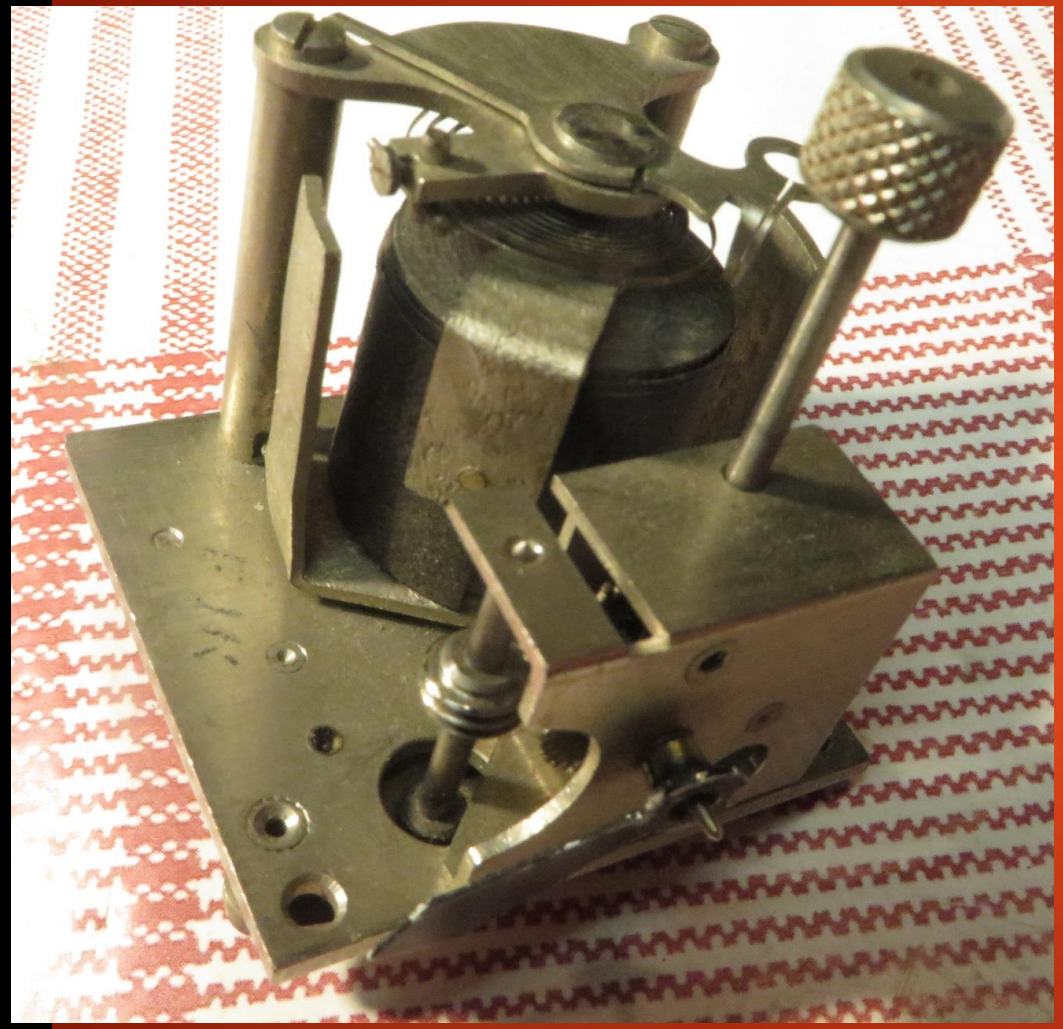
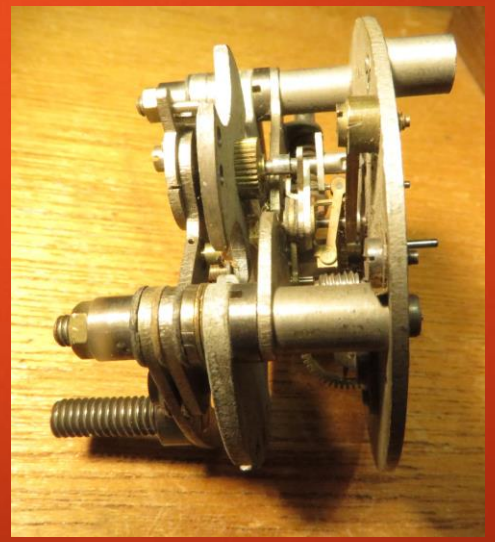
Zoe – a Bulle Prototype C 1934 (not your normal Bulle)

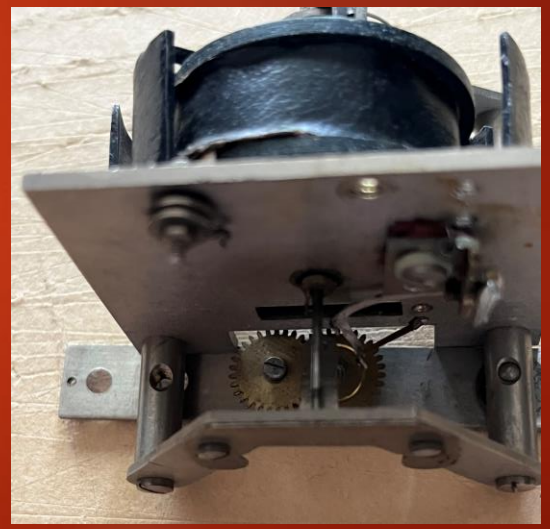
Zoe – a Bulle Prototype
C 1934



Recently I was given three movements by a friend in France. They were bought with Oscar (the subject of two previous presentations) and were also said to be prototypes from the Bulle Factory.

This presentation is about the restoration of the most complete of the three. For simplicity in identification the movement has been called Zoe.





