Eureka Clock Serial Number 404.

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Restoration photos by kind permission of the owner.

The short movement in this clock, s/n 404, is completely hidden by the case and dial. The case is of mahogany with inlay to the front. It is in very good condition and will only need a light polish with a good Beeswax. There seem to be no major marks or damage.

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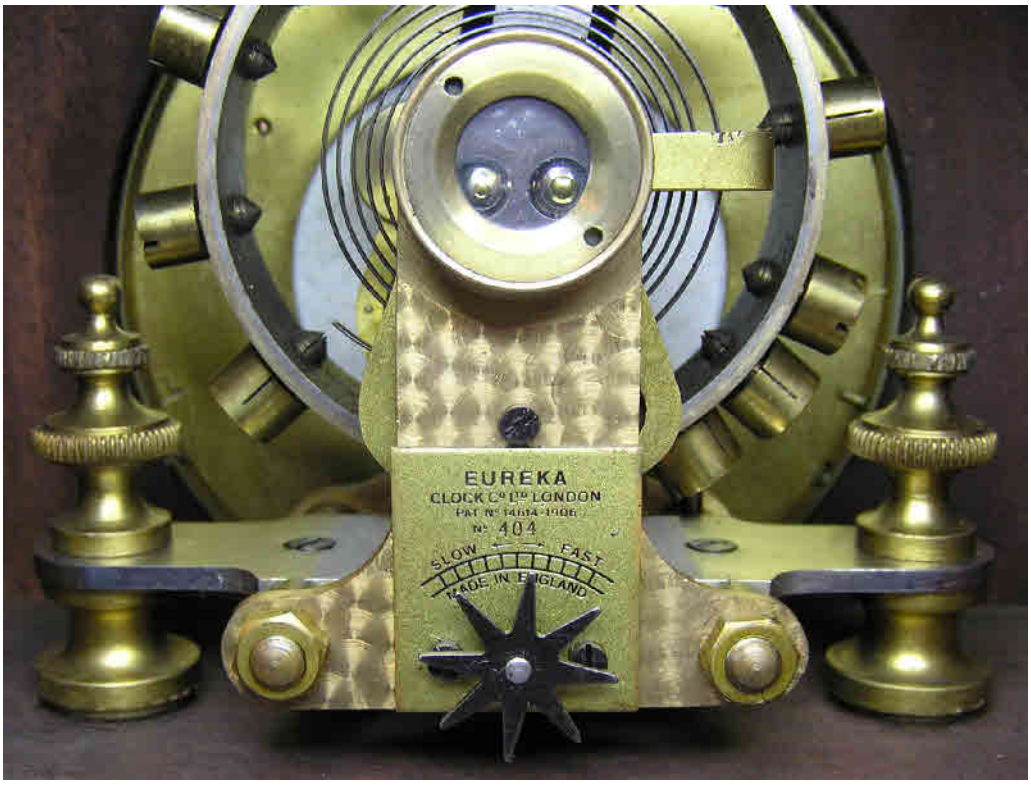
The rear of the case has a full length door with a brass catch.
The movement sits on a seat board above a compartment that used to hold a full size 1.5volt Flag cell battery. Most clocks now are fitted with a small modern "D" cell battery in its place. This clock has been modified with some sort of 1950's connector. It may have been run on a 3 or 4.5 volt battery. Suffice to say the clock does not run once connected to a 1.5volt cell. It may just need a good clean or there may it be something more fundamental. The balance spring looks to be in good condition with the right number of turns.

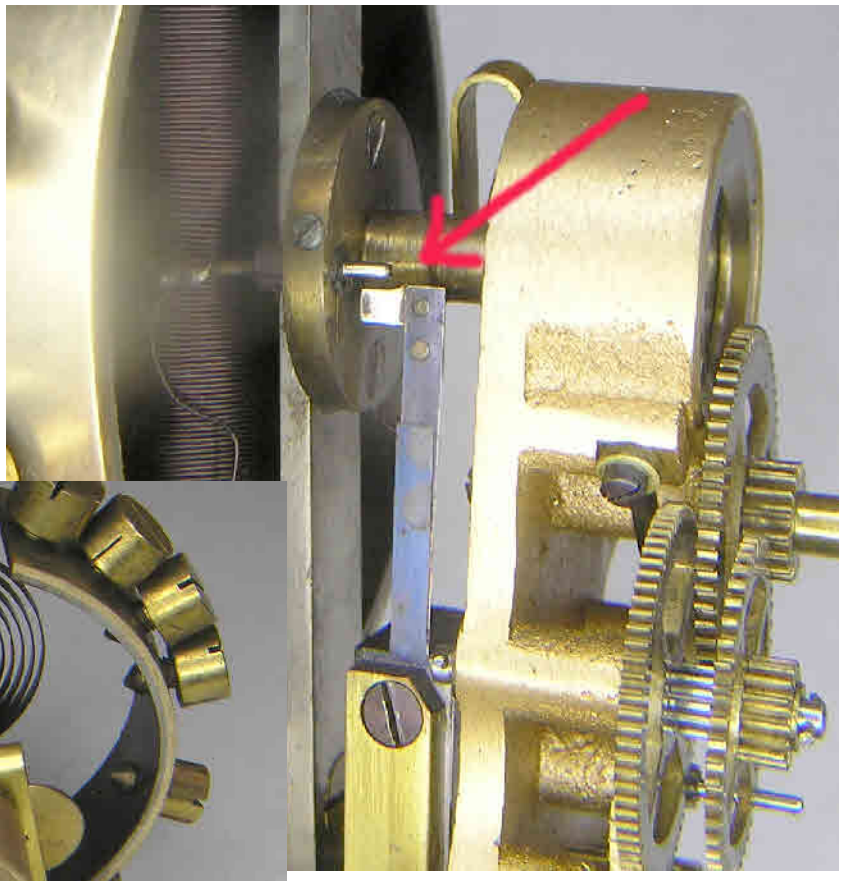
Eureka Clock Serial Number 404.

