Eureka Clock Serial 7169

Restoration of Eureka Clock Serial Number 7169

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Photos by kind permission of the owner

This tall Eureka clock has a three ball bearings and a second hand. The dial is in good condition with just a feint hairline crack which is not really noticeable. The door and glass has been retained by the owner.

These tall three ball movements with a seconds hand are more sought after than the same movement with two balls and no seconds hand. So they can command a premium price.

Overall it looks like a nice complete Eureka.

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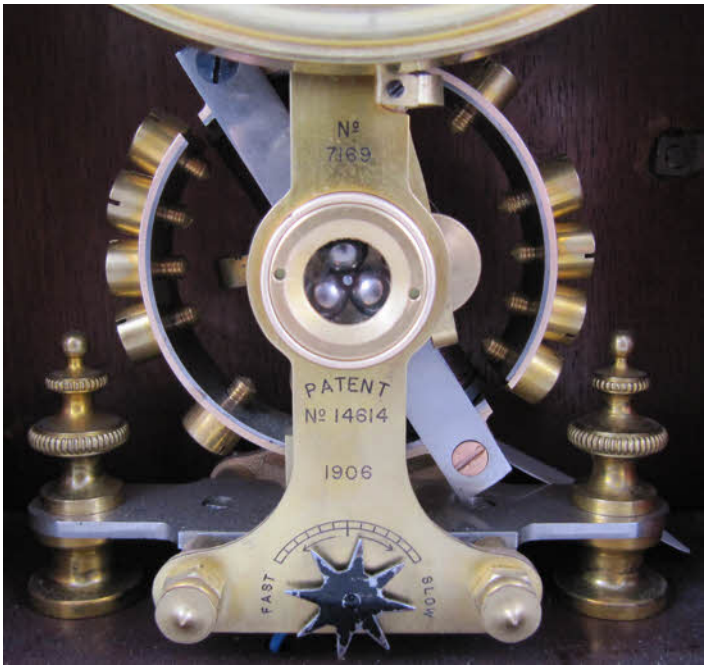
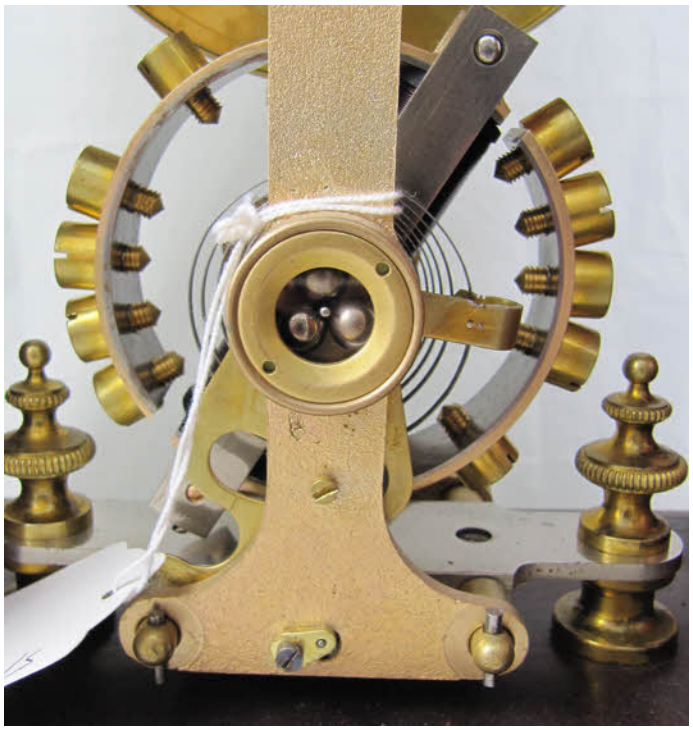
The clean dial with seconds hand.



The three ball bearing movement. Note the star wheel is a little distressed and has been painted black after the original blueing has worn off. I should be able to re-blue the surface.

The rear of the dial shows some bad marks and some padding where the screws are not holding the enamelled dial tight the dial pan. I'll investigate and remedy this.



The rear of the movement.

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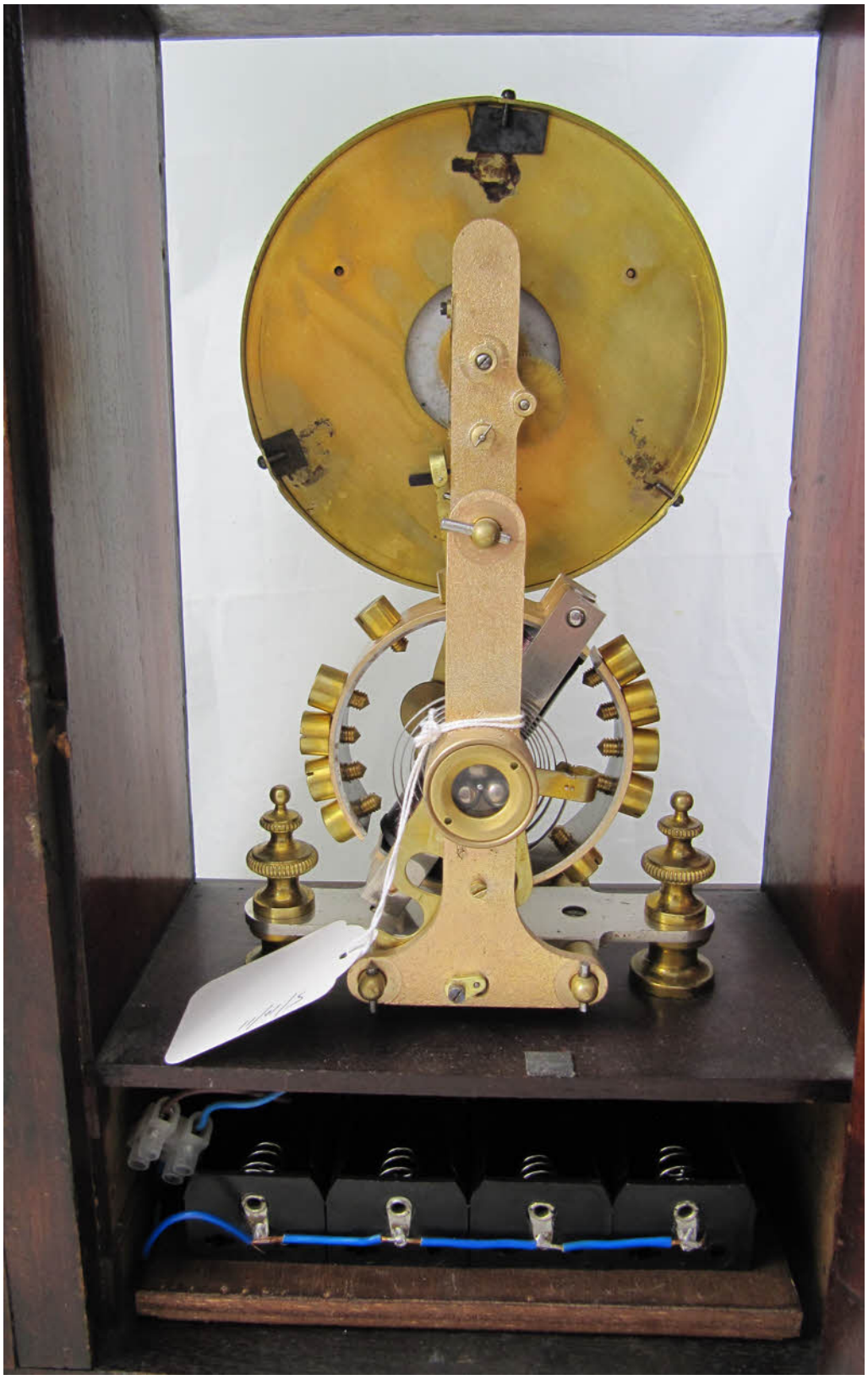