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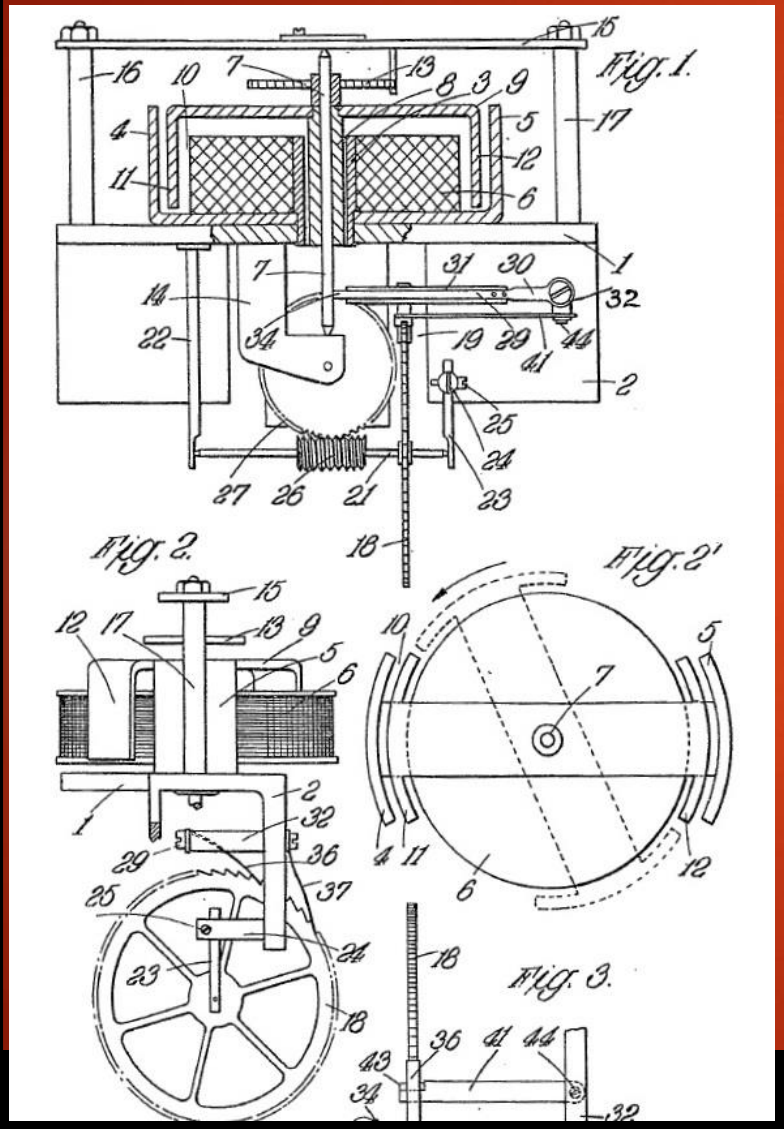

- Maurice Favre – Bulle (along with Marius Lavet) developed the well known Bulle clock which utilised a pendulum and pin and y shaped electrical contact system around 1920. He was a prolific inventor with over 100 Patents to his name – mainly clock related.
- He had a number of patents for balance wheel clocks and the previous presentations on Oscar the Balance wheel clock discussed this.

Date granted	Patent No	Description	Balance	Comments
15/03/1923	FR555047A	Montre Electrique	Pivoted coil	
13/11/1924	GB202328A	Electric watch UK patent	Pivoted coil	Very similar to French patent FR555047A of 1921
6/01/1925	US1522178A	Electric Watch Us patent	Pivoted coil	Very similar to French patent FR555047A of 1922
5/01/1927	FR31714E	Electromagnetic clock 1st revision	suspended magnetic pendulum	More like brillie Principle with Bulle crown wheel
16/08/1927	CH121379A	Electromagnetic clock	suspended magnetic pendulum	More like brillie Principle with Bulle crown wheel
17/03/1927	GB267351A	Electromagnetic clocks	suspended magnetic pendulum	More like brillie Principle with Bulle crown wheel
9/10/1928	FR33897E	Mechanism of an electromagnetic clock	Two Pivoted coils	Twin pivoted coils and magnets with classic ypiece c
18/02/1929	FR660348A	Escarpment electric direct and suitable ideas for portable clocks	Pivoted coil	Mainly the escapement ratchet wheel
7/10/1929	FR673360A	Mechanism of an electromagnetic clock	Pivoted magnet in a coil	Travel clock mechanism?
9/10/1930	GB336033A	Improvements relating to electric clocks	Pivoted coil	
16/01/1931	CH143077A	Escarpment of electric clock - design of classic Bulle Travel Clock	Pivoted coil	
24/11/1931	FR720031A	Montre Electrique	Balance wheel	Similar to Oscar work and supports
21/12/1932	FR41643E	Montre Electrique - first addition	Balance wheel	Similar to oscar but parallel to axis incrementing jew
16/11/1933	FR41799E	Montre Electrique - second addition	Balance wheel	Detail of contacts and large perp ratchet wheel
15/02/1934	CH167232A	Piece electric horology	Balance wheel	Same as rev 2 of french patent FR41799E
19/02/1935	US1991839A	Electric Timepiece	Balance wheel	Same as rev 2 of french patent FR41799E
21/12/1933	GB403145A	Electric watch UK patent	Balance wheel	Same as rev 2 of french patent FR41799E
7/09/1933	DE584504C	Electric watch German patent	Balance wheel	Same as rev 2 of french patent FR41799E
1/05/1934	FR767359A	synchronous time device	Vibrating suspended weight	Every which way of a coil moving a magnet and vice
1/04/1935	FR45164E	synchronous time device	Vibrating suspended weight	AC powered Vibrating weight and gearing
24/07/1935	GB432299A	synchronous time device	Vibrating suspended weight	AC powered Vibrating weight and gearing
7/04/1936	US2036917A	Electric timepiece	Vibrating weight	AC powered vibrating weight and escapement
23/07/1952	FR56460E	perfection of Direct acting gearing and worm ratchet	Vibrating pendulum	

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The movement is built above and below a 40x40mm square plate

