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FOR HISTORICAL CLOCKS

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Real or Fake?

Examination and Analysis of a Clock Presenting Itself as a "Horizontal Table Clock from the 16th Century" with Astronomical Display

from Jürgen Ehrt

"Whoever seeks an angel and only looks at the wings might bring home a goose."

This statement, expressed by the naturalist, mathematician, and physicist Georg Christoph Lichtenberg (1741–1799), is intended to serve as the guiding principle for the following documentation.

At first glance, the exhibit presents itself as a horizontal table clock from the second half of the 16th century.

The clock features not only an hour display but also indications of the synodic lunar cycle, an hour strike, and an alarm mechanism on a bronze bell.
My documentation aims to provide information on the following points, among others:

- Is this clock truly an exhibit from the 16th century?
- If not, which characteristics call its authenticity into question?
- Does the clock exhibit similar or identical features to those found in past exhibits that have appeared in international auctions?

The documentation will also provide insight into the technical and craftsmanship methods used, along with the selection of materials from different eras, to create such a conglomerate.

To anticipate the conclusion at this point: we are dealing with a forgery that leaves no room for interpretation as merely a clock with so-called transitory modifications—alterations and repairs that naturally occur in old clocks over the centuries due to various reworkings.

The photographs provided to me by Mr. Stefan Muser via Dr. Bernhard Huber are included in my research as reference material.

Mr. Muser is the owner of the internationally operating auction house Dr. Crott in Mannheim.

On May 10, 2014, during the 89th auction, an item listed under LOT number 619 with the designation *"Significant Square Renaissance Horizontal Table Clock with 24-Hour Dial and Alarm"* was offered for sale at his auction house. However, the item remained unsold.

The clock bore a stamped hallmark *"AW"* with a star on the iron plate. It had the stated dimensions of 112 x 114 x 74 mm and was estimated to date to around 1600.

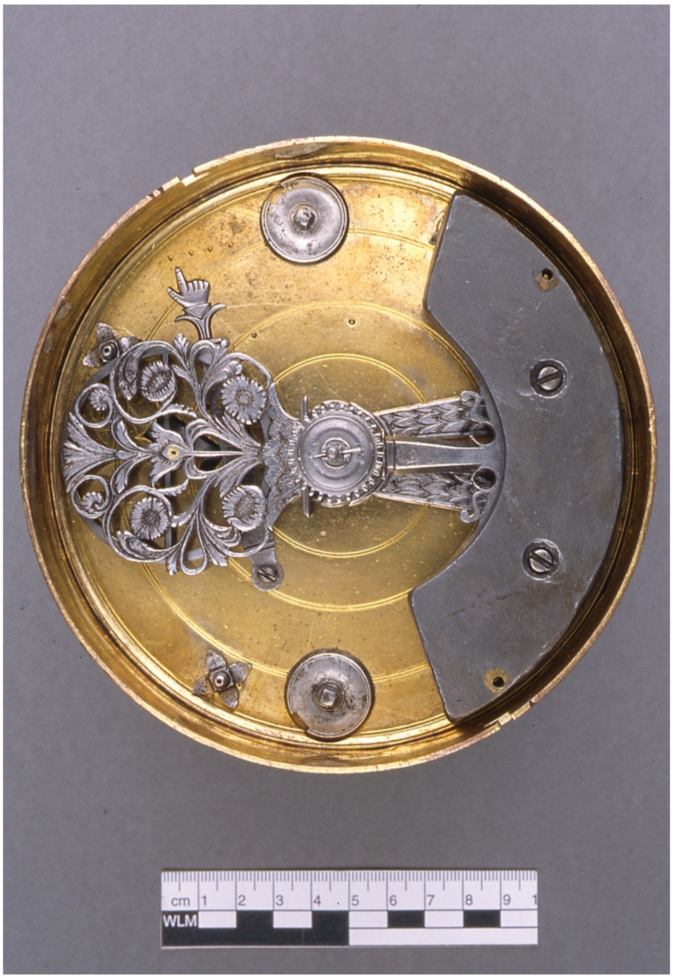
This clock exhibits not only significant features similar to those found in the object under investigation but also suggests a causal connection between the two.

Since I was unable to examine Mr. Muser's clock in its original form, my analysis is limited to observations based on the provided images.

Referring to the age-old question, *"Which came first, the chicken or the egg?"*, it is impossible to determine with certainty which clock served as a model for the other.
However, based on the findings from my examination, I can assert that constructing the clock under investigation would not have been possible without at least a fundamental knowledge of the *Muser Clock*.

Even without a detailed analysis, the images alone lead me to question the authenticity of the *Muser Clock*, pending a thorough investigation.

Furthermore, in 2008, I examined a clock at the Württemberg State Museum in Stuttgart that displayed striking structural parallels to the table clock currently under investigation.
I was unable to confirm its originality—it was a forgery.

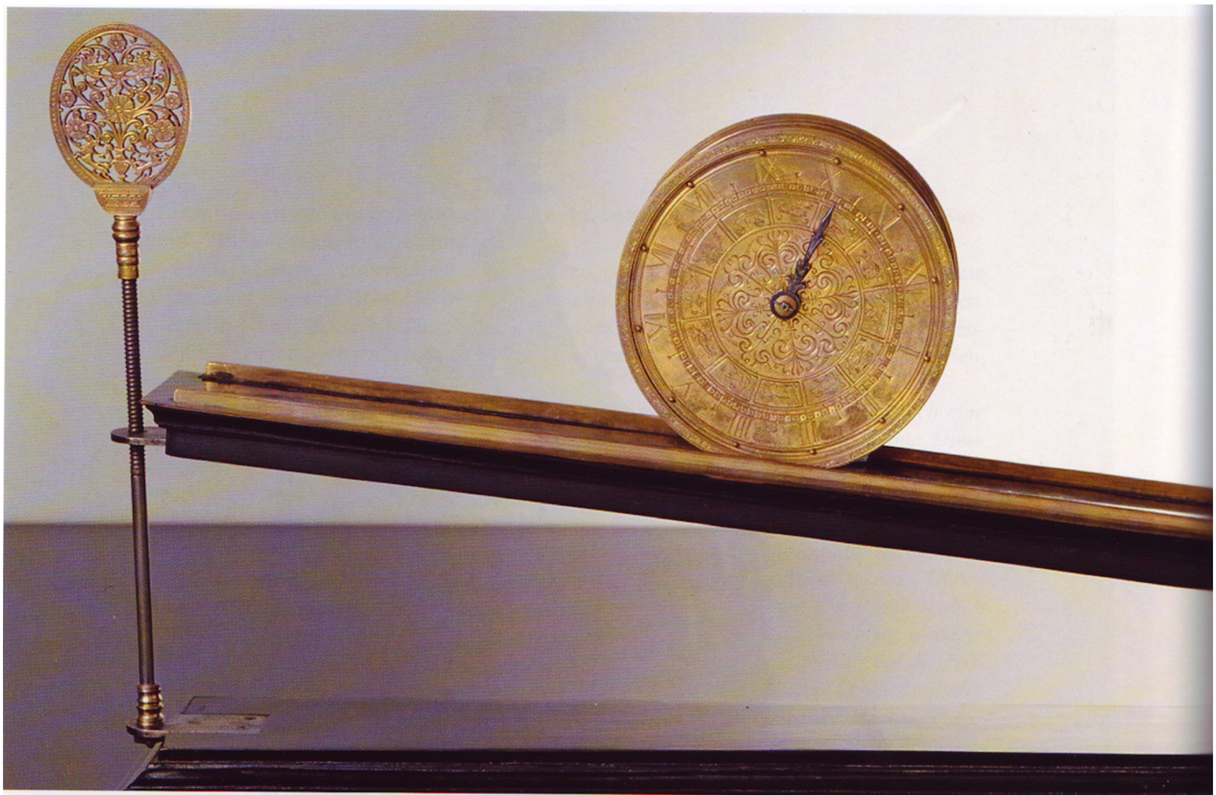


Photos: Württemberg State Museum Stuttgart, Moritz Paysan

Photos: Württemberg State Museum Stuttgart, Moritz Paysan

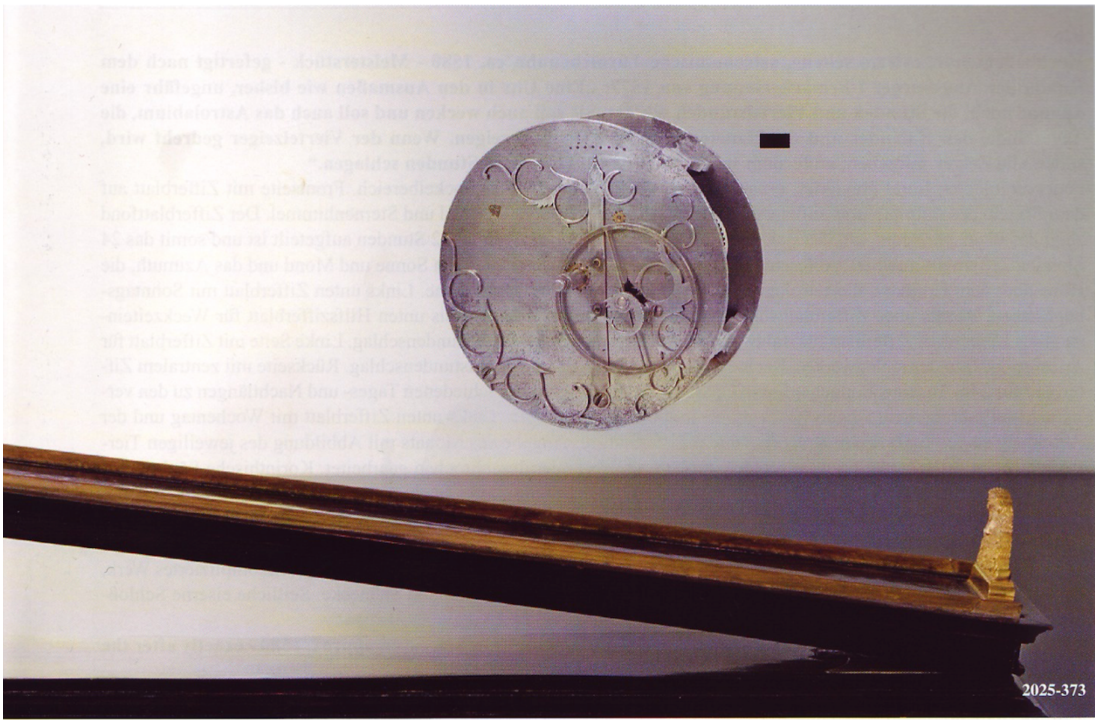
Another clock, which—due to its unmistakable craftsmanship and based on the insights gained from the examined timepiece—must be attributed to the same workshop, appeared in a 2005 auction at the Dr. Crott auction house.

This clock is also a so-called *"clock on an inclined plane."*

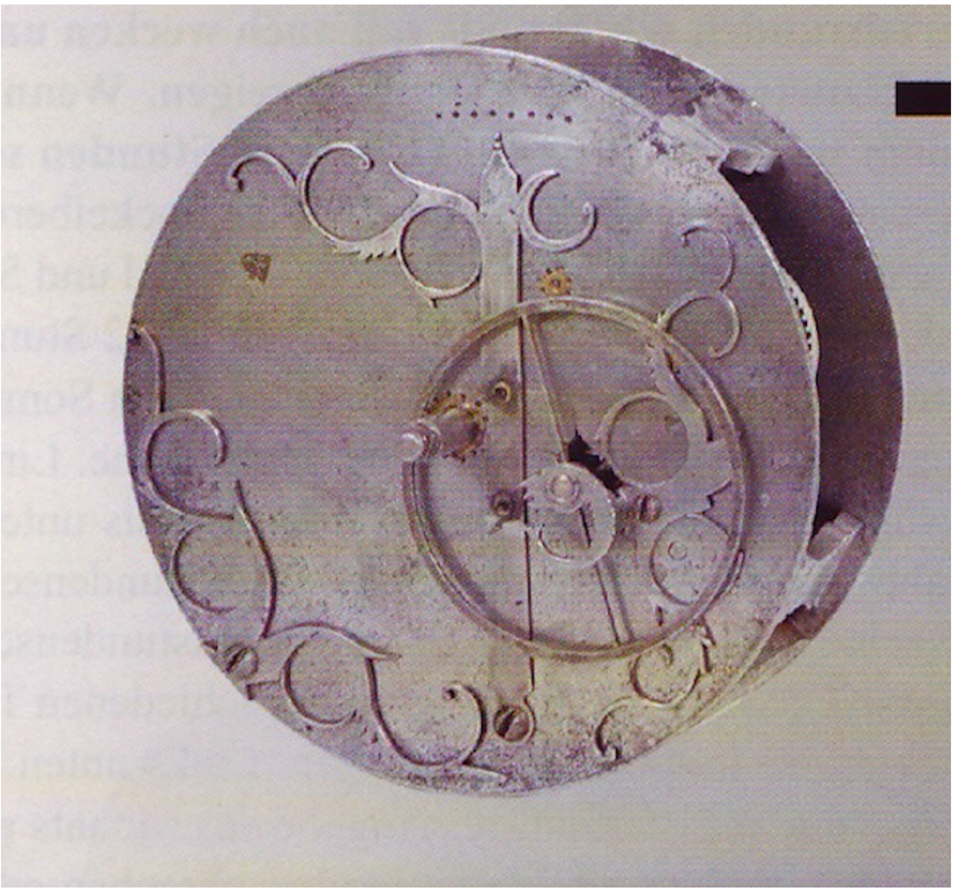


624
Bedeutende Renaissance Tischuhr „Schiefe Ebene", gepunzt „AW" mit einem Stern, ca. 1600
G: schiefe Ebene: Eichenholz, ebonisiert, abgestuft, gedrückte Kugelfüße, gravierte durchbrochen gearbeitete Justierschraube für Neigungswinkel, aufgelegte vergoldete Führungsbänder. Uhrentrommelgehäuse: Messing, feuervergoldet, graviert, ornamentiert und durchbrochen gearbeitet mit Laub- und Rankenwerk. Eingelegte silberne Plaketten mit Darstellungen von Tag und Nacht. **Z:** Vorderseite: Messing, feuervergoldet, röm. Zahlen, Tierkreiszeichen, floral graviert, Eisenzeiger. Rückseite: Messing, feuervergoldet, gravierte Figur des Herkules auf Löwen stehend. **W:** rundes Eisenwerk, Eisenräder, facettierte eiserne Werkspfeiler, Spindelhemmung mit eiserner Radunruh und Schweinsborstenregulierung, eiserner durchbrochen gearbeiteter Unruhkloben, schweres Bleigewicht zwischen den Platinen.

