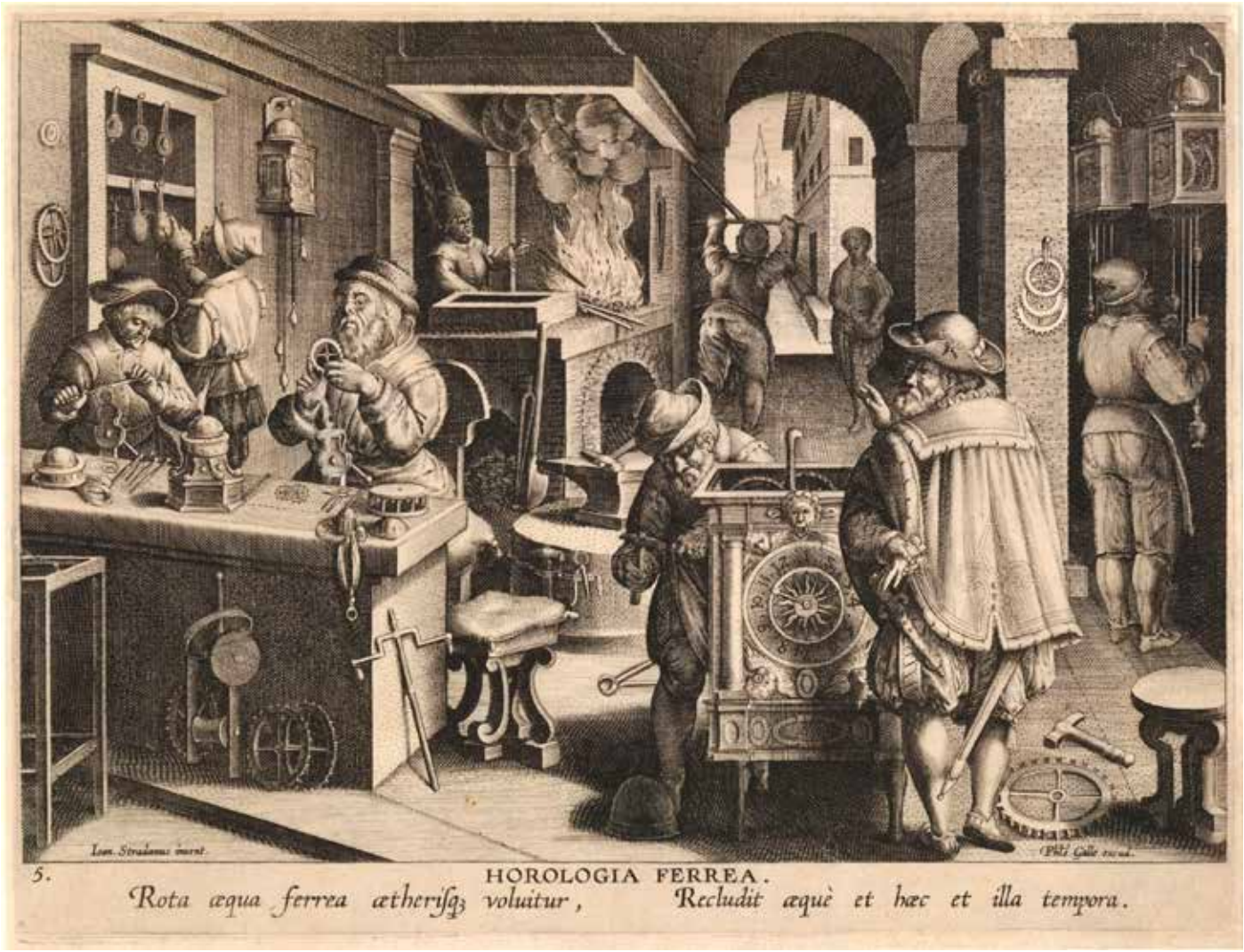

Figure 4. Engraving of a clockmaker's workshop, by Johannes Stradanus, about 1590, dominated by a blazing forge

The copperplate engraving by Johannes Stradanus is just as well known and as widely reproduced as the woodcut by Jost Amman, but it is more ambitious and contains even more detail. It is one of a collection of 20 prints called *Nova Reperta* (*New Inventions of Modern Times*) published in Antwerp. These include such subjects as the discovery, invention or production of silkworms, distillation, olive oil, cane sugar, oil paint, determining latitude, polishing metals, the astrolabe, water mills, windmills and—the one of interest to us—iron clocks.