The coil, balance wheel and hands side

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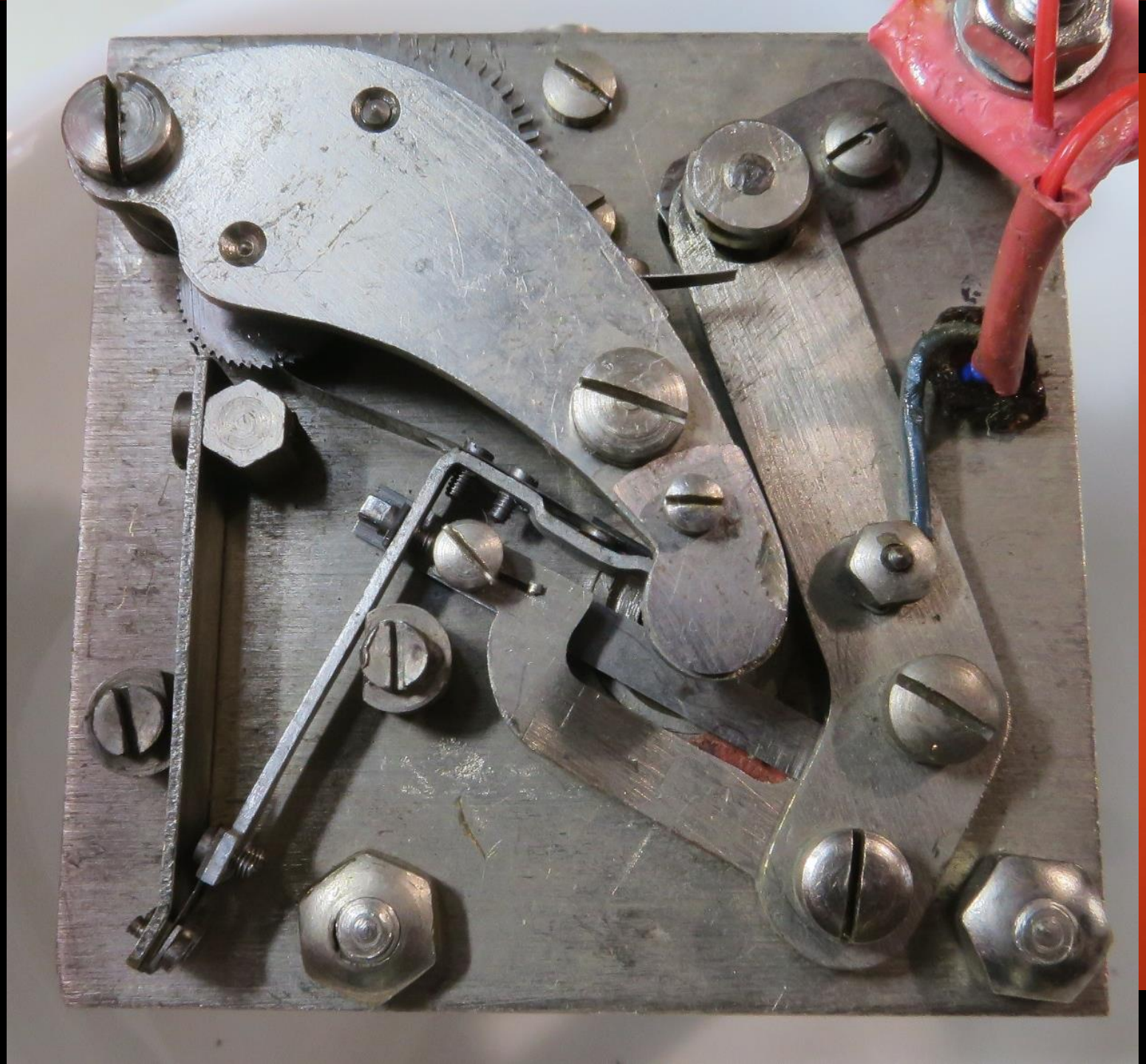
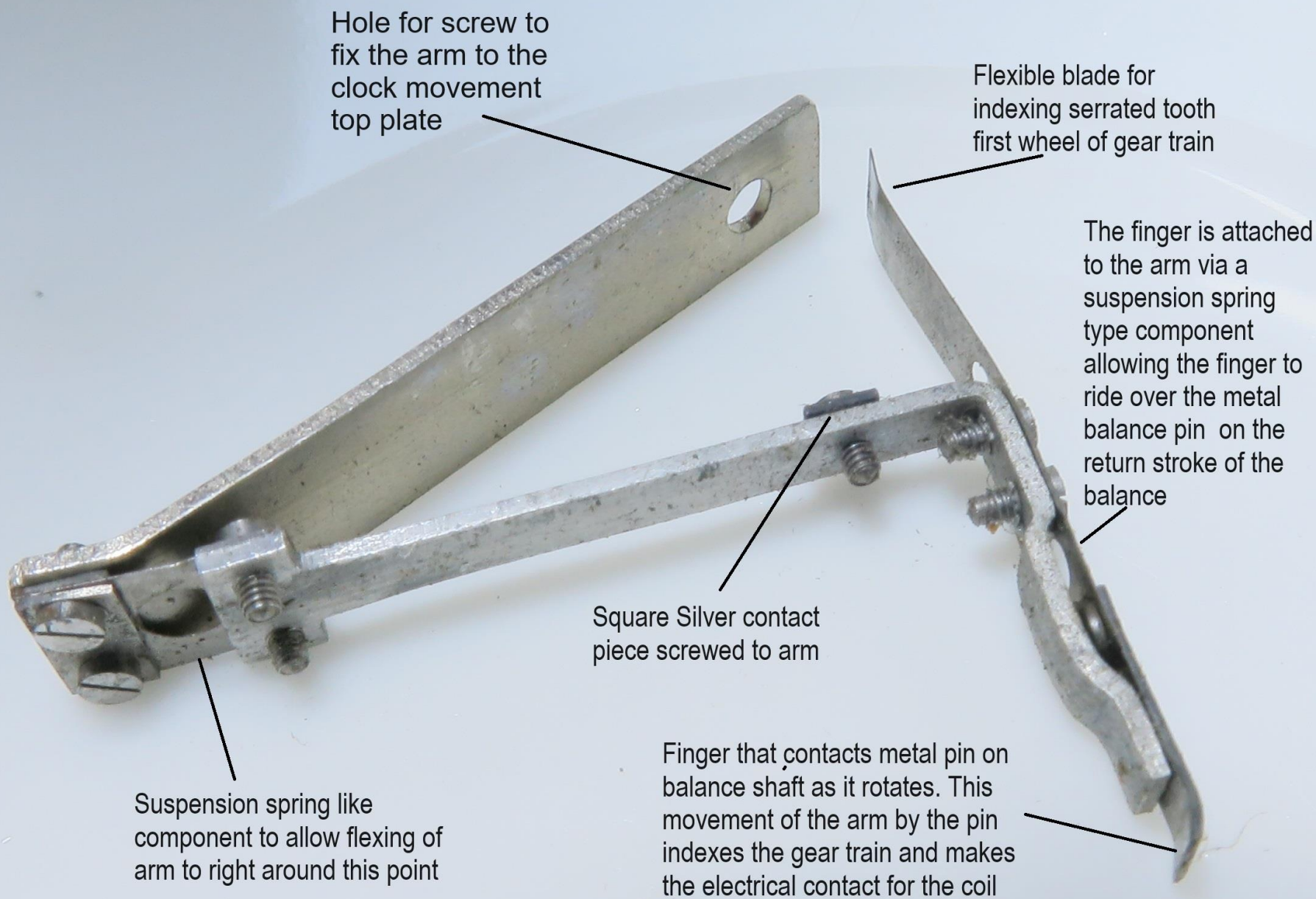
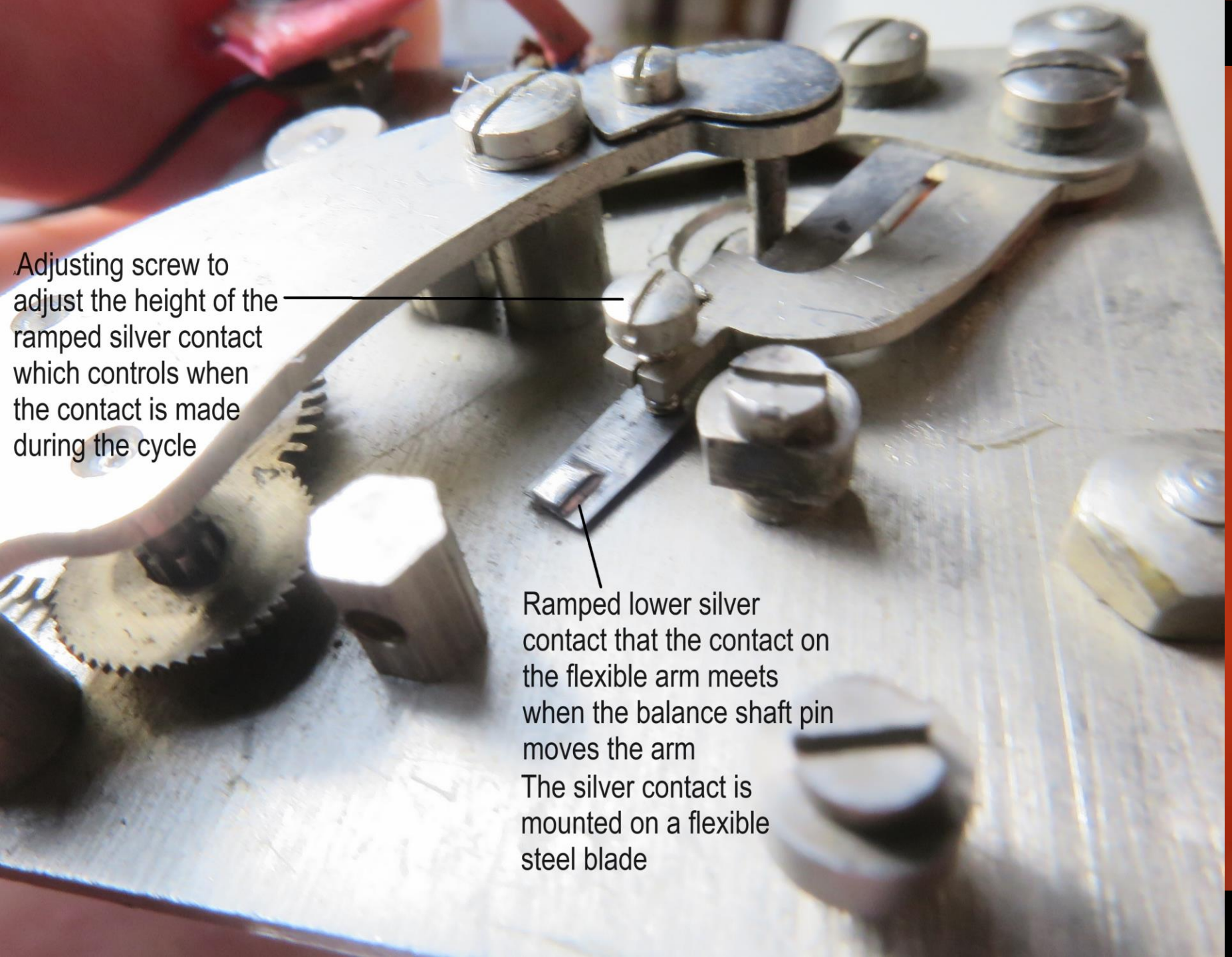
The escapement and electrical contact side 1