Source: Auction Catalogue Dr. Crott



Source: Auction Catalogue Dr. Crott



Source: Auction Catalogue Dr. Crott

The previously mentioned theoretical and methodological inclusion of the Renaissance table clock depicted below, along with another clock bearing the *"AW"* hallmark, was of significant importance in obtaining the investigation results for the examined timepiece.

619

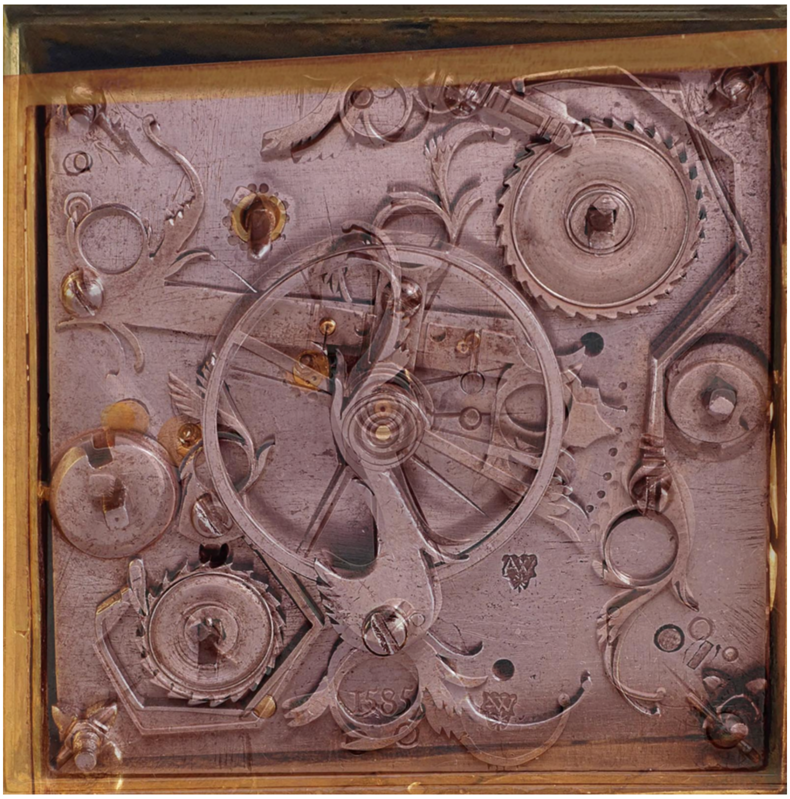
Punze "AW" mit einem Stern, 112 x 114 x 74 mm, circa 1600

Bedeutende quadratische Renaissance Horizontaltischuhr mit 24-Stundenzifferblatt und Wecker
Geh.: Messing, feuervergoldet, profiliert, 4 balusterförmige Füße, Wandung allseitig aufwändig graviert mit Figurenstaffagen zeitgenössich gekleideter Damen und Herren, auf dem Boden graviertes Portrait in Profilansicht eines antiken Feldherrn mit vogelverziertem Federbuschhelm, römischer Schanzaxt (Dolabra) und Schild, zwei Schallöffnungen auf der Seitenwandung. **Zffbl.:** Messing, feuervergoldet, Tastknöpfe, arab. 24-Stundenanzeige, 2 x radiale röm. Stunden "1-12", gravierte Tierkreiszeichen, zentrale silberne Weckerscheibe mit eingelegten arab. Zahlen und Kompassrose, Eisenzeiger. **Werk:** Eisenwerk, punziert "AW" und Stern, Eisenräder, facettierte eiserne Werkspfeiler, Spindelhemmung mit eiserner Radunruh und Schweinsborstenregulierung, eiserner durchbrochen gearbeiteter Unruhkloben, Glocke zwischen den Platinen.

Die Dolabra gehörte zur Grundausstattung der römischen Legionäre. Sie war keine Waffe, sondern diente ausschließlich als Werkzeug z. B. zum Graben.

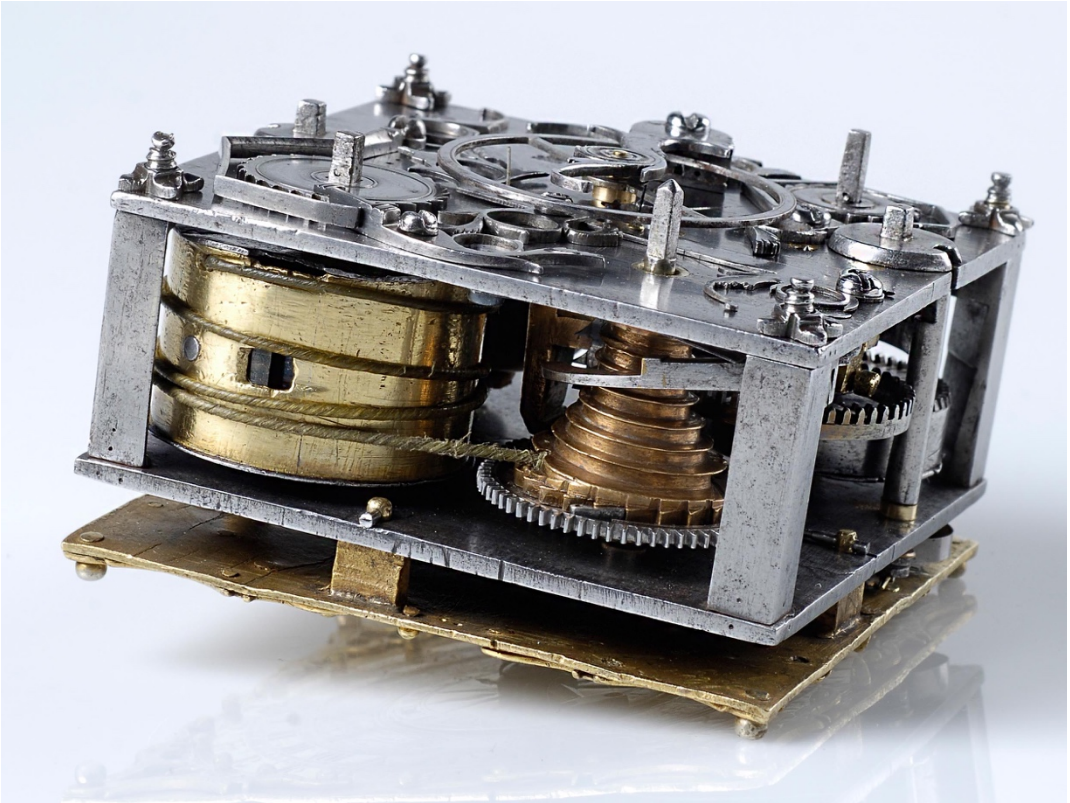
38766 G: 2, 23 Z: 2 W: 2, 17, 41, 51
40.000 - 50.000 EUR 54.900 - 68.500 USD 424.000 - 530.000 HKD

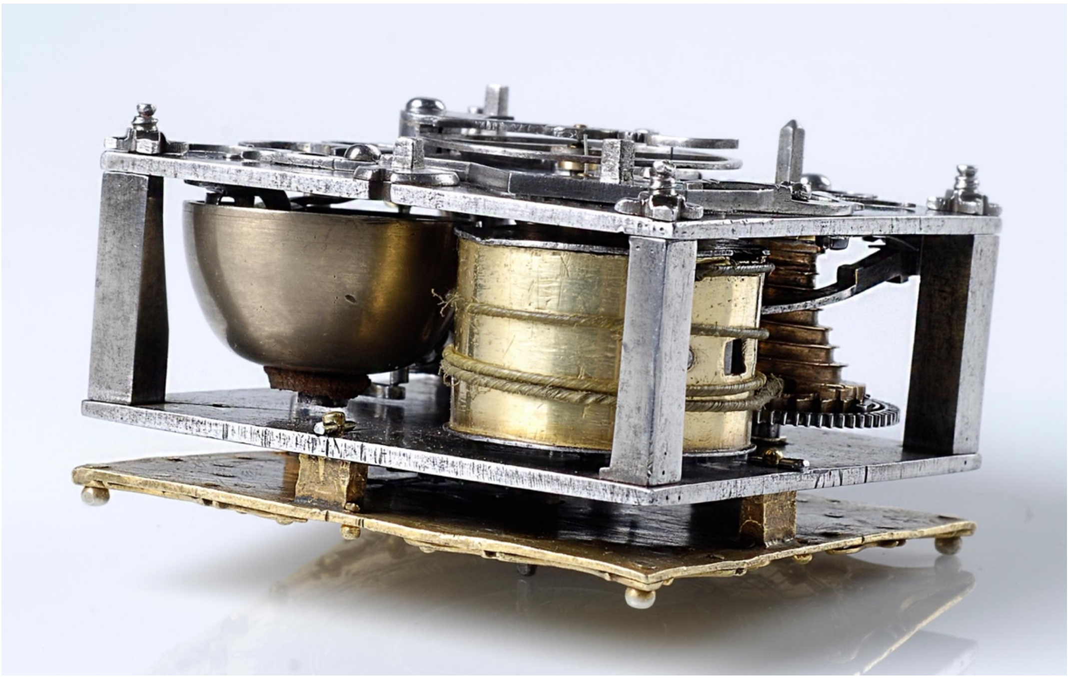
Following images: Auction catalog Dr. Crott



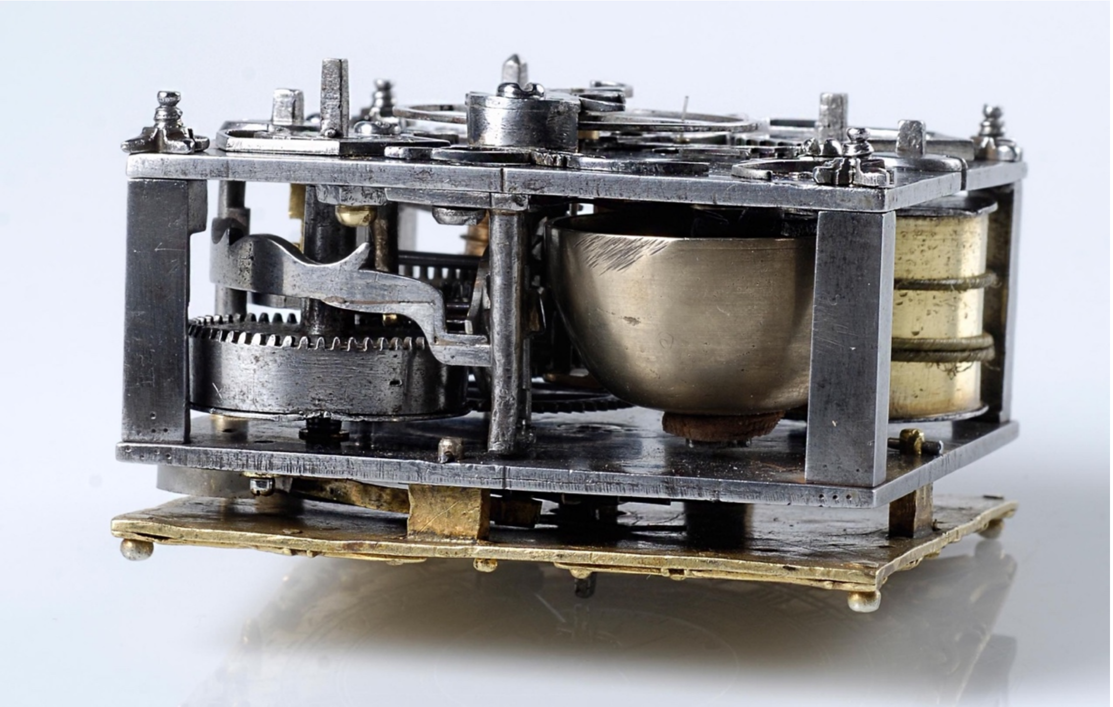
If the clock movements are overlaid in a photomontage, striking similarities become apparent—such as those that can only result from production within the same workshop.

Source: Auction Catalogue Dr. Crott





Source: Auction Catalogue Dr. Crott


Source: Auction Catalogue Dr. Crott

An evaluation of the "Muser Clock," taking into account correlating data and facts, cannot be completed without an examination of the original.