The rear of the clock showing the separate battery compartment which now holds a set of four "D" cell battery holders. These have been wired correctly in parallel to give 1.5 volts.

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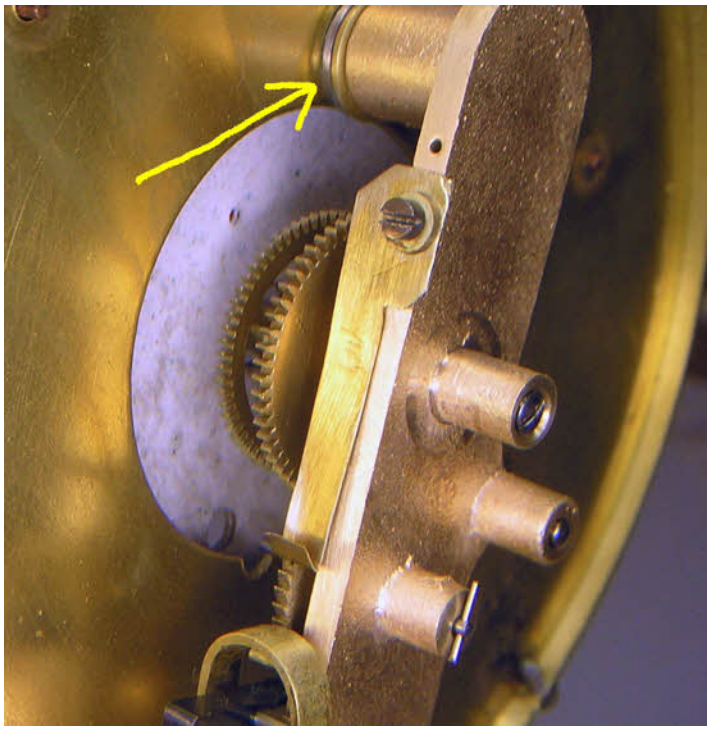
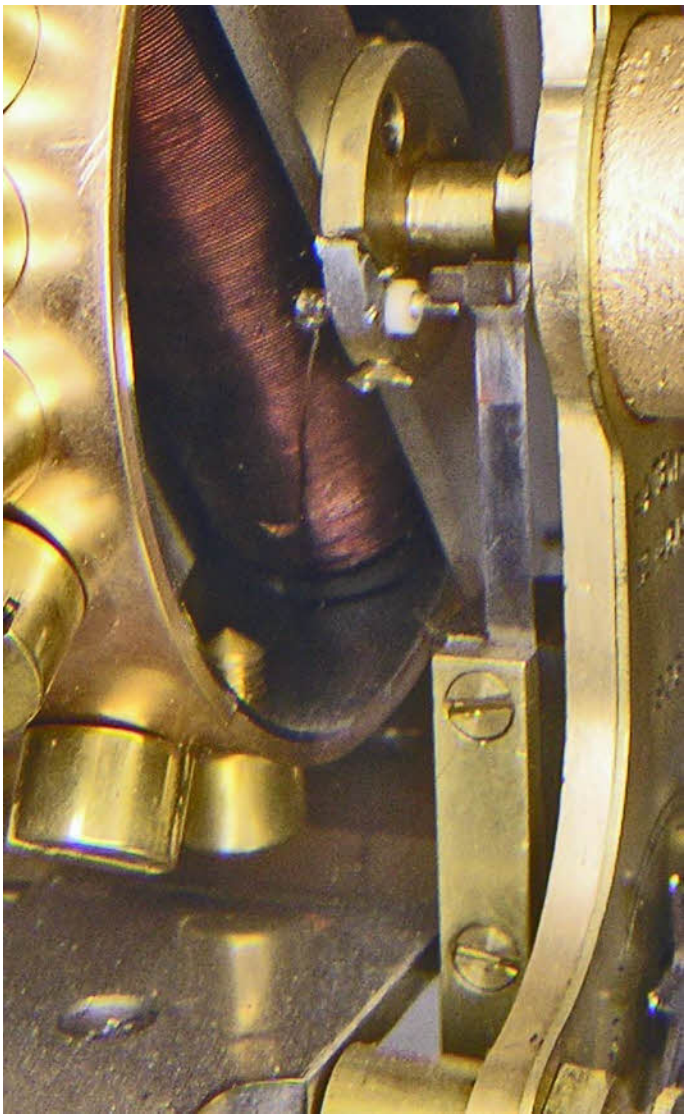


This photo shows the click spring for the count wheel. It is a replacement crudely made from brass. It performs it's function OK but I will make another to suite. Note the screw holding the large wheel of the motion work. This is the only wheel that has a screw retainer the rest are held in place by small clock pins as is normal on these clocks. Also notice the two large washers (arrowed) between the frame and the dial pan. This suggest a problem with the screws.



The rear of the balance wheel shows the pivot housing which also holds the contact pin. It is damaged and will need replacing. The contact flag is also worn down and will need replacing.

These photos on the left shows the state of the dial rim. These are made from solid brass rather than thin spun brass. It looks to have been hammered around the screw holes. I will try and smooth these out as best I can and fit blued screws.