Jan van der Straet or Stratesis (1523-1605) is usually known by the Latin version of his name: Joan, Joannus or Johannes Stradanus. He was also known as Giovani Stradano. He was born in Flanders and was mainly active in sixteenth-century Florence, which probably explains the various alternative versions of his name. Various dates are given for this publication, ranging from 1575 to 1590, so it is best just to say 'late sixteenth century'.

The print, **figure 4**, is much larger than the earlier woodcut, being 283mm by 234mm (about 11in by 9¼in) and is titled 'Horologia Ferrea' or 'Iron Clocks'. There is also a Latin caption that Charles Aked in his article in *Clocks* March 1986, translated as 'the iron wheels turn evenly, disclosing equally those times and these'. However, this ignores a vital word and *Clocks* reader and former lecturer in Latin, Talbot Stone, has provided me with a more accurate version: 'The iron wheel is perfectly balanced and is turned by the lightest breath of air'.

The significance of this is that it is clocks with iron wheels that are being illustrated again, though not Gothic clocks this time. What is often not appreciated is that even elaborate astronomical clocks in fine gilt-brass cases usually have movements, including the frames and wheels, made of iron at this period, **figures 5** and **6**.

Though the composition of the engraving is similar to Amman's woodcut, with a bench at the front, a

forge in the rear corner and the master talking to a customer, it depicts a larger concern with many more people. Here the view is from inside looking across the workshop and through an open archway that has no sign of doors, probably due to artistic licence. Otherwise its valuable contents such as clocks and watches would be easy pickings for night-time thieves.

The eye is drawn through the arch, down the narrow street outside and past houses to a tall clock tower. Entering the workshop through the arch is a plainly dressed young woman carrying a basket that may have contained lunch for one of the workers.

Dominating the front of the workshop is the master standing behind a clock of monumental proportions with a hammer in his right hand and apparently striking a punch or chisel of some sort held in the other. Why he would be hitting the side of the clock is difficult to understand.

In front of the clock is an aristocratic looking bearded gentleman, fashionably dressed in a large-brimmed hat, coat (possibly trimmed with fur), a ruff, fancy knee-breeches, stockings, elegant shoes and armed with not only a sword but also a dagger. He is clearly someone of importance, possibly the customer of the large clock. Scattered untidily on the floor nearby are a pair of pincers, a large clock wheel and a hammer, as well as a stool.

The extremely large clock is of a type that is not easy to classify. It is not a turret clock that would be hidden away in a tower, yet it is far too big to be in a normal domestic situation. Perhaps it was intended for a large open hall in a castle or palace. It must have been weight driven and probably positioned high up on a wall. It is not possible to establish what the case is made of. It may have been carved and gilded or painted wood with gilt-brass ornamentation.

The single-handed dial has Arabic hour numerals with 1 at the top instead of 12, which is surely a slip by Stradanus. There are winged cherub-head spandrels, and at the top a grotesque male head with an open mouth. There is a Renaissance border at the bottom, pillars at the sides and the whole structure stands on four tall, but rather spindly looking baluster-shaped legs. Its bell sits on the floor in the shadow of the clock.