However, it can be stated in advance that both exhibits originate from the same workshop and share the distinctive mark of the same craftsman.

The duplicity in the basic structure and execution is unmistakable and can only be explained as the work of a creative creation that, however, misses the authentic craftsmanship of a proper 16th-century table clock.

The exhibit under investigation

© Restaurierungsatelier Jürgen Ehrt


© Restaurierungsatelier Jürgen Ehrt
1cm
1cm


© Restaurierungsatelier Jürgen Ehrt
1cm
1cm


© Restaurierungsatelier Jürgen Ehrt
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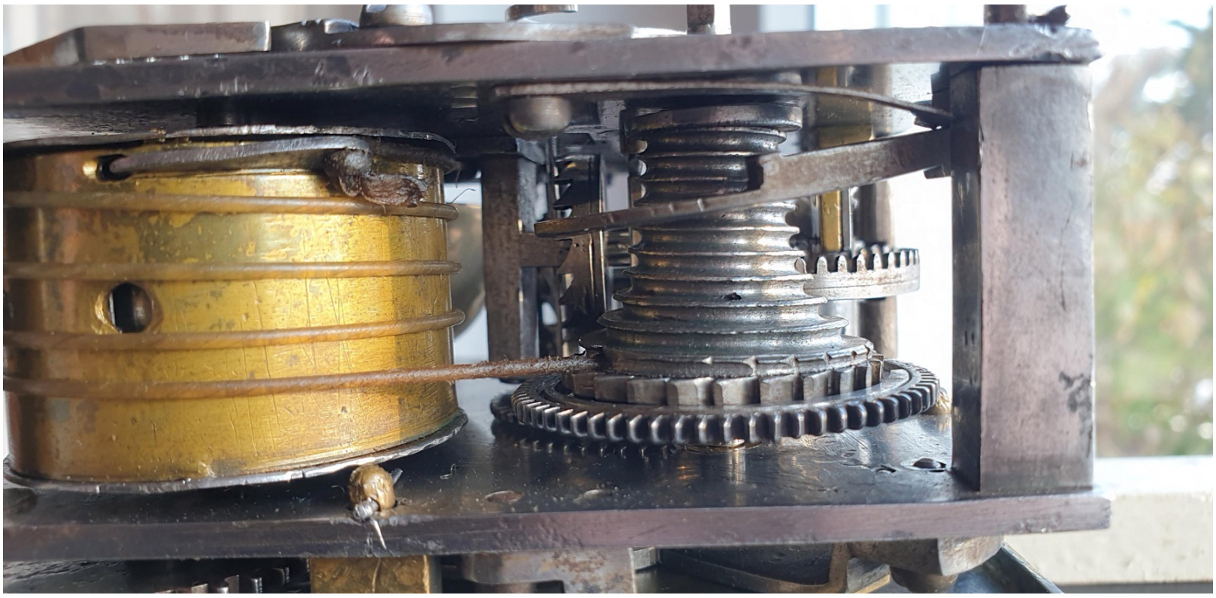

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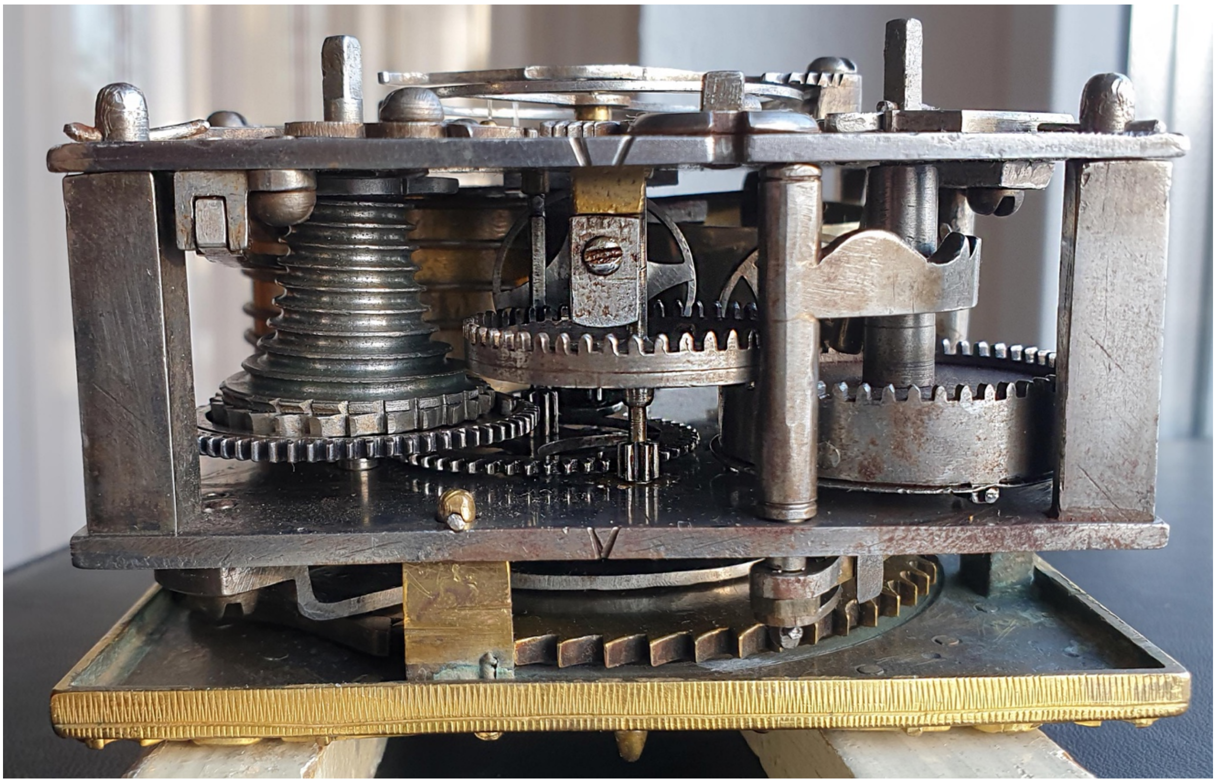

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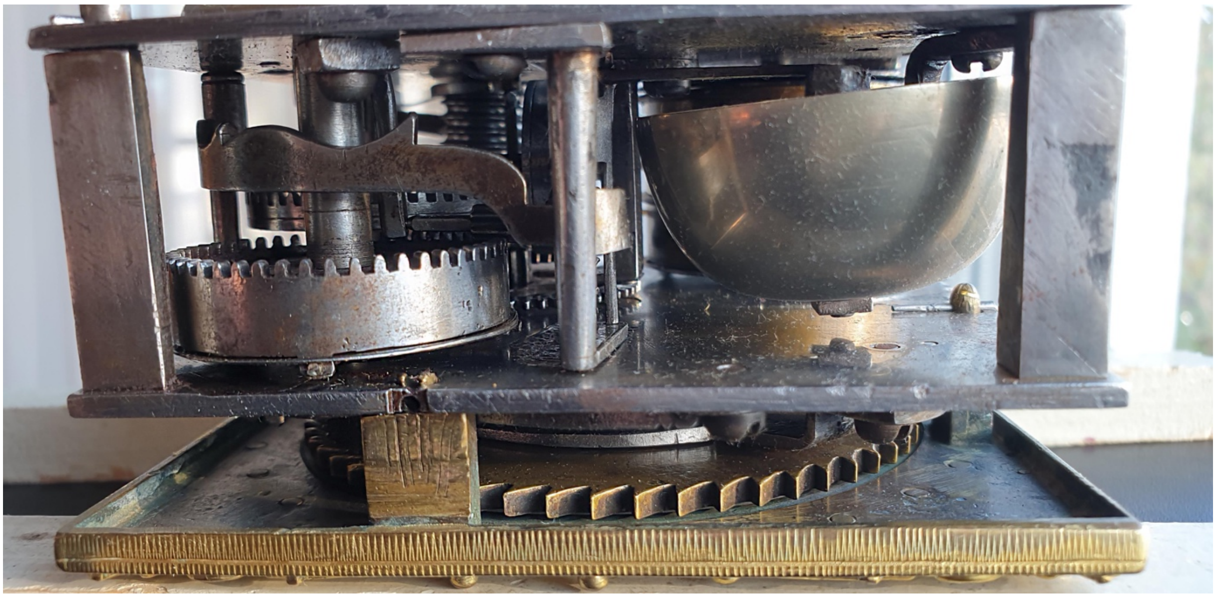


© Restaurierungsatelier Jürgen Ehrt

View into the opened watch case of the examined watch.
© Restaurierungsatelier Jürgen Ehrt

Evaluation

Investigations of the Fusee:

The fusee is a construct made from old parts:

The fusee's snout and the separate lock were adapted and mounted onto the fusee from old, pre-corroded iron.

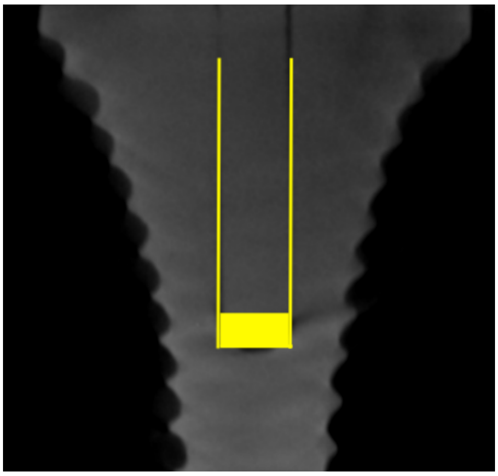
The fusee lock, with a thickness of 2.12 mm, is screwed onto the fusee. Three blind holes, with a depth of 5.7 mm, were drilled into the fusee body for this purpose. Two of the three holes broke through the outer wall of the fusee. Threads were cut into the holes for the three screws (4.84 mm x 1.8 mm). The screw holes are much too deep for the 4.84 mm long screws. If you add the thread depth of 5.7 mm to the thickness of the fusee lock (2.12 mm), the total depth amounts to 7.9 mm. This is excessively over-dimensioned and would not be expected in an old fusee; furthermore, a watchmaker would not have accepted the drilled-out fusee threads in a high-quality clock.

It is likely that the fusee was too high for the required build depth. The appearance implies that the fusee was shortened in the lower section. For this, the bottom of the fusee was ground flat with a high-speed lathe on a support.

The subsequently milled semi-spherical blind hole for the knot of a gut string blasted away the outer edge of the hole.

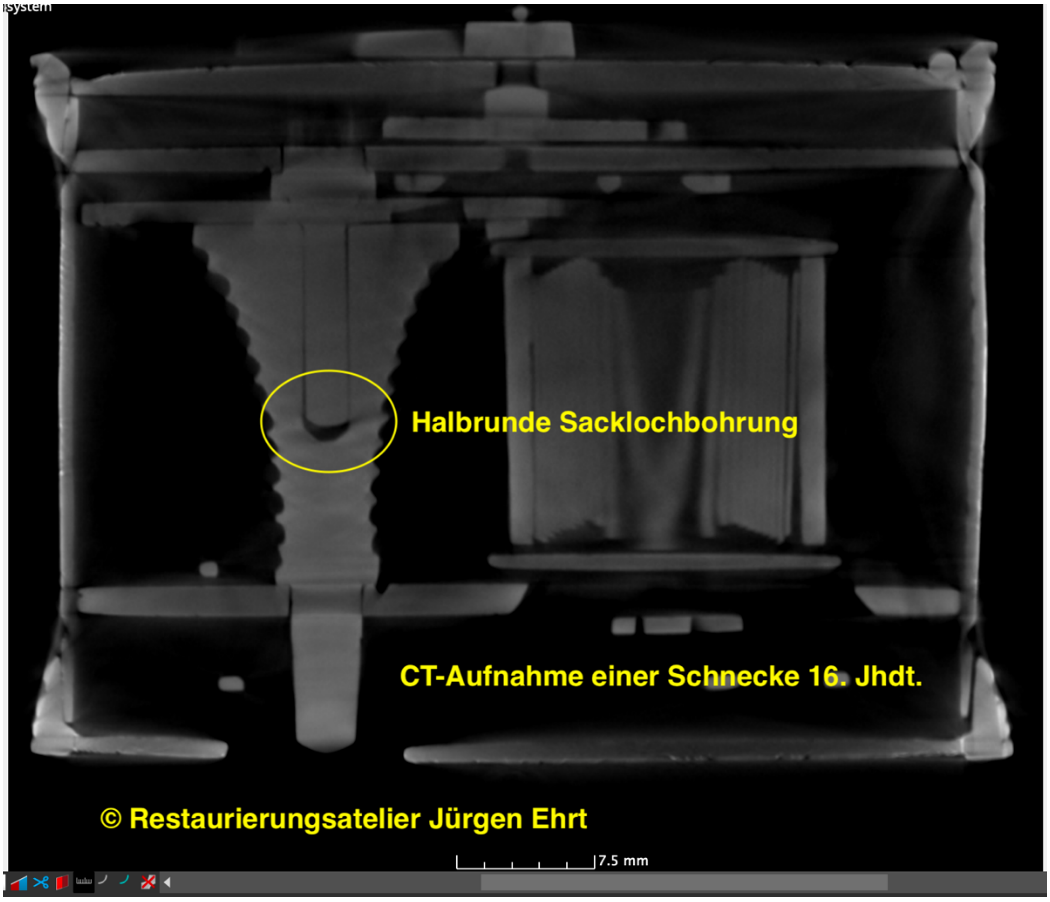
The central blind hole for the reception of the fusee wheel arbor was not suitable for it. Traceable marks of a subsequently inserted deep milling cutter with a flat milling head at the bottom of the blind hole indicate this later operation.