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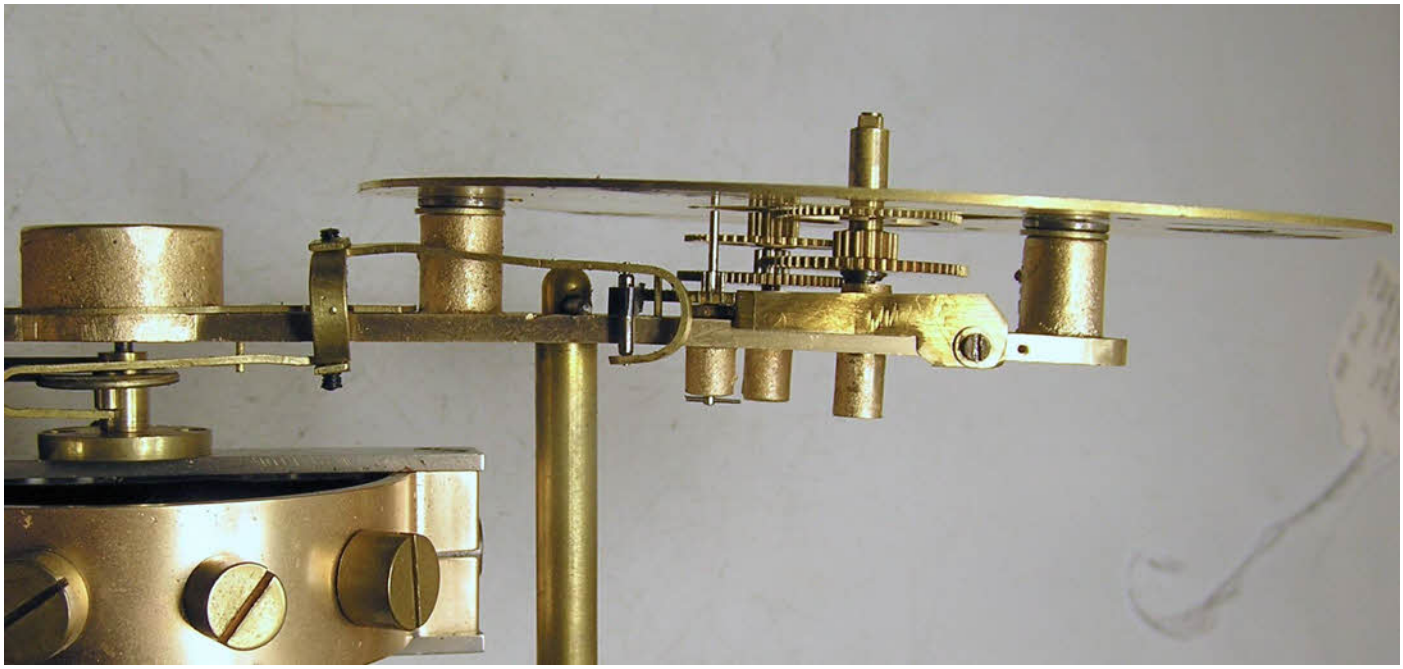

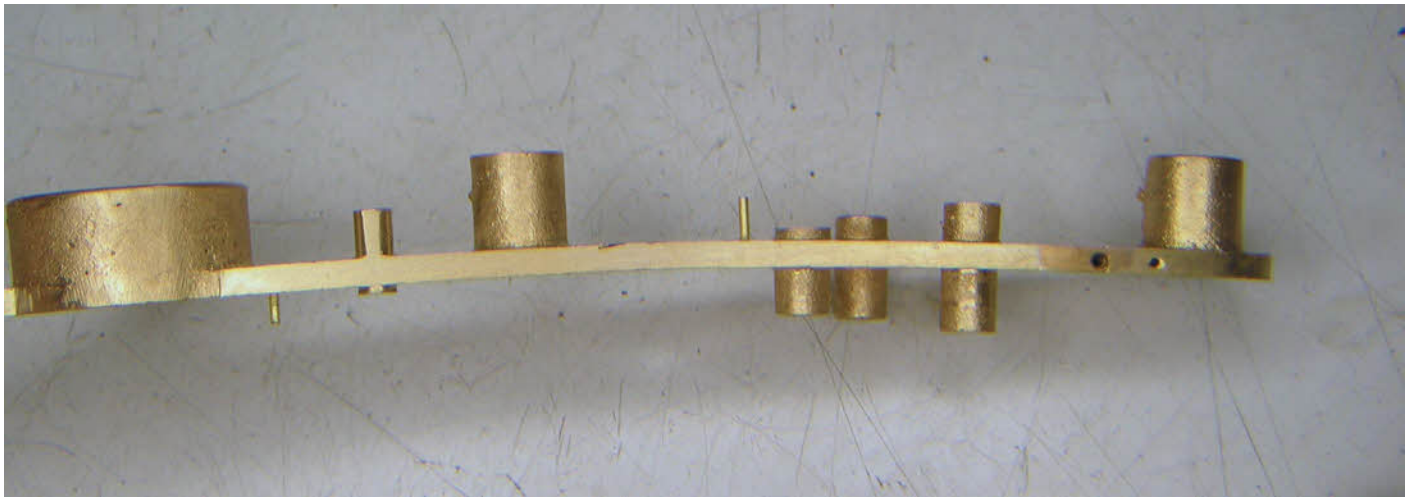

These two photos show a nice bend in the main plate which was not noticeable with the movement in place inside the case. I should be able to straighten this out OK but it begs the question " ...did the clock receive a big knock or was it dropped..."? I am not so much worried about the bend, as I am about any damaged parts resulting from the knock.