The escapement and electrical contact side 2



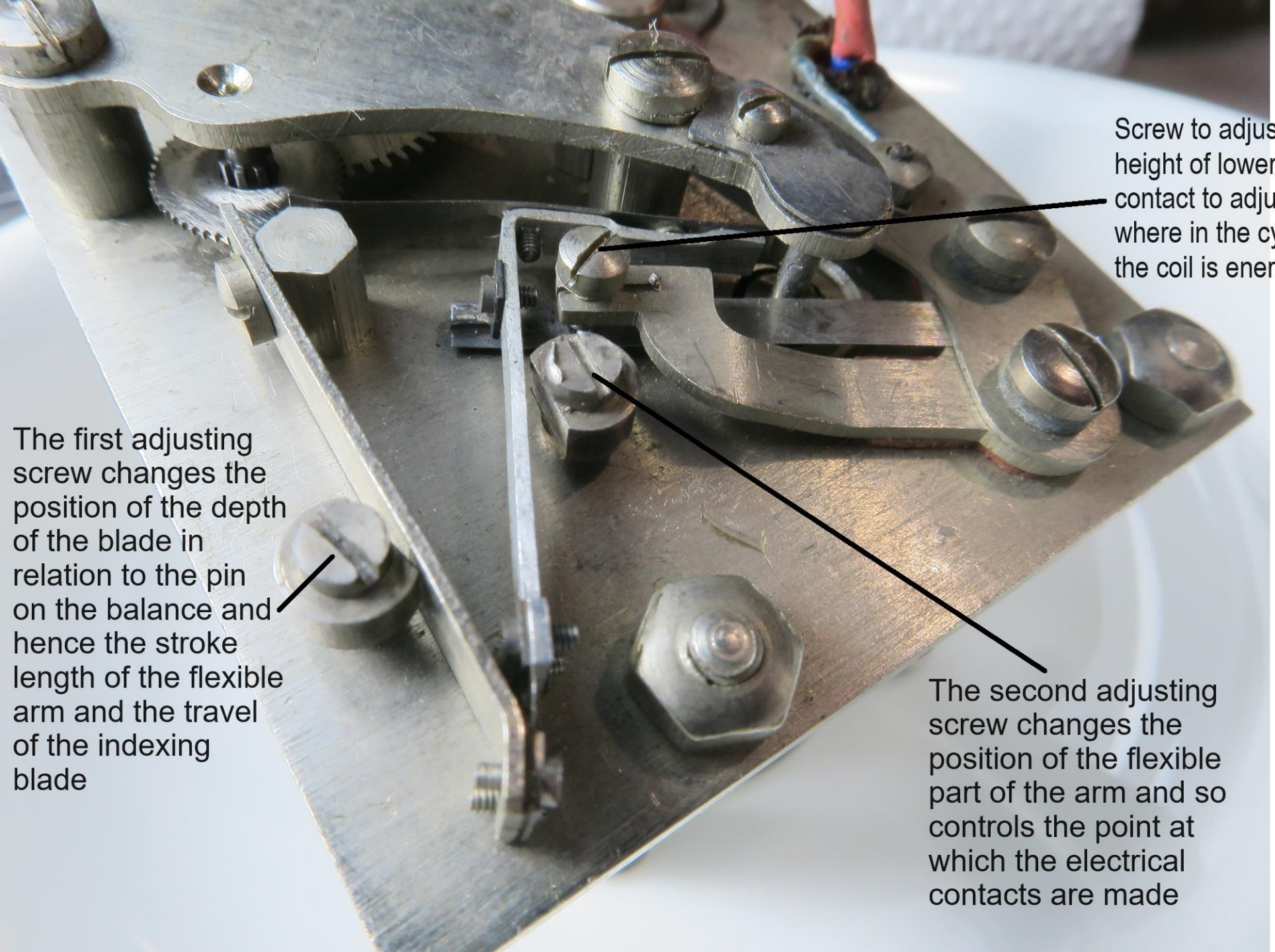
The escapement and electrical contact side 3