Example:



The CT scan shows a different fusée as a comparison and demonstration model.

The blind holes of old and unmodified fusees have a semicircular finish. See the example in the following tomogram:



The CT scan shows a different fusée as a comparison and demonstration model.
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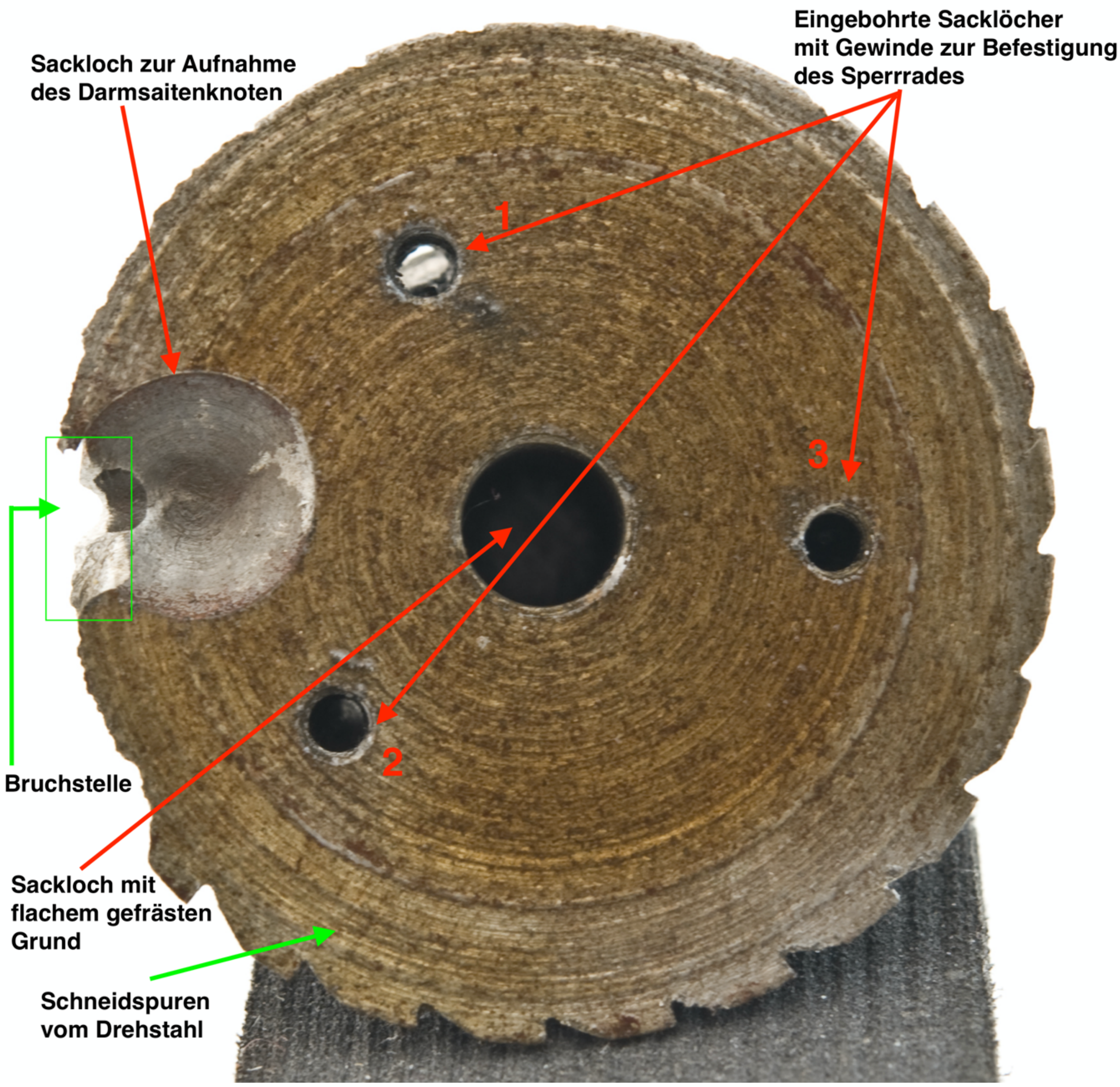
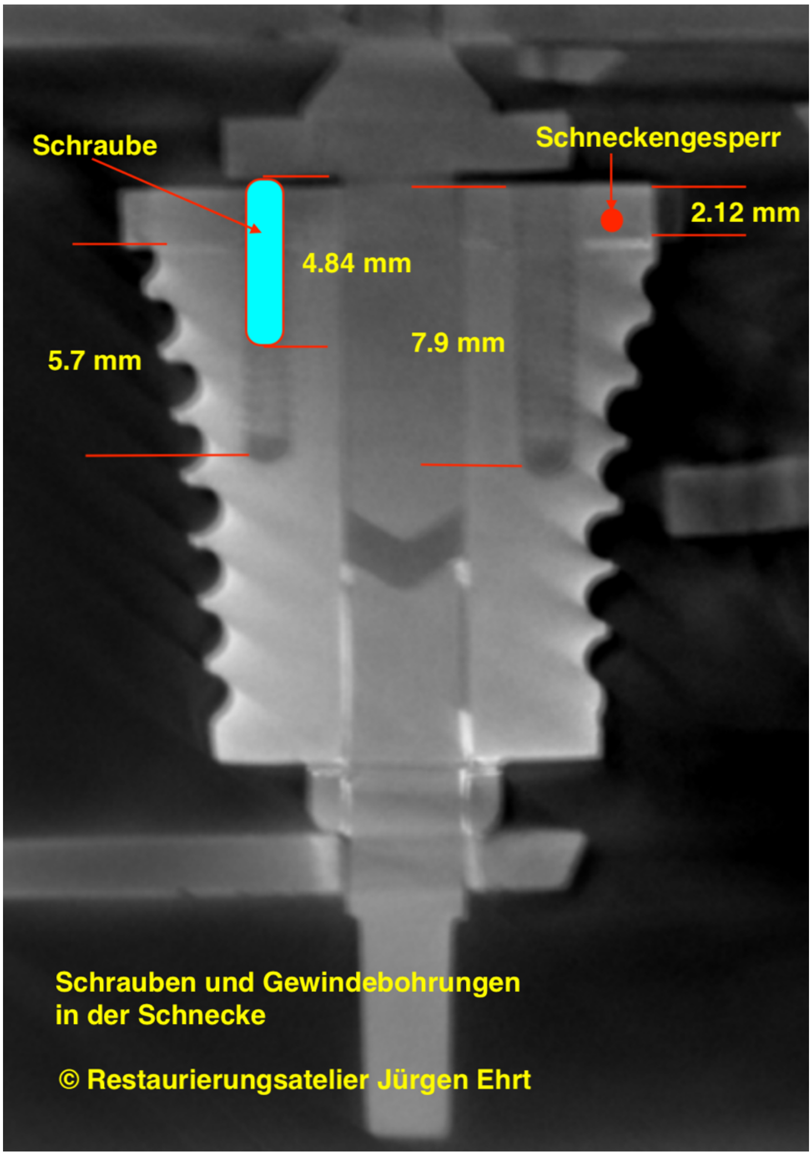

Eingebohrte Sacklöcher
mit Gewinde zur Befestigung
des Sperrrades
Sackloch zur Aufnahme
des Darmsaitenknoten
1
3
2
Bruchstelle
Sackloch mit
flachem gefrästen
Grund
Schneidspuren
vom Drehstahl



The CT scan shows a different fusee as a comparison and demonstration model.
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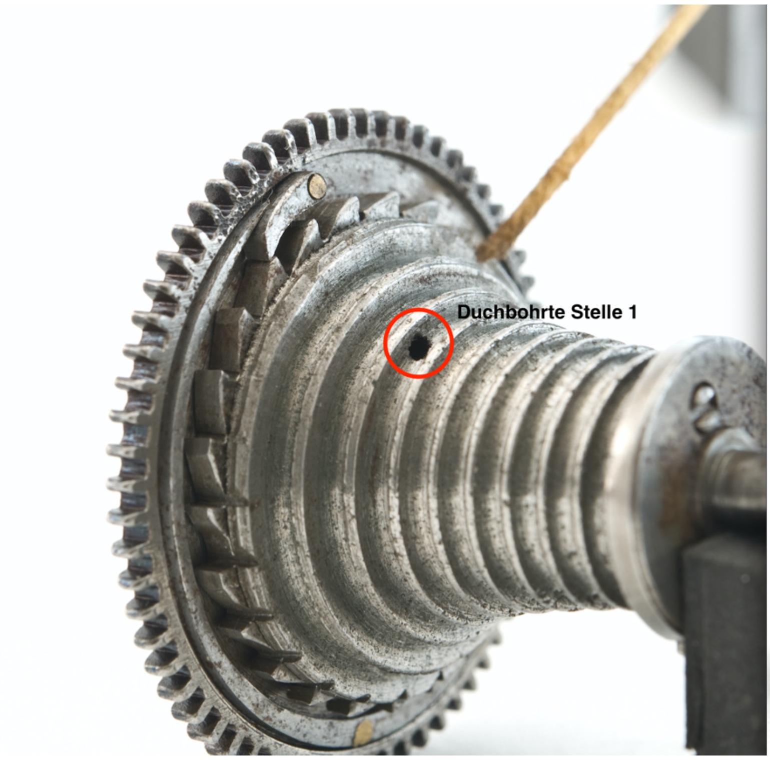
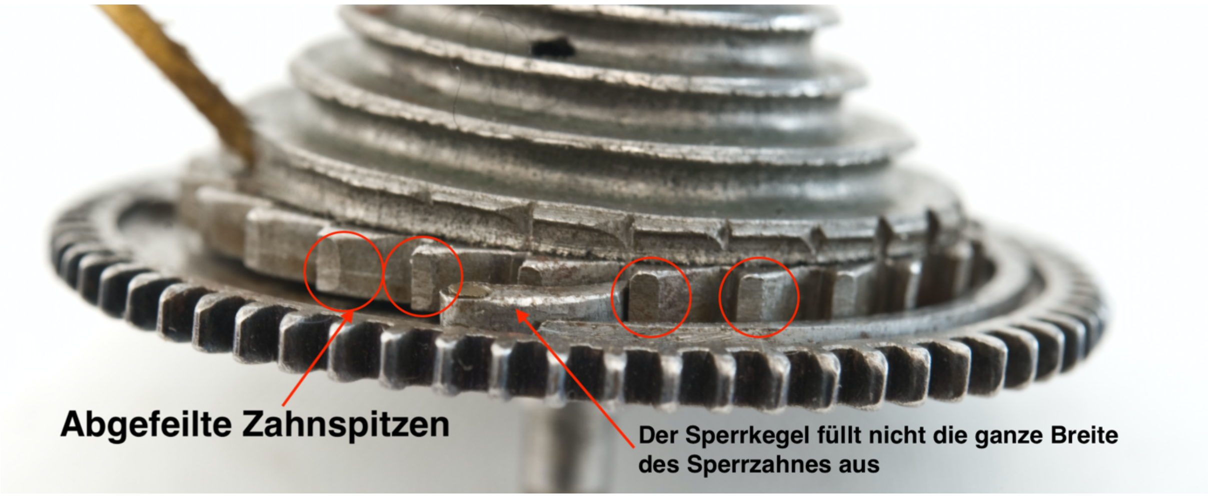
Perforated outer wall of the fusee.