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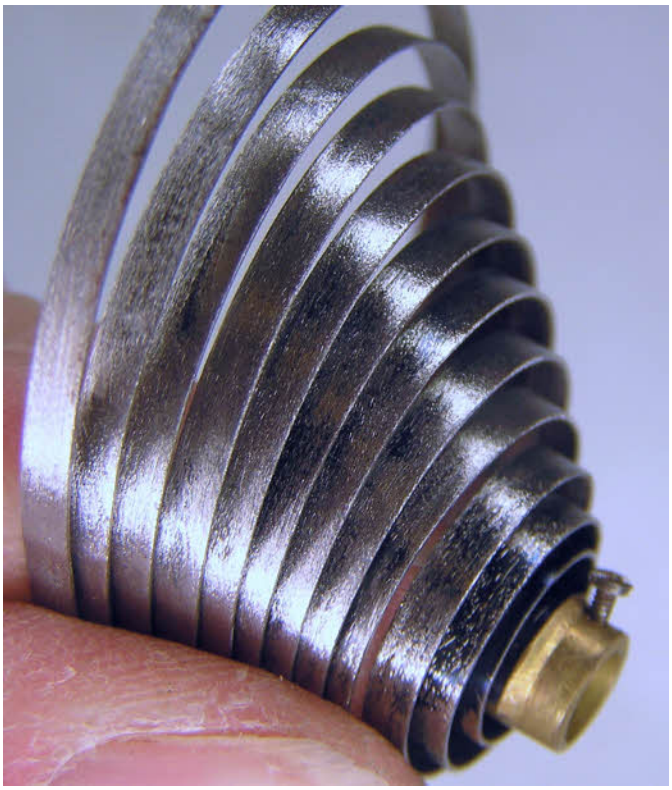
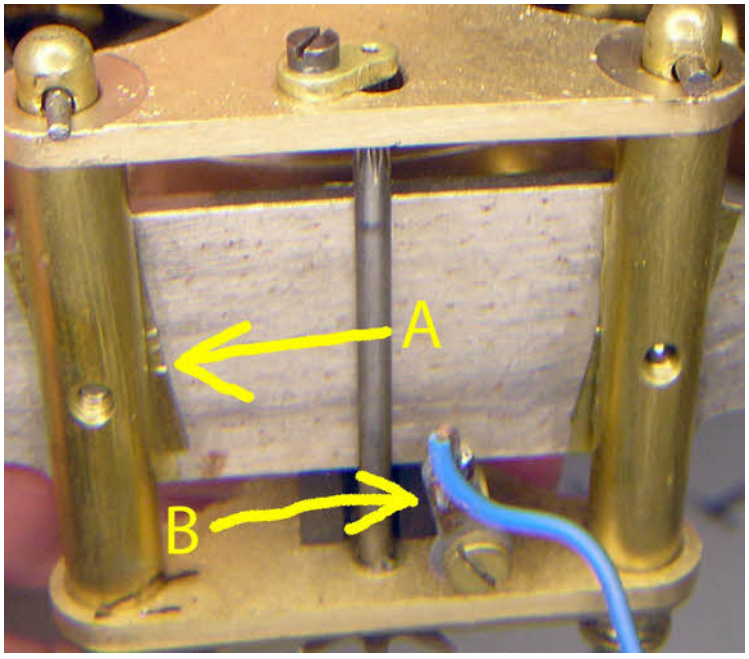


These two photos above show the condition of the balance spring. This one looks complete but it must have been very rusty at some point because it has been cleaned rather badly with a coarse abrasive. In fact as it later transpires, the spring has been severely weakened and I had terrible trouble trying to get it to beat at the correct rate for the 40 tooth count wheel. This will explained later on.



This last photo shows the packing shim A) between the pillars and the base plate. These are normal and are found on all clocks. They are used to raise the base plate to get it as near as possible to the solenoid on the balance wheel. The closer the batter as the magnetic flux generated by the coil drops off quickly even over short distances. But it can't be too close because there is a small gap needed to allow for the solenoid to drop a very small amount (a matter of thousands of an inch) due to the pull of the solenoid as it approaches the base plate. It's no good just spinning the balance wheel with no power applied to check the gap. I have seen this happen too often. The clock is rebuilt with adequate clearance but as soon as power is applied the solenoid pulls hard and the wheel fouls on the base plate. B) shows a wrongly fitted connector to the positive terminal.

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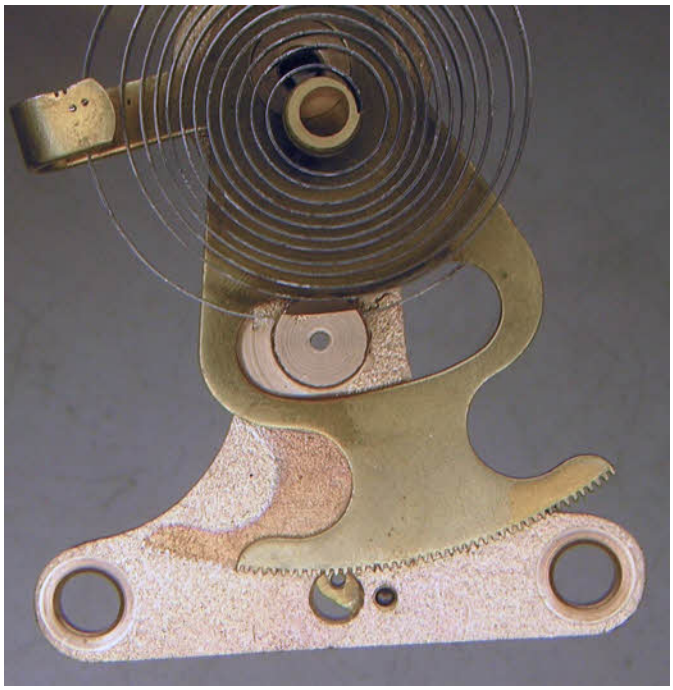
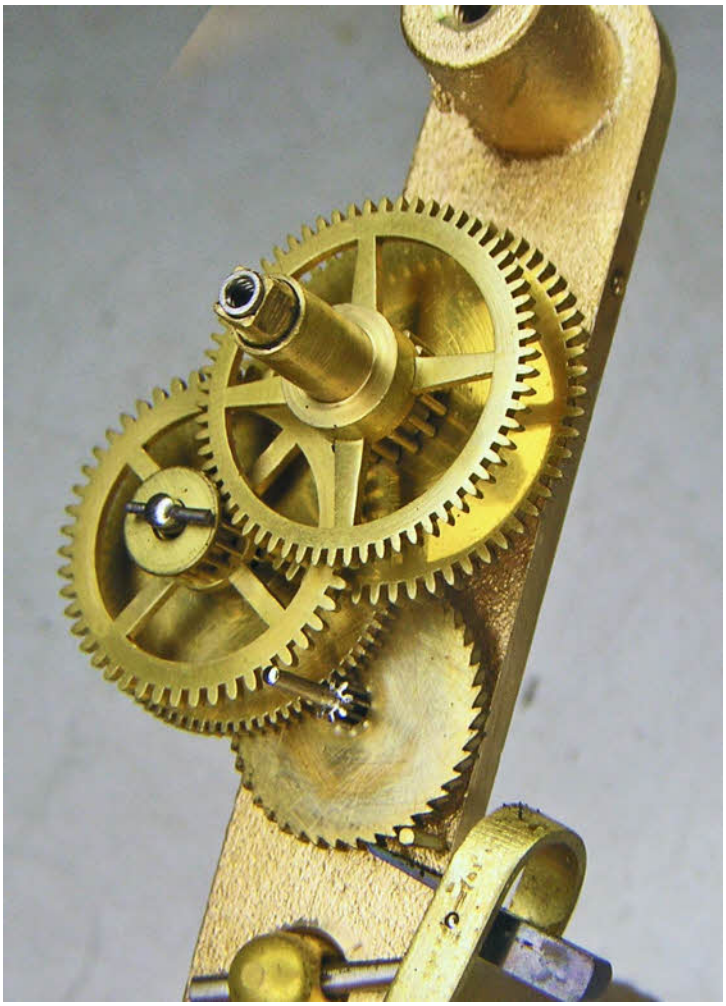


The timing quadrant looks as though it has not been moved for a long time!