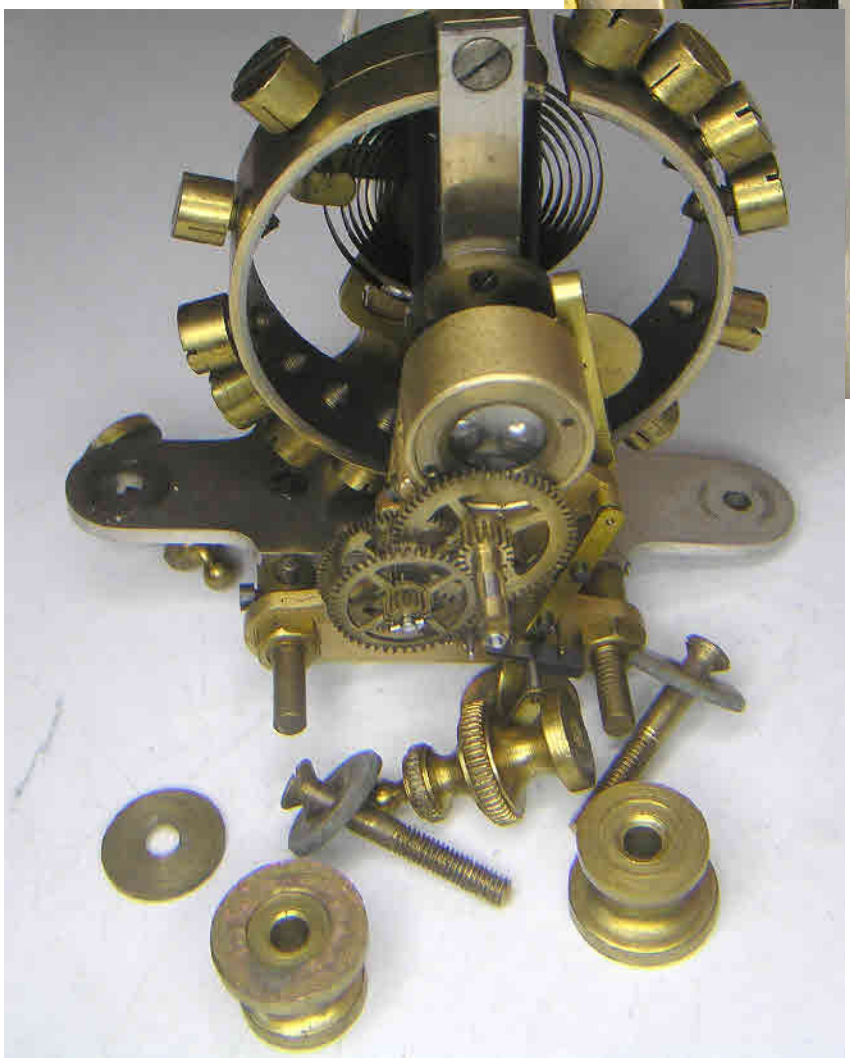


The top photo shows it to be a two ball movement with a rear star wheel for adjustment of the timing. The bottom photo shows the extra washers under the pillars. These have been inserted to raise the movement to the right height for the hand pipes to pass through the centre of the dial. The dial itself is held in the brass surround by three screws while the surround itself is secured to the wood case by small wood screws.
The small hole in the seatboard is to allow the wires to pass from the movement to the battery in the compartment below.

Eureka Clock Serial Number 404.

The photo right shows the wear on the silver contact flag. Although it only looks slight it does in fact have a significant effect on the running of the clock especially as this clocks does not have a slotted contact spring. This means that the flag is in a fixed position and cannot be moved up or down to compensate for wear. The wear on this flag means that the contact pin will disengage from the flag before the armature in the balance wheel has fully





descended. Consequently less pull will be generated on the base plate by the armature because the power is being cut further back in the swing. The more wear then the less magnetic pull and the less amplitude of swing.

So the flag springs will have to be replaced.

The photo at left shows the movement removed from the case with the the support pillars and washers.

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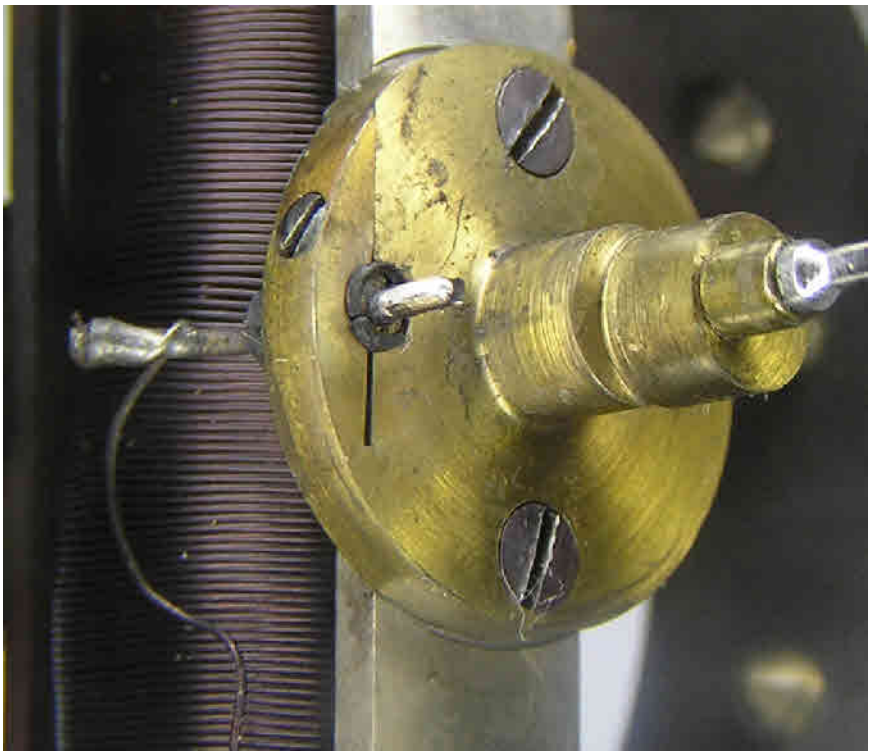
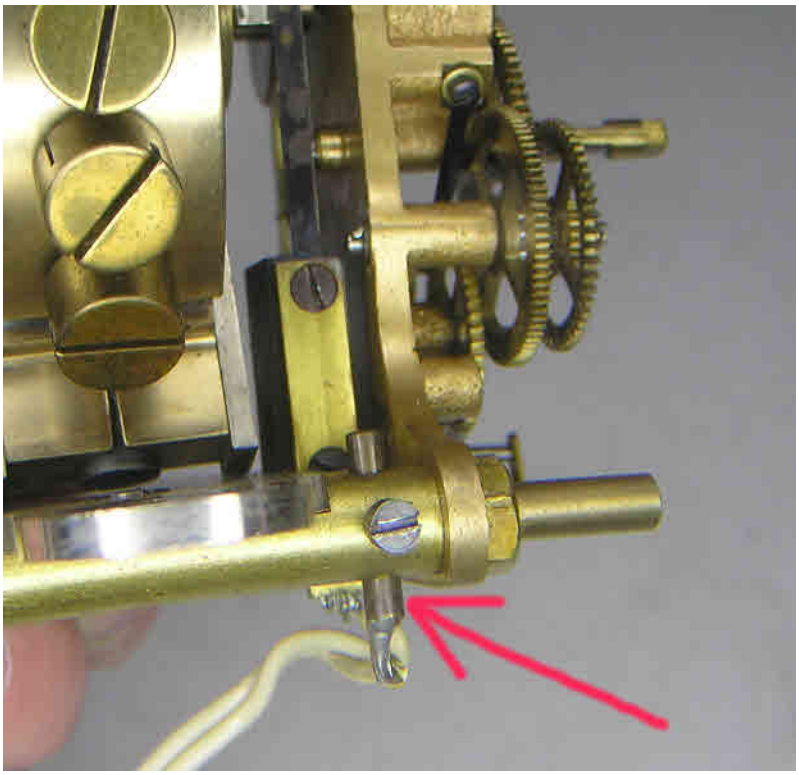