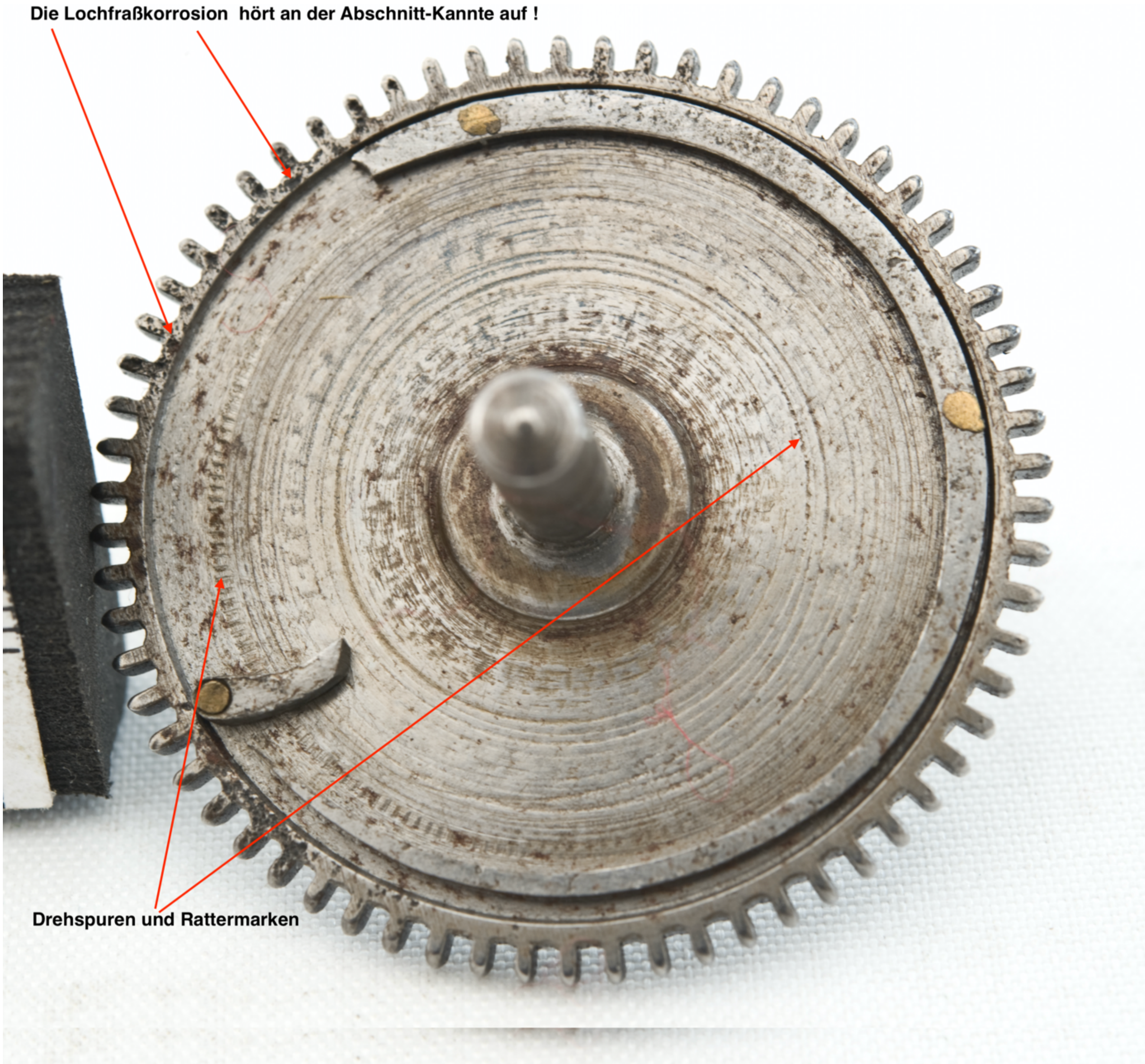


The detent on the ratchet wheel, due to its narrow dimensions, only reaches about three-quarters of the width of the tooth flank. The teeth of the ratchet wheel have been filed with scratch marks across the entire width. This inhomogeneous, feigned wear pattern of the detent on the teeth already suggests at this point that the crafting was done with the intent to counterfeit.



As can be proven for all other gears in the movement, the fusee wheel mounted on the detent is made from old iron material. The flanks of the wheel show significant old corrosion, some of which also has traces of pitting. However, this corrosion pattern is notably absent on the tooth cycloids, the tooth flanks, and the tooth roots.

The corrosion pattern, which extends to the cutting edges, would not have stopped at the edges in the case of homogeneous corrosion. It would naturally have continued into the tooth roots, tooth flanks, and cycloids as well.



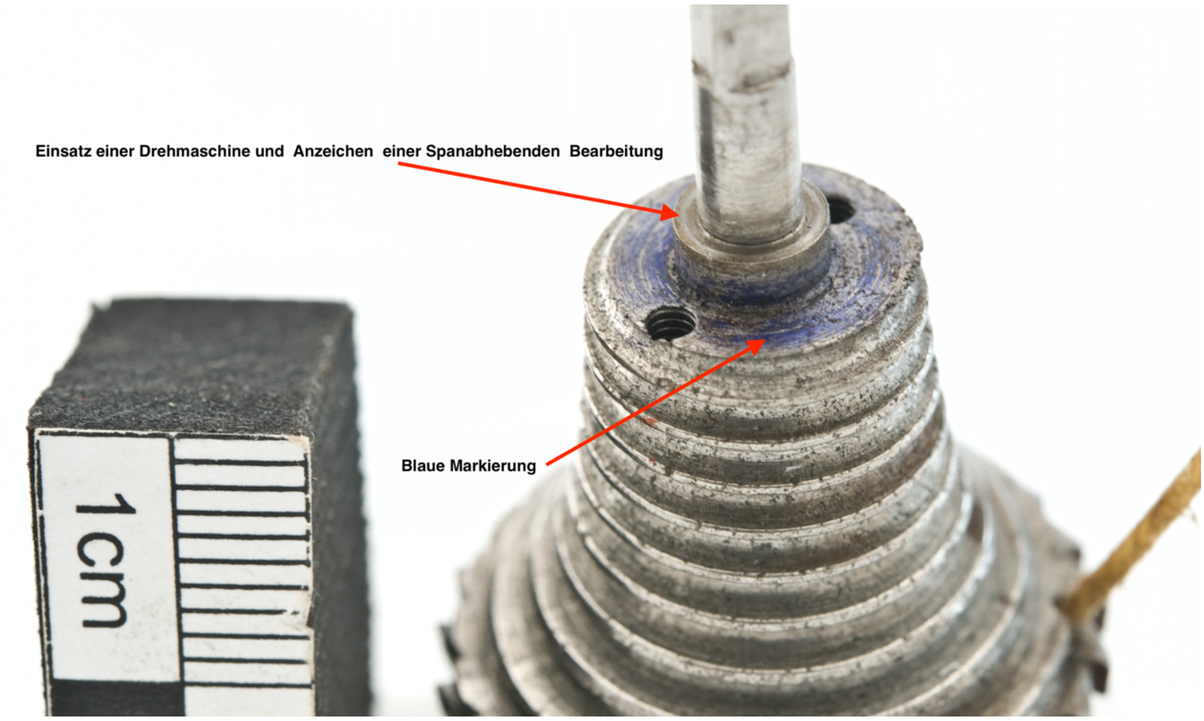
The tooth flanks appear to have been heavily polished at their cycloids and also exhibit an entirely inhomogeneous wear pattern in relation to the corresponding drive engagement with the fusee wheel. (See microscopy)

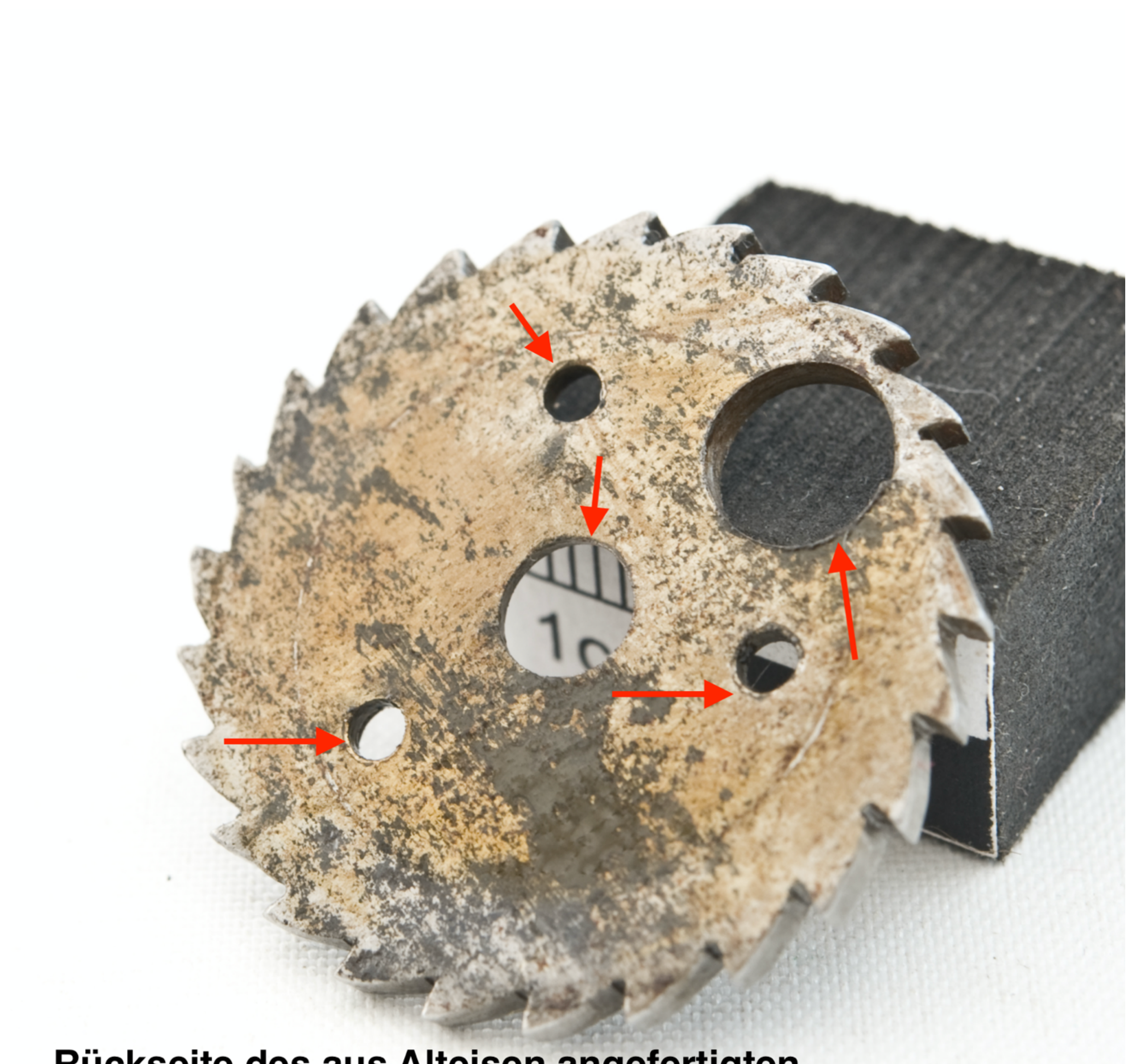
The detent wheel of the fusee, also made from old iron, shows sloppy workmanship at the points marked A, where the detent teeth have been poorly crafted. Points B indicate the subsequent fresh deepening of the borehole at the entrance for the gut string knot.

The extreme flat filing of the tooth tips may also have been carried out to avoid any rubbing or jamming of the detent teeth against the pressure spring of the detent cone.

The disassembly of the fusee snout shows clear signs of being a new fabrication.

The assembly of the fusee snout onto the neck of the fusee involved modifications to the fusee neck. The worker used blue paint to mark their working dimensions. Since this marking was later covered by the attached fusee snout, the worker likely did not consider it necessary to remove their telltale traces.

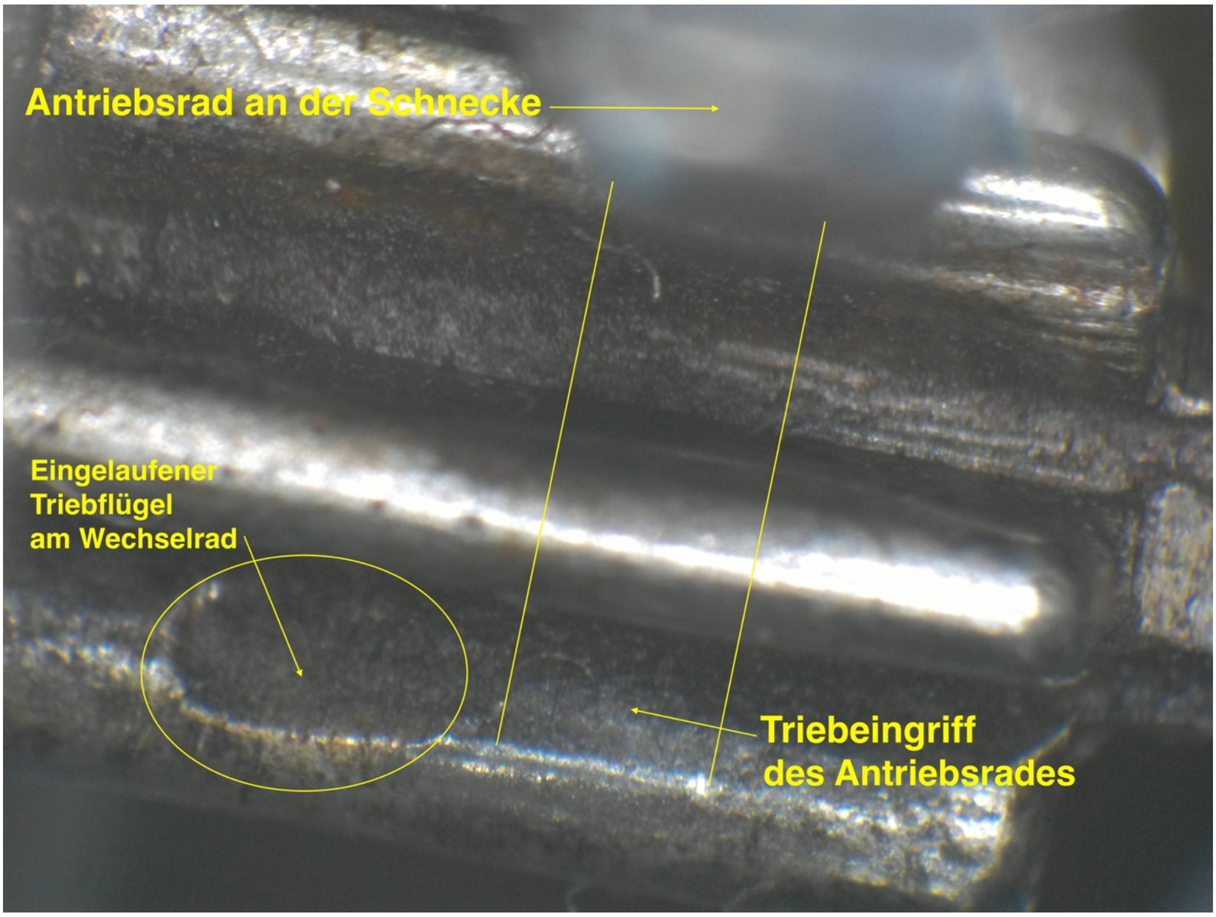




Rückseite des aus Alteisen angefertigten Schneckensperrrades mit Bohrungen und Kantenfräsung

