A note on early Synchronome Dial Movements

Introduction

This short paper is intended to provide a few additional pictures over and above those in Bob Miles's "Synchronome; Masters of Electrical Timekeeping", and where known, some background to the movements concerned, and some additional detail specific to the photographs.

Some of the movements are from my own collection, and some are photos provided by other collectors of items in their collections and who have contributed the background relating to those movements.

It was intended to concentrate on the development of the 'standard' impulse movement, which reached maturity about 1915 or so, and the various silent movement developments occurring over the same period.

1 Pre Pawl/Click movements

There are various drawings of 'anchor' type movements where a solenoid driven anchor advances a train, but none are known to have survived. The information we have about them comes from the Patent of 1895. See Miles Chapter 6.1 for more details.

2 1897 Click movement, coil spring with sliding bar tension adjustment

The concept that the hands are advanced by the energy stored in a spring first appears (in respect of Synchronome dial movements) in a Patent of 1897. The short electrical impulse through the solenoid 'cocks' the movement and the spring advanced the 120 toothed wheel. This makes the dial movement much less dependent on the strength and duration of the electrical impulse, something that would have been important in the days of early batteries. This movement with a horizontal bar bridge only supporting the minute arbour was probably introduced around 1897. The sliding bar to adjust the tension of the driving spring is a feature of this movement. The terminal block (screw terminals only at this stage) with spark suppression resistor would have been separate and mounted on the case. This movement is shown in Synchronome's catalogue of 1897.

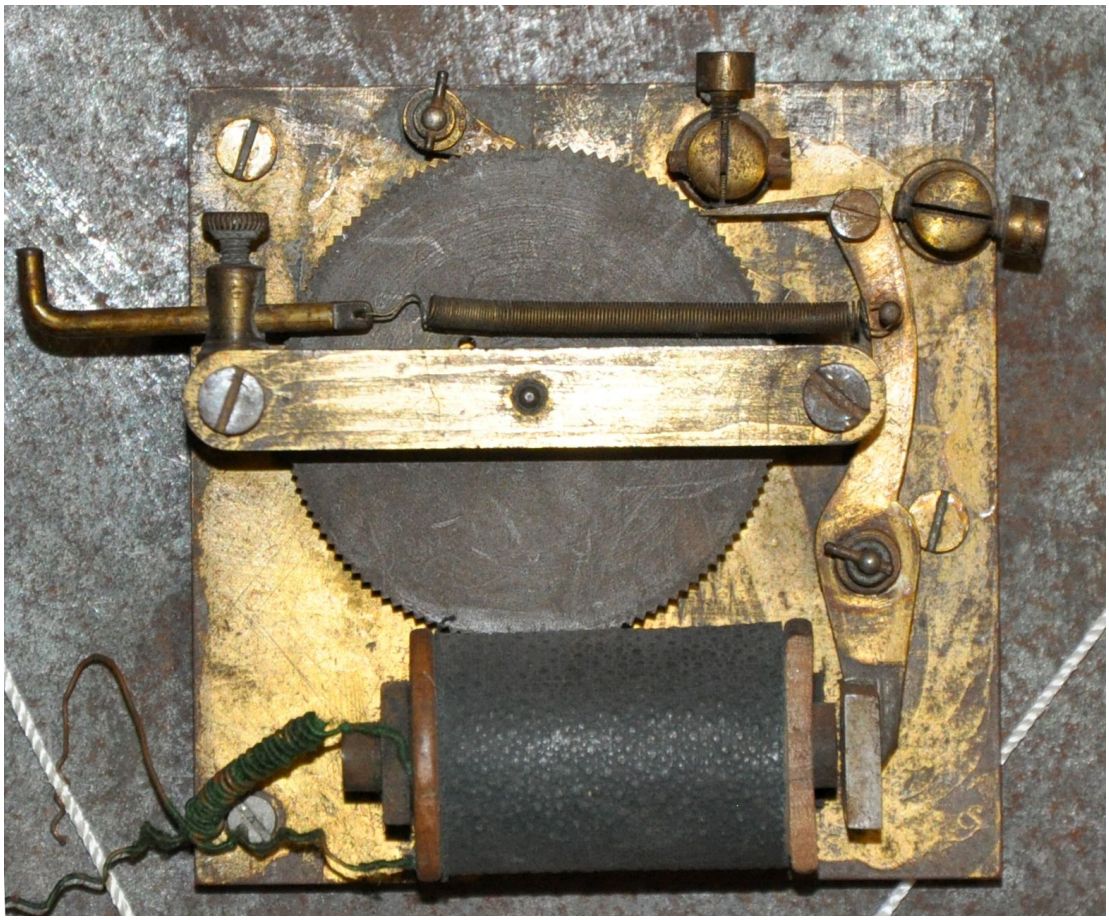

Figure 1 - 1897 Click movement, coil spring with sliding bar tension adjustment

This movement is shown in Miles as Figure 6/6, but without a photograph. Note that in this design, the click rests on the teeth of the 120 toothed wheel due to gravity alone. Note also the solid 120 tooth wheel in Figure 1. The catalogue illustration reproduced as Fig 6/6 in Miles shows a cut out 120 tooth wheel. It is thought that this movement is a little earlier than that shown in Figure 2.

3 1897 Click type movement, flat spring

This movement was introduced around 1897 and appears only to have been in use until 1899. A similar movement is pictured in Miles as figure 6/7.

