



SERVICING OR REPLACING THE CLOCK MAINSPRING IN A MONTRE ROYALE SOLAR POWERED CLOCK.

By LINDSAY BRAMALL
2018

CAUTION.

This clock has no provision for manually winding the mainspring and hence there is no way that the power in the mainspring can be released manually, either.

Before attempting to dismantle the clock movement as shown in this presentation, any power in the mainspring should be “let down”, ie, unwound, to as little as possible.

Check the mainspring wind indicator under the pyramid and check that it is on or near “0” on the dial.

If the clock is ticking (put your ear to one of the dials) then place the clock in a dark room until it stops.

Only after the clock meets these criteria should the following procedure be carried out.



1. Remove these 6 screws from under the pyramid

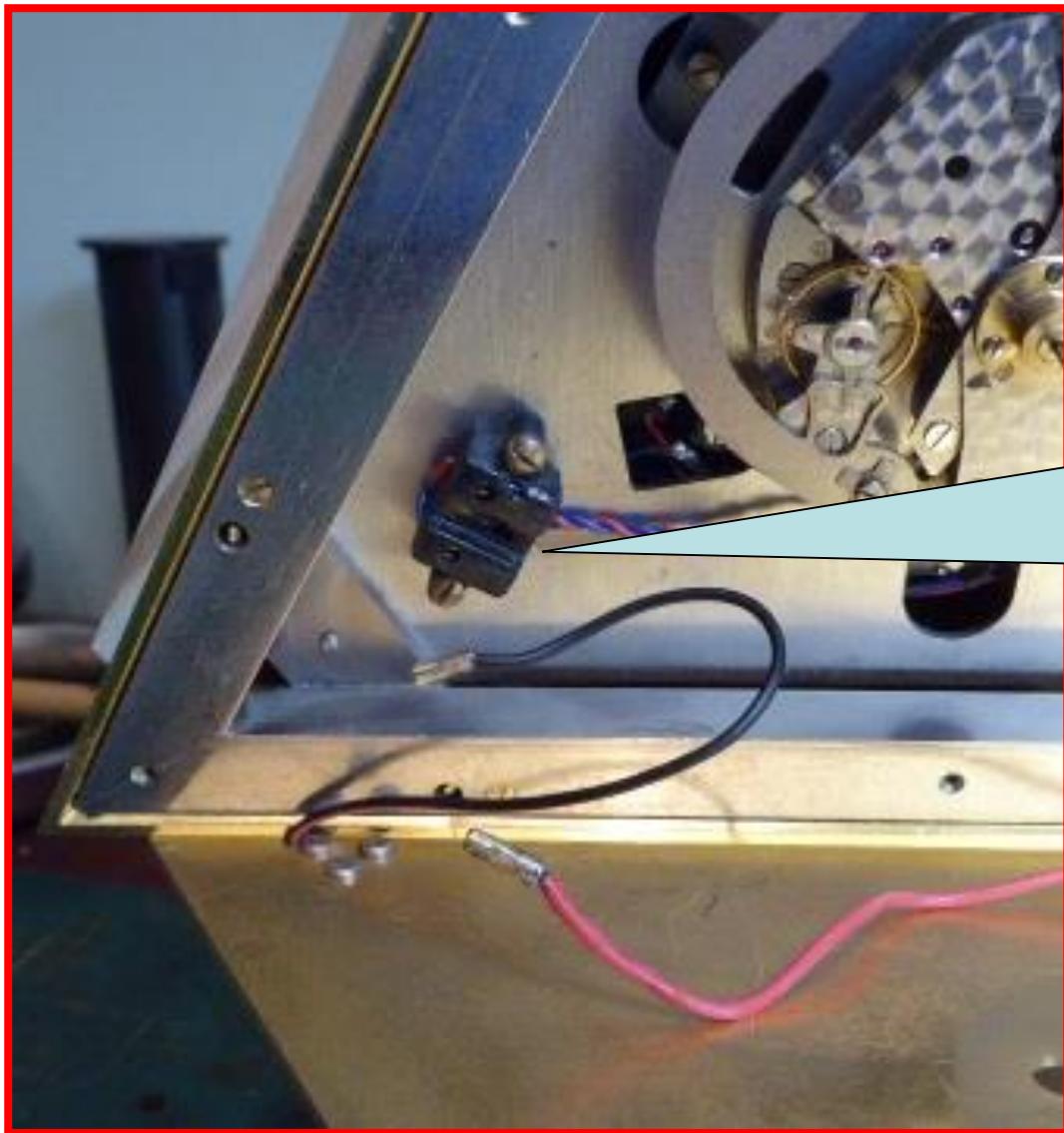


You will need a very short screwdriver to fit the centre screws under the pyramid.

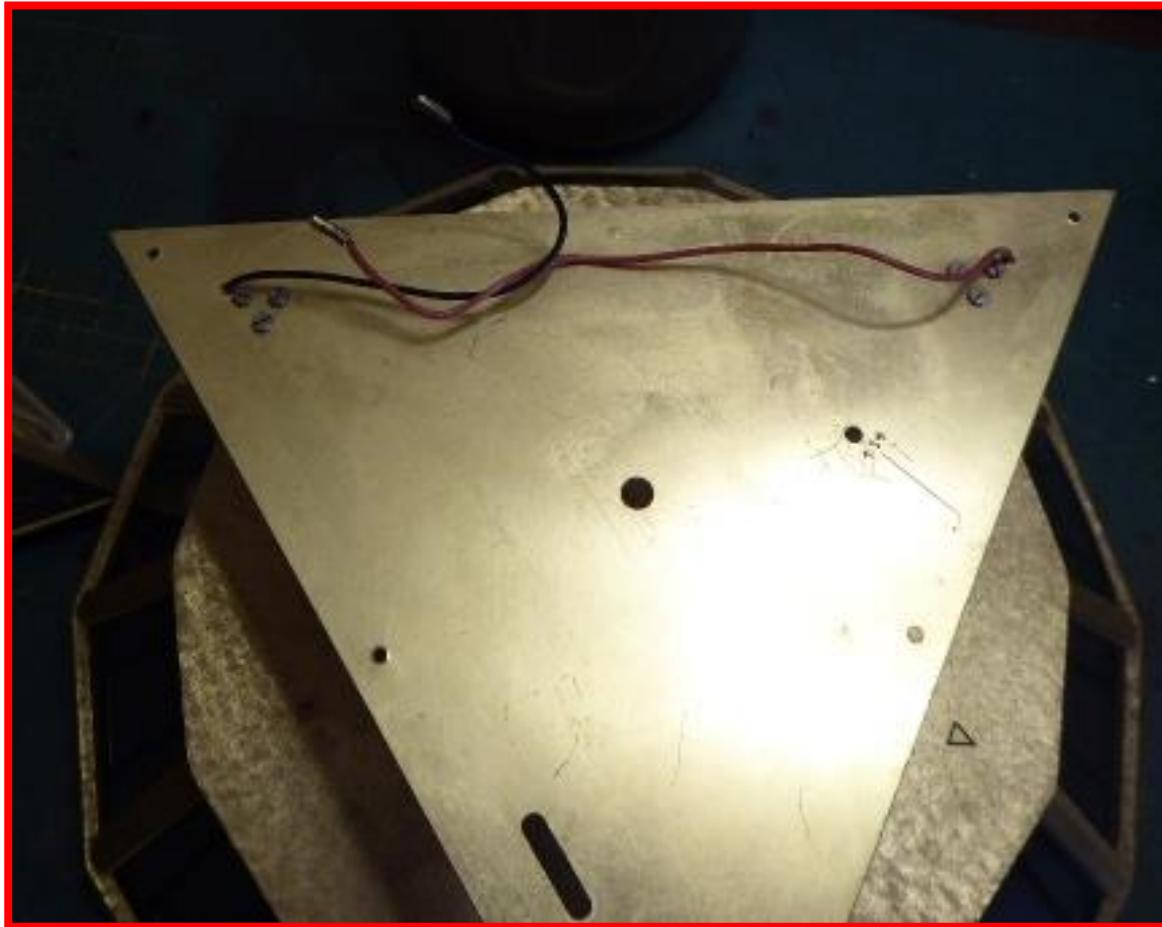


With the 6 screws removed the pyramid may be tipped up.

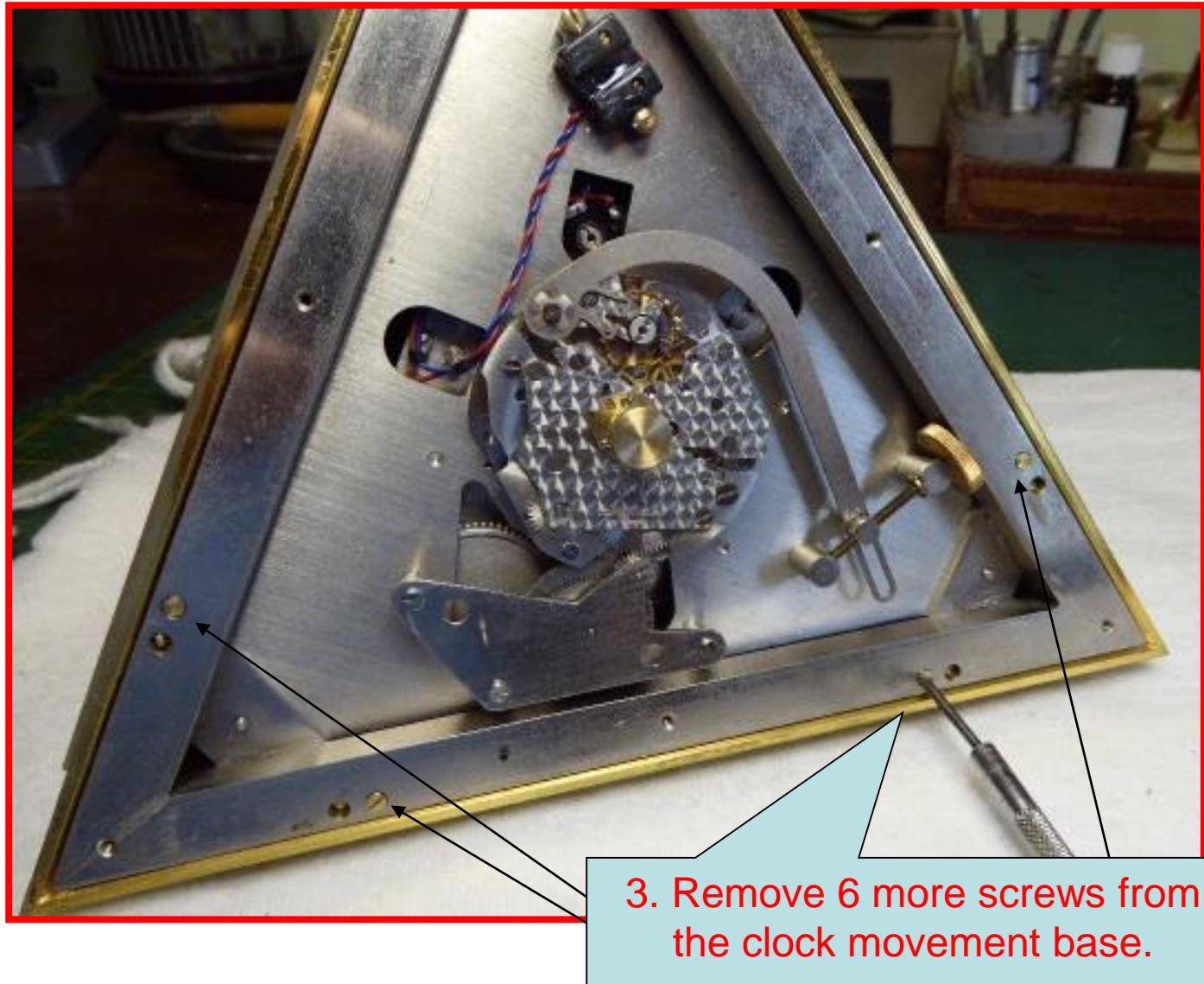
Take care to tip up with the wires as shown here.