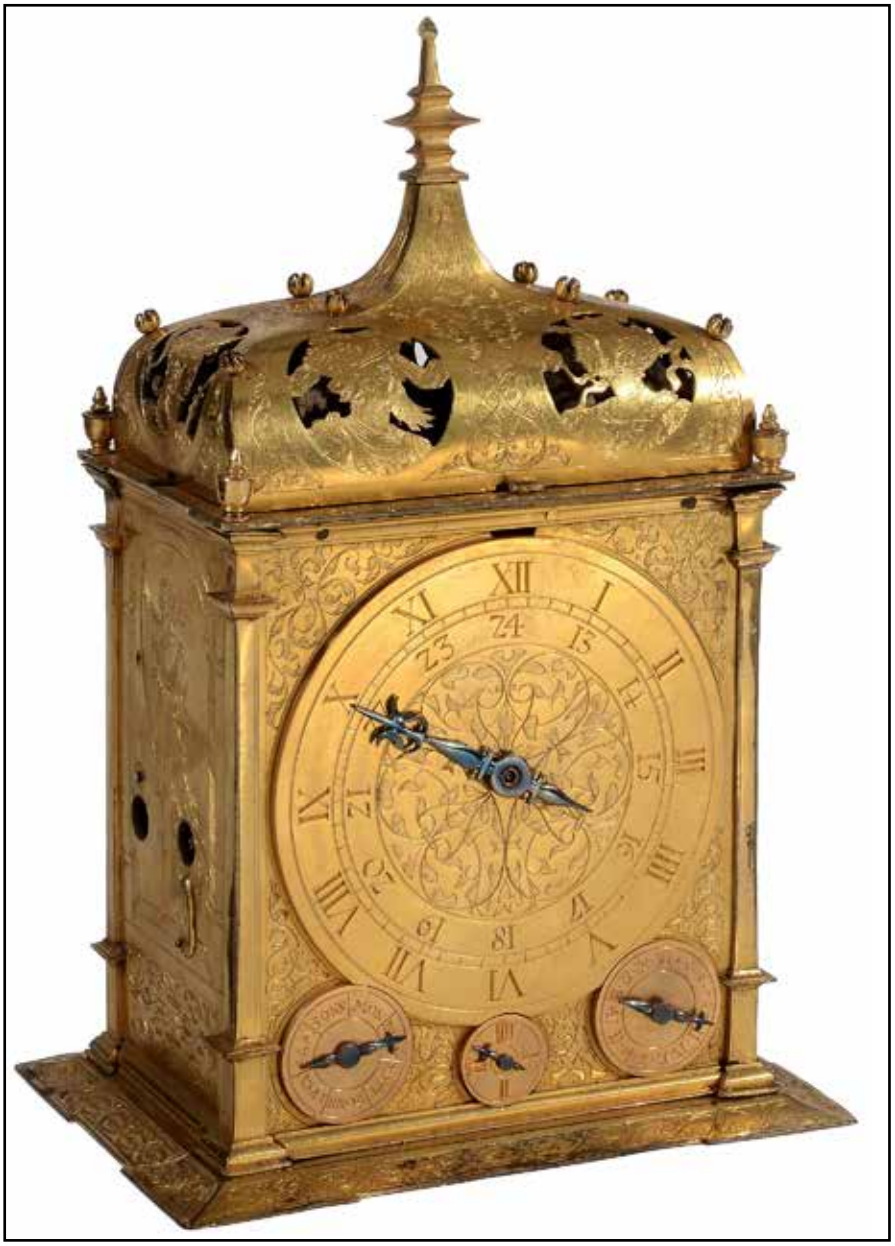

Figure 5. A complex spring-driven gilt-brass German 'masterpiece' table clock dated 1554. (Dreweatts 1759 Bloomsbury Auctions.)

To the left of the workshop is a sturdy bench with various items in front of it, including a large so-called 'monastic timepiece'. This is in an incomplete or partly built state, with just the simple frame and the winding barrel, but no other pivot holes or wheels fitted, and a dial that has not been painted with hour numerals or a sunburst design in the centre. There is no hand. Three large wheels stand alongside: one is probably the greatwheel, another the dial wheel and the third might be the crownwheel. The use of just a greatwheel and a crownwheel on these clocks was quite usual.

At the top is what at first glance is a foliot with downward curved arms, but it is actually the circular rim of the balance, without its spokes or the verge. Propped up against the end of the bench is a foliot with small regulating weights at each end, though it is fitted upside-down on its verge and the pallets are not shown. It might be part of the monumental clock. Alongside is an ornate stool with a comfortable padded cushion, most likely for the master's use. At the far left is a vertical frame of unknown use: it is too tall to use as a stool (if fitted with a seat) and too low for a clock test stand.

Seated at the bench are two clockmakers, each having a smaller version of the leg-vice described in Part 1, and with a selection of files on the bench. The older man on the right is closely inspecting a wheel while wearing a pair of spectacles, with a drawing on the bench of two wheels, one meshing with a pinion. The other man is filing the teeth of a wheel that is held in the

vice, with a small wheel lying on the bench. He would have been advised to grip the wheel further towards the top where there would be less flexing and more control, though it might be just the artist's way of ensuring that the wheel was clearly visible.