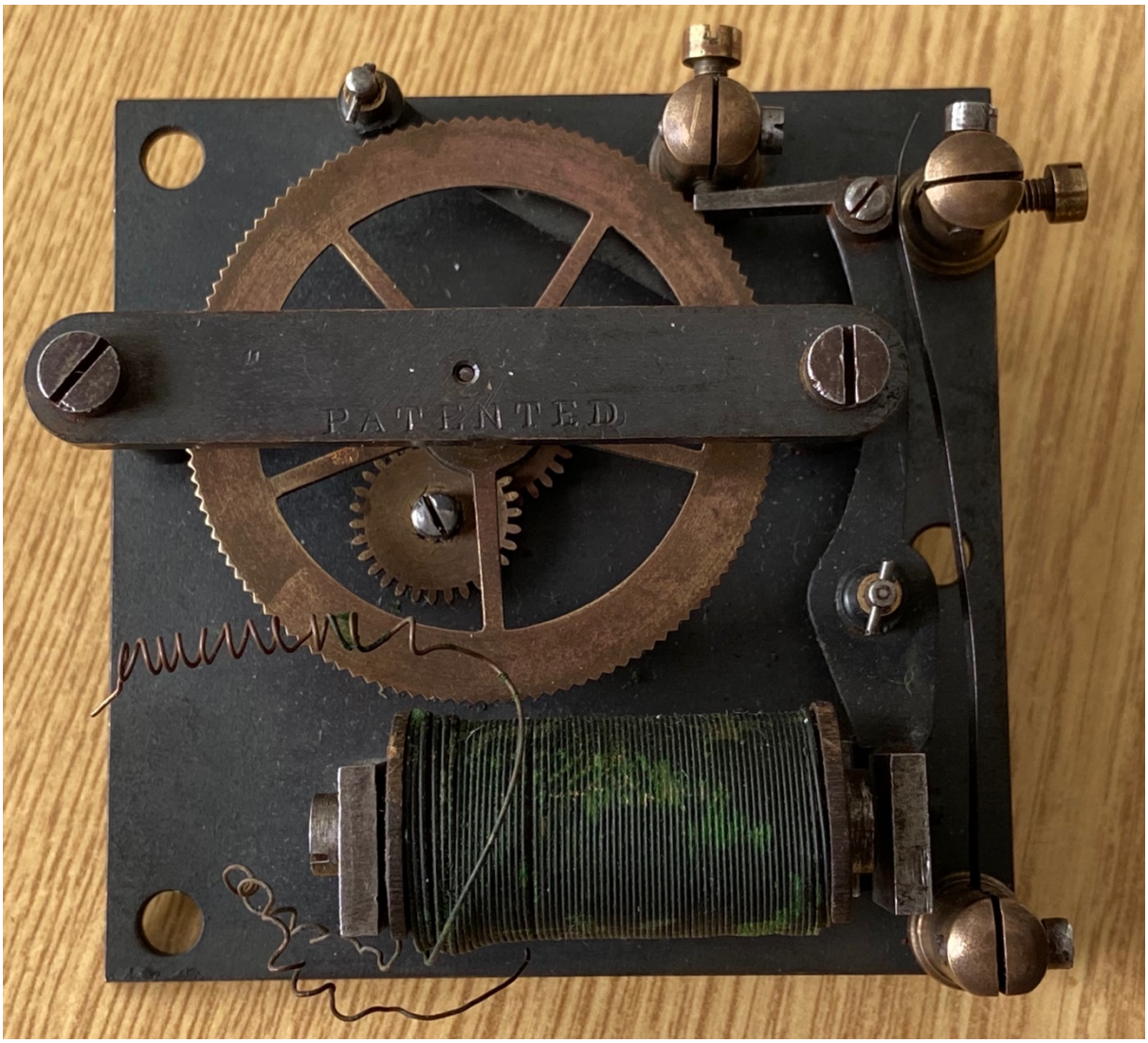

Figure 2 - 1897 Click type movement, flat spring

These movements are well made quality items and would have been relatively expensive to make. The adjustments have 'lock screws' fitted (Figure 3) and the round pillars are neatly turned with a skirt and filed flat where the screws are fitted. Screws are high quality 'cheese head' types and the bridge and back plate are very thick material (Figure 4), brass with a bronze finish. Note that there are 10 teeth between the driving pawl and the back stop (Figure 3). Note also that the driving spring presses on the rear face of the click and keeps it in contact with the 120 tooth wheel.

Figure 3 - Detail of adjustment lock screws

Figure 4 - Detail showing thickness of bridge and back plate

An example has also been seen where the "Patented" stamp has been on the back plate at the top right-hand corner.

4 1899 Click type movement.

This design used a bridge like the later 'long click' type, but retained the locked adjusters used in the 1897 design. An example to photograph has not turned up and the description is from an F H-J lecture of 1899 (Miles Fig 6/8). The diagonal bridge meant that the armature and backstop are now pivoted on the bar (rather than being from studs on the back plate alone). The number of teeth between the click and the backstop has been reduced from 10 to 7.

5 German supplied movement

Not much is known about this movement. It is known (see Miles Ch 6) that movements were supplied from Germany or France. These were supplied (pre the Great War) both to Synchronome in London and Alfred Jackson's Synchronome Australia. This is believed to be one of those movements, which were well made, but expensive.

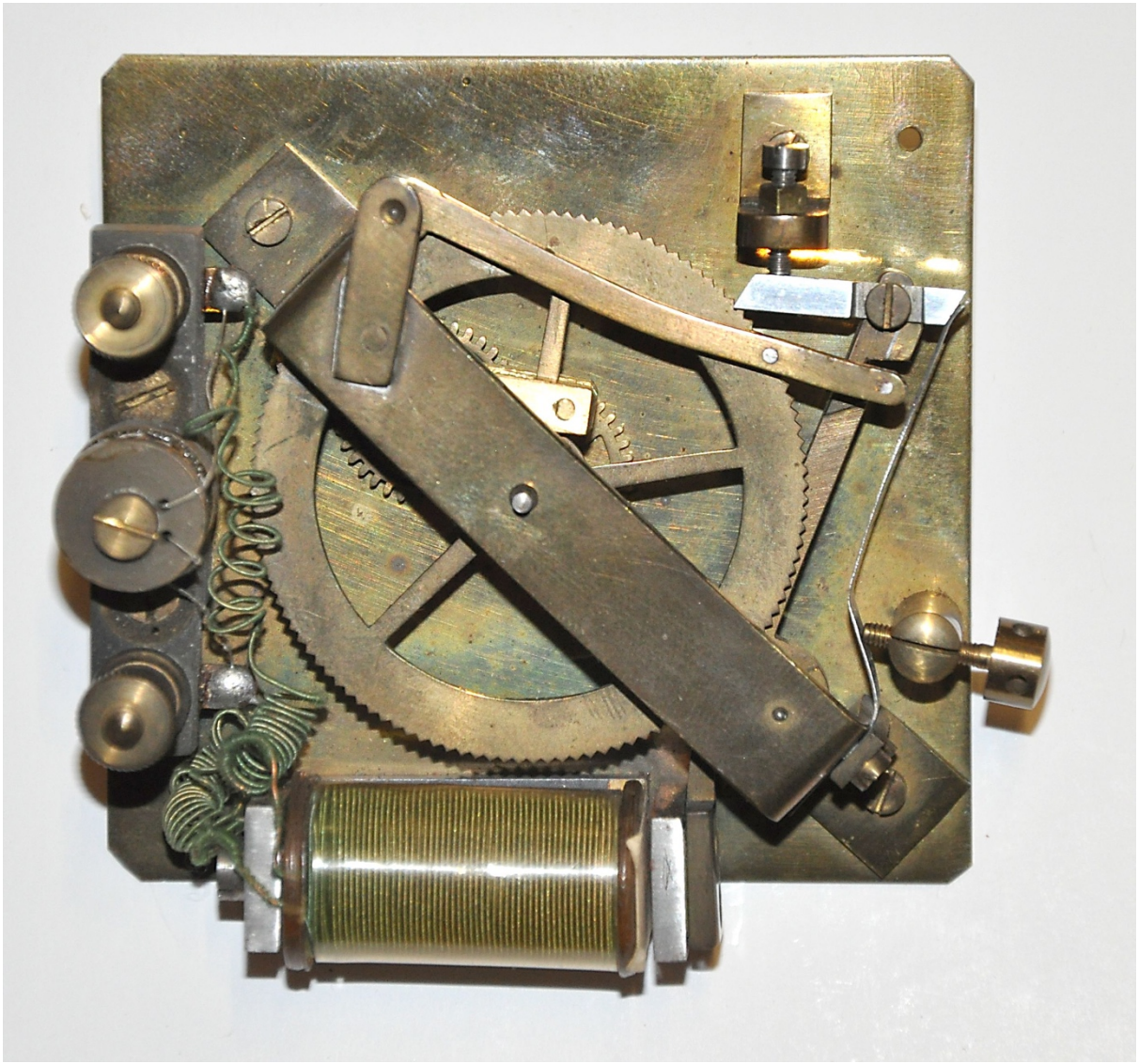

Figure 5 – probable German dial movement

Not much is known about these, but the use of a bobbin type resistor was common on Silent Electric clocks pre WW1 and shortly afterwards. This clearly has a lot of similarities with the double locking design. The use of an adjuster for the spring pressure is new – and very welcome because getting the spring tension correct can be tricky on early movements without this facility once they are cased.