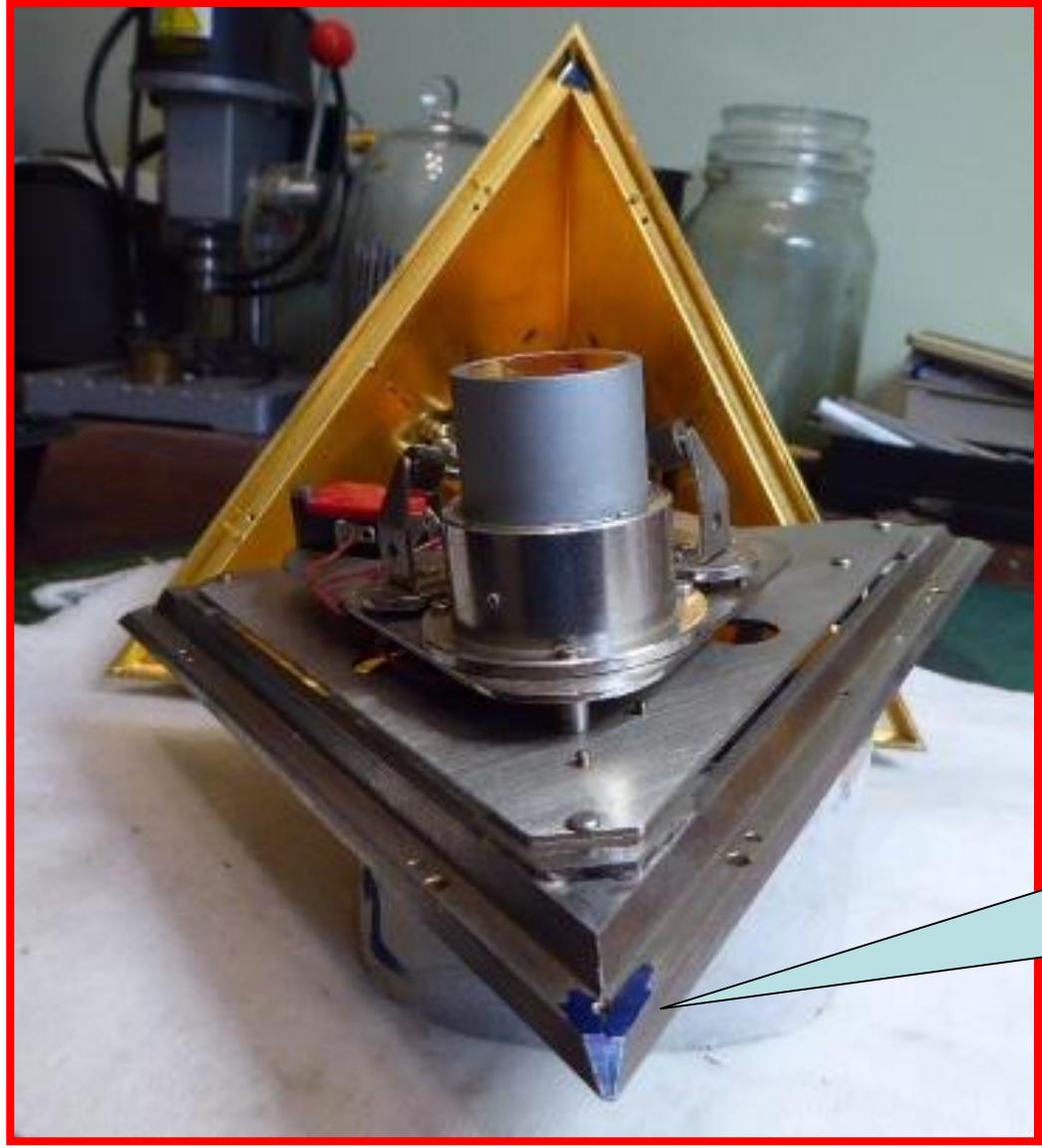


2. Remove the power wires from the terminal block. They are a simple friction fit. Take care to replace RED to RED when re-assembling



The solar base may now be put aside.





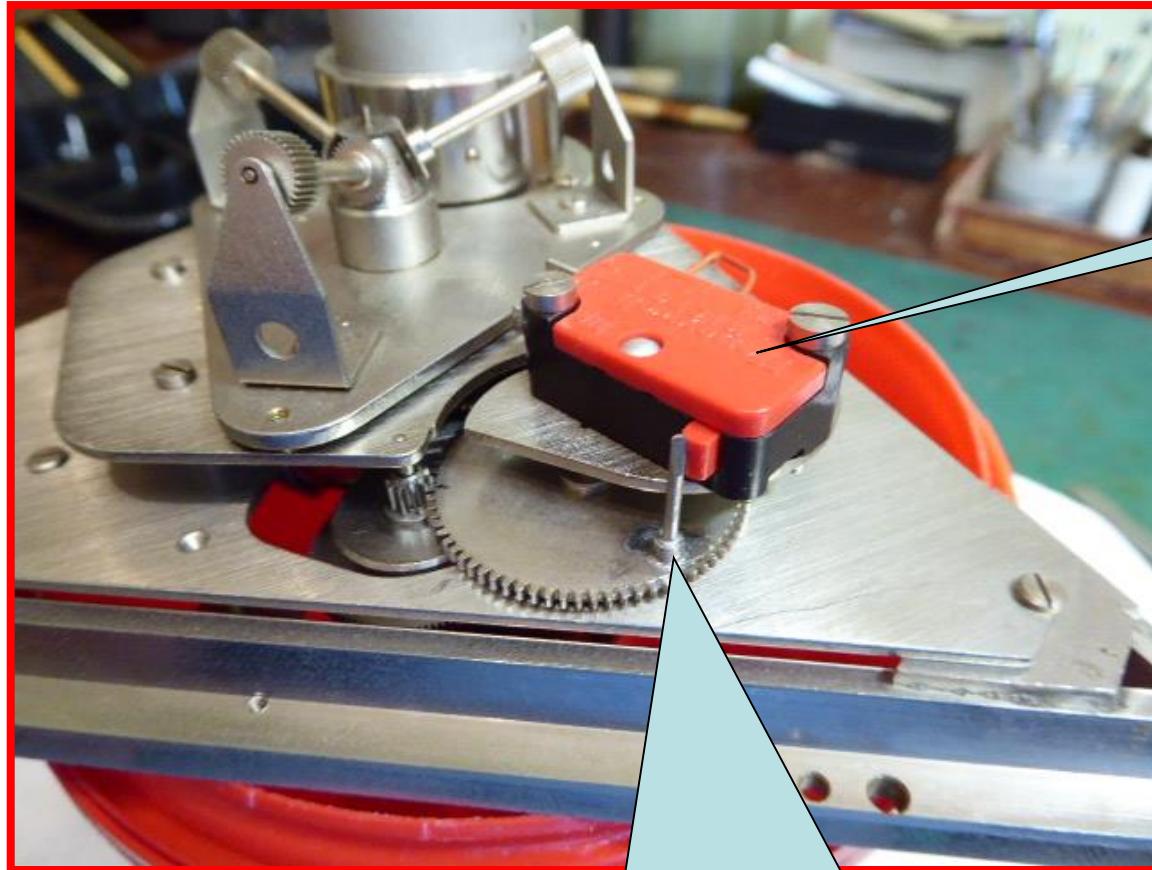
The pyramid may now be lifted directly up off the clock base.

4. Mark the base corner and the corresponding pyramid corner with a marker pen for re-assembly purposes.



Pyramid corner marked.

Base corner marked.



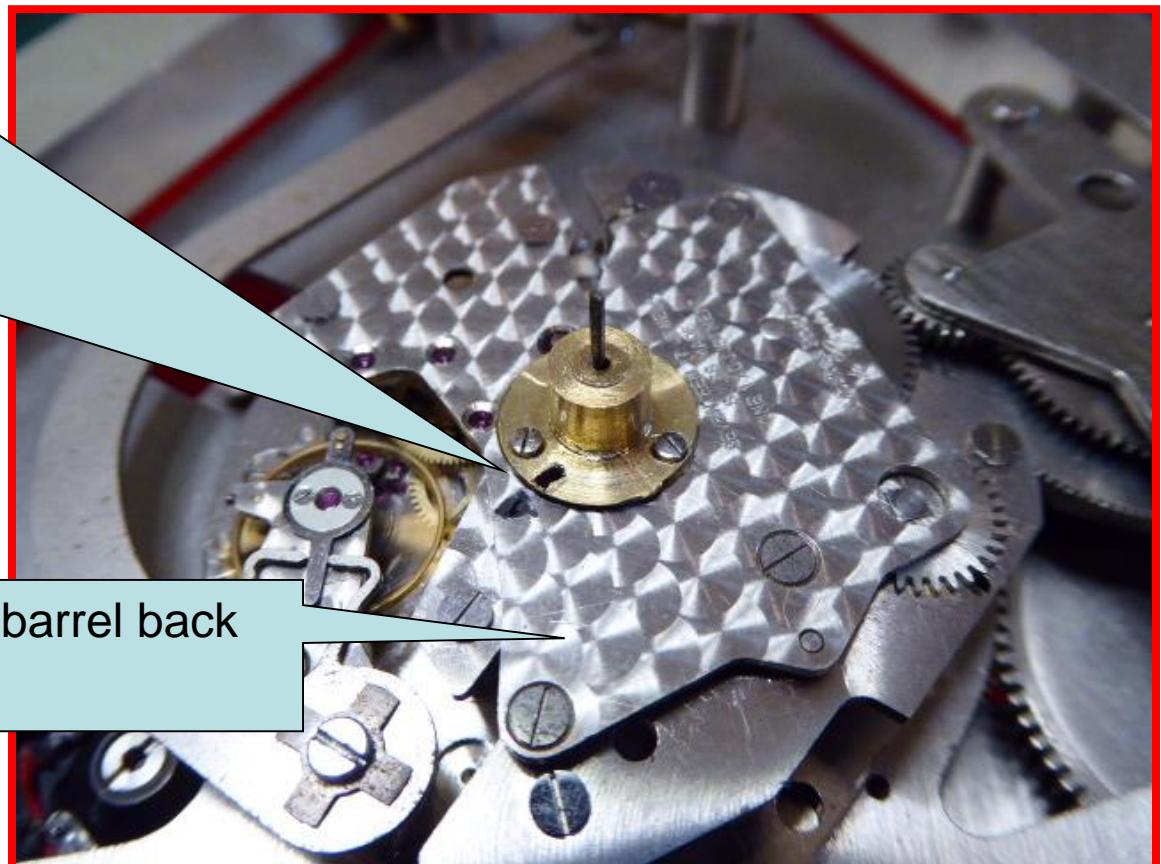
Micro-switch.

This is the pin, driven by the mainspring barrel, which activates the micro-switch to prevent over-winding of the mainspring

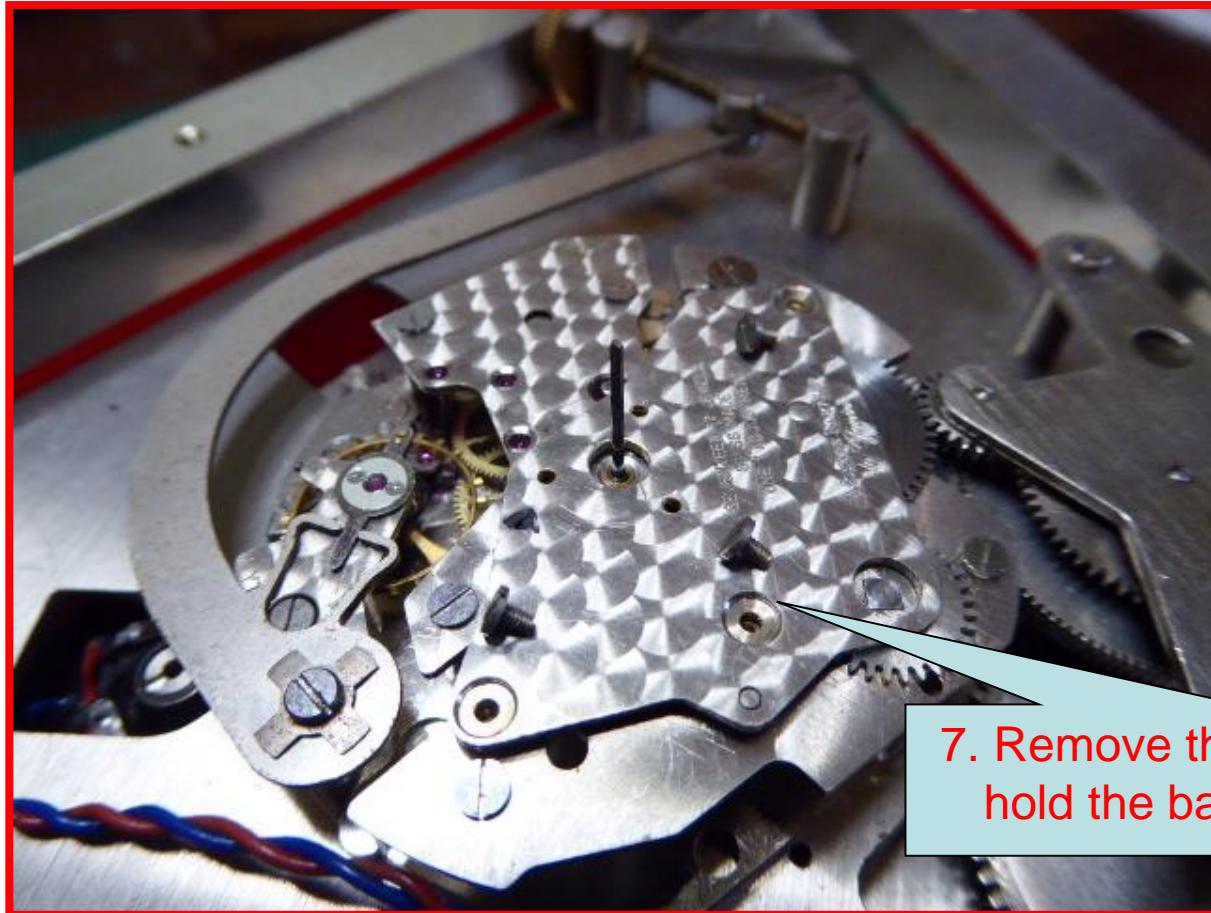
5. Put a reference mark on the centre arbor housing and the back plate, for re-assembly purposes.