The escapement and electrical contact side 4

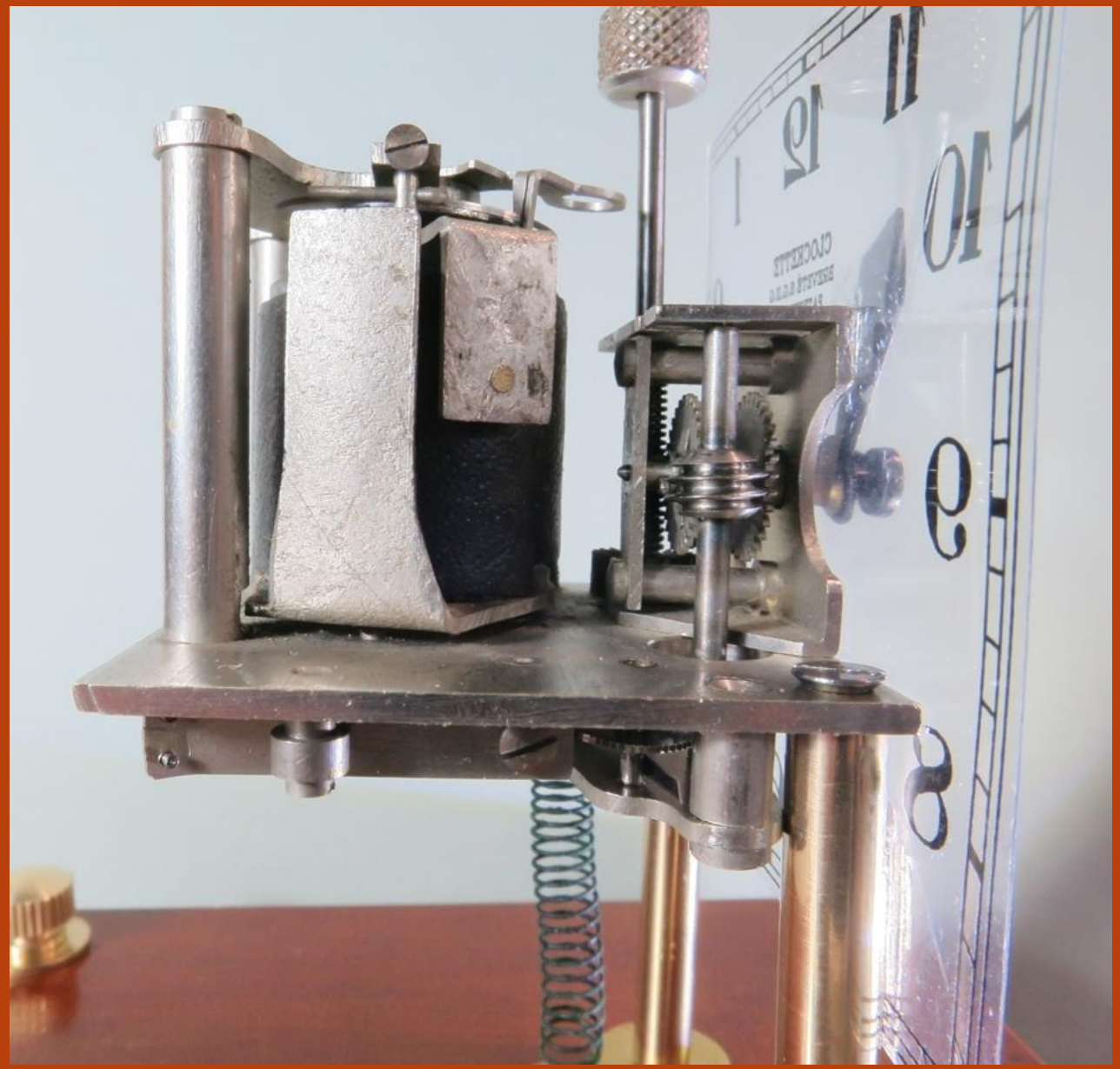
The main flexible arm has been removed so the lower electrical contact is visible

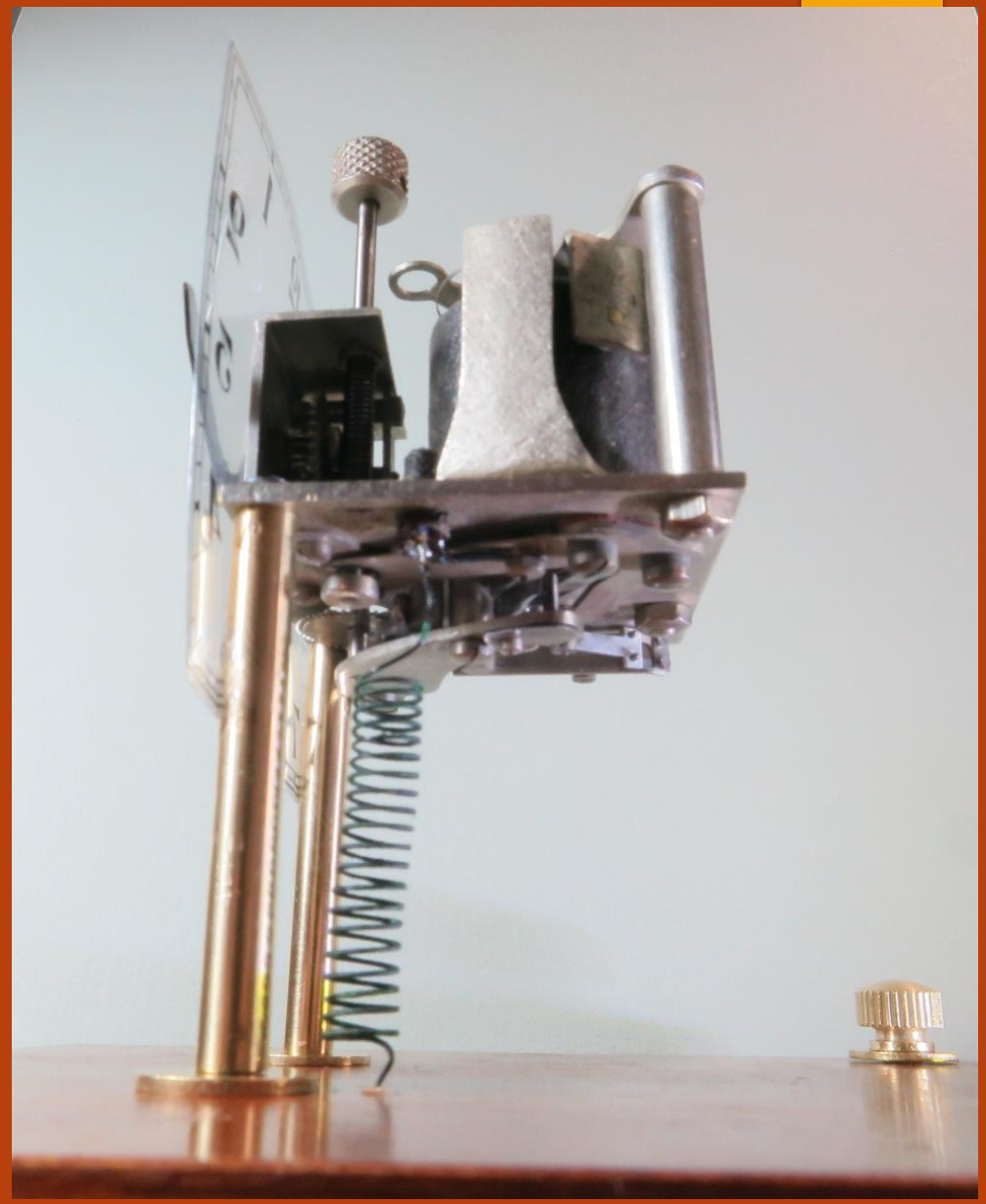
The escapement and electrical contact side 5