Back side of the fusée stop wheel made of old iron, featuring drill holes and edge milling.© Restaurierungsatelier Jürgen Ehrt

Mikroskopie

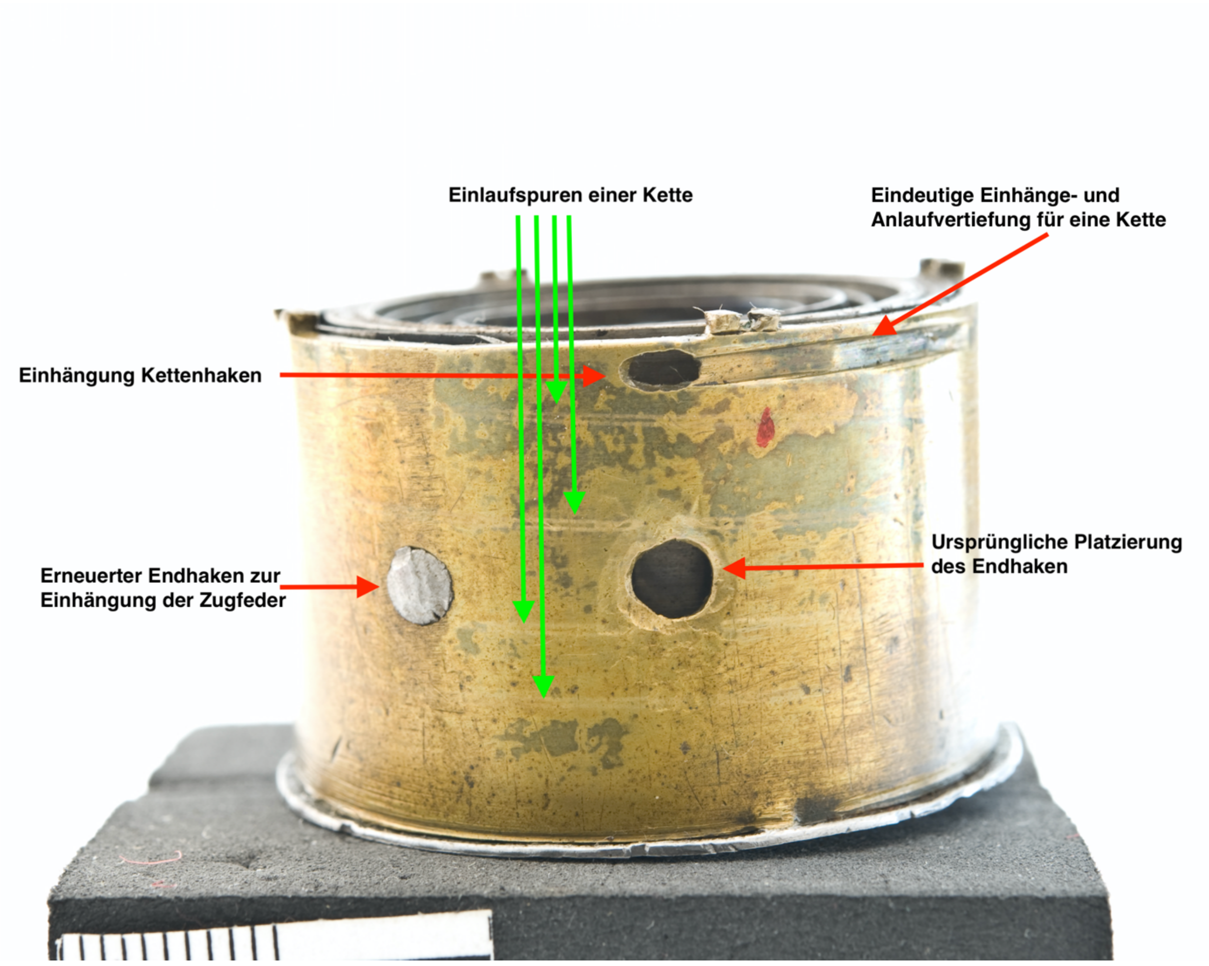


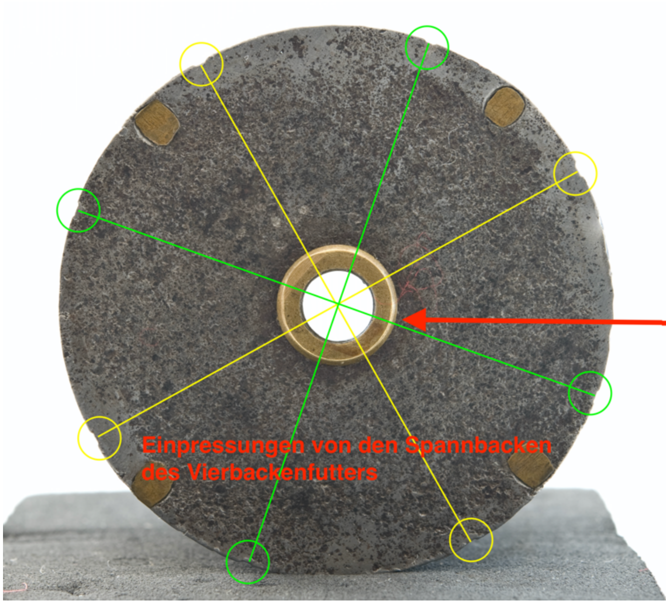
In the microscopic image, the incompatibility between the fusee wheel and the reversing wheel drive is clearly visible. The wear marks on the drive wings of the reversing wheel should align with the position of the gear engagement from the drive wheel of the fusee, but in reality, the wheel drive engagement is offset.

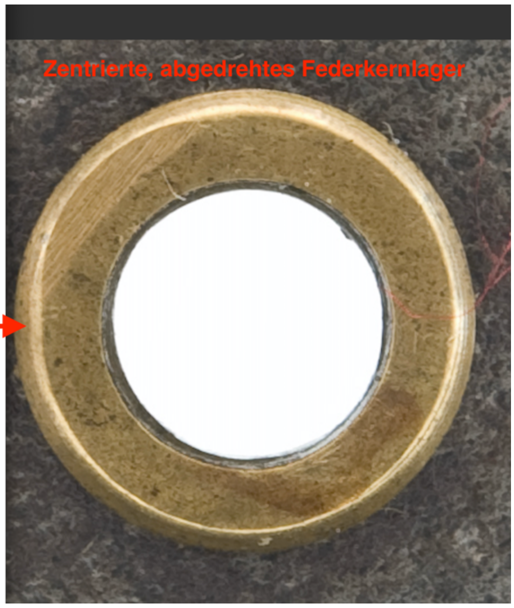
Investigation of the movement's mainspring barrel:

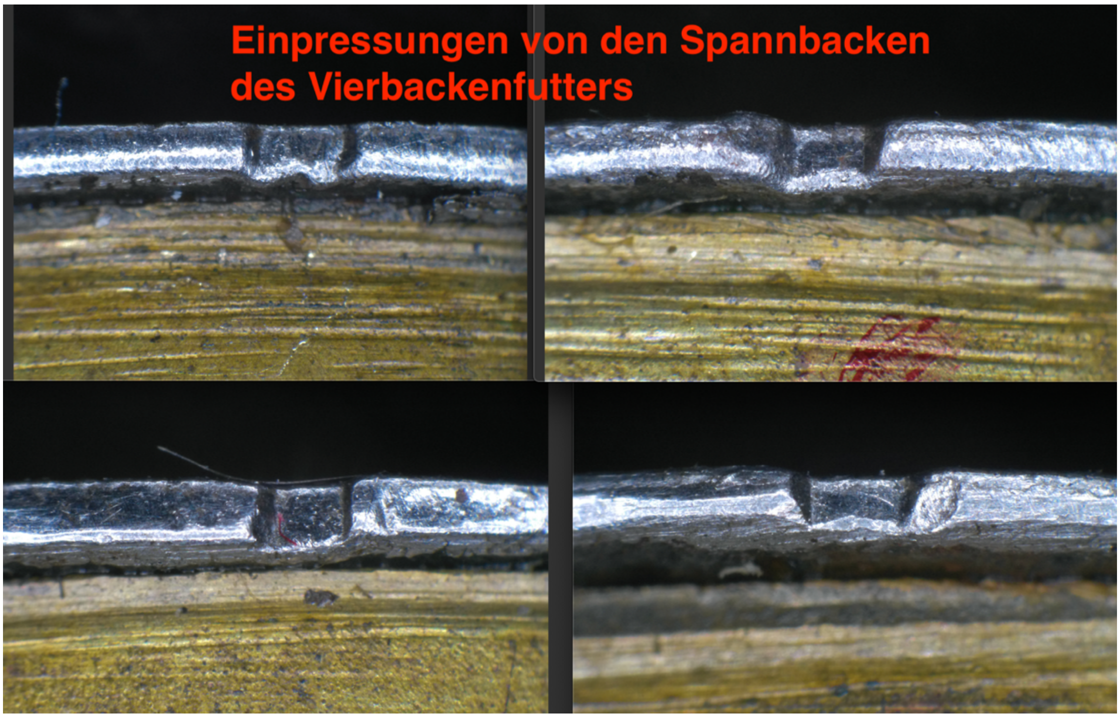
The mainspring barrel is a combination of brass and iron materials. The mainspring barrel was originally not operated with a gut string. The stereoscopic examination of the brass surface revealed that the mainspring barrel was previously used with a chain. This is further supported by the hook engagement on the barrel surface, which was designed for the locking of the chain hook.

Assuming that the fusee has an unchanged semi-circular running surface on its turns, as required for use with a gut string, it can already be postulated that the fusee and the mainspring barrel do not belong together for this reason.









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It can be assumed that in order to fit the newly manufactured mainspring arbor (spring core), the mainspring barrel had to be modified at its cover openings. For this, the mainspring barrel was clamped into a four-jaw chuck (green), and after re-clamping, it was done a second time (yellow). The turning marks on the brass bearing are clearly visible on the outer edge and in the bore.

The mainspring barrel shaft is of more recent manufacture and does not match the design of a mainspring barrel shaft from the second half of the 16th century. The stereoscopic examination proves that the mainspring barrel shaft is a new creation.

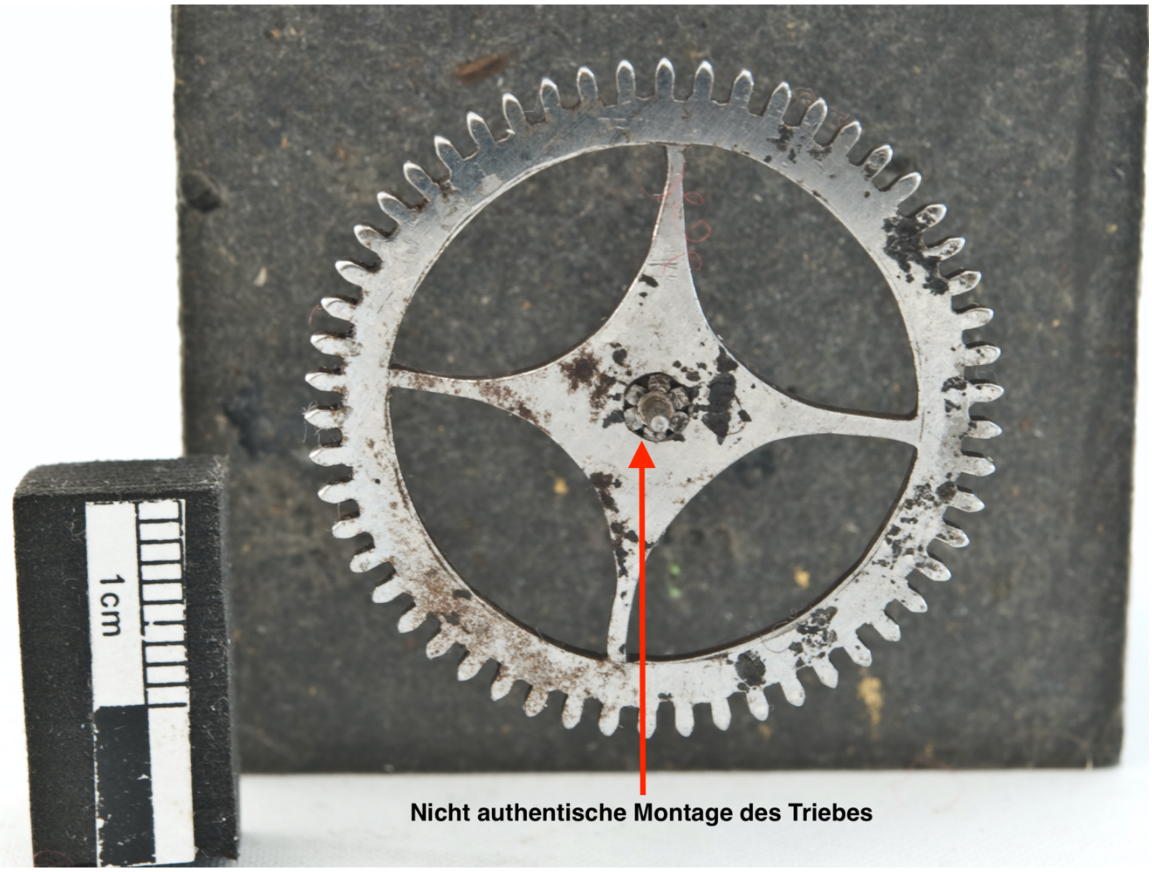
Due to reversibility considerations, the disassembly and examination of the mainspring was omitted.