6. Remove the 3 small screws and lift up this brass housing off the back plate..

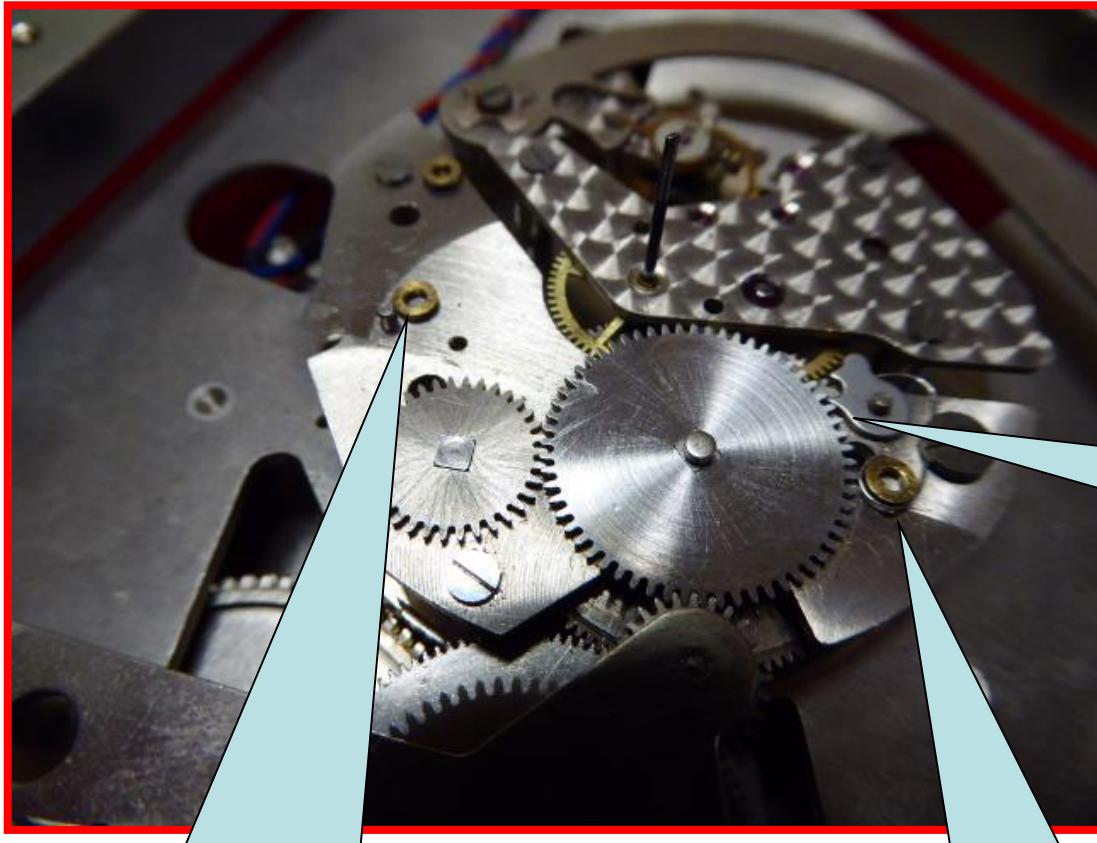
This is the mainspring barrel back plate.



It is worth noting here that I have made sure, as per the CAUTION notes at the beginning of this presentation, that there is little, to no residual power in the mainspring.



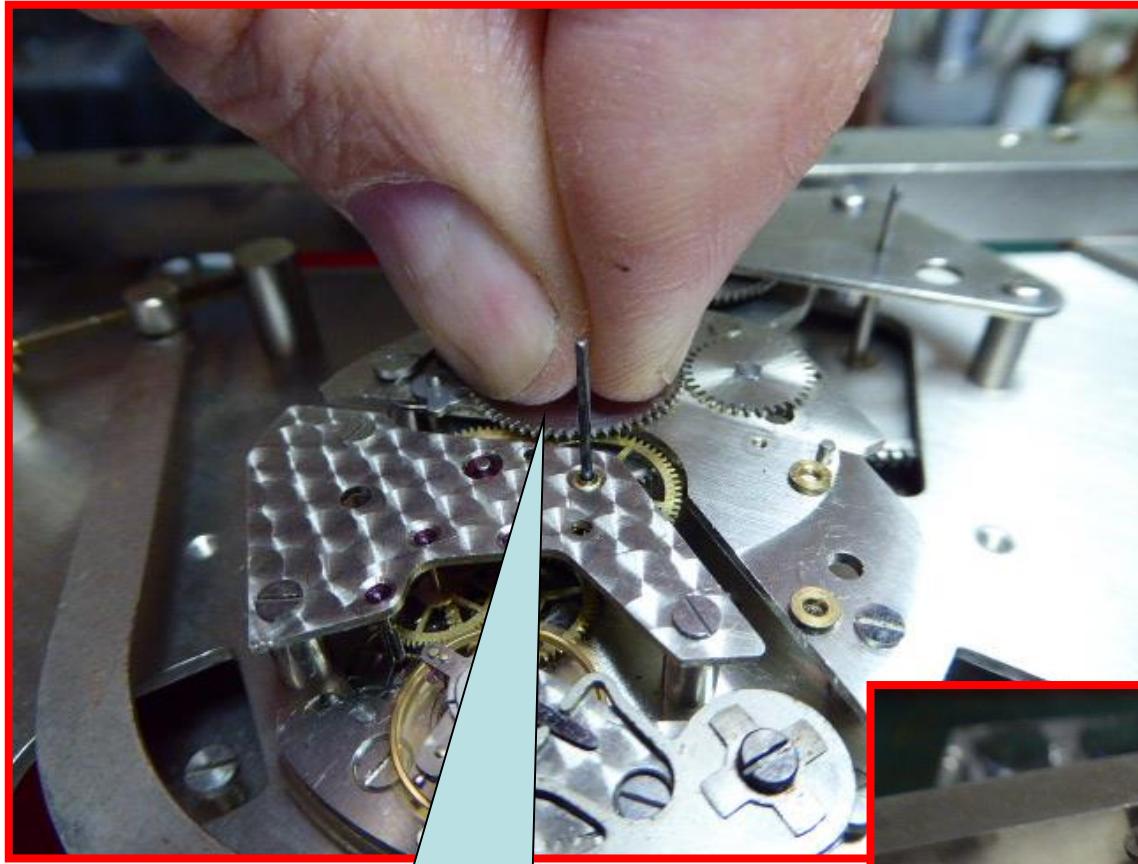
7. Remove the three screws which hold the back plate in position.



8. Gently pry the back plate up and off the clock movement.

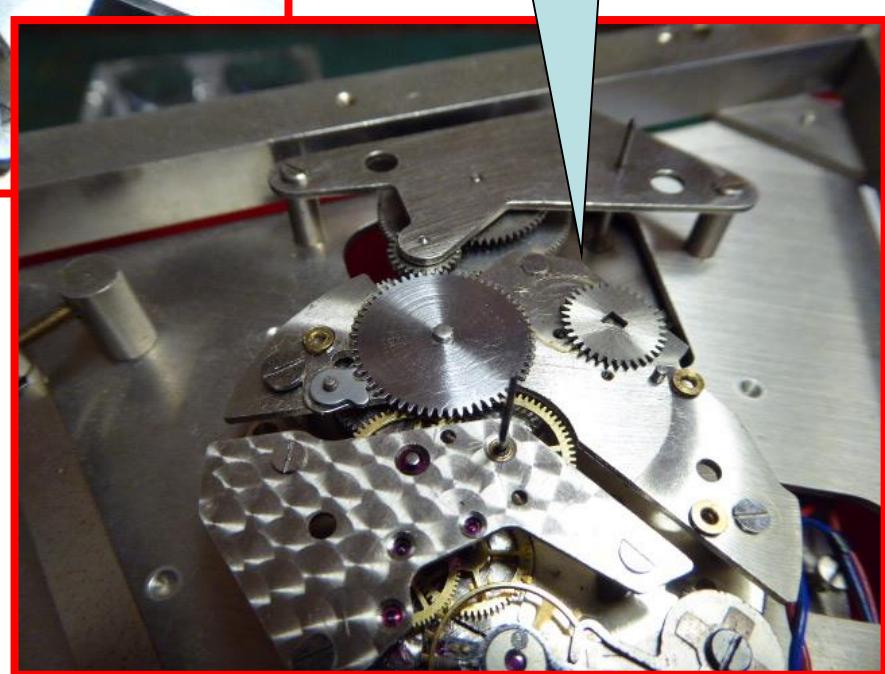
Take care to note the position of these two brass spacer washers before removing them.

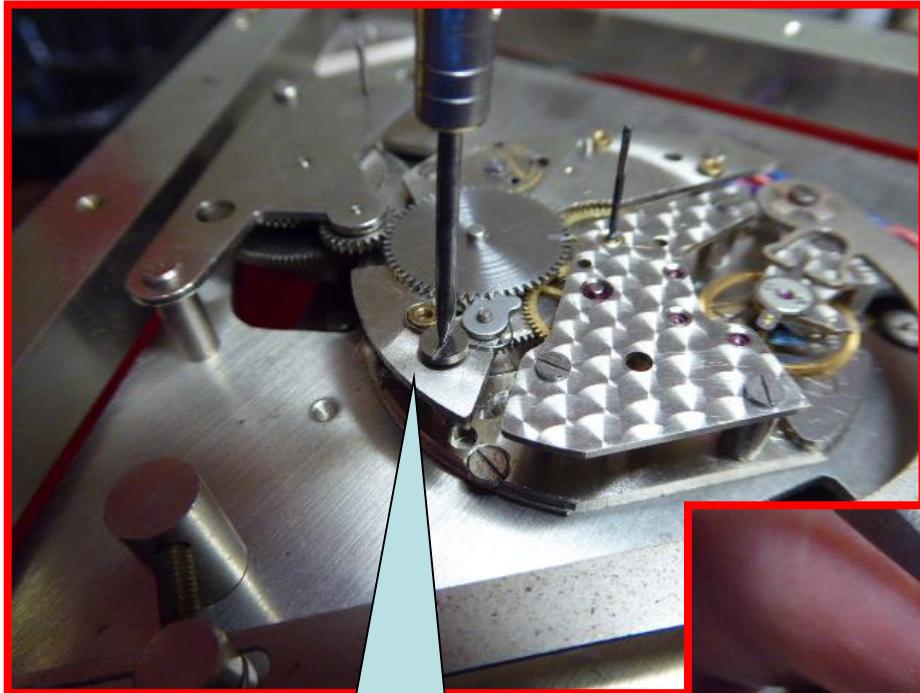
Note: On this clock this spacer washer has the click spring coiled around it!!!