6 British United Clock Co based movement

This type of movement was introduced circa 1900 – and is believed to have been much cheaper that the earlier movements. The British United Clock Co ran into difficulties around 1907 and was sold off in 1910. These movements are quite cheaply made from stamped parts and are much thinner material than the earlier designs.

Figure 6 - British United Clock Co based movement

Compare the material thickness and quality of workmanship here with the earlier movement shown in Figure 4. This construction seems to have utilised pressed or stamped out parts.

Figure 7 - Detail British United Clock Co movement

The British United Clock Co type was probably offered along with other types between 1900 and about 1909. I have not heard of an instance of this movement being used as a pilot dial in a master clock. Note that the shape of the teeth of the120 tooth wheel are the normal form of tooth shape for a weight or spring driven clock using meshed teeth, and not the triangular design more often seen on click driven dials. Despite the cost saving manufacture, these movements still work reliably today, even though well over 100 years old.

7 Long click movement

This movement was introduced circa 1904 and is the type used as a pilot dial in master clocks (where fitted) as well as in separate dials. In the examples seen, there are 5 teeth between the click and the backstop. These movements seem to have been used over the same period as the British United Clock Co type and overlap in time with the double locking type.

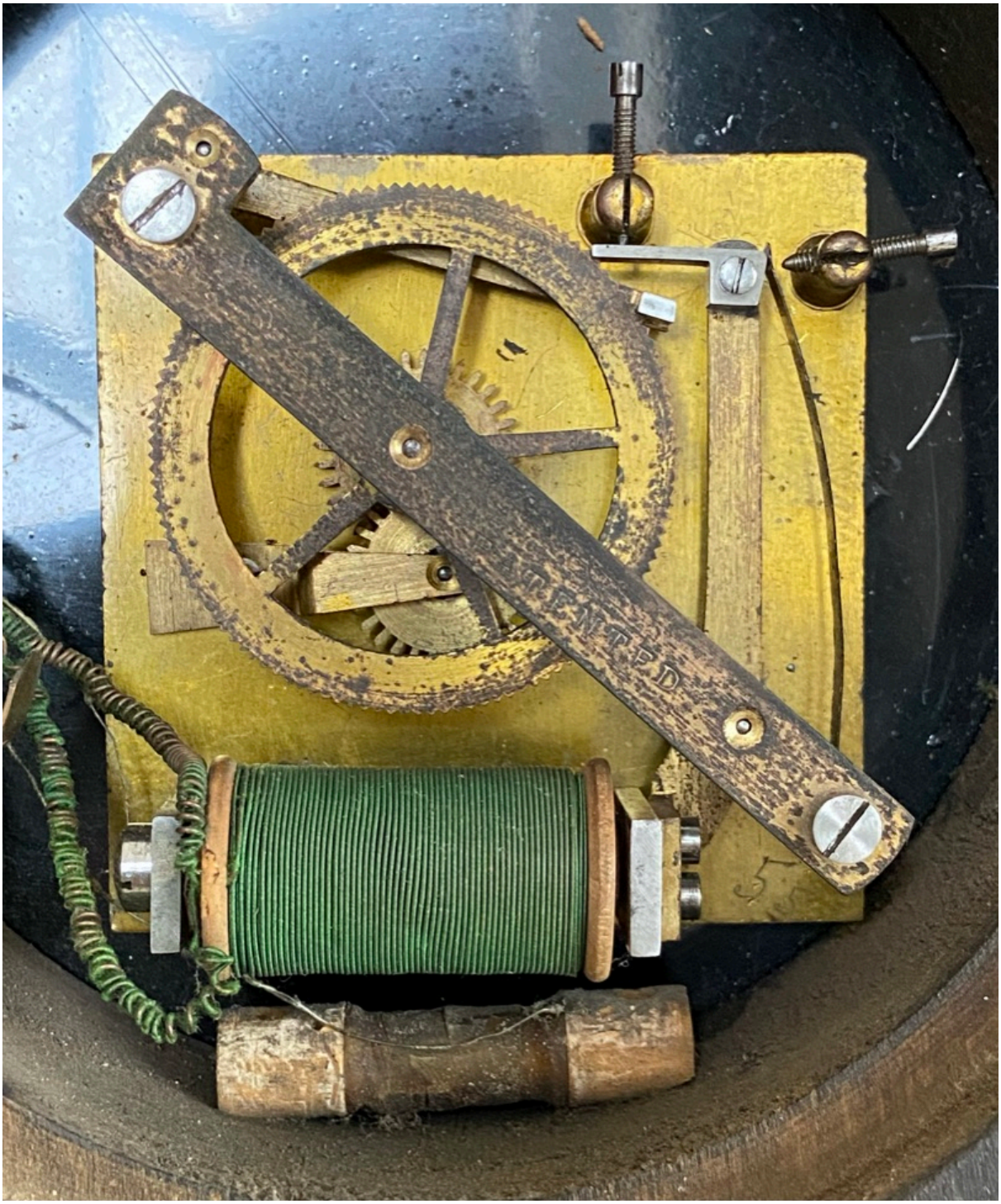

Figure 8 - Long click movement

8 Double locking movement

This movement was introduced around 1909 and remained in use in the ‘standard’ size until around 1914 and seen periodically as late as 1915 – though the design remained in use much longer for larger models – including those used in Synchronome programme controllers. It uses 4 teeth between the click and the backstop.