Examinations of the intermediate wheel:

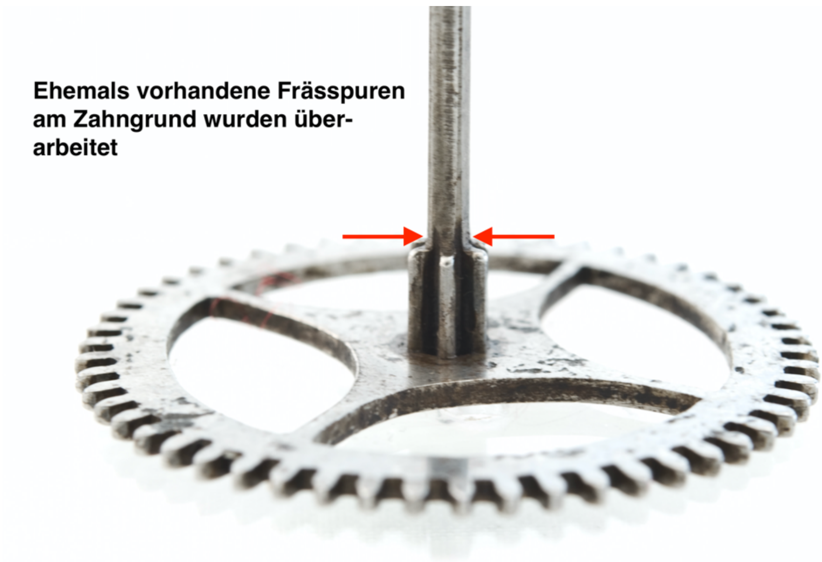
The gear between the fusee wheel and the crown wheel—referred to as the intermediate wheel—is a new creation made from old iron.

The wheel was cut from old, heavily corroded iron, some of which shows signs of pitting, and was rudimentarily machined to simulate an old, worn condition. As described with the fusee wheel, the same procedure was followed here. Notably, there are also no uniform corrosion patterns on this gear. However, traces of use on the intermediate wheel mechanism indicate that it was previously used in a different movement, i.e., in another clock.

The shaft, too short to fit into the 29.5mm gap between the plates, was fitted with a brass bearing. The shaft, made of iron, comes from a stock of old parts, has been reworked, and modified for use in this clock. The gear does not engage correctly with the next wheel, the crown wheel. Therefore, no corresponding wear patterns can be detected.

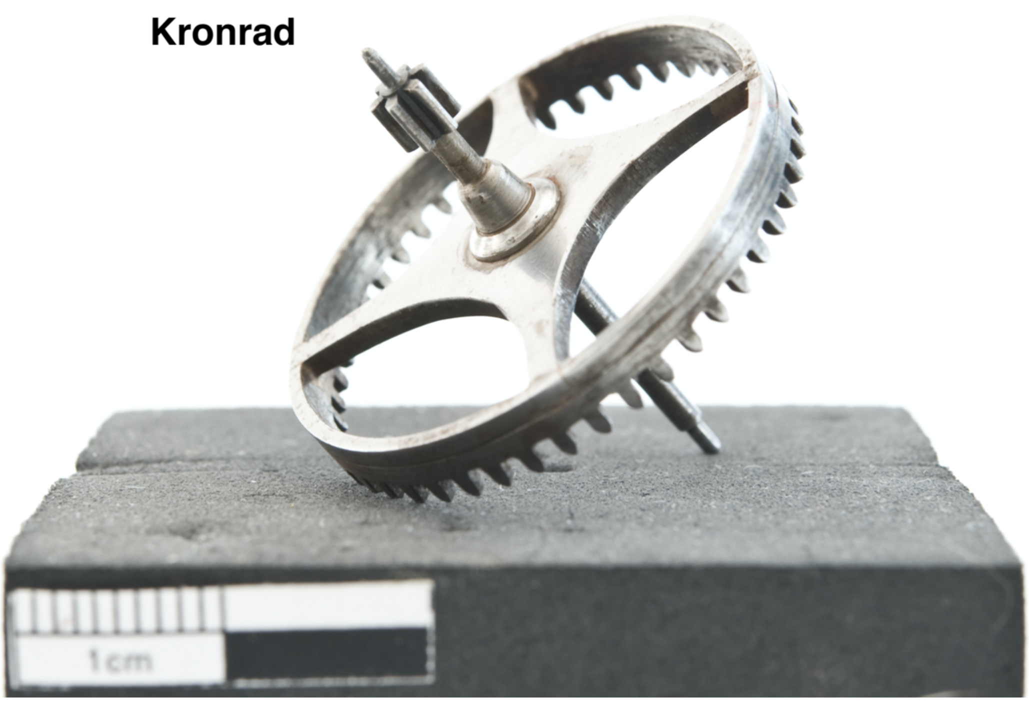


The gear shaft was subsequently reshaped from its original round form to a square shape. Evidence of this modification can be found in the filed traces left on the gear teeth.



Investigations on the crown wheel:

The crown wheel corresponding to the change wheel is also a new construction made from old iron. No coherent wear traces from the change wheel are observable on the crown wheel. However, authentic wear traces from use with a clockwork not belonging to this mechanism are present on the crown wheel drive.



The shaft of the crown wheel was modified from an old shaft and adapted to the crown wheel.

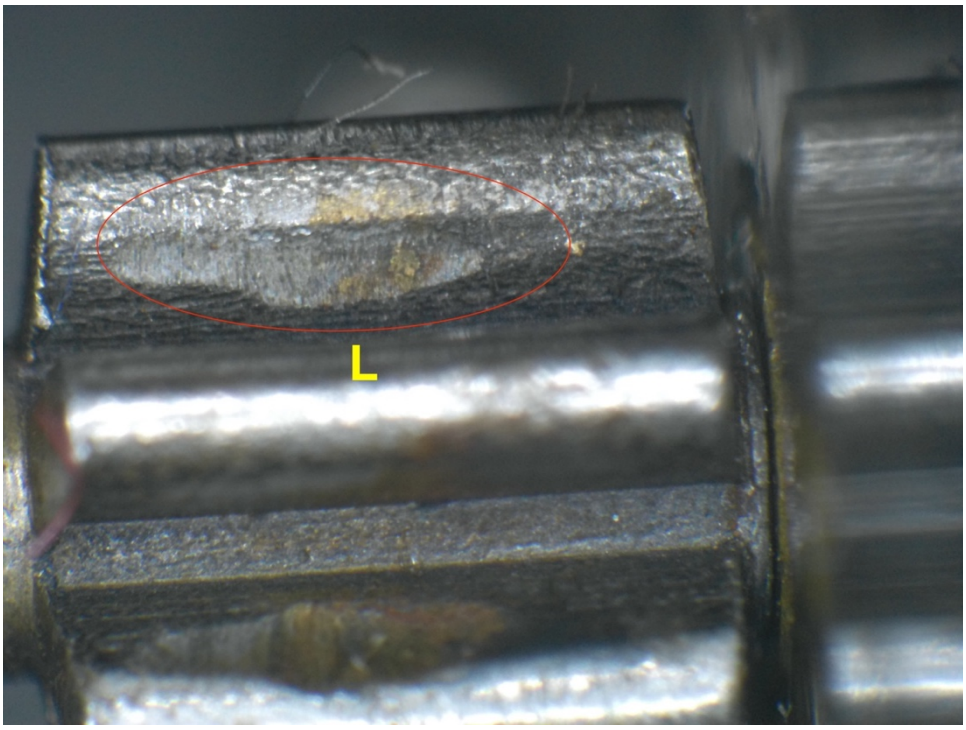
Explanation of Microscopy 01 to 04

This drive shaft was previously operated in the opposite direction (**L**). However, for use in this clock, the reverse direction was required, so the previously unused drive flank (**R**) had to be worn in. To achieve this, material was milled off the unused flank using a milling cutter, in an attempt to simulate a worn drive flank.

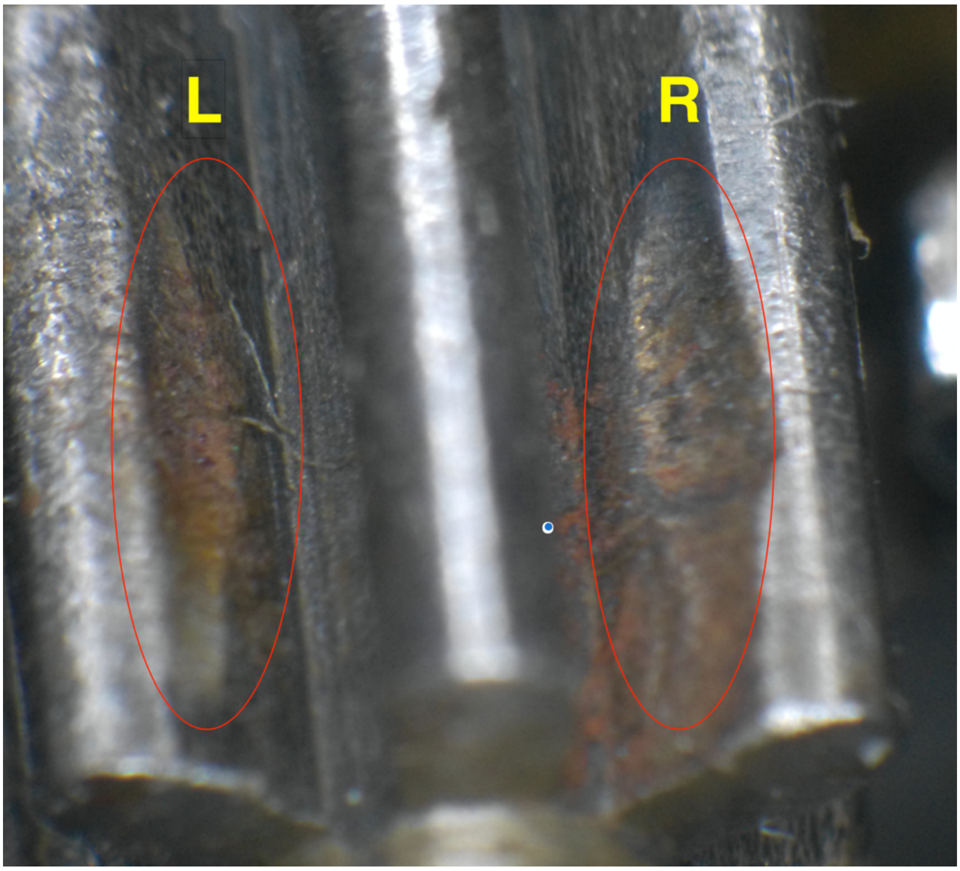
The brass-colored deposits are corrosion, which was not color-accurately represented due to light reflection under the microscope.

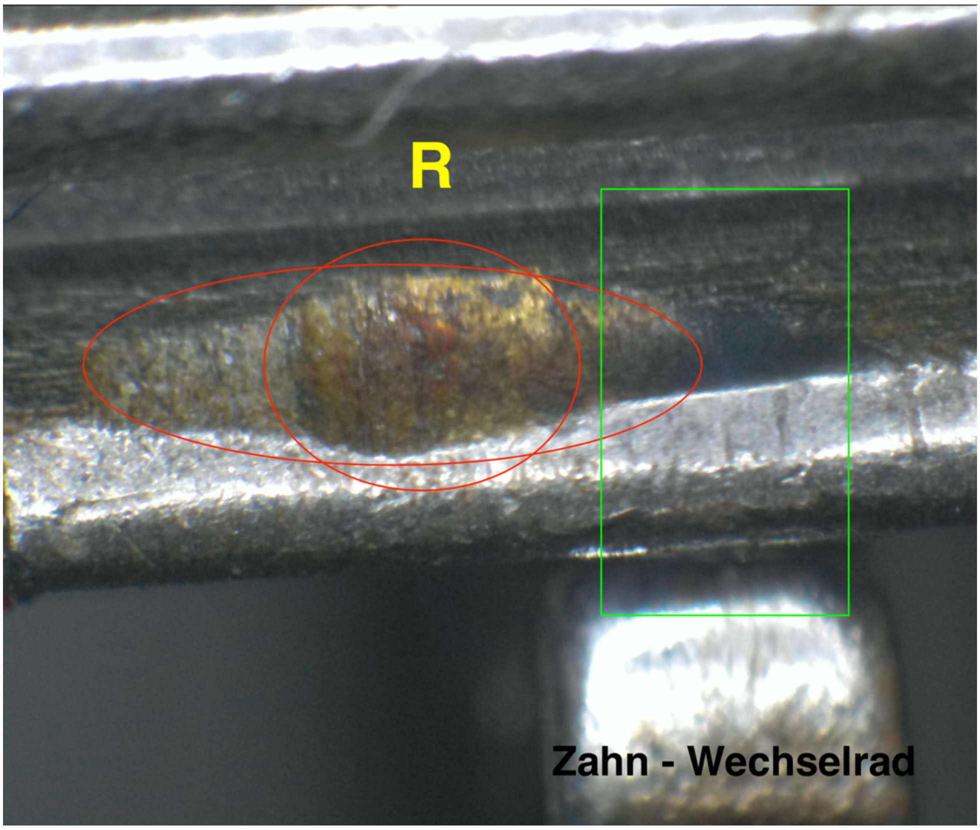
A clear indication of the incompatibility of the drive engagement can be seen in **Microscopy 03.** Here, the tooth engagement of the escapewheel is outside the <u>simulated</u> wear marks.