The photo on the right shows the motion work and driving pawl. The count wheel is a 40 tooth one which means the balance wheel and spring should beat 40 times per minute or 2400 beats per hour (2400 divided by 60 minutes is 40 beats). This clock though has a severely weakened balance spring due to the rough cleaning. It looks as though rough emery paper had been used resulting in a thinning of the spring. This meant that even though I adjusted the spring such that is was extremely short with coils touching one another at each swing, I could not get it to beat any faster than 2320 beats per hour (bph). This meant that even in that position it would be at least 80 beats per hour too slow for the 40 tooth count wheel resulting in the clock being slow by 50 minutes per day. Not an acceptable rate. So, short of buying a new spring, which would cost £130, I decided to cut a new count wheel to reflect an easily obtainable rate with this spring in its normal position. After leaving the clock to run for a while with the spring in a relaxed and normal position, I checked the rate which turned out at about 2200 bph. If I now take 2200 and divide that by 60 I get 36.6666 which is close to 37. If I now recalculate by multiplying 37 by 60 I get 2220 which is well within the normal adjustment for the spring. So I cut a new 37 tooth wheel and fitted it to the clock. After much testing the clock now runs to within five minutes a week. The spring though, is a bit variable in its strength even over small distances, so it will never be classed as a "regulator". But with care and attention paid to the star wheel adjustment over time by the owner I reckon the rate could get even better.

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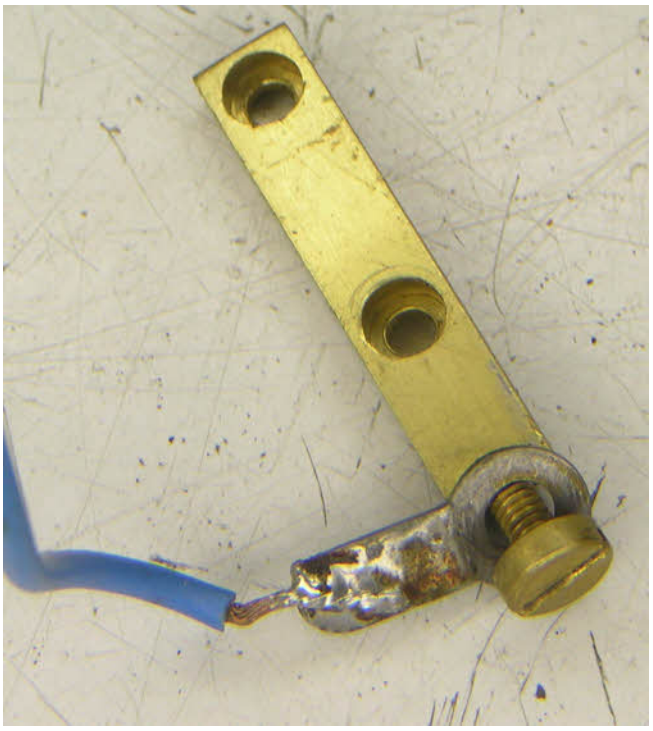
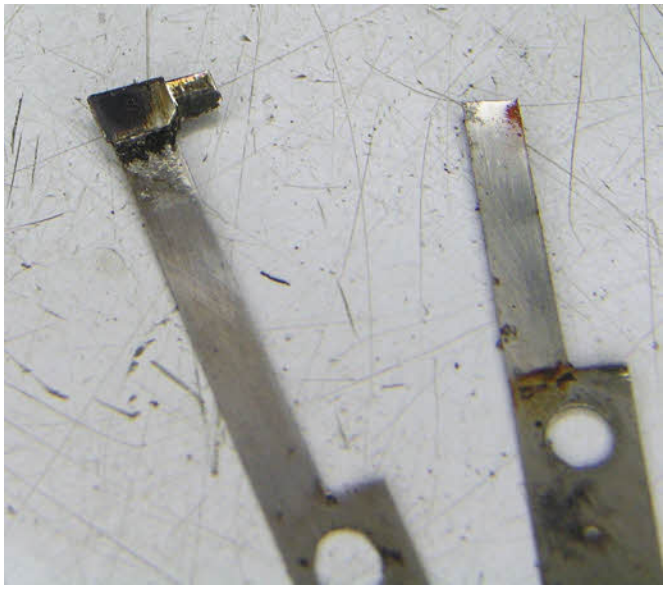
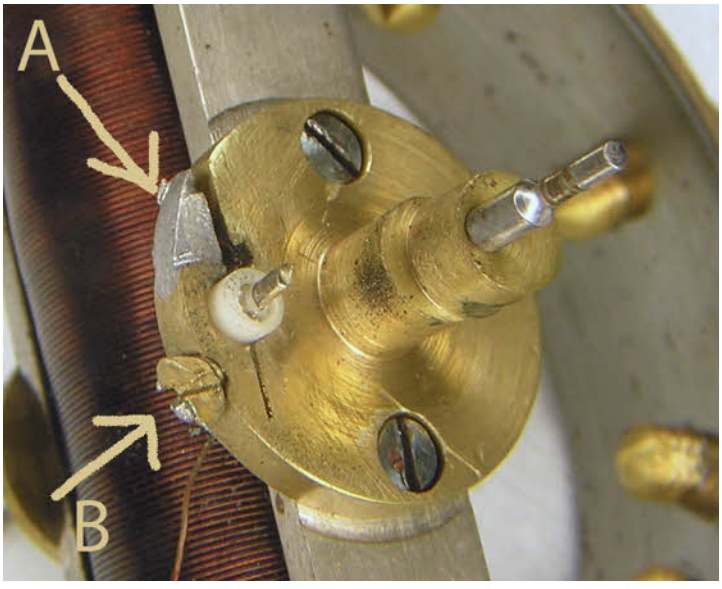


The wire should be soldered in and not have a screwed terminal. I will correct this.

The screws that secure the base plate to the pillars are wrong. They should be shouldered cheese heads. I will turn some up on the lathe.



The badly worn contact flag spring.



Some detail of the pivot assembly. A) shows the damaged and solder repair. While B) shows the re-positioned screw which is not in the best condition. All will have to be made.