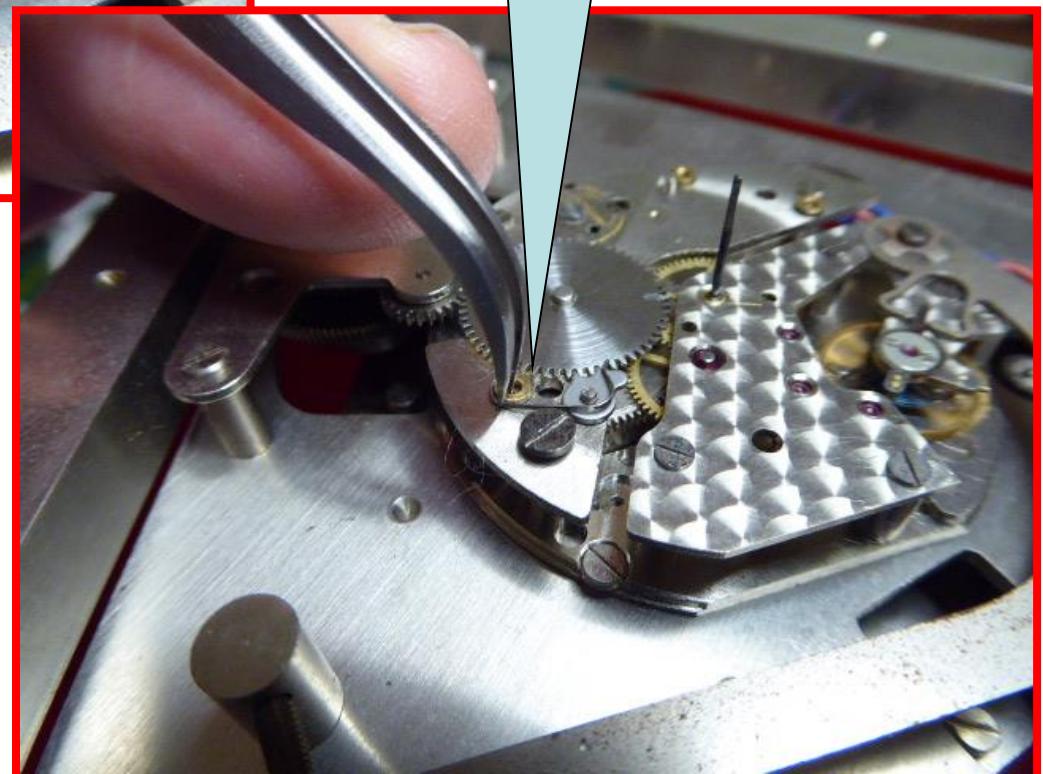
The small winding wheel has been removed.

9. Put light downward pressure on the barrel wheel, apply anti-clockwise pressure then pry the smaller winding wheel up and off its square.

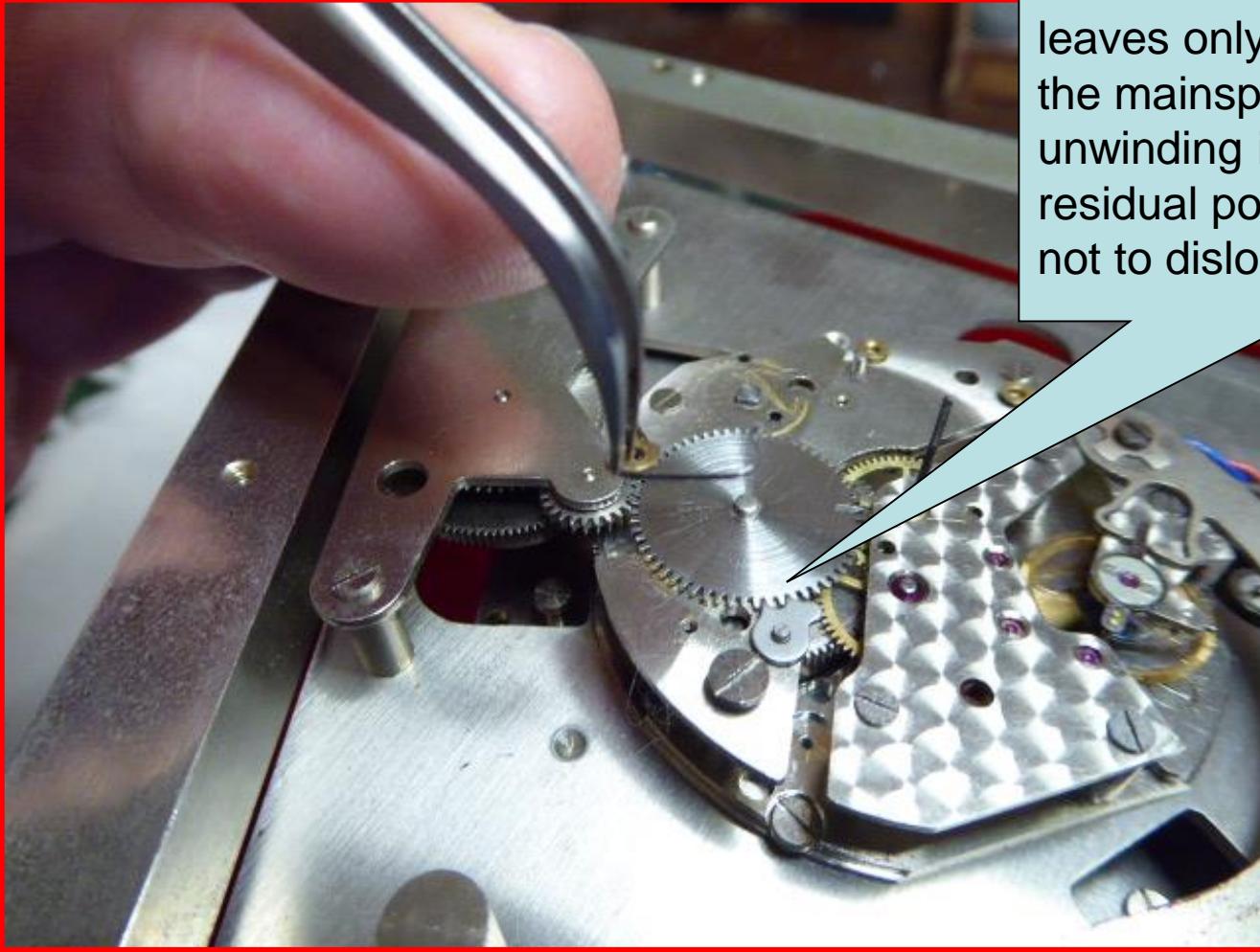




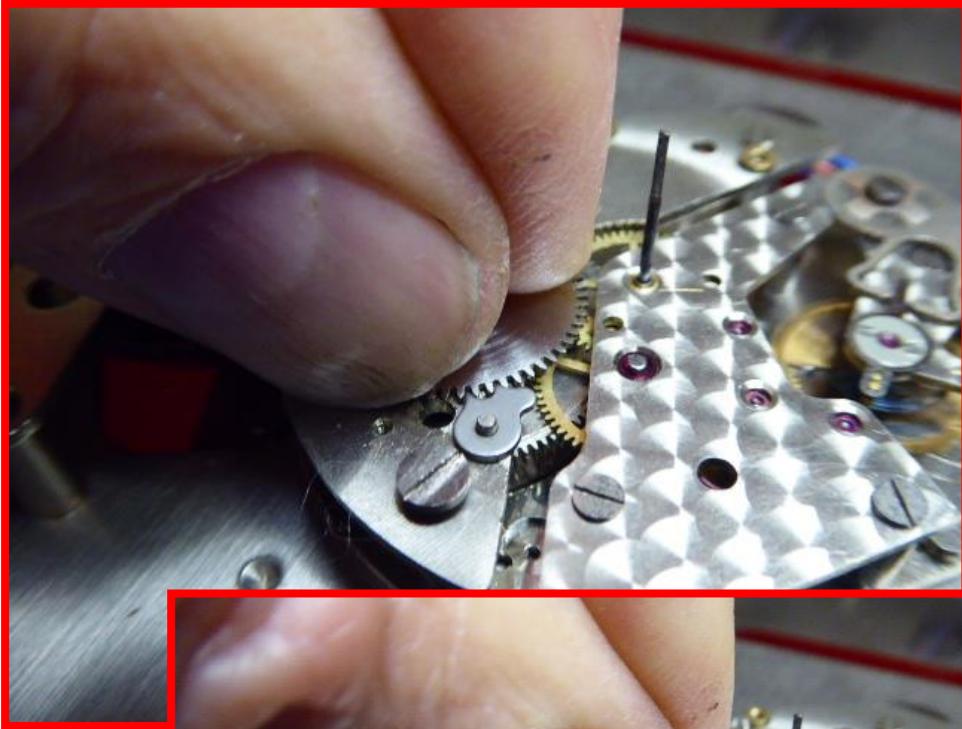
10. Loosen the click
spring retaining screw.



11. Remove the click
spring and spacer.

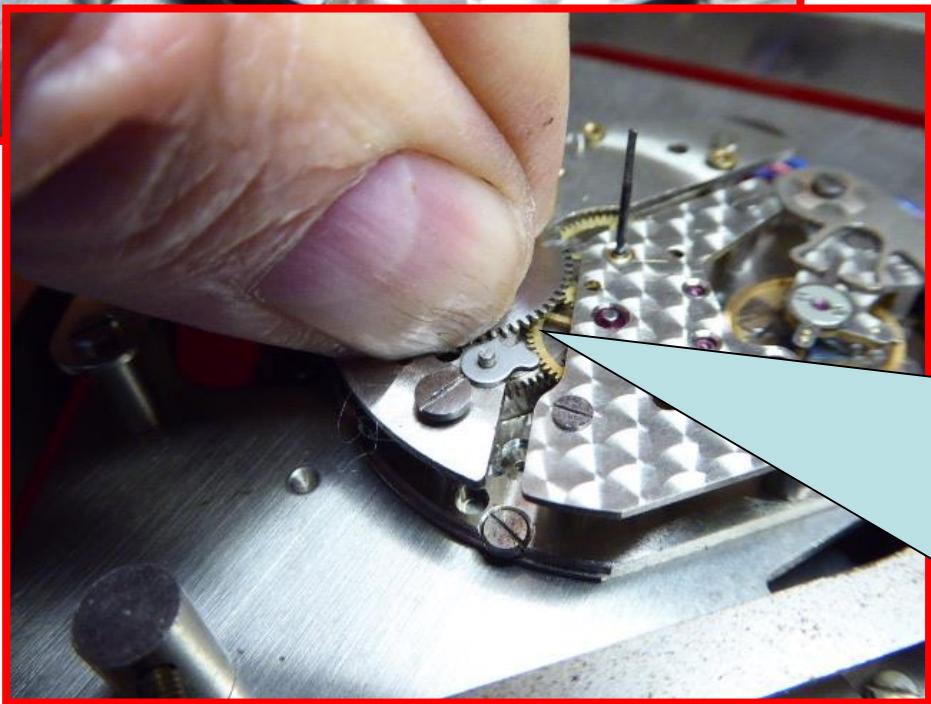


Removal of the click spring leaves only the click holding the mainspring from unwinding if there is any residual power, so take care not to dislodge the click !



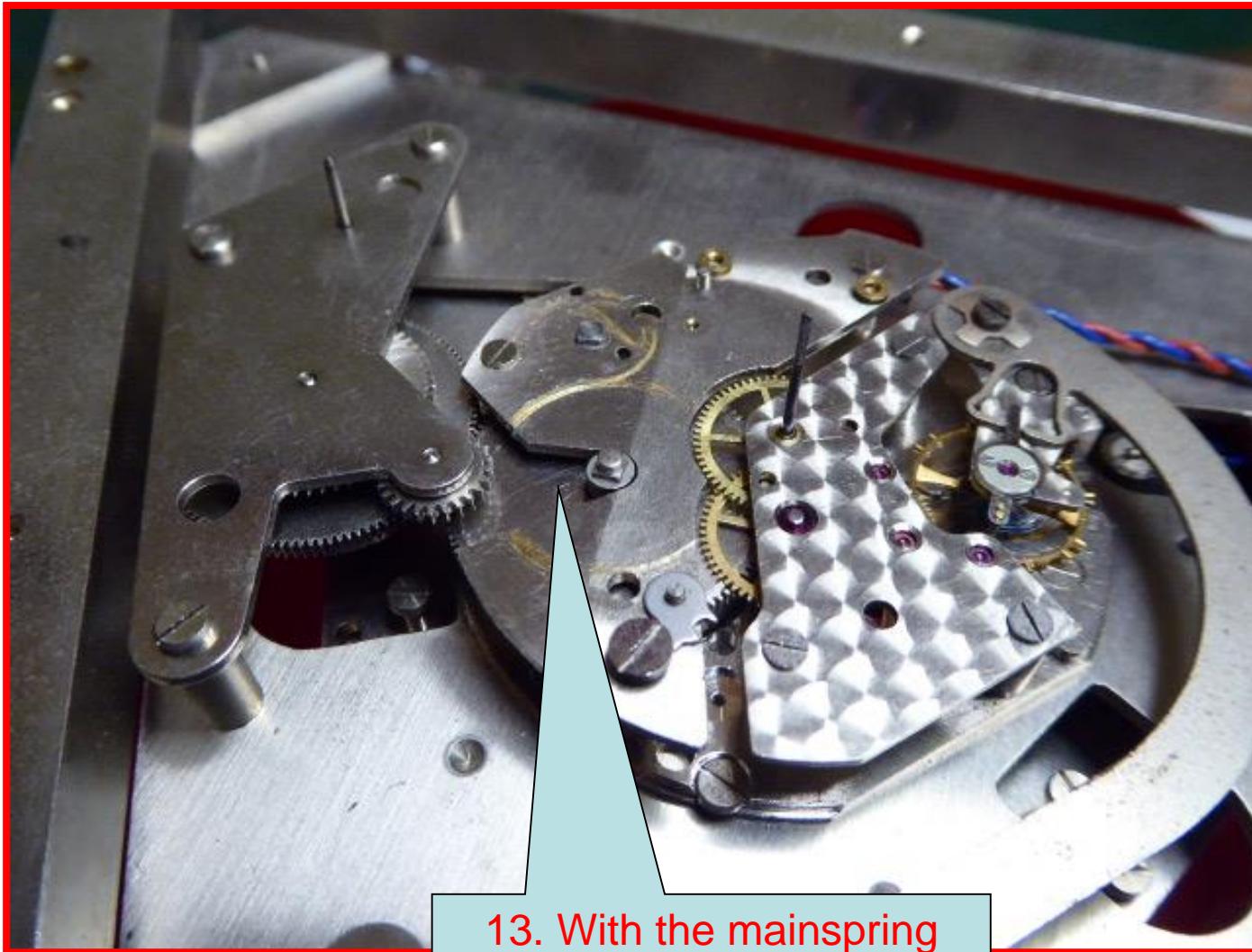
This step will allow any residual power in the mainspring to unwind so do not be distracted.