The contact pin was found to be in poor condition. There was continuity between the pin and the frame meaning that the insulation had broken down and the clock failed to run.. The pin assembly will be replaced.

The "Bullet" connector (arrowed) on one of the battery leads had an intermittent contact and the joint will need to be remade.



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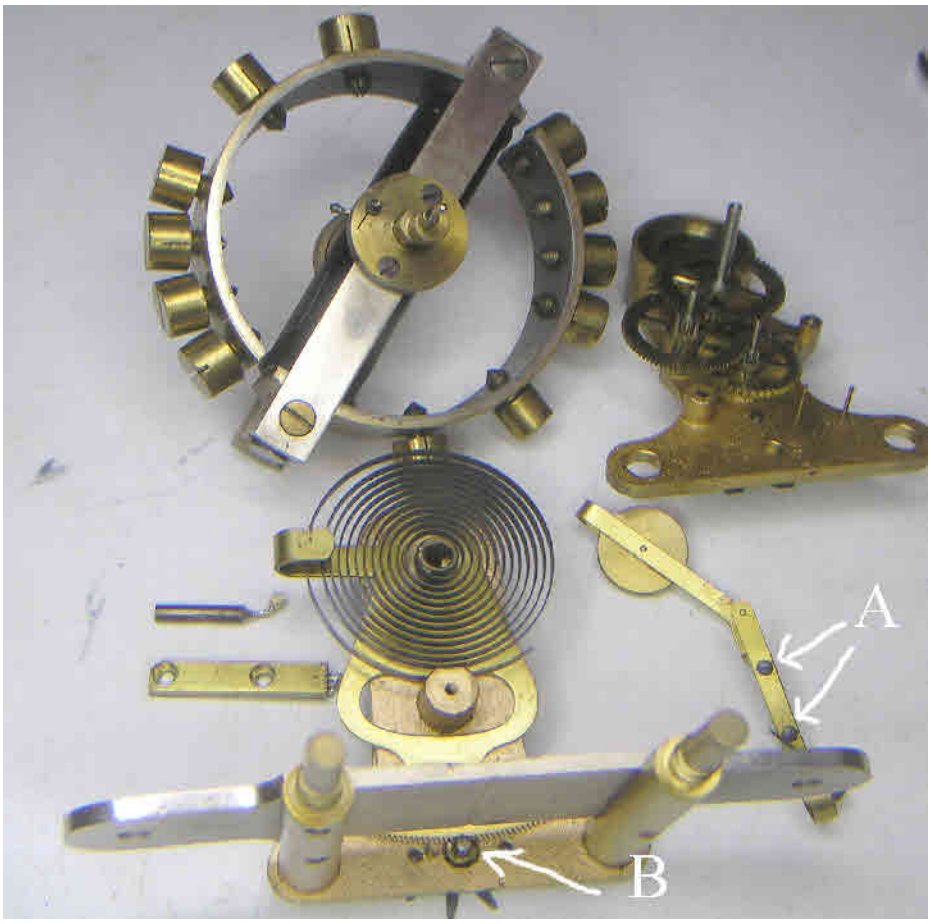
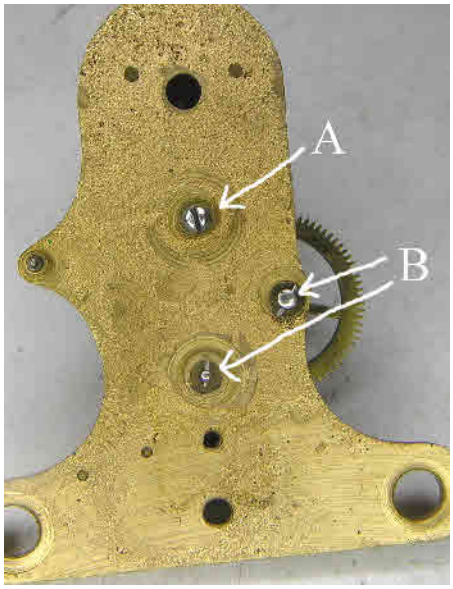


The front frame removed showing the balance spring attached to the rear frame. Note the motion work fully contained within the front frame. This particular clock has an impulse arm made in two parts. The two screws that hold it together can be seen arrowed (A). Some clocks have an arm made from a single piece of brass.

Note the pinion on the end of the star wheel arbour that turns the regulator segment (B). In this clock it is short because it only passes through the rear plate and thus is regulated from the rear of the clock. In other clocks it is a long arbour that runs through both plates and terminates in the star wheel on the front plate.

Note also the condition of the balance spring. Twelve and a half turns with a good even pitch.



These two photos at left show the fibre block that the contact springs are screwed into. The block insulates the flag from the rest of the frame. The motion arbours extend through the front plate and are retained with either screws (A) or pins (B). The fibre block covers the lower arbour completely and needs to be removed before the retaining pin can be extracted. Note also the washers that take up some of the end play on the arbours.