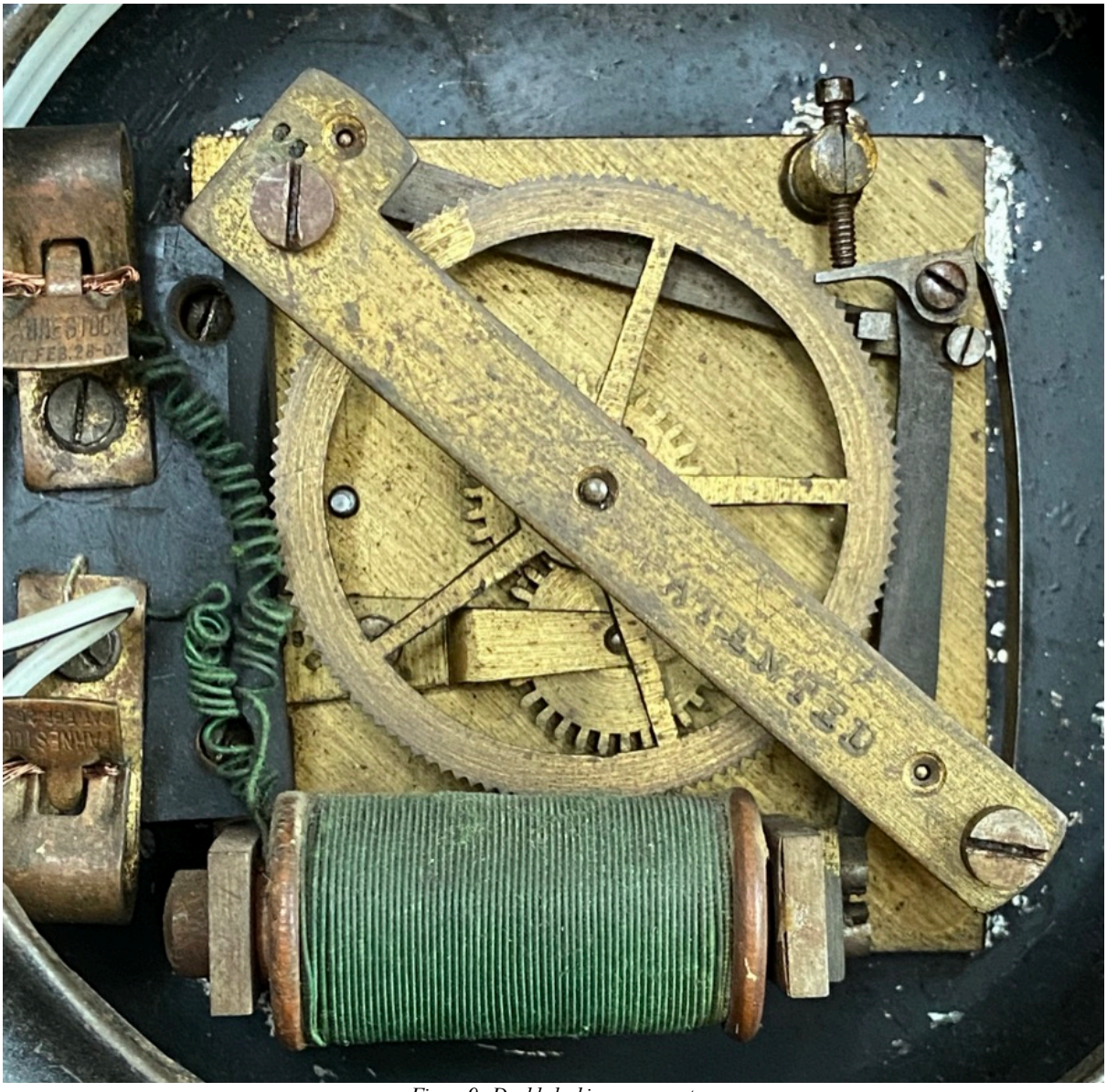

Figure 9 - Double locking movement

The screw terminals of the early clocks were replaced by Fahnestock spring terminals about 1911 around master clock s/n 229, although screw terminals were also in use for a year or two afterwards.

9 1st Standard type movement

This became the ‘standard’ from around 1915 and master serial number 669. The stamp on the bridge for the “Patented’ changed from an upper case with pronounced serif style font – to a less stylised font around 1914/15 still in upper case – and then to a lower case Patented and English Made probably in 1915. There are now just 3 teeth between the click and the backstop.

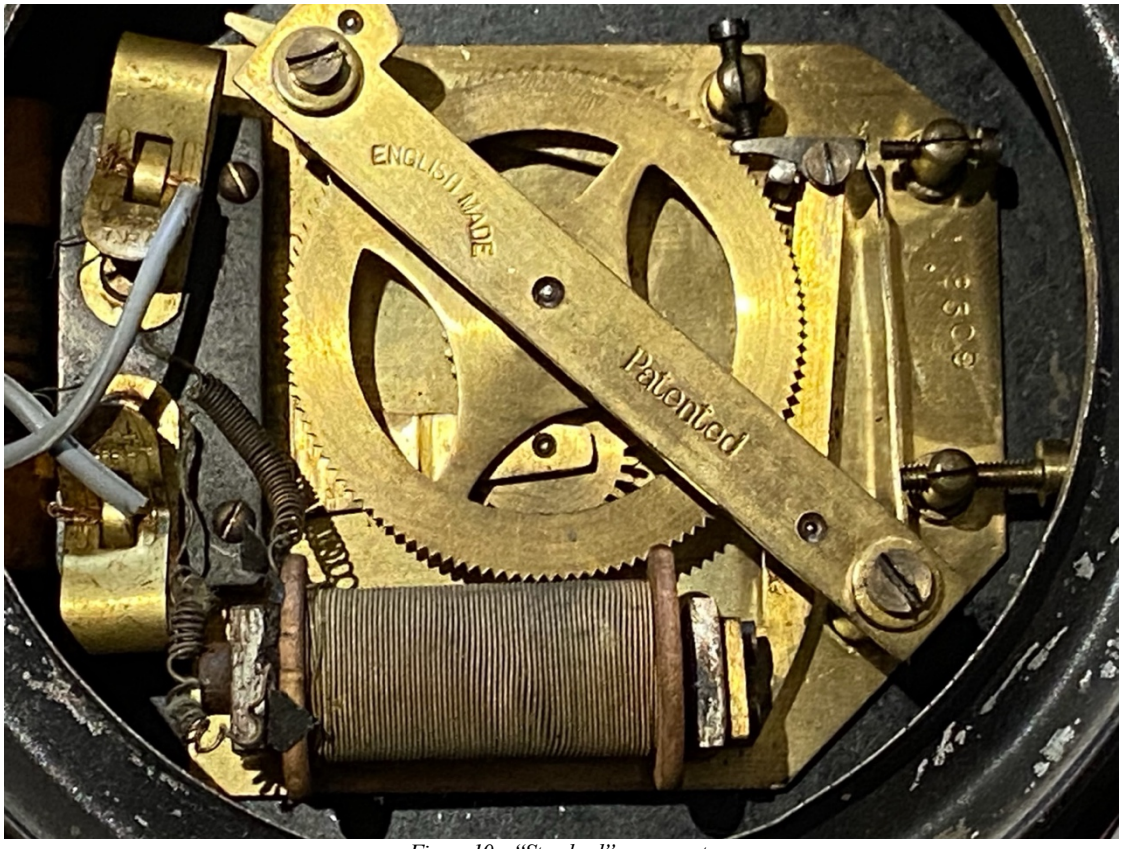

Figure 10 – “Standard” movement.

Two major steps have been taken with this design.
Firstly, there is an easily accessible adjuster for the spring pressure. This was a tedious task to adjust on the older movements because the adjustment was either by rotating the pillar on which the spring is mounted – something that requires removal of the movement from the dial to access the screw – or bending the spring – which is rather imprecise.
Secondly, the backstop has an extension that can be pressed by finger pressure to allow the hands to be freely rotated. It does this by both lifting the backstop and lifting the click clear of the 120 tooth wheel.

This design remained largely unchanged for the next 60 or so years in which these types of impulse movement were in production. Changes that did occur were minor and concerned with economical and practical volume production, notably the adoption of various commercial ‘radio’ types of resistor and the replacement of the metal ‘click’ by a nylon item in the 1960s and 70s.

Silent Movements, spring gathering click and backstop.

Much of the evolution of the design of the dial movement has been tracked from the use of these movements in master clocks – which are serial numbered, and can be dated (albeit with some uncertainty). Silent movements were never (as far as is known) supplied by Synchronome in master clocks – presumably because the master clock was itself noisy. This makes dating these movements very uncertain and it is based mainly on 'similarities' with other items for which we do have a better idea of the date.

Figure 11 – Early silent type movement

Figure 11 shows an early silent type movement. The "Patented" stamp suggests a pre 1915 date, and the design has no spring tension adjuster. Note that the armature is a light pressed design – typical of these movements.