CARE

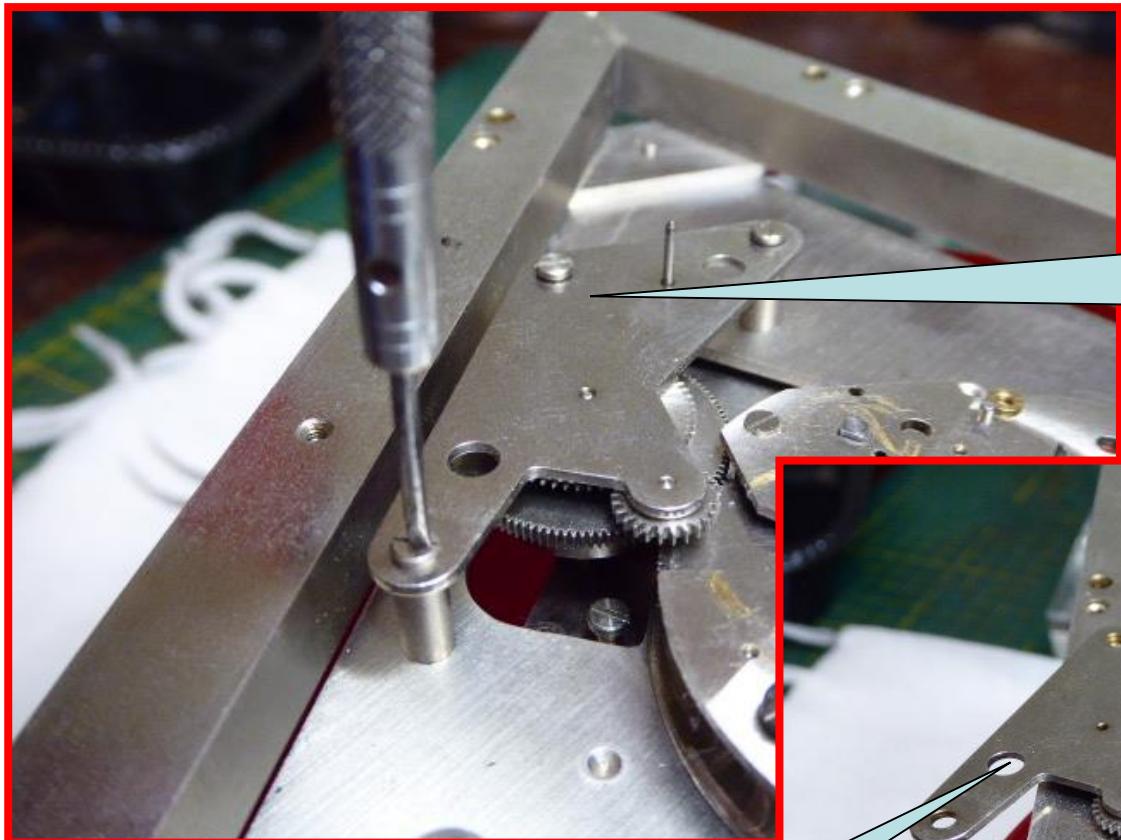


12. Whilst applying downward pressure to the barrel wheel turn it slightly anti-clockwise to disengage the click.

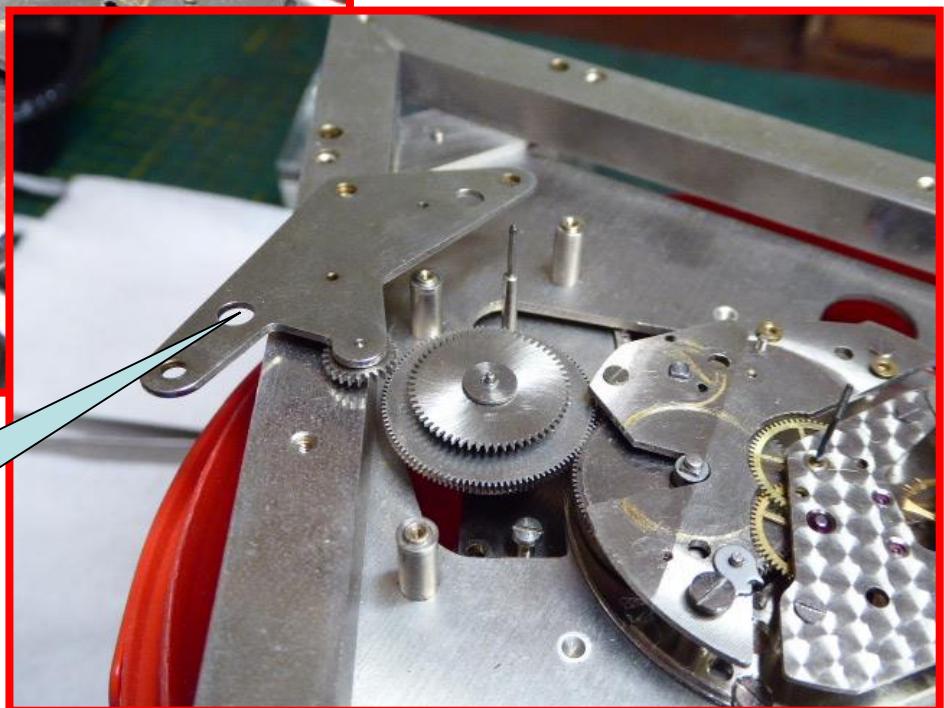
Then slowly allow the barrel wheel to rotate clockwise until no more spring pressure can be felt under your fingers.



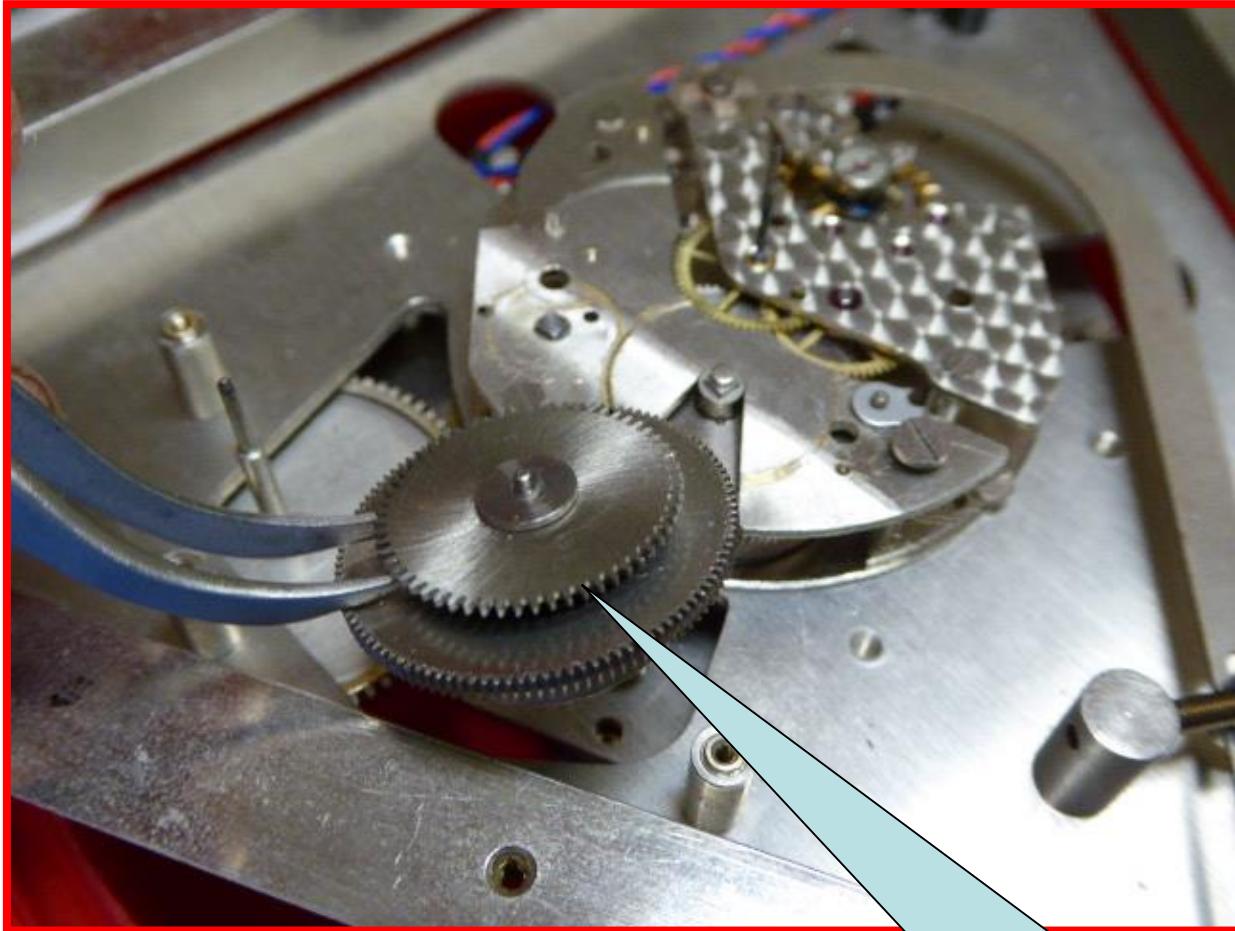
13. With the mainspring power let down remove the large winding wheel.



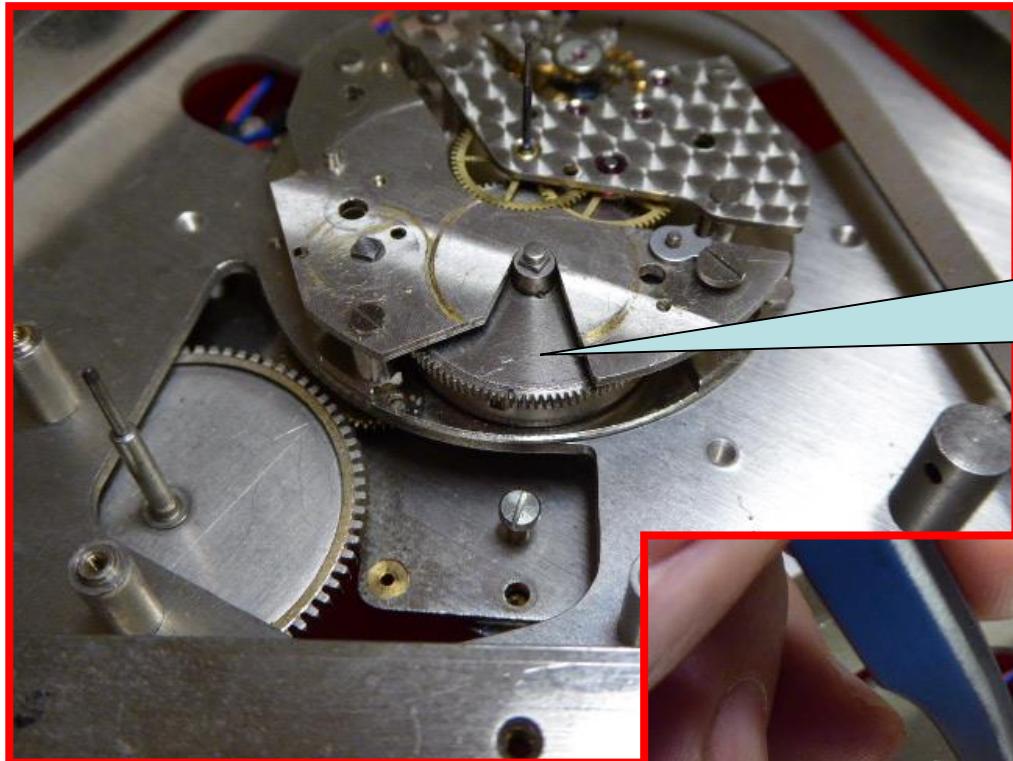
14. Remove 3 screws from the winding control plate.