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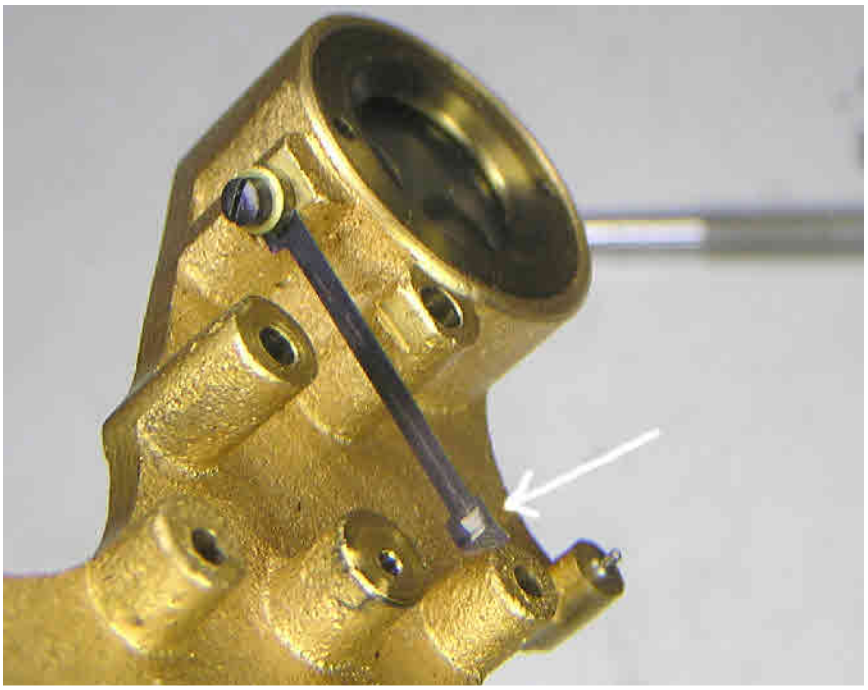
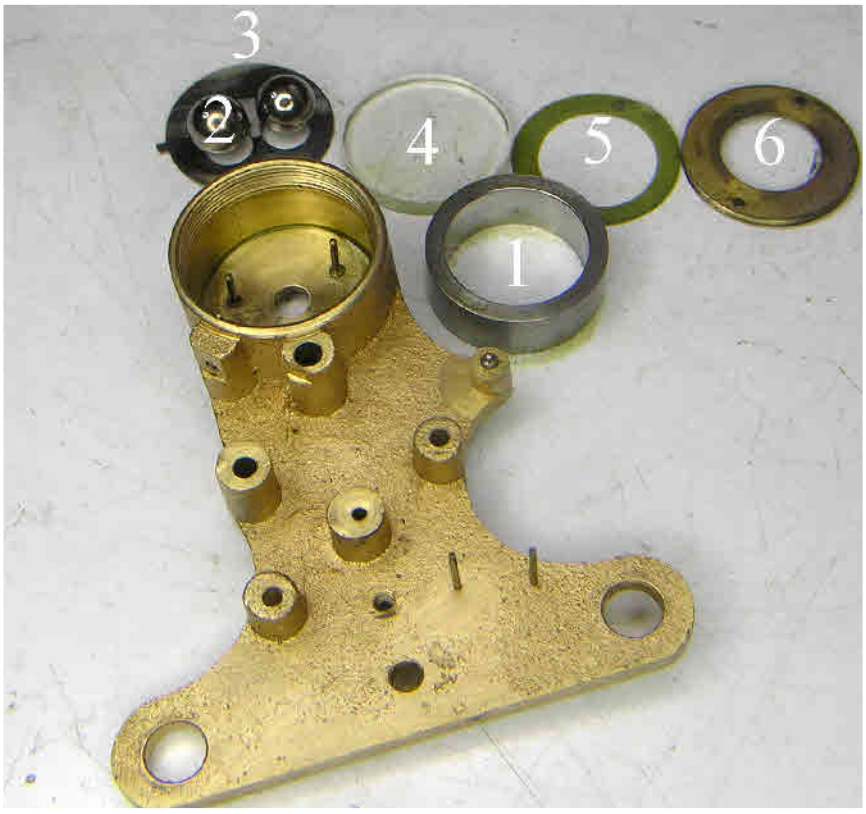


The click spring for the count wheel has a little wear that shows as a polished patch on the spring. But it has not started to cut through the steel yet so it will last another 20 years or so yet.



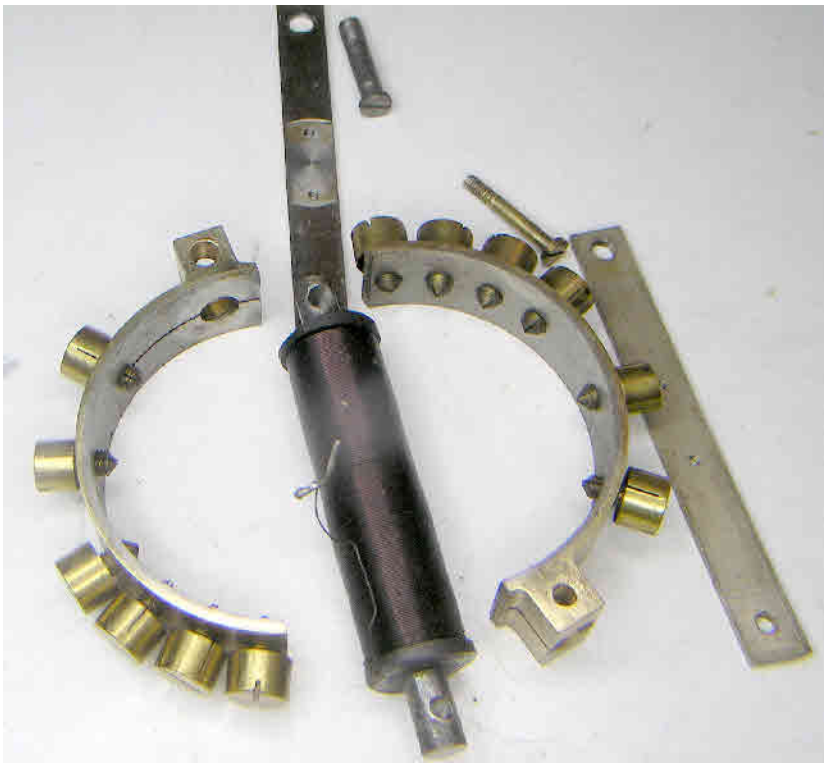
The front bearing disassembled. After cleaning and inspection for wear the order of re-assembly is :-

1 - Steel bearing housing.
2 - The ball bearings.
3 - Steel bearing plate.
4 - Glass disc
5 - Paper washer.
6 - Lock washer.