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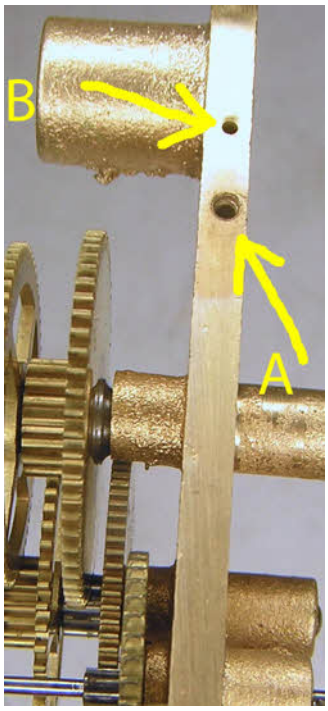
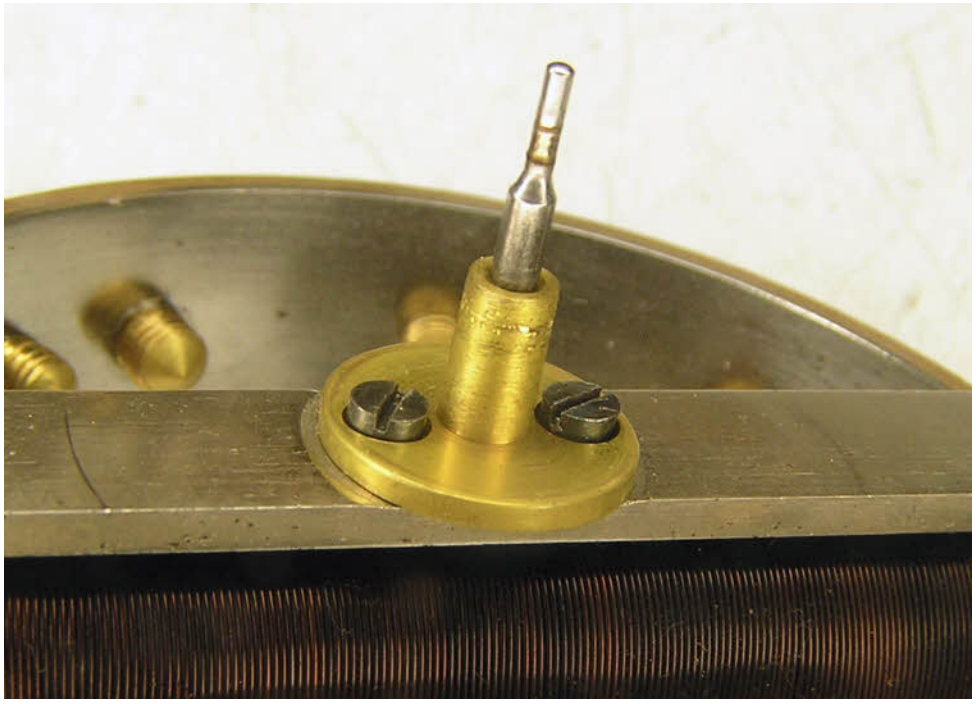


A) is the threaded hole for the count wheel click spring. B) should have a pin which accurately positions the spring and stops it from twisting in use.



The other pivot assembly has the wrong screws as can be seen from the amount they protrude from seating. They are in fact from the damaged pivot assembly on the other side of the balance wheel. So new ones will need to be made for this side.

Unfortunately all the balance screws had damaged threads in the balance rim. I re-cut the threads as best I could before re-fitting the screws. Other than that the only thing to be done is to replace both the rims and the screws.

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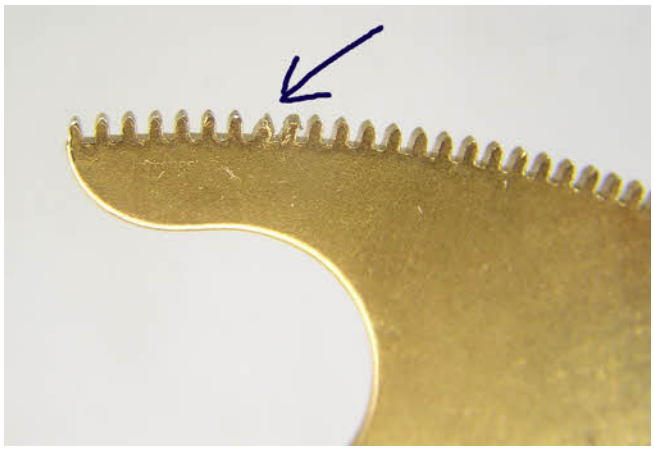
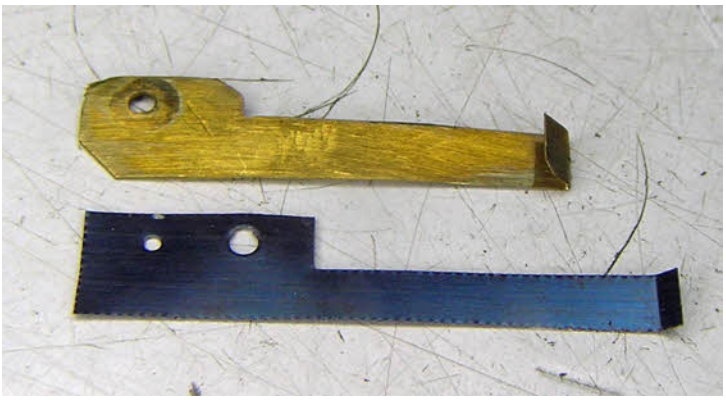
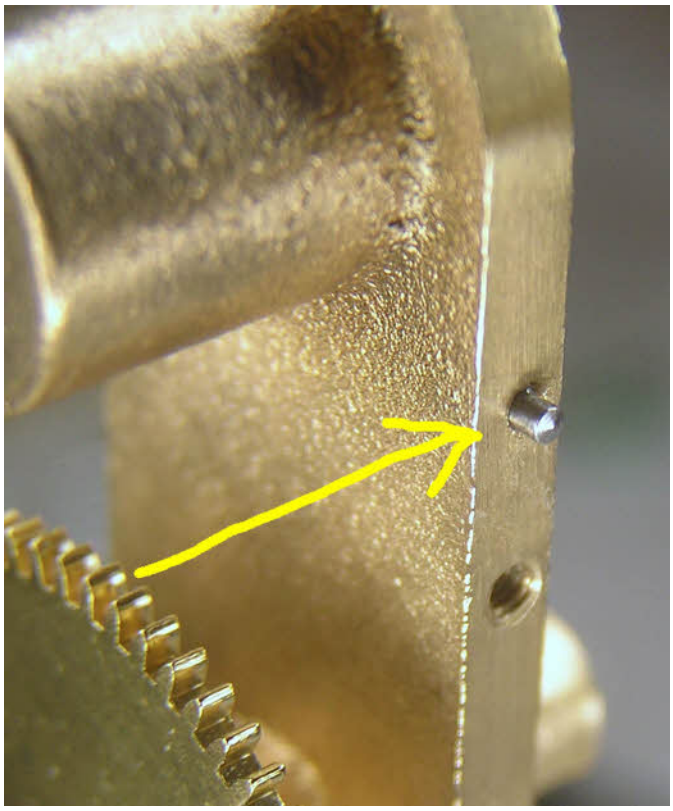