15. Lift off the winding control plate with the idler gear attached.

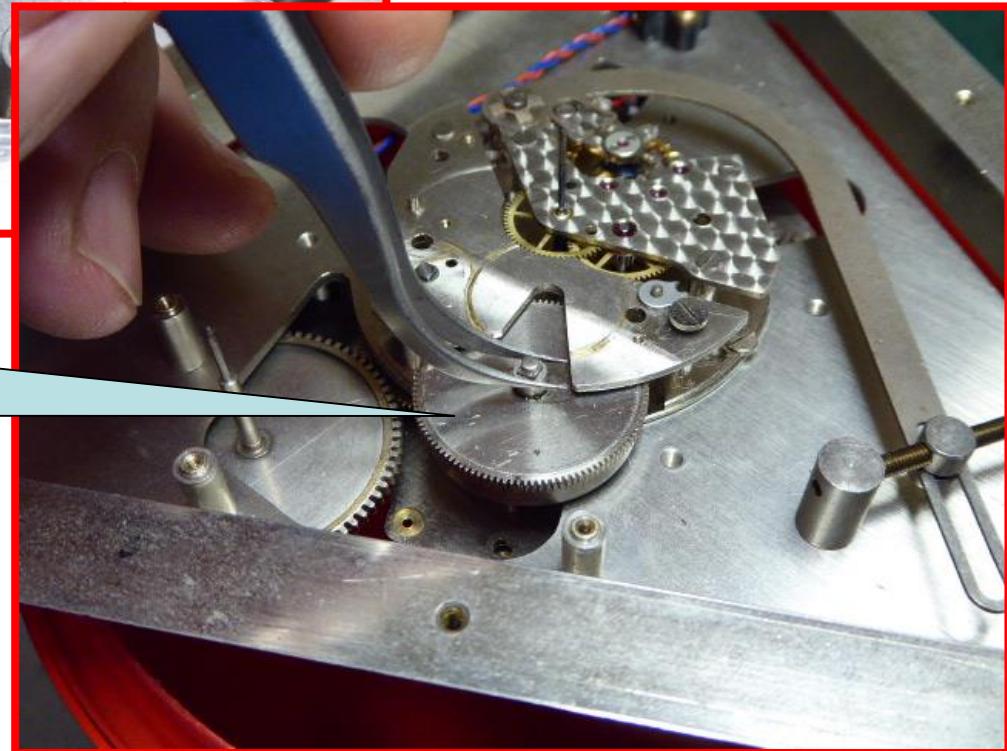


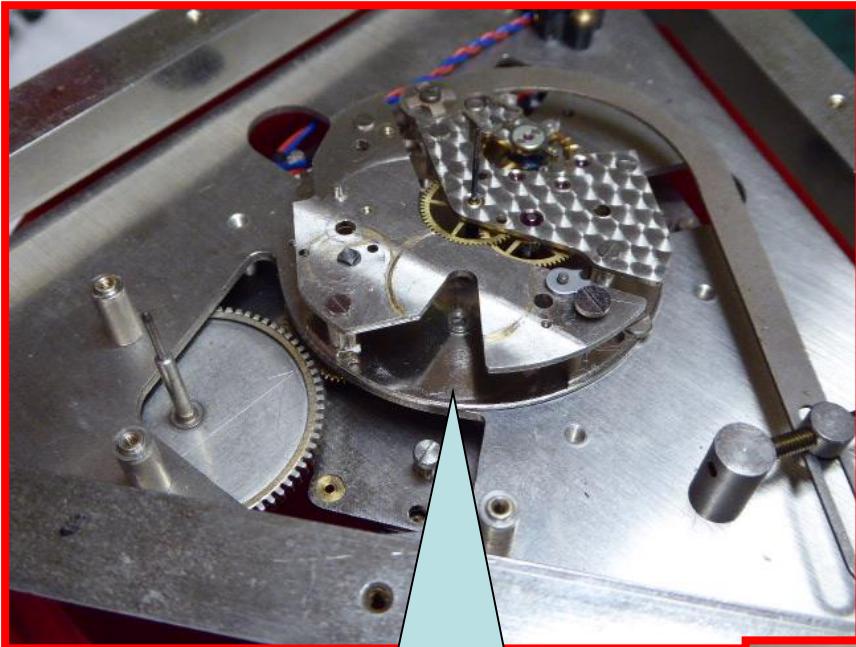
16. Lift out the differential winding gear cluster.



The mainspring barrel is now clearly seen in between the clock plates.

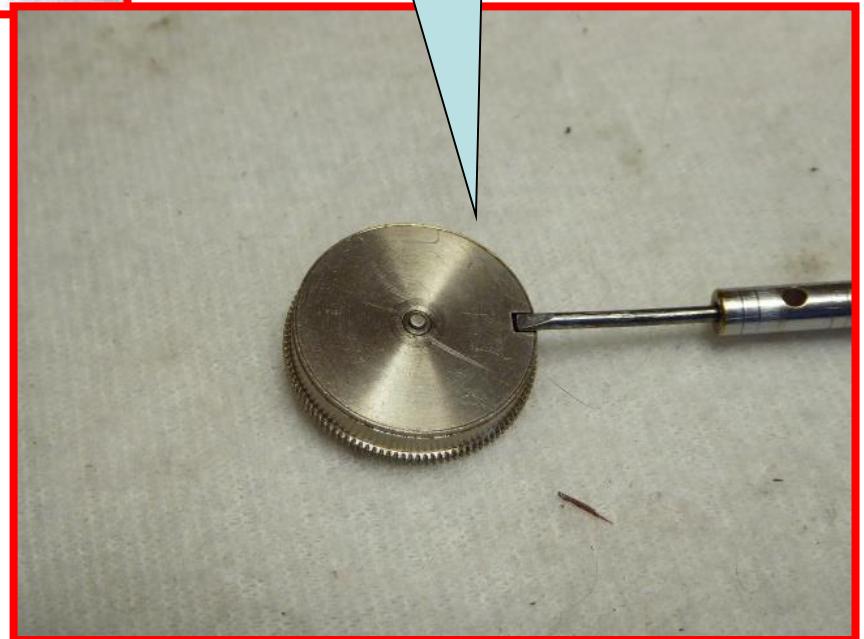
17. Lift the barrel up and out of the movement plates.

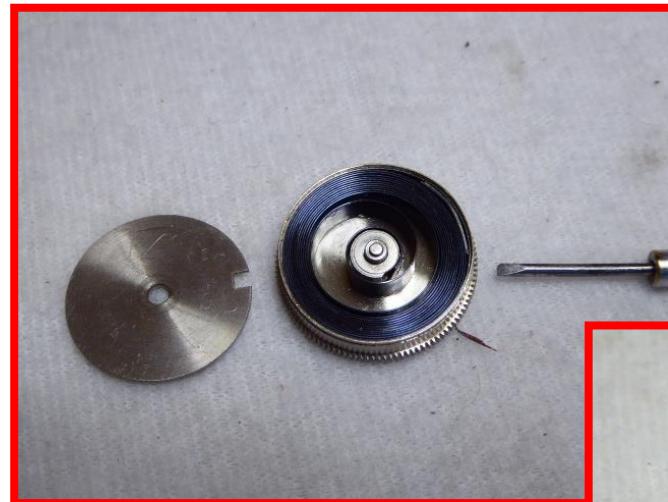




18. With a small screwdriver pry off the barrel cap .

The barrel has been removed ready to be opened to access the spring.

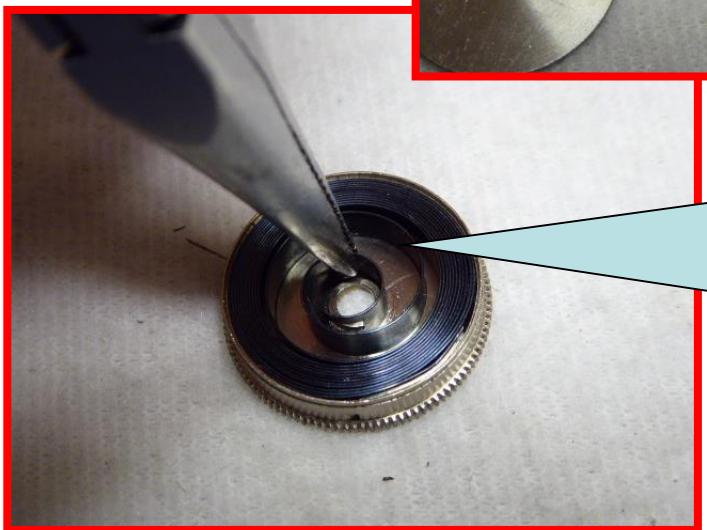




The mainspring and arbor
can now be seen.

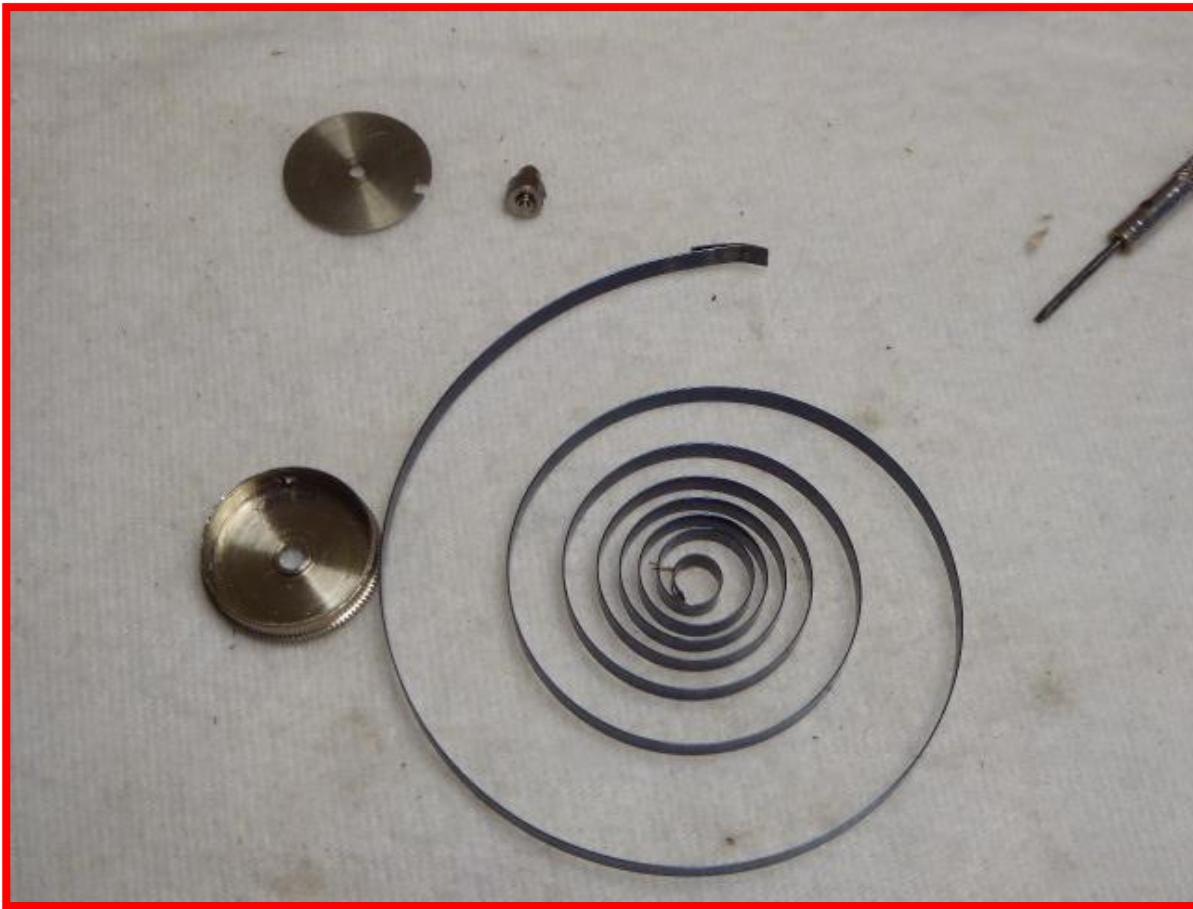


19. Remove the
barrel arbor.



20. Grip the centre of the
mainspring, hold the barrel in the
other hand and pull the spring,
gently and gradually, out of the
barrel.