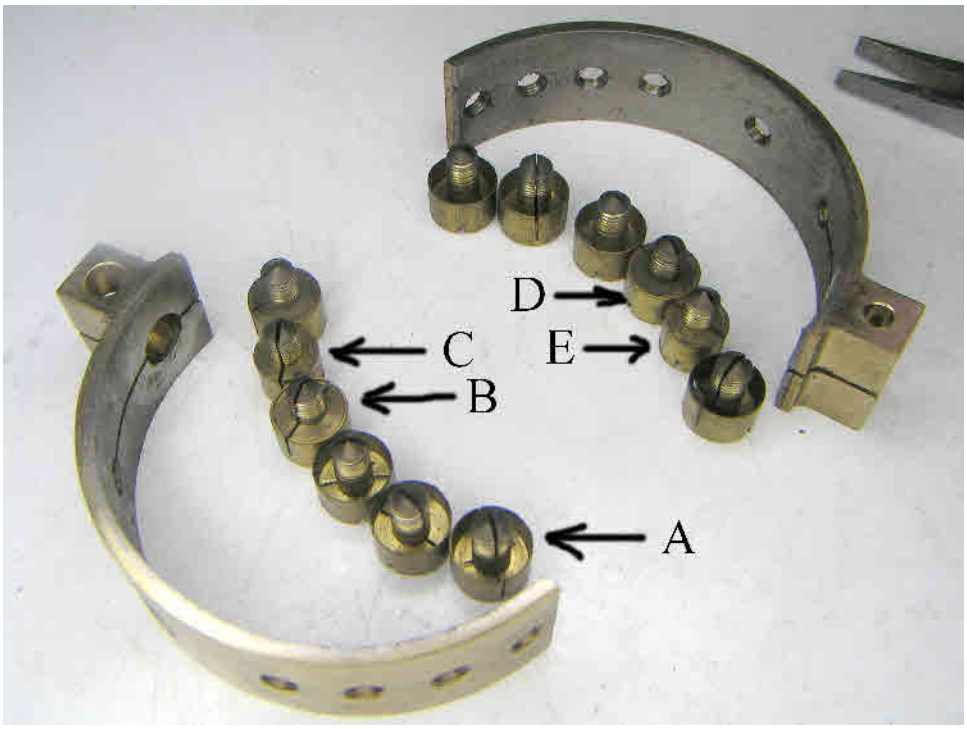
In this clock all the pieces are in good condition. There is no rust and there are no chips in the glass.

The bearing assembly in the rear plate is also in excellent condition.

Eureka Clock Serial Number 404.



This photo shows the armature and balance wheel disassembled. The winding should be checked for resistance. It should read 20 Ohms give or take 3 Ohms. This one is reading a steady 20 Ohms. The winding must be treated carefully and should only be lightly brushed to remove dust etc. The rest of the assembly can be cleaned in the normal way. The armature ends should be cleaned lightly with wire wool so as to provide good electrical contact. Either take a photo or carefully draw the parts in situ as its important to reassemble in the same order. The enamelled wire, for example, exits the coil through the fibre cap which must be positioned in the gap between the balance wheel halves.



Be especially careful when removing the poise screws. As you can see from the photo the screws may look similar from the outside but they may have been undercut to remove weight. "A" is the same diameter as "B" but has a lot of undercut to reduce its weight. "C" and "E" are the only screws of smaller diameter.

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All the steel work has been bagged separately so that they can easily be identified and replaced in the correct order.. I normally clean all the brass work first and only clean the steel work at the time it is required in re-assembly. The lower photo shows the armature ready for cleaning and testing. (20 Ohms approx)

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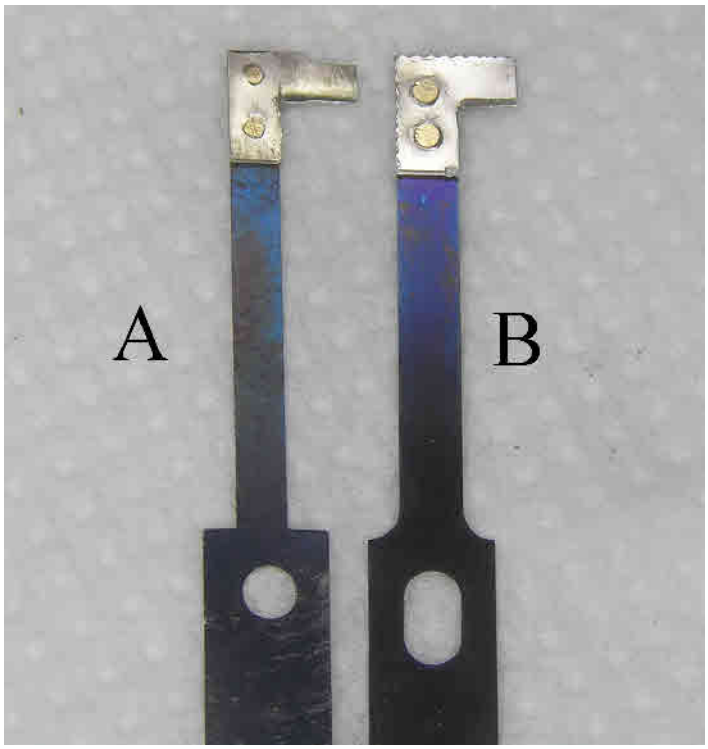
In this clock the identification plate carries the regulator pinion and star. Unfortunately the star and pinion are riveted together through the plate and cannot be removed without damaging the pinion arbour, plate or star. So as long as there is no damage to either the plate or the pinion there is no need to do anything other than lightly clean and add a drop of oil.



This photo shows the worn and new flag springs. The original (A) has holes only while the new one (B) has elongated holes to make it easier to adjust for best position and allow for wear in later years.

The photo above shows new bullet battery lead connector.

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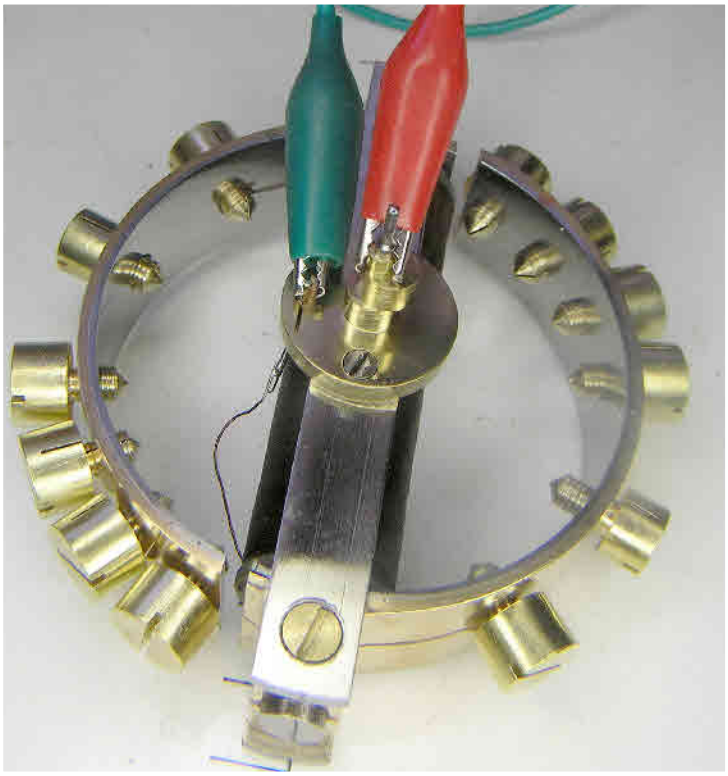