The three adjustments

A simple base was constructed and a transparent dial added to display the movement





This is a small movement with the base plate being 40mm square and the dial 55mm square

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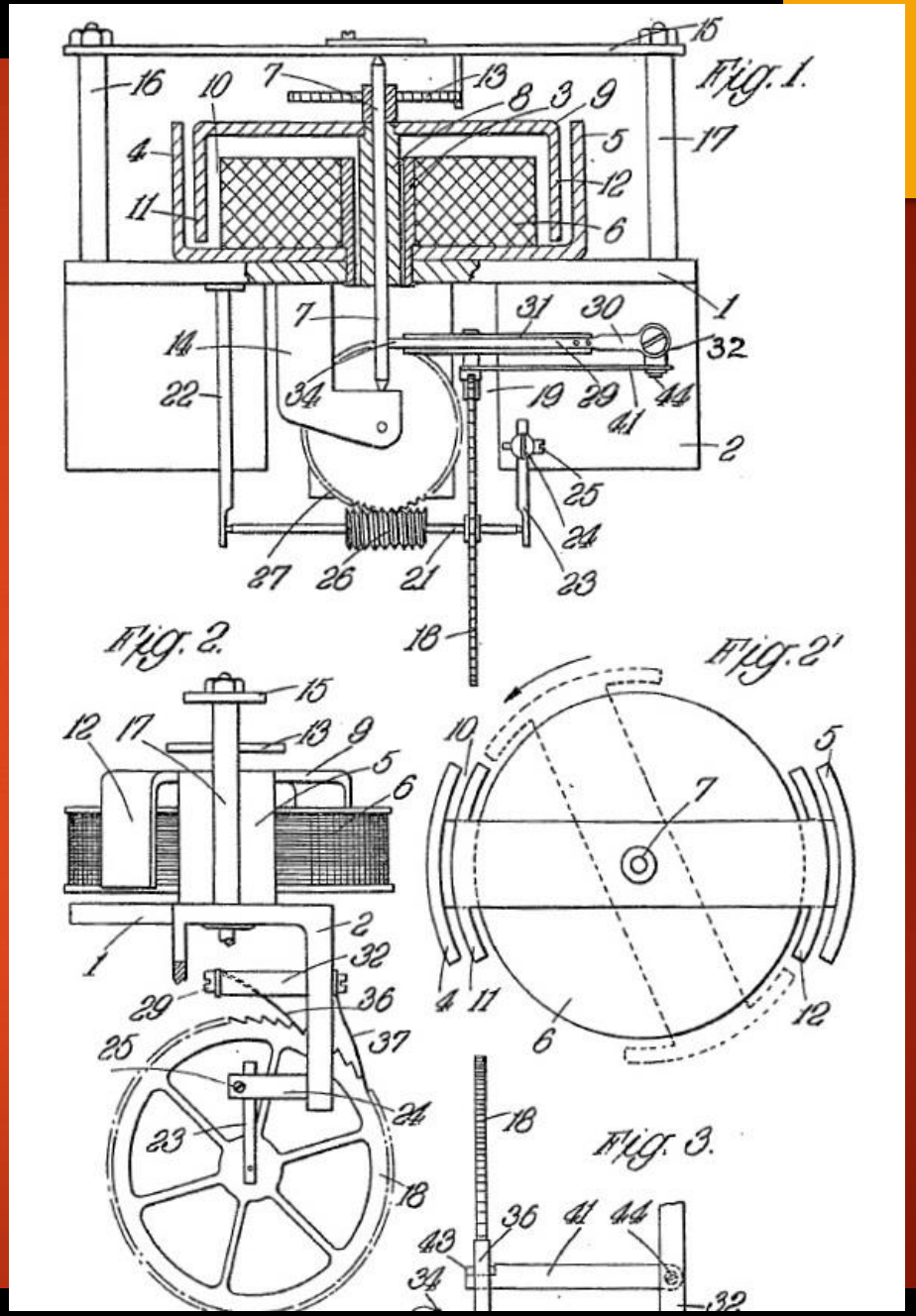
VIDEOS