Take care things can easily get out
of control here.



The barrel and mainspring are now able to be inspected and serviced.



Note: the hook end of the spring locks behind a small hook on the barrel wall.

The clock movement is an *Arogno Cal.26N*.

The mainspring specification is:

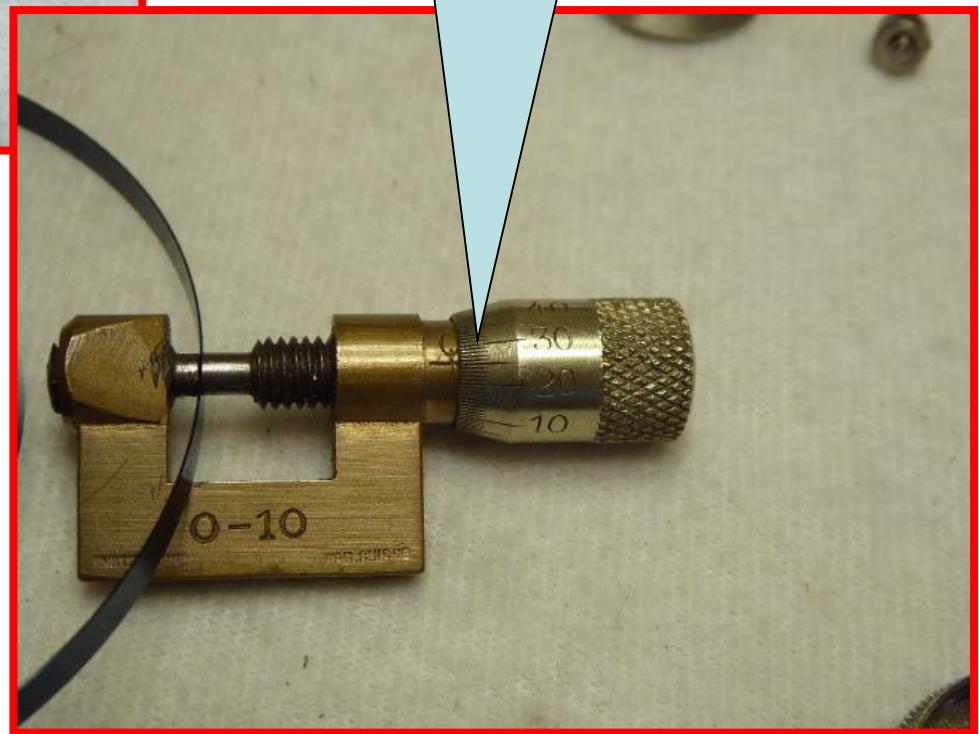
4.05mm wide X 0.26mm gauge X 670mm long.

A replacement mainspring is available from Cousins UK.
Part No. 210770.

This spring is a 1000mm long and requires shortening to the specification length of 670mm.



Spring gauge is 0.26mm



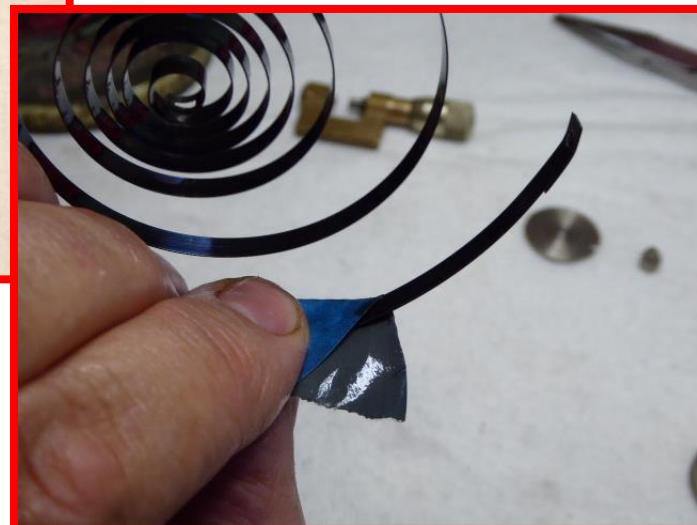
Spring width is 4.05mm

The options now are to fit a new mainspring OR clean and service the existing spring.

If a new spring is to be fitted jump ahead to **23.**

If the existing spring is to be used continue here.

21. Using 2000 grit
Wet&Dry paper with
mineral turpentine solvent
rub along both side of the
mainspring to remove dirt
and old oil, etc.



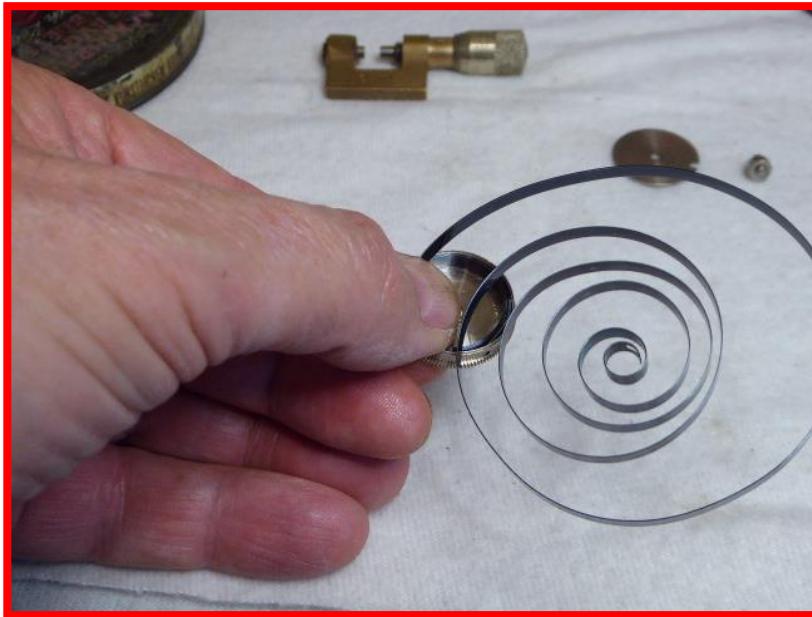


22. Wipe clean and dry off the spring with a soft cloth.



23. Using a quality oil put a smear coat over the entire spring surfaces.





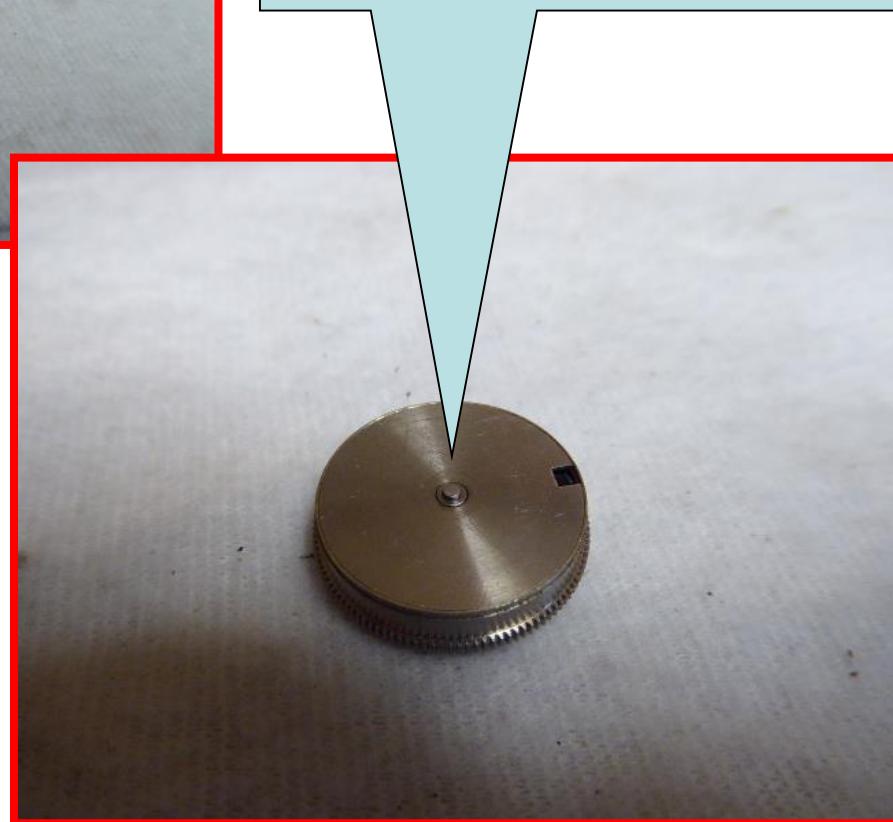
24. Engage the spring hook end into the barrel hook and proceed to wind the spring, clockwise, into the barrel.





25. With the spring in the barrel, refit the arbor and close up with the barrel cap.

Put a little oil on the arbor pivots.

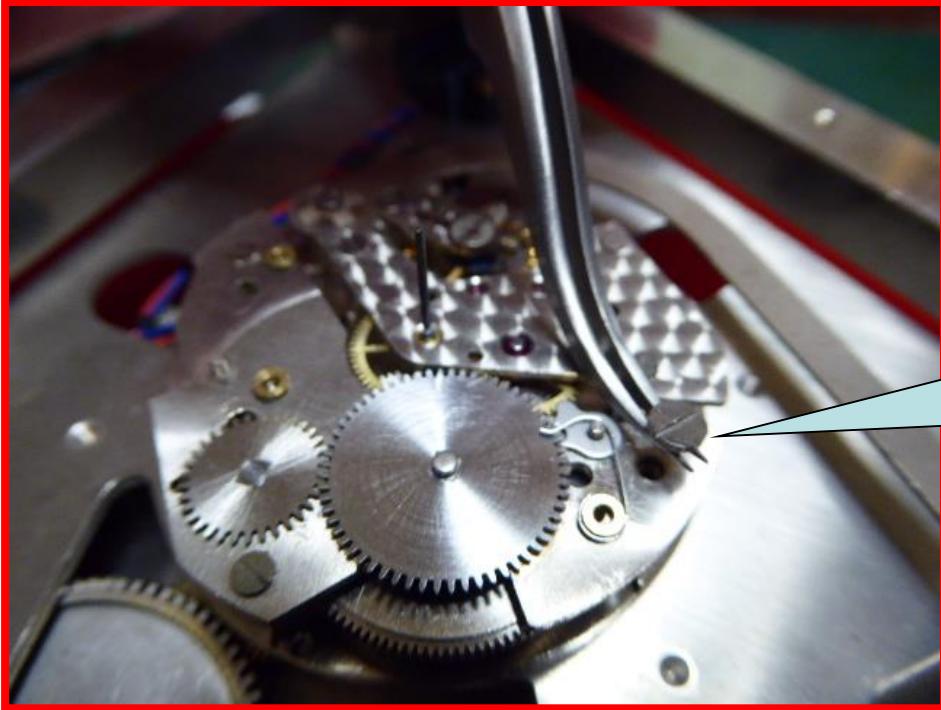


This completes the mainspring servicing or replacement.