These photos show the magnetometer being used to check the effectiveness of the armature. One wire is connected to the silver contact pin whilst another is connected anywhere on the frame. When the wires are then connected to the opposite poles of a 1.5 volt battery the current in the coil will induce a magnetic field which is then magnified by the soft iron armature. This field can then be measured using the magnetometer which was made to test the Bulle magnets. Using the same method, the armature should read approx 120mm for a compass reading of 45 degrees.

The photo at left shows the shims being prepared under the steel base plate. They should be added until the armature of the balance wheel is as close as possible to the plate when in the vertical position. A gap of a few thousands of an inch should be aimed for.

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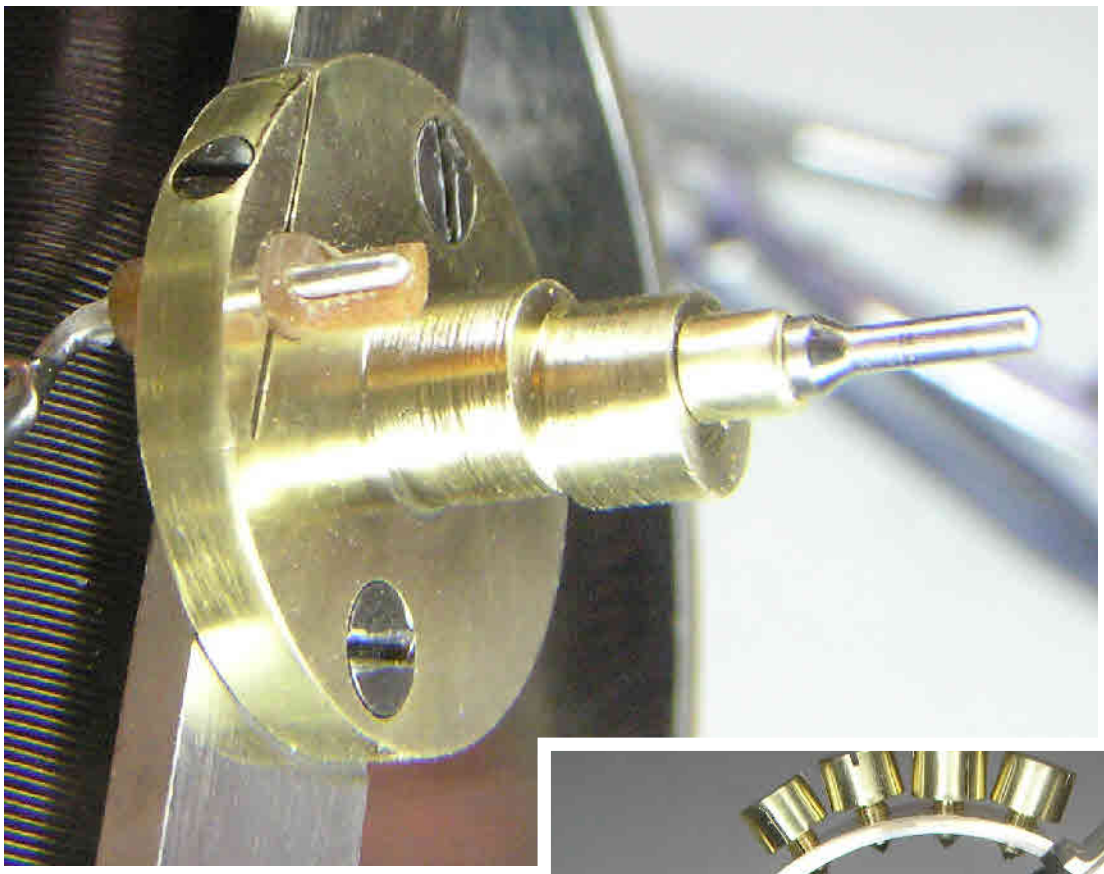
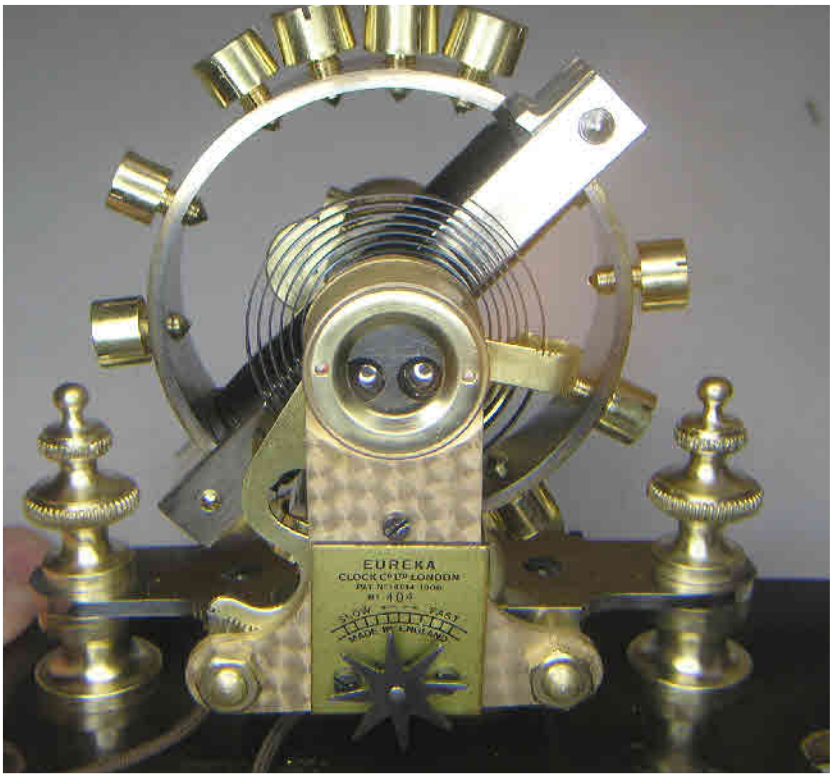


The new silver contact pin assembly in position. It should be adjusted so that the contact flag contacts the silver pin on the up swing and the fibre side on the down swing. Start off with the fibre at 90 degrees to the saw slot. And adjust whilst manually swing the balance wheel backwards and forwards.