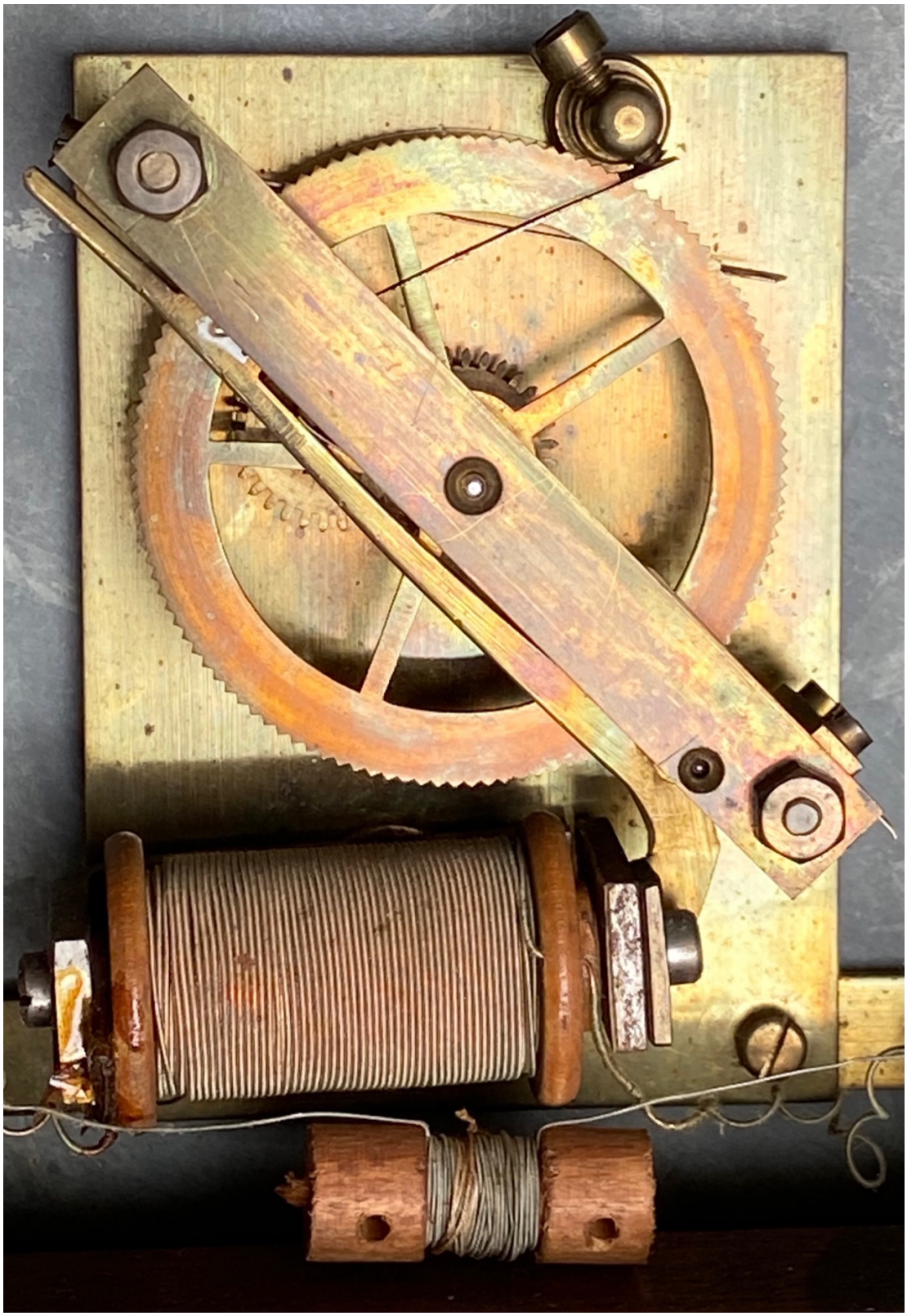

Figure 12 - Silent movement, probable home made?

Figure 12 shows an early silent movement. This is fitted in a Synchronome signed dial, but is probably a 'home made' example. If so, it is unusual, as the home made examples usually follow the conventional design. It is very well made but uses slightly different construction to Synchronome, notably a circular (rather than square) minute arbour and studs and nuts to secure the bridge (rather than cheese head screws).

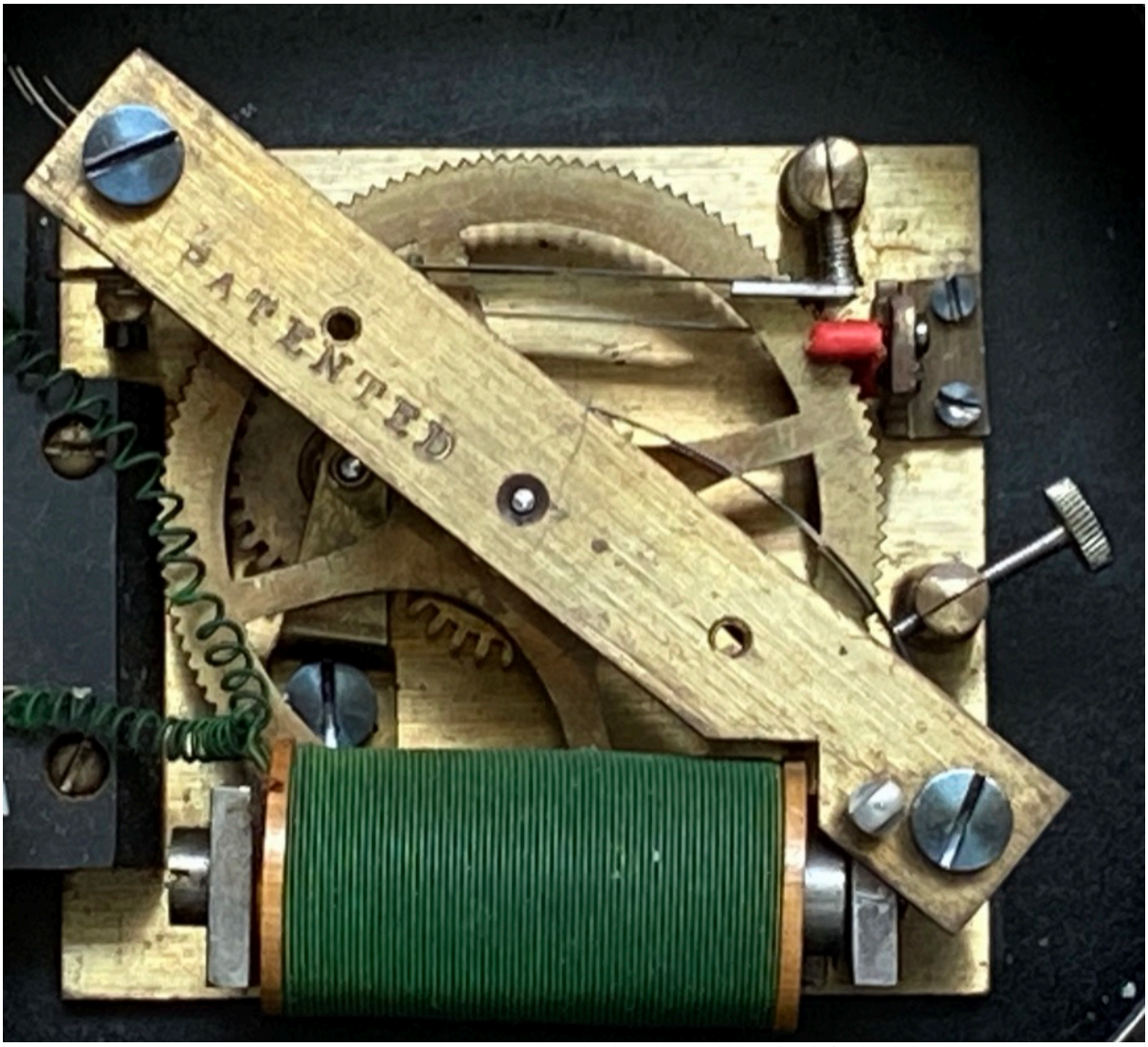

Figure 13 - Later pattern silent movement with adjuster and additional pads for the clicks

Figure 13 has the additional features of an adjuster for the spring tension, and two rubber covered 'stops' for the pallets – presumably in an attempt to reduce noise further. The date of this is unknown, but the "Patented" stamp suggests a pre 1915 date. It is in a Dykes Brothers wall mount dial with an early type of wooden surround. The two additional tapped holes in the bridge are often found on this movement and were used to secure the terminal block and spark suppression resistor where space was at a premium. On some examples with the block mounted on the bridge, the "Patented" stamp is moved to the baseplate – along the top edge. An example is shown in Figure 14 – which illustrates just how small and compact these movements can be.