Re-assembly is simply the reverse of disassembly

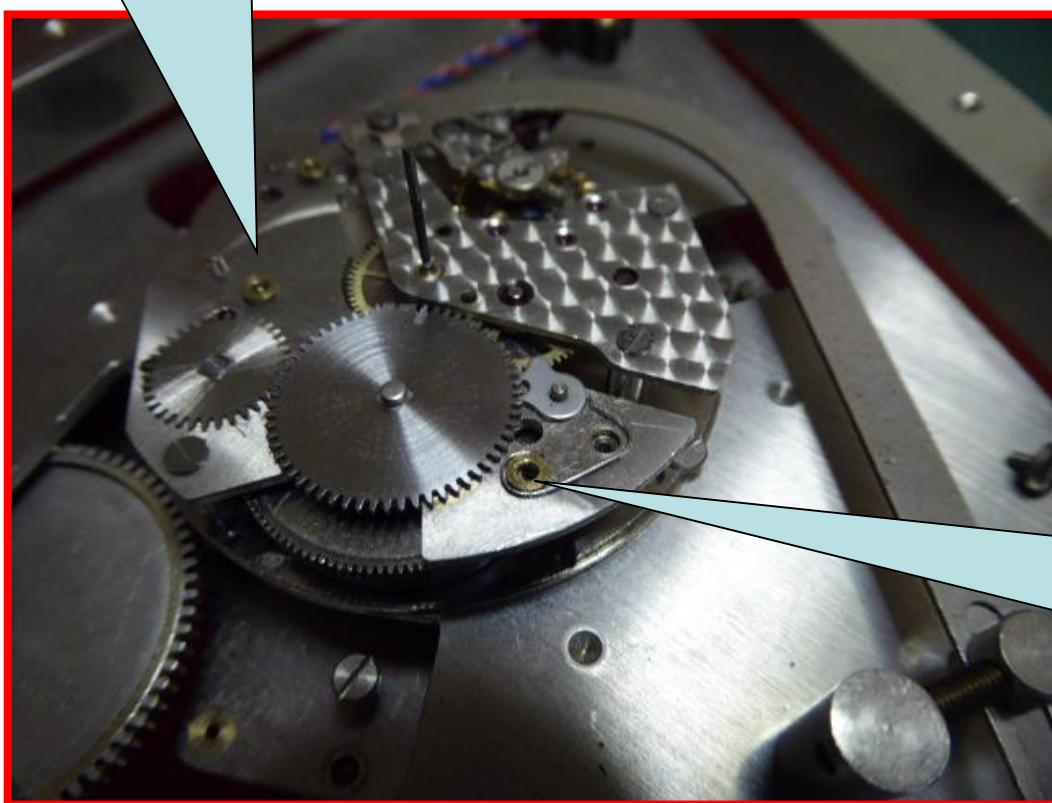
HOWEVER

During re-assembly there are several synchronizing
steps required.

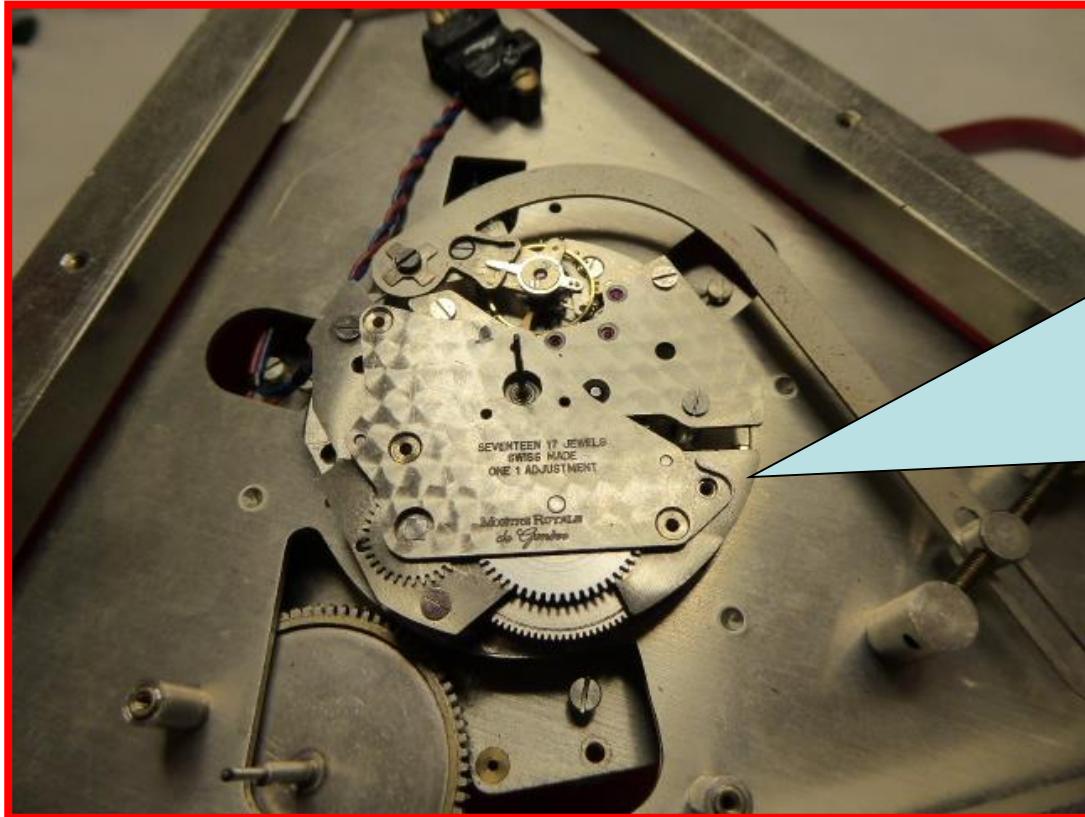


26. When replacing the barrel and winding wheels remove the click spring retaining screw.

27. Replace the spacer washers ready for the back plate.



28. Sit the click spring and its spacer washer in place for the plate screw.



29. With the back plate is in position Replace the three hold down screws.

Then push the click spring in under the plate onto the back of the click.

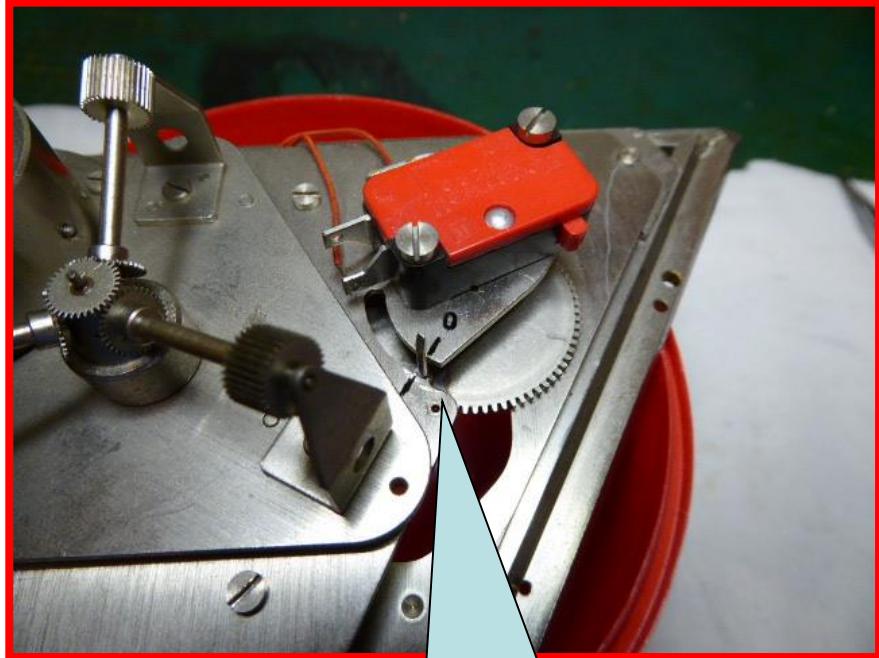
Then replace the click spring retaining screw.
(See 26.)

At this point in reassembly the relationship between the mainspring and the spring wind indicator has to be set up.

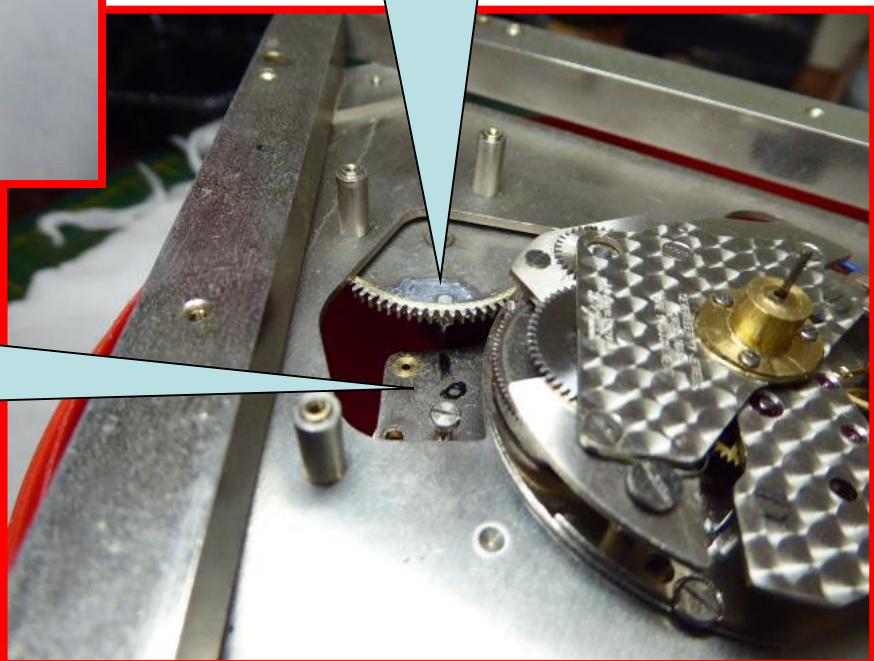
Having just installed the barrel it is in a completely unwound condition, so the indicator must be set up to show “0” and the micro-switch activating pin 7 days away from stopping the electric winding motor.



The problem here is that the indicator disc will not be fitted until the entire pyramid is assembled. To overcome this I determined the position of the pin such that it had 7 days to reach the micro-switch.

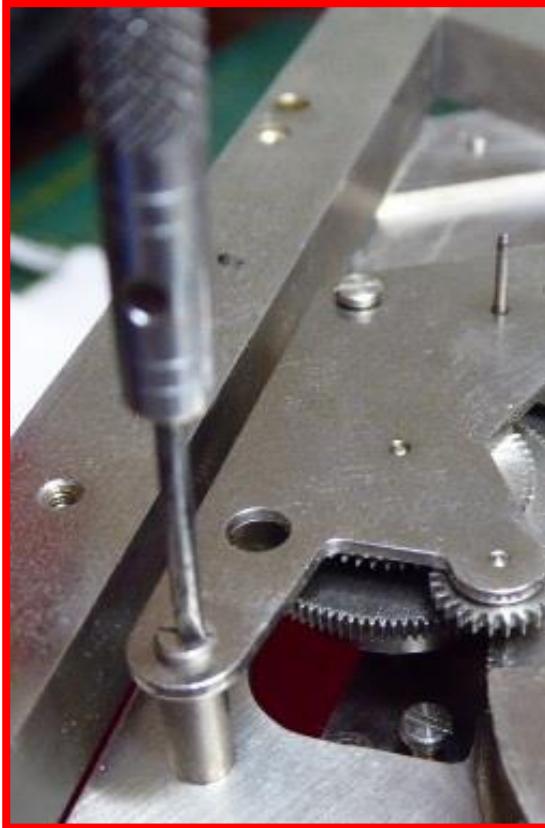


30. Set the pin wheel such that the pin is at the position shown.



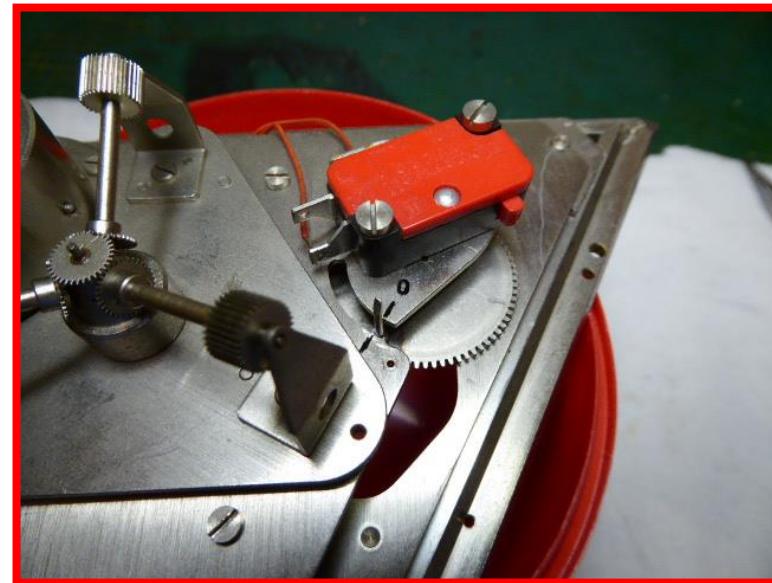
31. Drop the differential gear cluster back into its position ensuring that the wheel with the pin attached remains at the “0” position.





32. Refit the indicator mechanism plate.

Check on the other side of the base to see that the pin still lines up with the “0”mark



33. Continue to rebuild the entire clock in reverse of disassembly from here. Remembering that when re-fitting the wind indicator to orient it to “0” on the scale.

If the solar cells are producing adequate power and the electrical circuitry is fully functional then the “mainspring winding electric motor” should start to wind the mainspring as soon as the required amount of light plays on the solar cells.

The motor and the gear train, all rotating, can be heard with an ear to a dial.

The clock shown in this presentation “self-started” ticking when the mainspring power indicator showed $\frac{1}{2}$ a day.

Winding continues in adequate light, until the spring is fully wound and the pin actuates the micros-switch to stop the motor, and prevent over-winding.