The movement on a test stand whilst checking the action of the flag and pin. It is best to adjust the balance spring so that the pin lies in contact with the flag when at rest with no power. Then when power is applied the clock should immediately start it's oscillations. This will work 75% of the time but it could be that when the clock was stopped the flag lies in contact with the fibre side of the pin and the balance wheel will need to be moved a quarter turn to start the clock.

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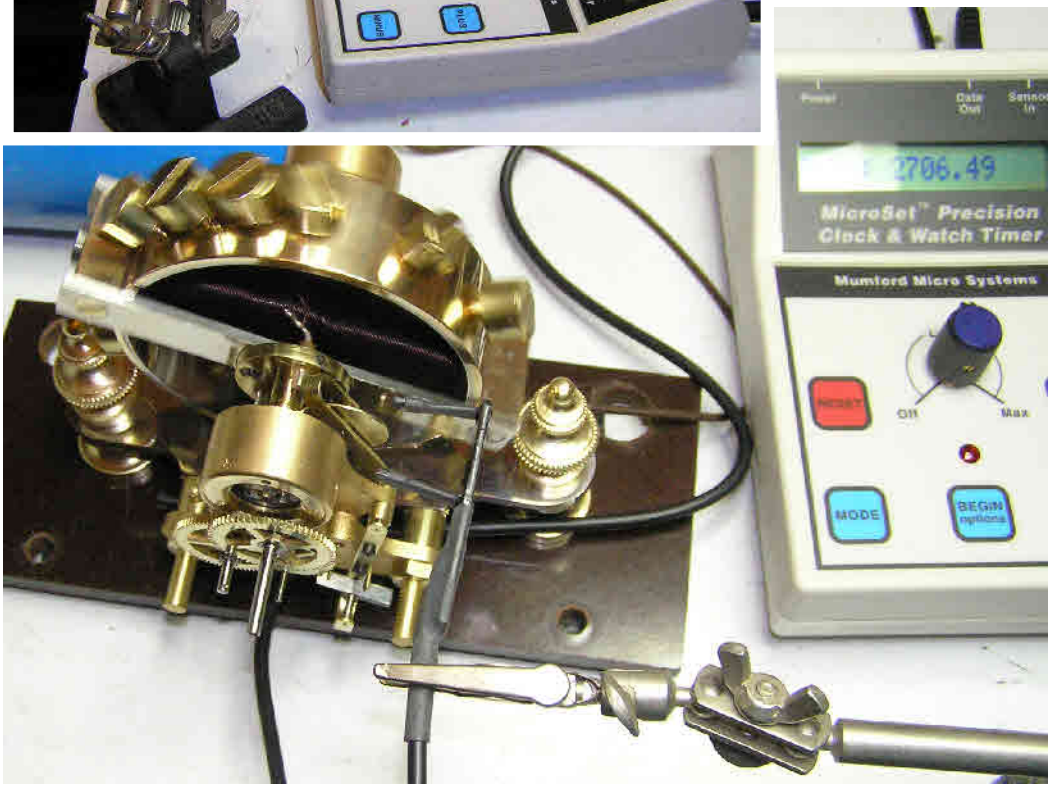
The set up I use for testing a Eureka. The Microset timer is invaluable for quickly assessing the rate of the clock. In this case there should be 2700 beats per hour for this clock. It only takes 20 oscillations to check the rate. The Thandor unit at the rear of the lower photo is a variable power supply with fine adjustment. I use this first to regulate against exactly 1.5 volts. Once the clock is running correctly with at least 310 degrees of swing then I switch to the battery that will be installed in the clock. In this case it is a replacement "Flag" cell battery with the same dimensions as the original.



As can be seen in this photo the rate is 2706 beats per hour with the balance spring regulator all the way to the fast setting. If the clock reads less than say 2695 beats per hour with the regulator set all the way to the slow position then it will be possible to adjust the rate to perfect time (as far as any Eureka clock will allow) by positioning the regulator somewhere between the two extremes.

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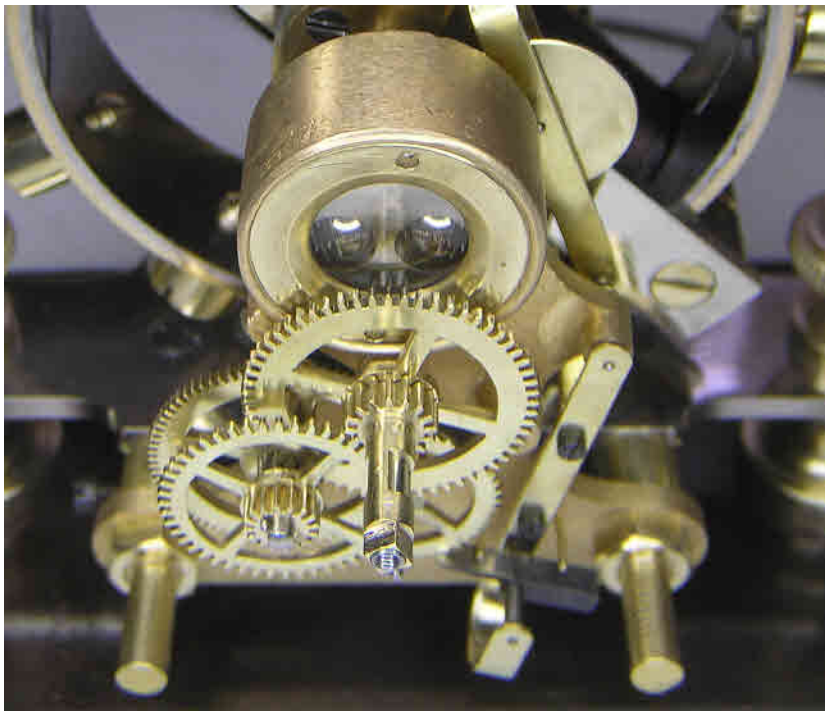