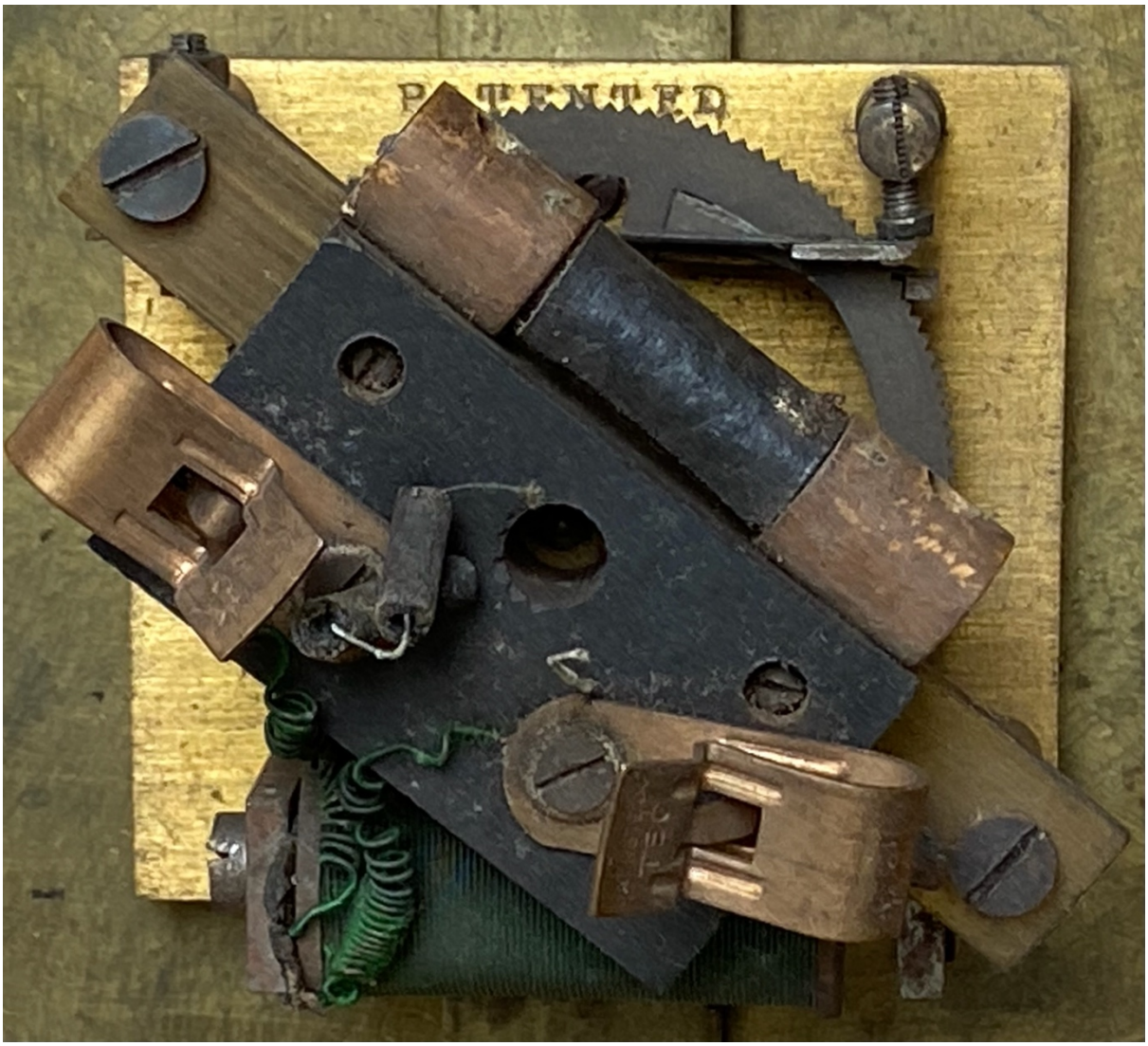

Figure 14 – Compactly configured silent movement

These movements are frequently found in small mantel clocks, as in the clock shown in Figure 15.