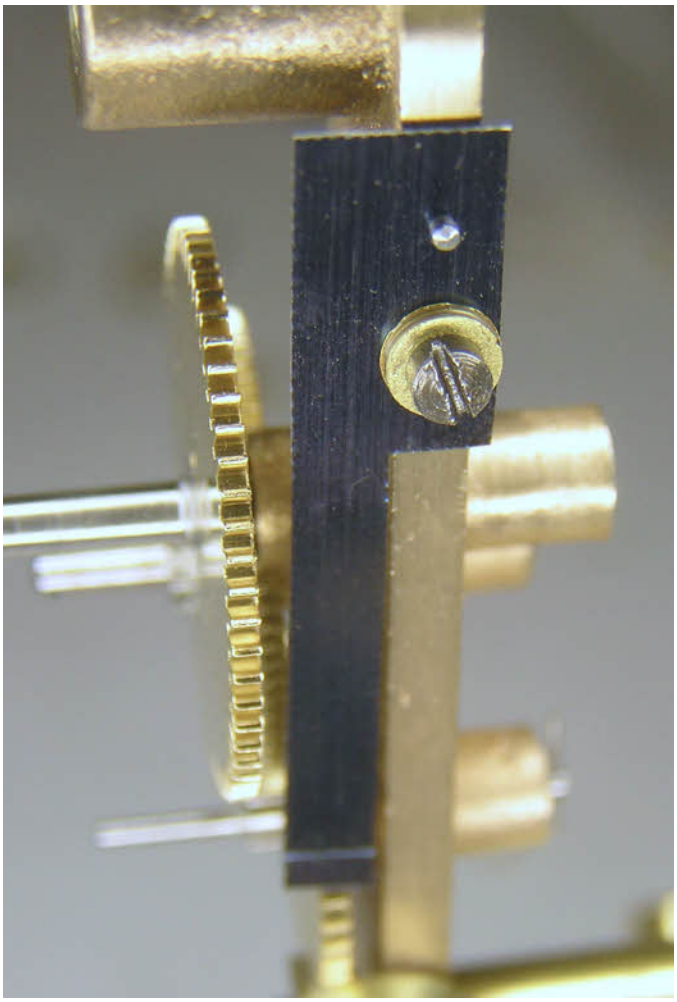
Even the quadrant has not escaped damage. Note the bent teeth (arrowed). I will straighten these relatively easily with a little care.



The new click spring shown alongside the old one. Note the extra hole for the locating pin.



A new locating pin fitted ready for the click spring which is shown in place in a trial assembly.



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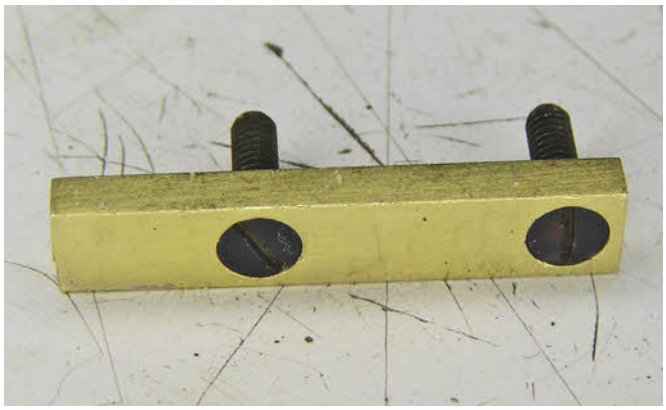
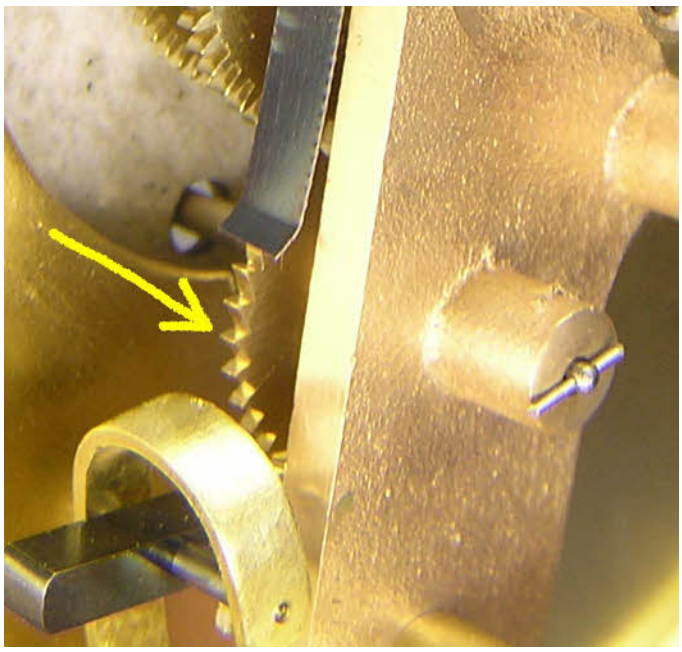


New screws for the positive terminal block.

Here we have the new pivot assembly which was turned up on the lathe. It has an offset cam which needed a little extra concentration when machining. The first one I made finished up with the cam on the opposite side near the contact pin. What a waste of time purely through not paying attention to the machining operation at hand. The pivot itself is re-used from the original. The screws are the ones from the other pivot assembly.



The new 37 tooth count wheel in place showing the click spring engaged.

The hour hand had a silver solder repair which is hardly noticeable from the front so it was left as is.