Zoe – a Bulle Prototype C 1934

Favre-Bulle had great expectations for the clock

At the beginning of the patent no GB 403.145 he says

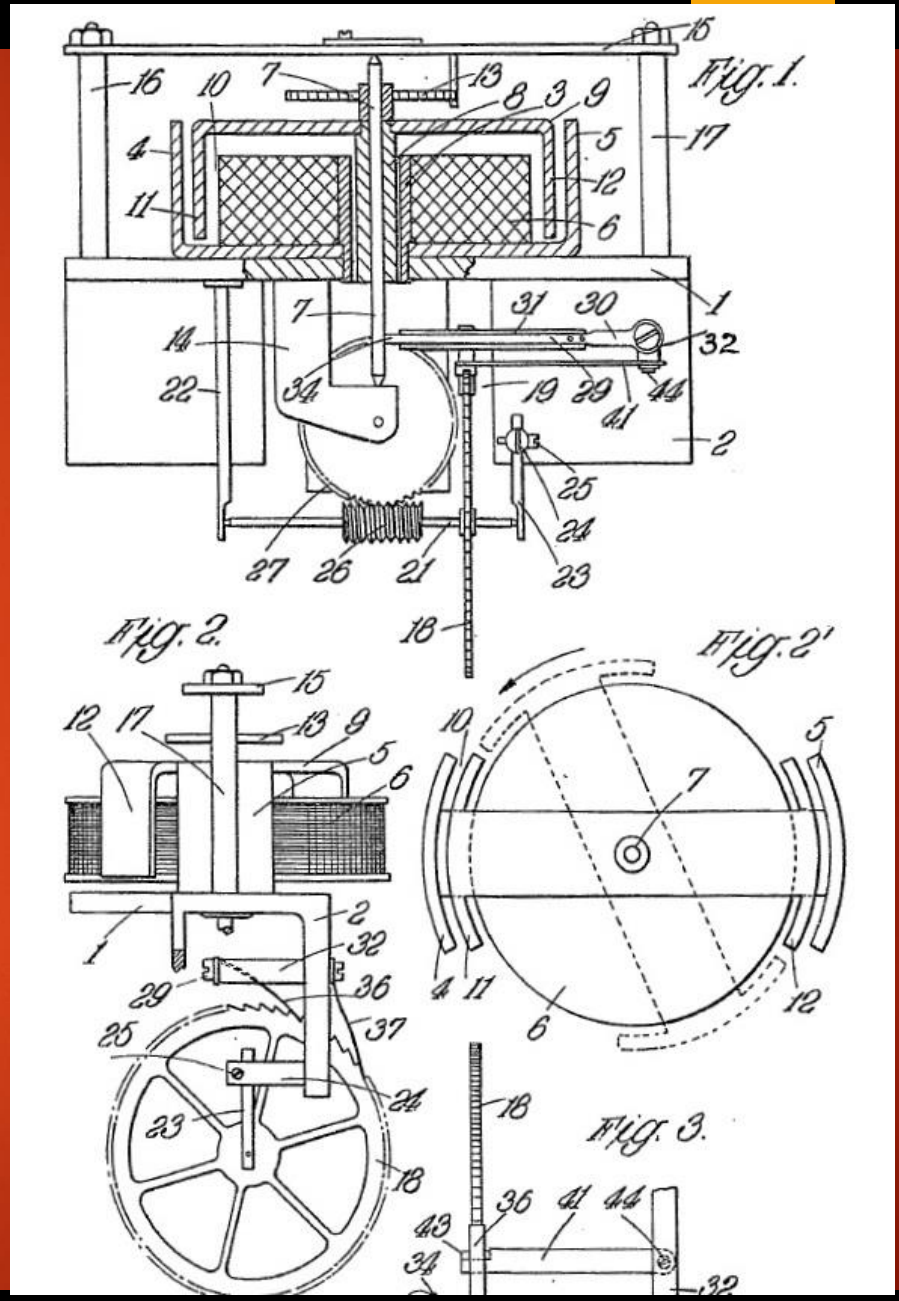
"The object of the invention is
An improved electric watch with electro-magnetic action, providing absolute reliability of working with a simplicity of construction as yet unobtained by any system of mechanical or electrical watch."



Zoe – a Bulle Prototype C 1934

Claims Made in Patent GB 403145A Page 1
"This watch is characterised by a simplicity which is expressed by the presence of only three rotary arbours
(a) The balance shaft
(b) The ratchet wheel shaft
(c) The minute wheel shaft

This simplicity associated with an escapement which, while greatly facilitating manufacture on the most economical lines, endures a degree of working precision equal to that of the best chronometers.
In this invention use is made for the intermediary member (Flexible arm) of a spring detent.
The actual function of this detent is to transmit the alternating rotary movement of the balance to the ratchet wheel and simultaneously to ensure the opening and the closure of the electric circuit of the apparatus."

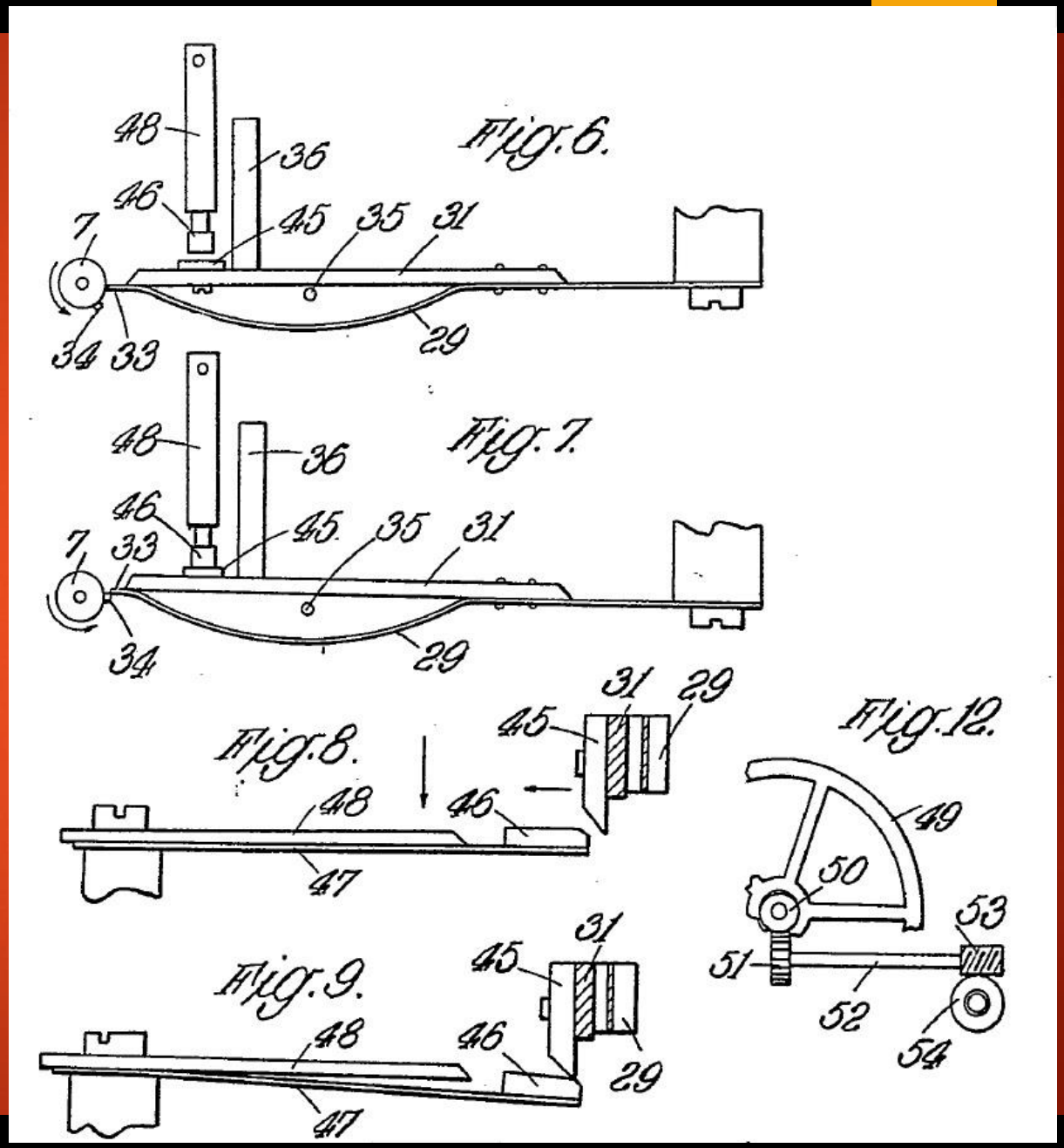


Zoe – a Bulle Prototype C 1934

Claims Made in Patent GB 403145A Page 2

"The purpose of realising simplification, while placing the balance horizontally which, as is known, is of great importance for the precision of running, but it goes without saying that for example in order to reduce the thickness of the movement, if one wished to place all these members in a single plane, there would have to be added to the mechanism either an angle gear or a second worm.