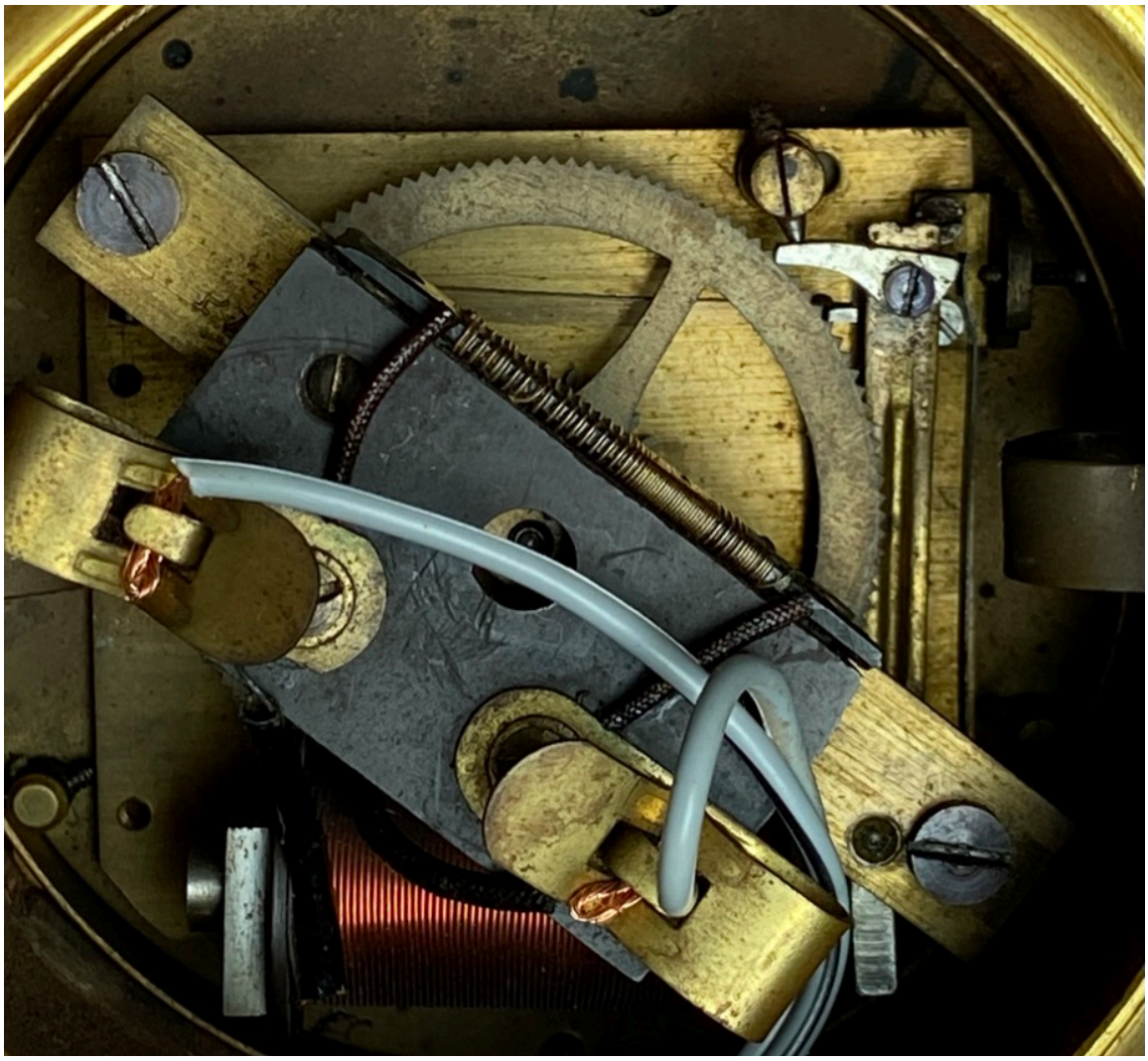

Figure 15 - Hybrid model with silent type backstop, but 'normal' driving click

Figure 15 is an unusual ‘hybrid’ with a light sprung backstop from a silent type movement, mated with a ‘normal’ driving click. Also unusual in this example is the use of a pressed armature (as usually found in the silent design with the sprung clicks), presumably to reduce weight. The enamel wire and the ‘flat’ type wirewound resistor are often later features and this movement probably dates rather later – however, the lack of a tension adjuster for the spring would suggest an earlier date – so overall, the date is very uncertain. I have only seen this one example of this style.

10 Silent Movements, No 1 size with swinging armature.

The standard “No 1 size” Synchronome movement was already a little less noisy than the normal size movement. (Figure 16). Although the No 1 movements were relatively common, being used in some master clocks for a period, the silent versions are relatively uncommon and were probably therefore only made in small numbers.

The version with the swinging armature replacing the normal armature follows a design used by Gillett and Johnston. It may be coincidence, but the examples the author has seen have not carried the Synchronome name, and possibly there was. Some arrangement between Synchronome and Gillett and Johnston to use the design in an ‘unsigned’ movement. The movement shown in Figure 20 in the sound insulated can, although unsigned, has spring terminals for the wires that are of a type associated with Gillett and Johnston.

Figure 16 – Standard (i.e. 'normal' armature) No 1 movement

The silent version shares the same size and main parts, but uses a different design for coil core, magnetic circuit and armature where the moving section 'swings' over an extended coil core and matching iron magnetic circuit resembling a 'tusk' without any contact. This can be seen in the close up, Figure 18.

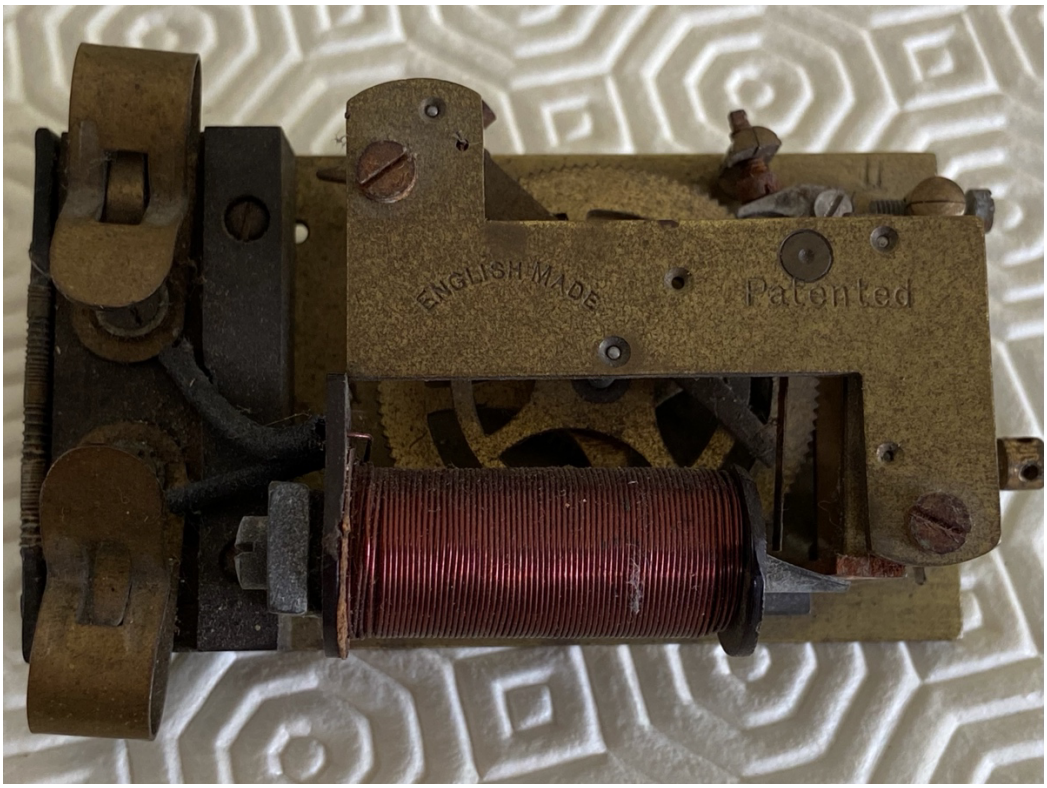

Figure 17 - Silent (i.e. swinging armature) No 1 movement

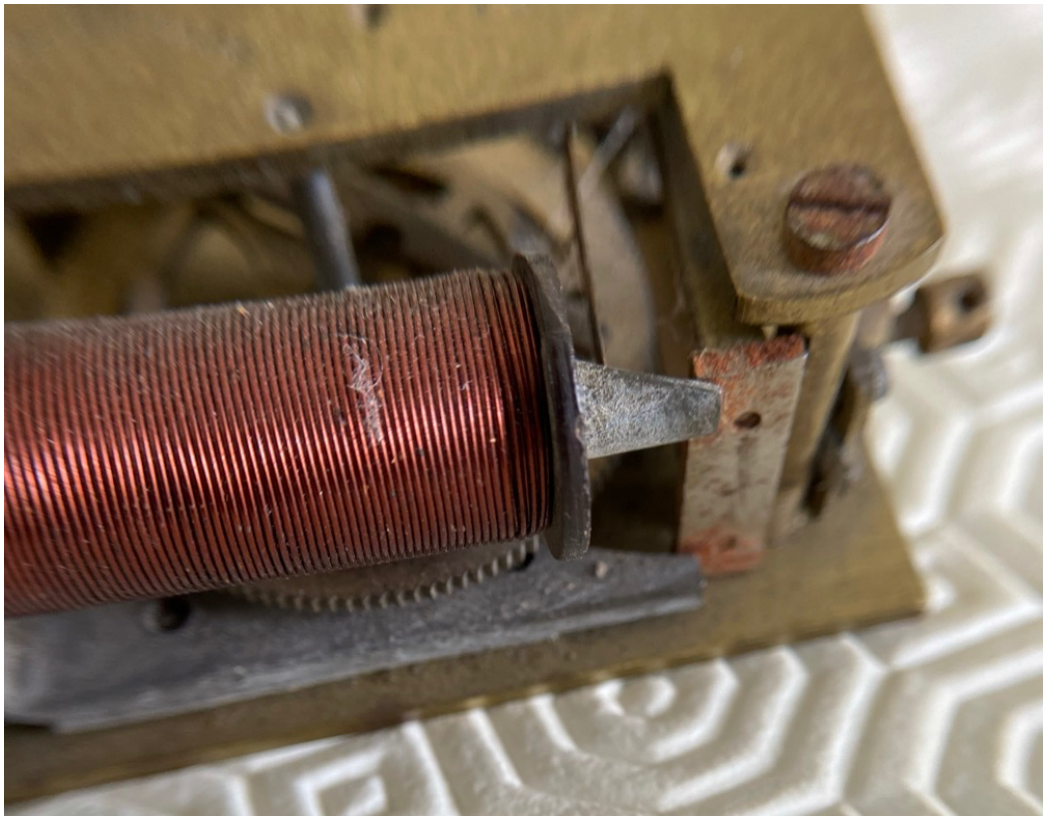
Figure 18 - close up of silent No 1 movement showing 'tusks'.