All the files shown have an integral round knob at the end instead of a separate wooden handle and are being used in a different manner to how files are used today. Instead of the handle being grasped in the hand, the file is held by the pointed end while the knob is pushed by the palm of the other hand. Though this does not seem a very convenient way of working, the pose seems quite deliberate and not just a misinterpretation by the artist.

Sitting on the bench are three spring-driven horizontal table clocks, which were popular in Continental Europe, but are rarely seen in Britain. On the left is a small one in a round case with a domed bell on top; sometimes the bell sits beneath a pierced gilt-brass cover. Alongside it lies a cord, maybe of silk, indicating that this clock could also be hung round the neck and used as a watch, as this dual use was common practice. In the centre is a much larger table clock in a hexagonal case, almost certainly made of gilt brass. Sitting on top is what might be a decorative casing or a hinged lid. Alternatively it might be a removable alarm mechanism with a domed bell. **Figure 7** shows a square table clock fitted with this type of detachable alarm. It has four legs that just clip on to the case of the clock, with a lever that is set over the desired alarm time and released by the hour hand. In the engraving there are six legs with panels between them that obscure a view of the dial. This may be a misinterpretation by the engraver of Stradanus's drawing, but is seems quite deliberate, so its actual construction remains in doubt. On the right is the movement of a round table clock, which has far more pillars than usual. A neck watch sits on the corner of the bench, its cord hanging over the edge. Nearby is what might be a pouch or pocket for the watch.