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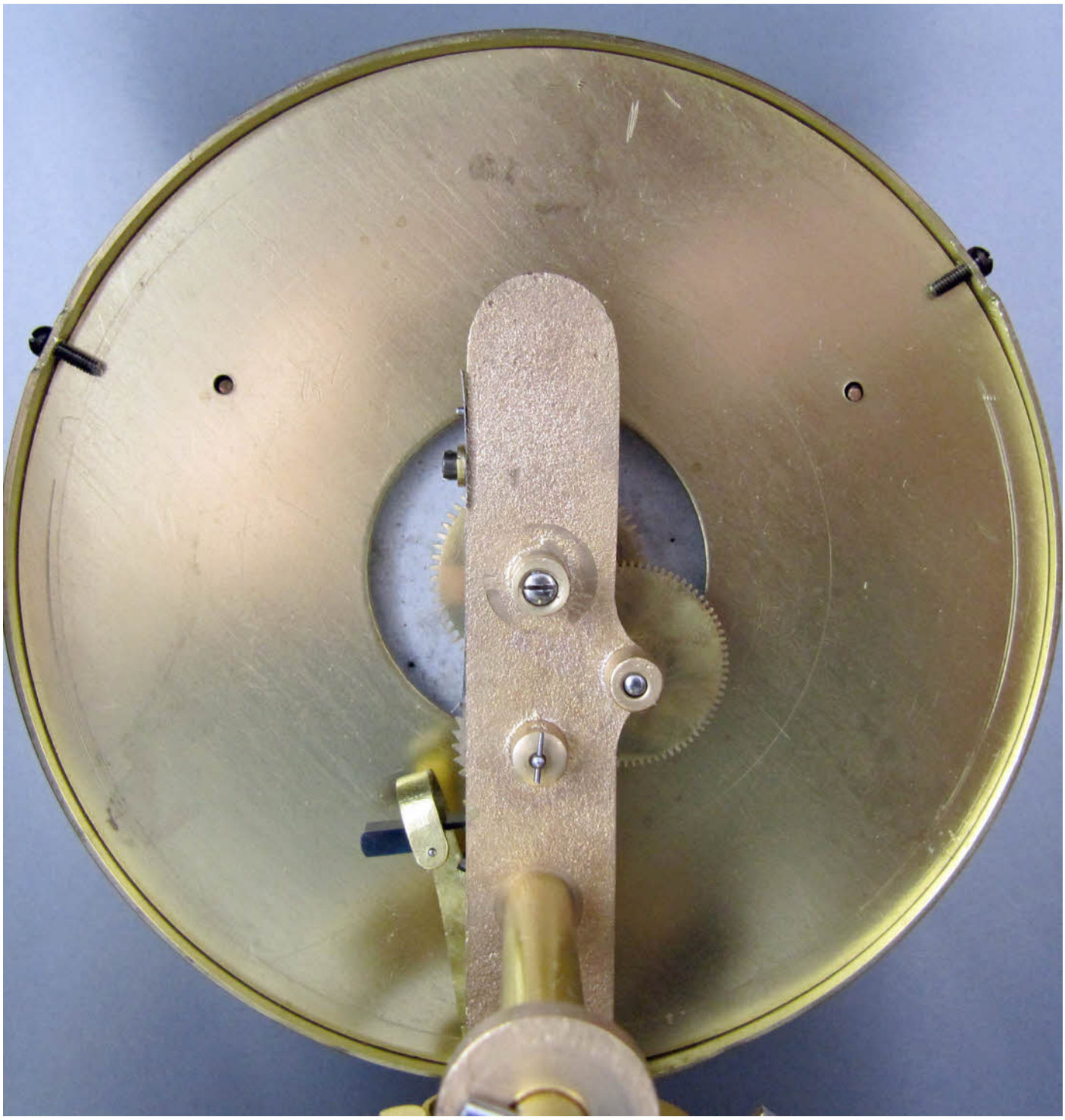

The rear of the dial showing the new screws and cleaned dial pan. I had to space the enamelled dial correctly with packing between it and the dial pan. This was adjusted such that the screws held the dial and pan securely in the bezel surround without putting too much pressure on the enamelled dial and cracking it.

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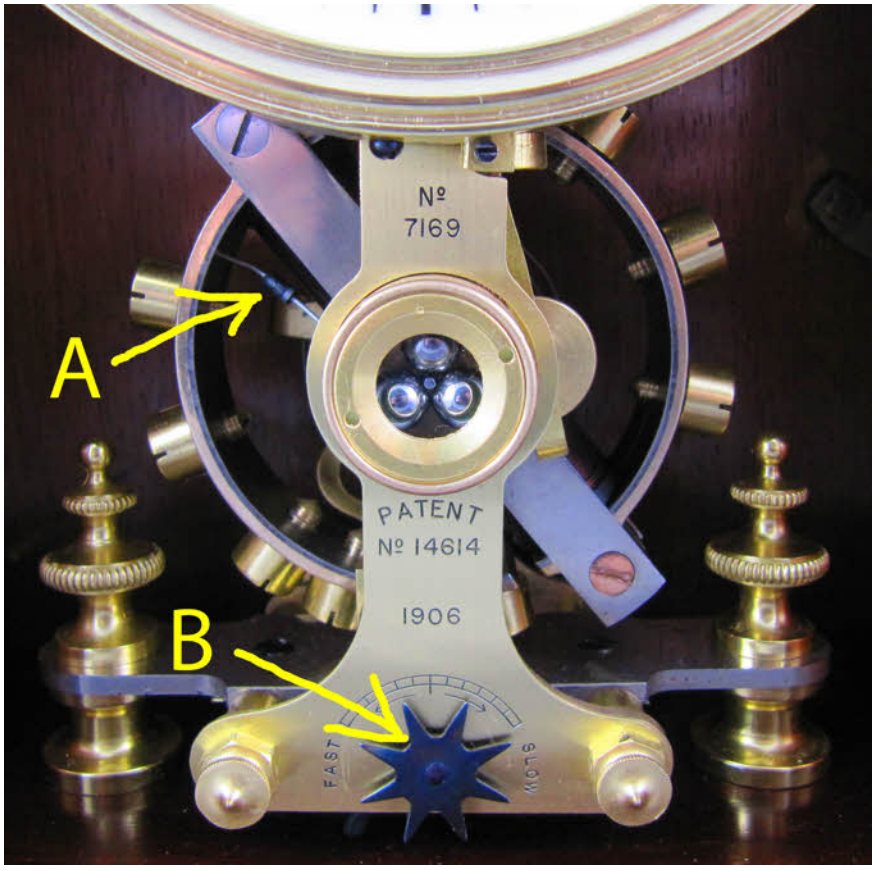
The battery compartment fitted with my Horologix flag cell battery. This battery holder takes four "C" cell batteries and regulates the supply to the clock at the desired voltage of 1.6 volts. It certainly looks the part!



A view of the movement back in the case. A) shows a diode I have fitted which stops the back EMF which causes a lot of the damage and corrosion to the contact pin and fork.
B) shows the cleaned and blued star wheel.

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Rear view of the completed clock. The case only need a good wax polish.

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The completed clock