The example shown in Figure 17, Figure 18 has additional features which possibly seem to be designed to allow horizontal mounting and probably reduce noise still further. These are also included in the movement pictured in Fig 6/27 of Miles. These comprise an additional flat spring (seen in Figure 18)

which damps the movement of the armature as current is applied, a spring arbour for the backstop to avoid reliance on gravity, and an additional smooth wheel with a damper (mounted from the backstop arbour) – both seen in Figure 19. It is not entirely clear, but this may have been intended to reduce any 'shake' of the hands.

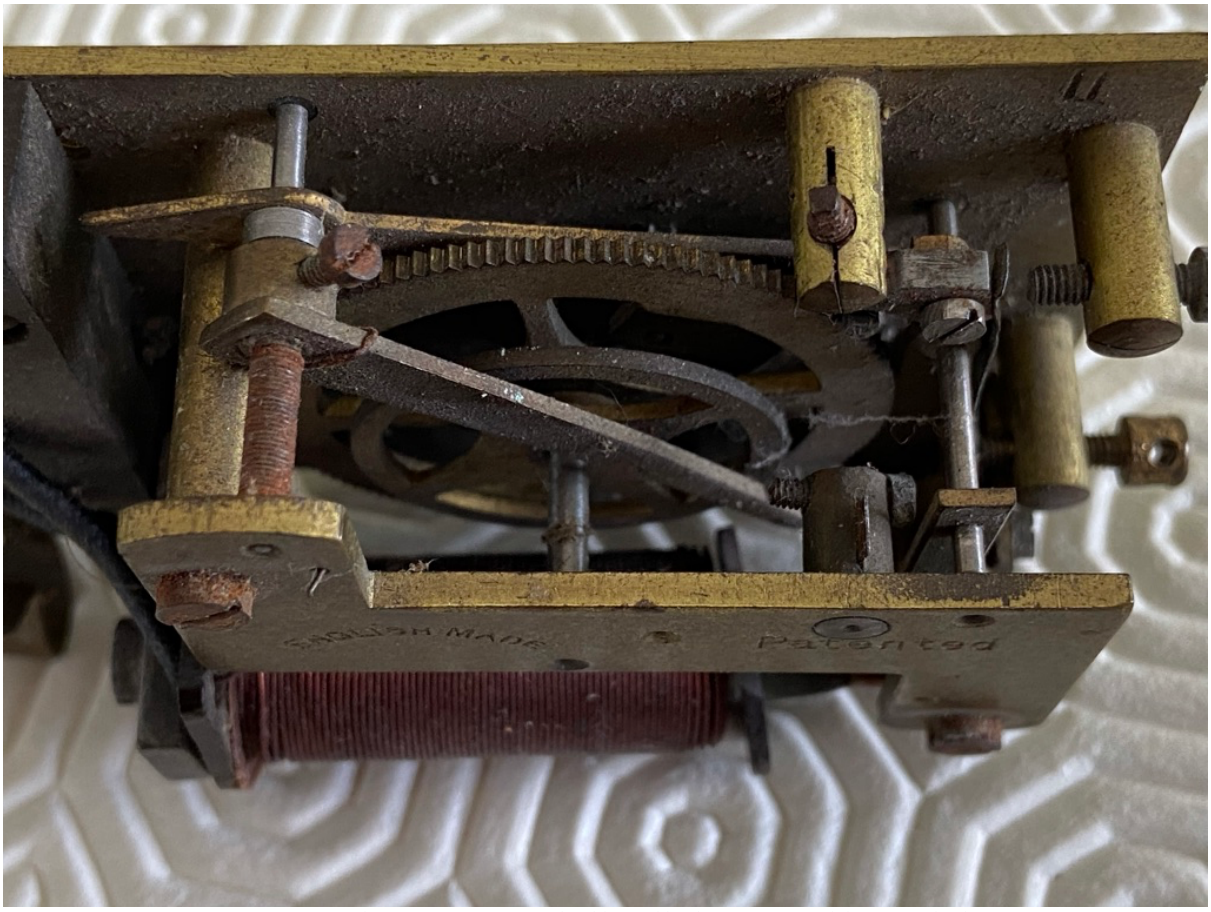

Figure 19 - Silent No 1 movement with additional backstop spring and damping wheel

These silent movements were also sometimes mounted in heavily sound insulated 'cans'. The example shown in Figure 20 is unsigned, but the cable clips are Gillett and Johnston's type and it is possible it was supplied through G&J. This example has a gravity operated (i.e. non sprung) backstop, no additional smooth wheel, and no flat spring for an armature stop. However, a small rubber foam block is fitted to damp the armature movement.

Figure 20 - Silent movement in insulated can.

11 Patented Stamps

11.1 Early pronounced serif type

Figure 21 - Early pronounced serif upper case type

The type shown in Figure 21 is found from the earliest movements through the various different designs through until about 1915, when the stamp was changed to a type without serifs (Figure 22). It is usually seen on the bridge, but has also been seen on the baseplate on early movements.

11.2 Sans serif type serif type

Figure 22 - Sans serif type serif type

This seems to have only been used for a short time around 1915 before changing to the type with mixed cases and "English Made" added (Figure 23).

11.3 Mixed case with addition of "English Made" type

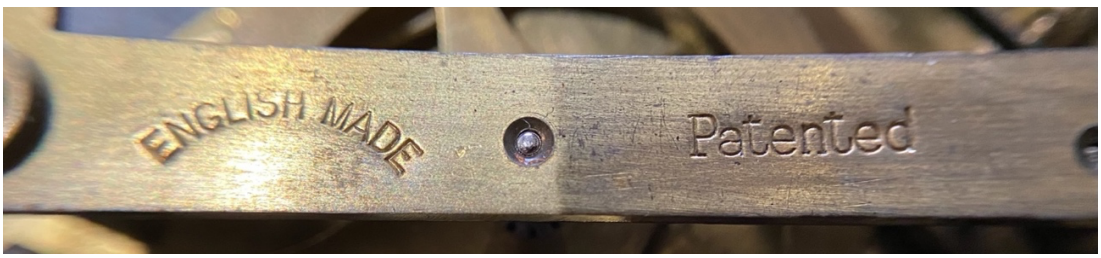

Figure 23 - Mixed case with addition of "English Made" type

The "English Made" is believed to have been added for 'patriotic reasons' during the Great War when imported and particularly German goods were unpopular.