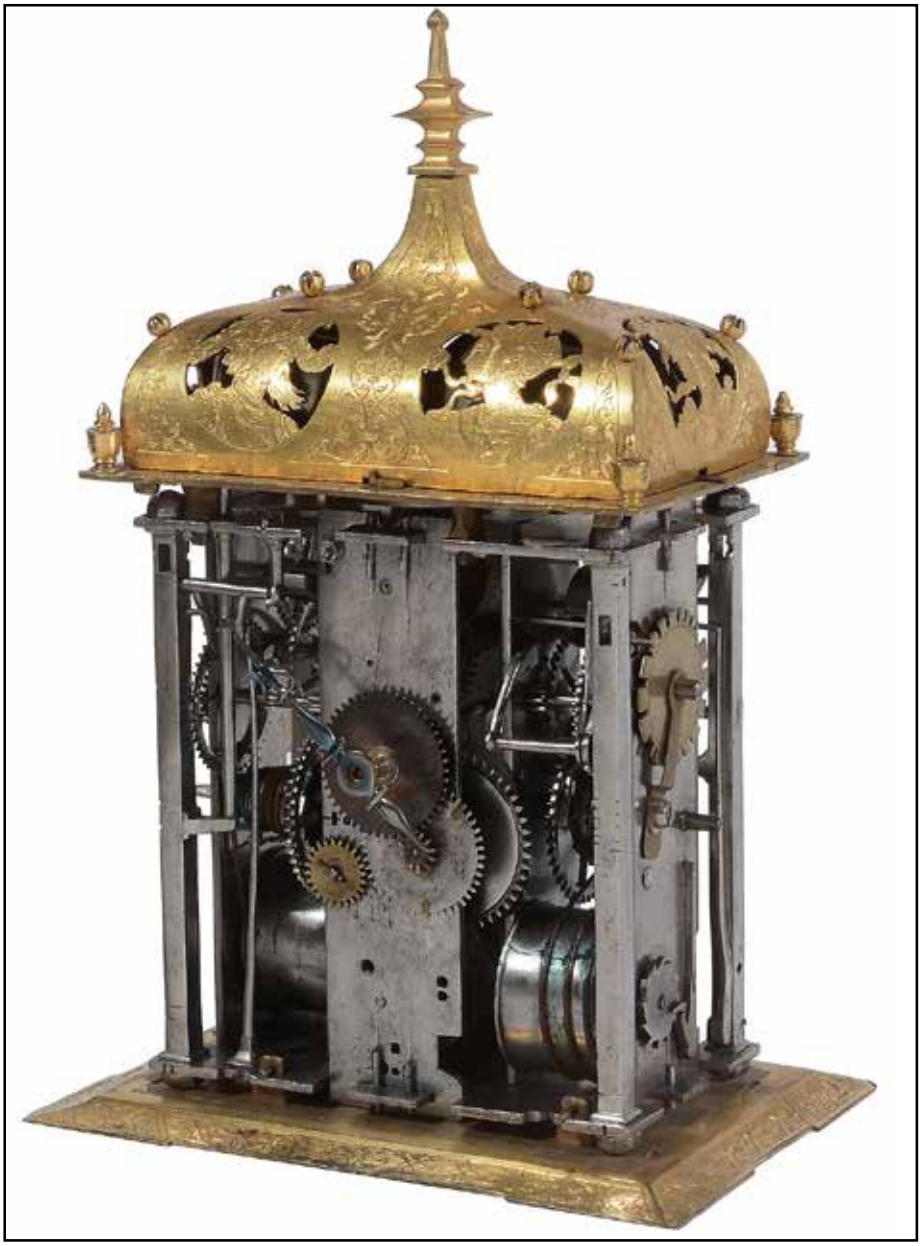

Figure 6. The quarter-striking posted-frame movement, including the wheels, is made almost entirely of iron, (Dreweatts 1759 Bloomsbury Auctions.)

On the left-hand wall are two clock wheels hanging on nails and above is an oval watch case, while to the right a worker inspects six oval neck watches that are probably on test. They hang on cords from nails in the frame of an open-fronted built-in cupboard, the top three being open-faced, the others having closed hinged covers. At this period watches were worn hanging from a cord or chain around the neck or sometimes in a separate pouch. Their timekeeping ability and reliability were rather limited and watches were mainly worn for flaunting the owner's wealth to those he was trying to impress. They were a form of mechanical jewellery and can be regarded as fifteenth-century versions of executives' toys, **figure 8**. They are sometimes called 'Nuremberg eggs', but this is a corruption of the archaic German word *Aeurlein* or *Uhrlein* (little clock) as *Eierlein* (little egg), and Nuremberg egg is a term that has fallen out of favour today.

To the right of the watches on test is a Renaissance chamber clock, complete with two weights and two counterweights to provide power to each train. All four weights appear to be rather similar in size, whereas in practice the counterweights should be much smaller that the driving weights, otherwise they would balance each other out and no power would get to the wheels.

The case would be made of gilt brass and the large bell does not have a four-armed frame, so it is not an iron Gothic clock of the type shown in the Amman illustration. There are four pillars and the side doors are decorated, probably with engraving. The dial appears to have two hands, but this seems unlikely as a single hand was usual at this period,

apart from on chiming clocks.

Two similar clocks, though with less decorative cases, hang on the opposite wall, being wound by another workman with a spare set of three wheels hanging on a pillar alongside him. Like the other wheels hanging on the walls in other parts of the workshop, they are probably there just for artistic effect as it is unlikely that wheels would be made just for stock.

The other main feature in the workshop is the blazing forge at the rear. A large smoke-hood or canopy extracts the fumes, while a youth pumps a double-handed lever situated to the right in the archway, to work the bellows. Below the hearth is an arched opening to act as an ash-pit. The hearthstone is extended forwards and on it sits a thick-walled box-like structure of indeterminate use. It might be a wooden moulding box for casting brass parts such as clock cases. However, it is too high for pouring molten metal from a heavy crucible. In any event cases were made by specialist brass founders, chasers, engravers and gilders, not the clockmakers themselves.

Alternatively—and more likely—it might be a stone trough containing cold water for cooling hot iron or hardening and tempering steel. In this case it would be placed in a position that was more convenient for the man working at the anvil.

The smith is heating a component in the fire, holding it with tongs, with another pair of tongs sitting on the hearthstone, with yet another pair and a shovel (both probably for the fuel) propped up at the end alongside a pile of fuel. In the centre of the workshop is a large anvil and a hammer. The anvil sits on a large section of tree trunk to bring it to a convenient working height, with various small tools, such as pincers, hammers and the like, hanging in the loops formed in a leather strap nailed round the trunk so that they are conveniently to hand.

How representative is this engraving of an actual clockmaker's workshop and how much artistic licence has been used? The intention was to show a reasonably large concern and the wide range of clockwork items that were made in such an establishment. Even excluding the customer and the woman entering through the archway, there are a total of seven workmen, compared to just the clockmaker and his apprentice in Jost Amman's illustration. Whether such a wide range of timepieces, ranging from a monumental clock to watches, would be made in the same workshop is debatable.