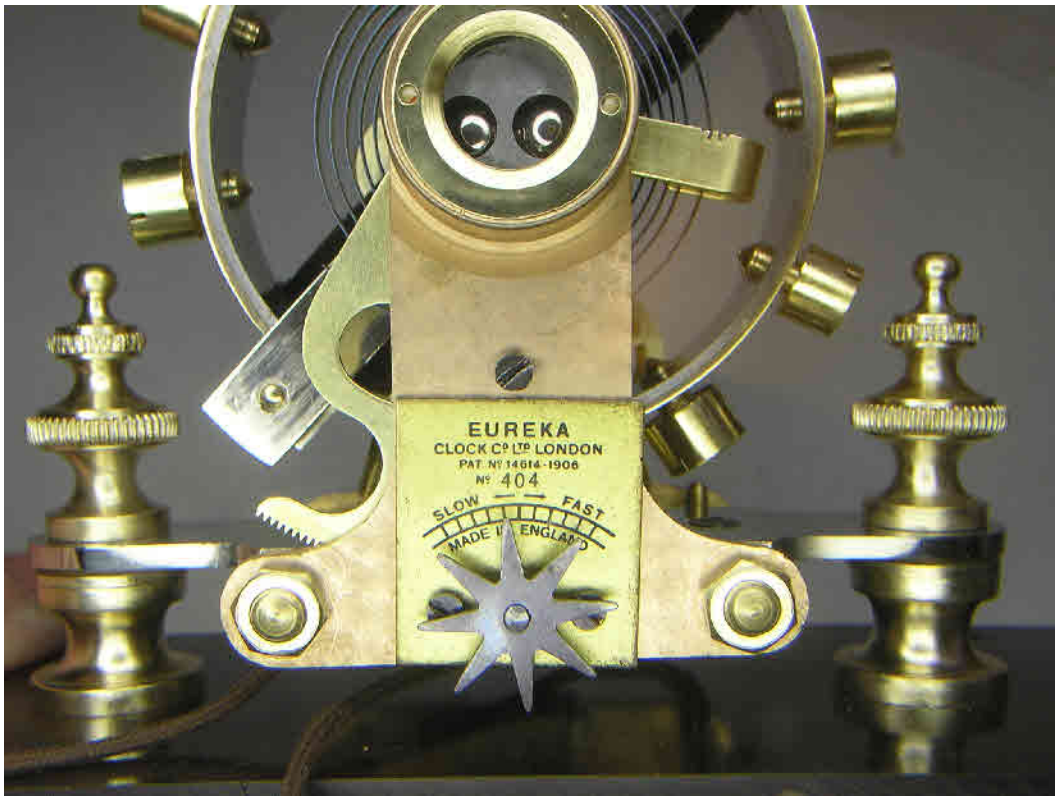

Photos of the re-assembled clock. Note the replacement flag cell battery fits perfectly in the original housing.

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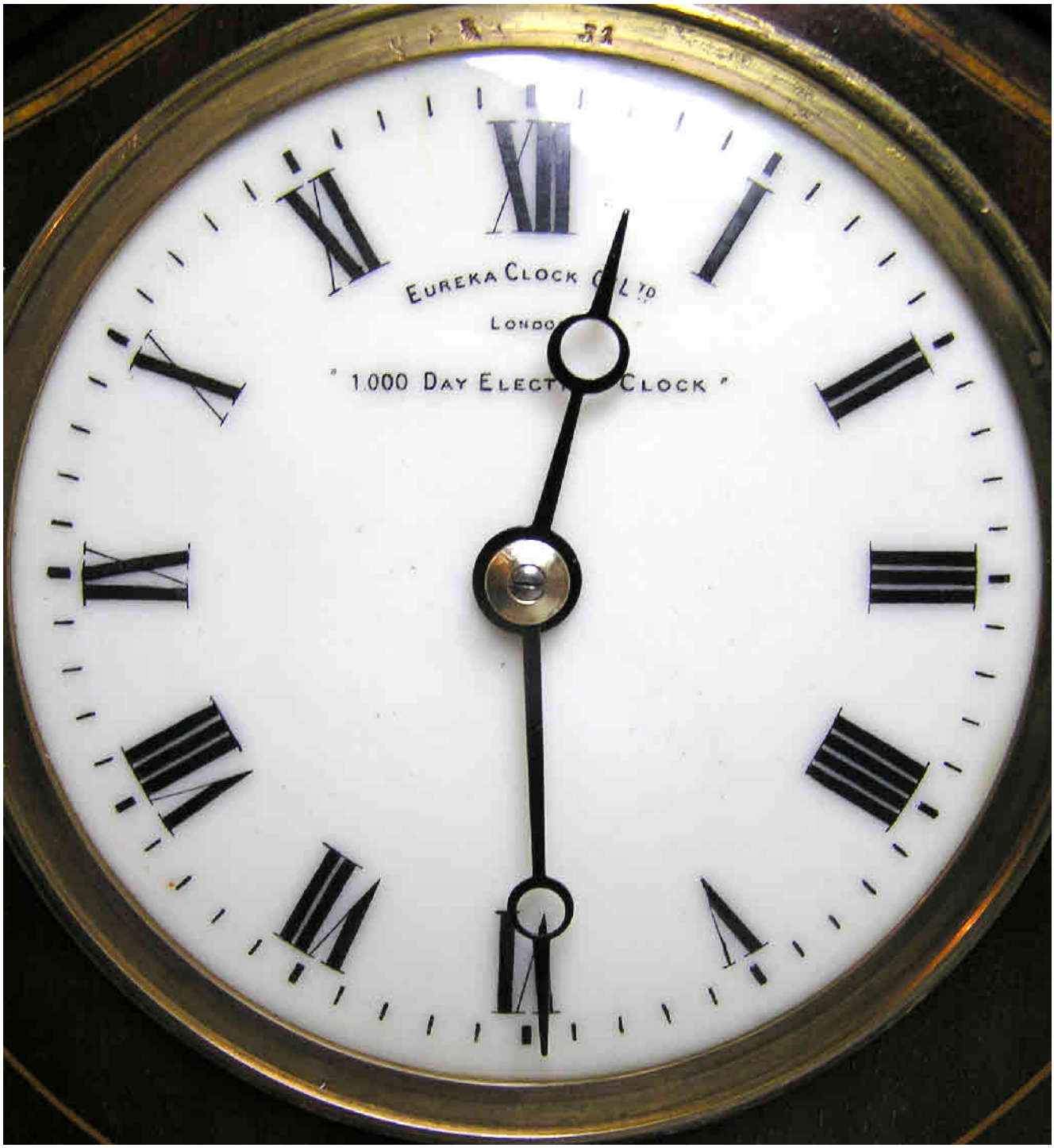

The cleaned dial and hands.

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The completed clock.

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