The diagram (fig 12) shows such an arrangement where the ratchet wheel 49 drives by a worm, 53, which drives the wheel 54 keyed on the minute shaft or any other transmission member."



Zoe – a Bulle Prototype C 1934

Zoe was one of the first directly impulse balance wheel Clocks

It appears, based on Patent and dates. that the was a fair bit of competition in this market. However the dominance of the Jaeger design in the car clock market indicates that the Bulle movement was not successful in penetrating this market.

The table below shows Brillie, Bulle, Jaeger and Orel patent dates

Date filed	Date granted	Patent No	Description	Balance	Comments
24/12/1927	18/02/1929	FR660348A	Bulle Escarpment electric direct and suitable ideas for portable clocks	Pivoted coil	Mainly the escapement ratchet wheel
20/06/1928		FR666179	Brillie/Constance Battegay	Balance wheel direct impulse	First direct impuilse balance wheel torroidal Magnet
2/08/2028	7/10/1929	FR673360A	Bulle Mechanism of an electromagnetic clock	Pivoted magnet in a coil	Travel clock mechanism?
1/05/1929	Provisional	GB332962	Brillie/Constance Battegay	Balance wheel direct impulse	Similar to FR666179
29/07/1929	9/10/1930	GB336033A	Bulle Improvements relating to electric clocks	Pivoted coil	
19/08/1929	16/01/1931	CH143077A	Bulle Escarpment of electric clock - design of classic Bulle Travel Clock	Pivoted coil	
15/01/1930	10/07/1934	US1965762A	Brillie/Constance Battegay	Balance wheel direct impulse	Similar to FR666179
15/07/1931	24/11/1931	FR720031A	Bulle Montre Electrique	Balance wheel	Similar to Oscar work and supports
28/10/1931			Jaeger Possible French Patend applied for but cannot find		
12/11/1931	21/12/1932	FR41643E	Bulle Montre Electrique - first addition	Balance wheel	Similar to oscar but parallel to axis incrementing jewel
28/05/1932	16/11/1933	FR41799E	Bulle Montre Electrique - second addition	Balance wheel	Detail of contacts and large perp ratchet wheel
1/07/1932	15/02/1934	CH167232A	Bulle Piece electric horology	Balance wheel	Same as rev 2 of french patent FR41799E
6/07/1932	19/02/1935	US1991839A	Bulle Electric Timepiece	Balance wheel	Same as rev 2 of french patent FR41799E
14/07/1932	21/12/1933	GB403145A	Bulle Electric watch UK patent	Balance wheel	Same as rev 2 of french patent FR41799E
15/07/1932	7/09/1933	DE584504C	Bulle Electric watch German patent	Balance wheel	Same as rev 2 of french patent FR41799E
17/10/1932	16/07/1935	US2008338	Watch (Jaeger Car Clock)	Balance wheel	First Patent found for Jaeger balance wheel (possibly french
10/04/1933	1/05/1934	FR767359A	Bulle synchronous time device	Vibrating suspended weight	Every which way of a coil moving a magnet and vice versa
6/03/1934	1/04/1935	FR45164E	Bulle synchronous time device	Vibrating suspended weight	AC powered Vibrating weight and gearing
9/04/1934	24/07/1935	GB432299A	Bulle synchronous time device	Vibrating suspended weight	AC powered Vibrating weight and gearing
Circa 1935	No Patent Found		Cartier formed company Delvicar	Balance Wheel	Most Delvicar clocks dails labelled Cartier Electric
8/03/1935	7/04/1936	US2036917A	Bulle Electric timepiece	Vibrating weight	AC powered vibrating weight and escapement
11/08/1936		GB504365	Orel - direct balance impulse	Balance wheel	First patent for Orel
21/12/1945	23/07/1952	FR56460E	Bulle perfection of Direct acting gearing and worm ratchet	Vibrating pendulum	

Zoe – Comments (1)

This is covered in patents FR41799E(1932) and GB303145A (1932)

The main flexible arm element is a suspension spring like mechanism as shown in the first photo. The photo has text showing the functions of the components of the arm. The arm is allowed to flex via a suspension spring type element. The balance as it rotates has a steel pin on its shaft that contacts a steel finger on the suspension flexible arm and moves it forwards and backwards. On the forward stroke the blade moves the indexing wheel on the gear train and also makes an electrical contact to the coil. The steel finger is mounted on a flexible spring so it can ride up over the pin on the balance shaft when the balance is going in the backward direction. The top contact on the flexible arm is a square silver button.

The bottom contact is attached to the top plate of the movement via a flexible blade spring. The contact button on the bottom contact is sloped so the contact is made depending on the position of the flexible arm and its vertical position which is adjustable by an adjusting screw. Because the bottom contact is on a flexible blade it deflects as the top contact slide across it creating a wiping effect as is common in bulle clocks

Zoe – Comments (2)

There are also two adjustment screws acting on the flexible arm.

The first adjusting screw changes the position of the depth of the blade in relation to the pin on the balance and hence the stroke length of the flexible arm and the travel of the indexing blade. It is adjusted so that only one tooth position is moved each cycle. This is a tricky adjustment as the there are many teeth on the wheel and so a very fine adjustment must be made otherwise two teeth or even zero teeth will be indexed.

The second adjusting screw changes the position of the flexible part of the arm and so controls the point at which the electrical contacts are made (this point is also adjustable by the adjusting screw adjusting the height of the ramped bottom fixed contact).

A little difficulty was had at first when the toothed wheel being indexed tended to over run. It was finally realised that there was a missing part. It was a simple length of stainless steel which rubs on the shaft of the toothed wheel and creates friction and prevents the toothed wheel “over running” one or more teeth positions. A small 0.1mm thick strip of stainless steel was made and there was an attachment point already on the movement for it. Why it was missing is unknown.

Zoe – Comments (3)

It is interesting to note that most of the adjustment screws were not correctly adjusted and so the mechanism was not in a working condition even with the contacts cleaned. The suspension spring like flexible element also was bent a little which prevented the second adjustment screw from functioning as an adjustment.

It can be said though that it would be a difficult mechanism for a clock repairer to understand and adjust – firstly because it is unusual and secondly because there are so many adjustments. Also the repairer may not have the benefit of a video camera that allows slow motion examination of the mechanism and a binocular microscope.

Compared to say the electromechanical jaeger car clock mechanism it is very complex. Perhaps that is why it appears to have remained a prototype. It certainly is a well constructed mechanism though.