The main concern is the location of the forge and anvil, not only with respect to each other but also with the two clockmakers and watchmakers working at the bench. It is more likely that the smith would stand on the other side of the hearth to that depicted, so he could easily and quickly

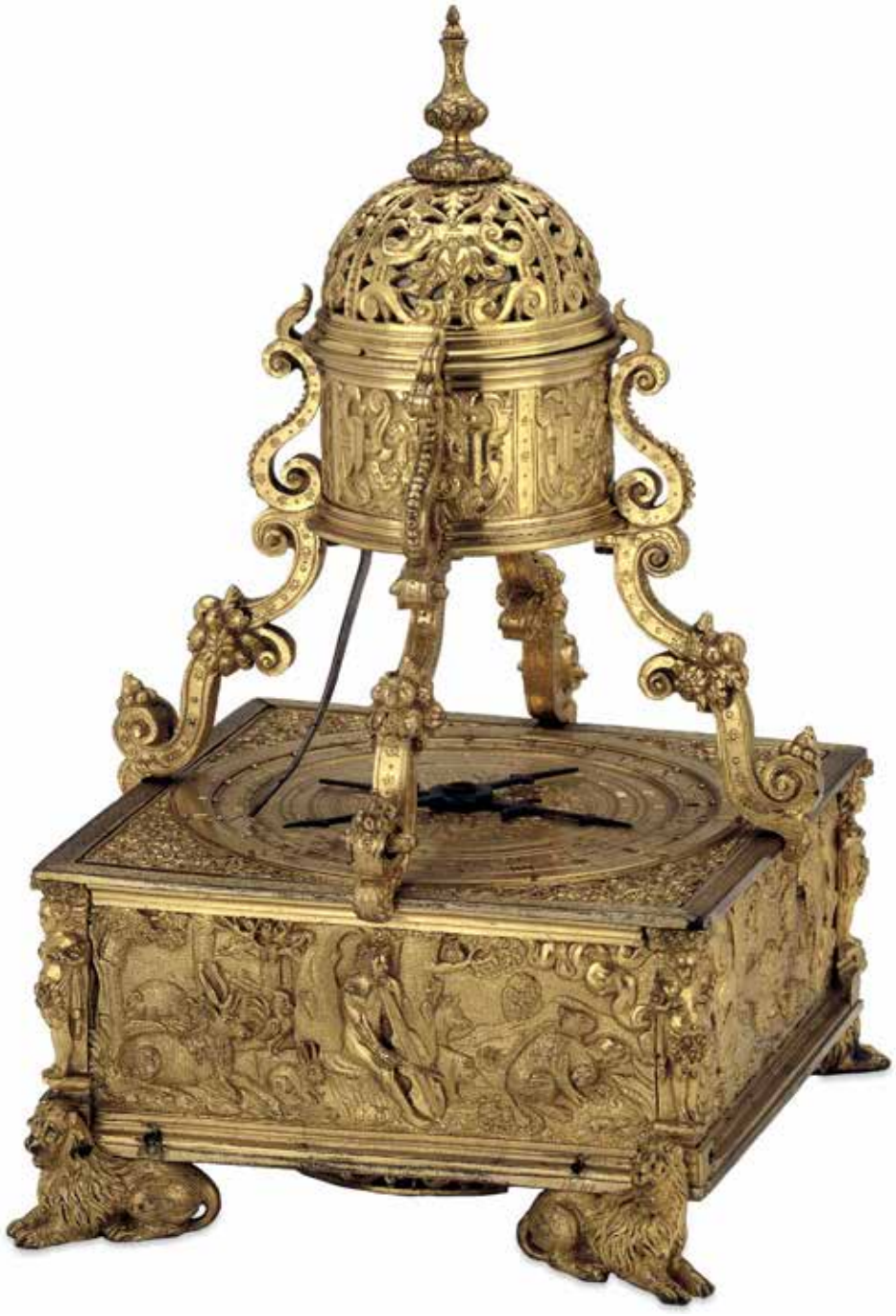

Figure 7. A square table clock, probably made in Augsburg, southern Germany, about 1580, with a separate alarm mechanism on top. (©Trustees of the British Museum.)

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