Mikroskopie 01

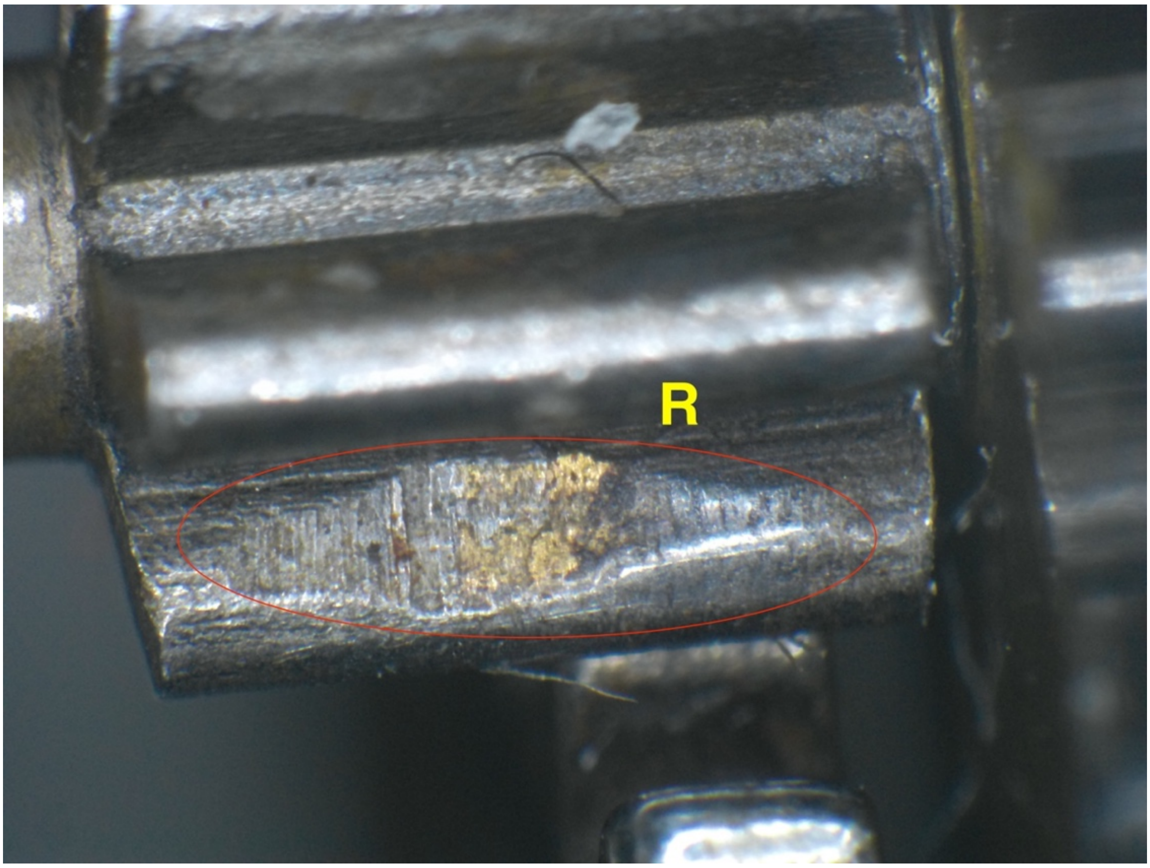


Mikroskopie 02 und 03



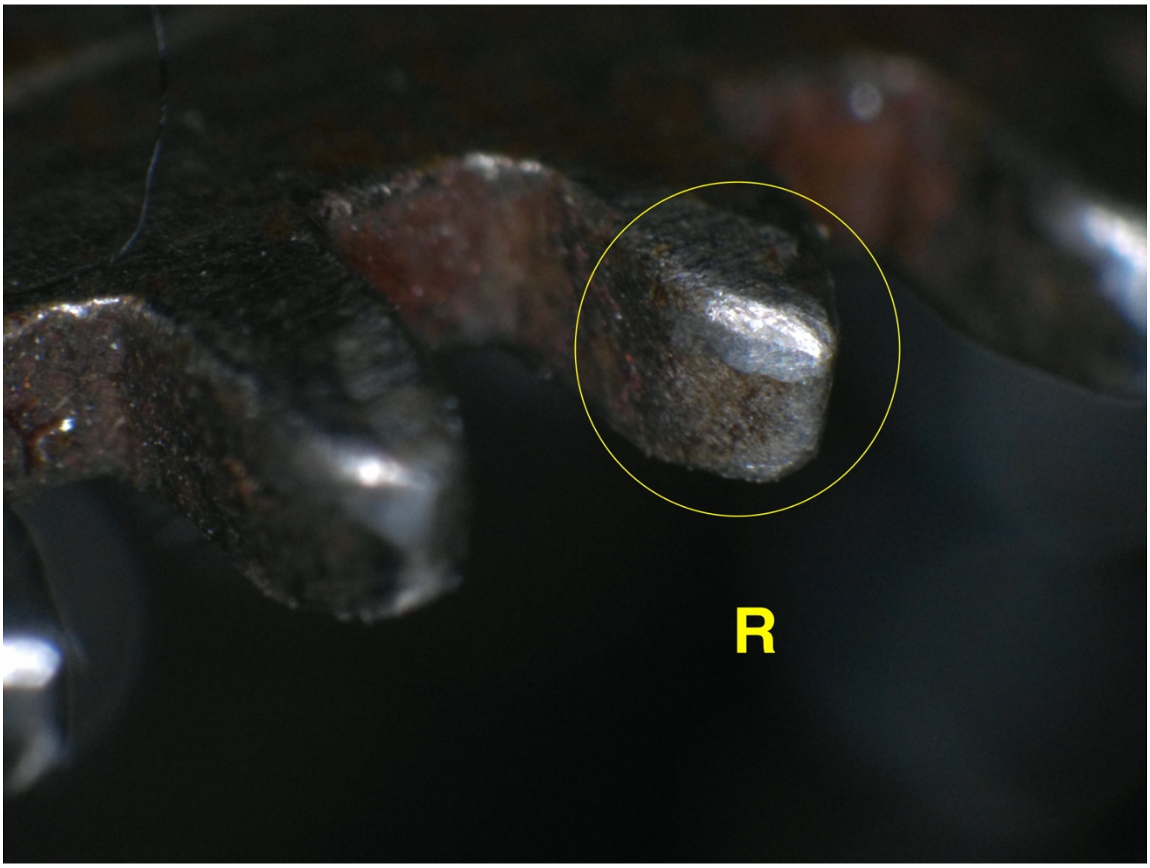


Mikroskopie 04



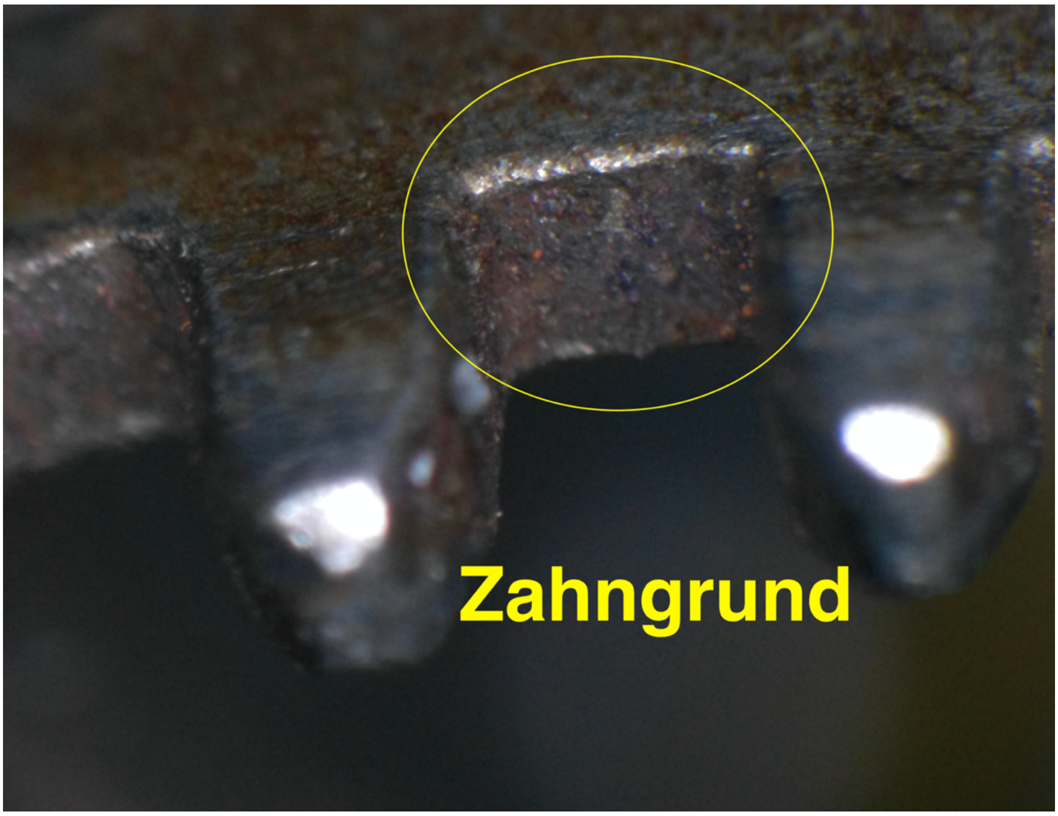
Tooth profile on the crown wheel

The tooth profile of the crown wheel also shows no usage-related traces on the tooth flanks and cycloids.



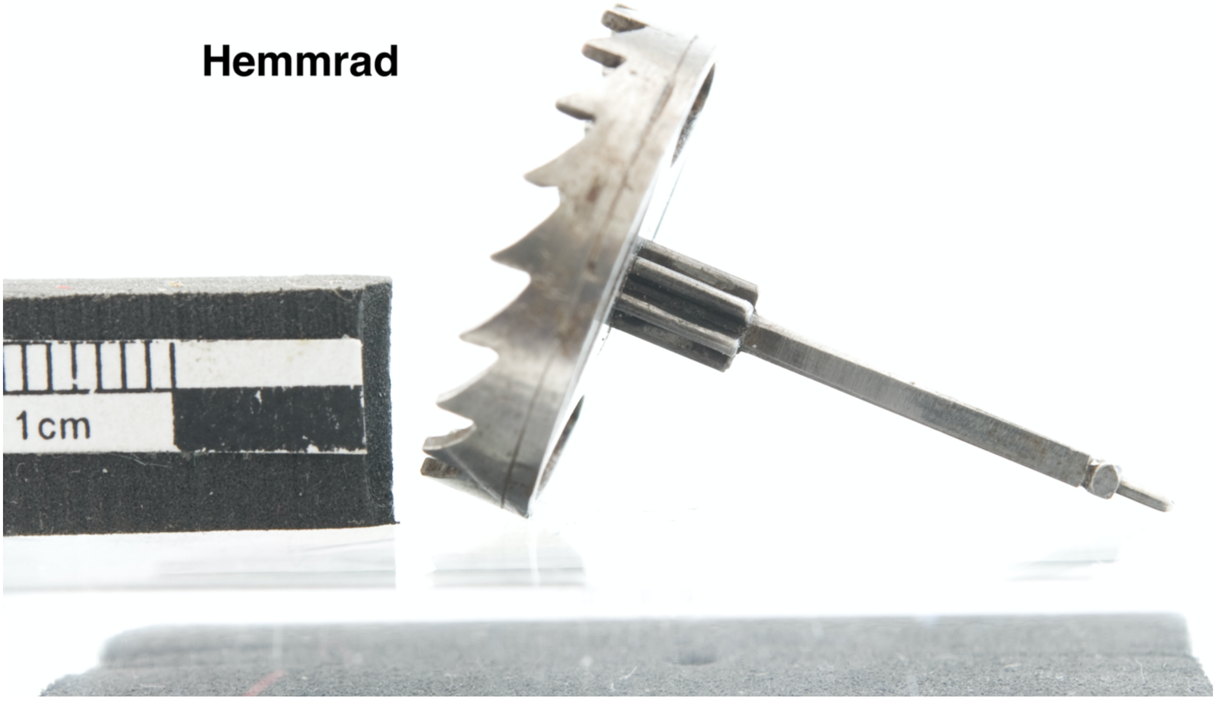
The tooth root of the crown wheel shows the typical pattern of machine-assisted milling. Here, one would expect to see filing marks, as the manufacturer attempts to suggest at other places in the movement.


L


Zahngrund

Investigations on the escapement wheel:

The escapement wheel shows heterogeneous wear marks on both sides of its tooth flanks, but these do not correlate with the engagement with the crown wheel. Based on this observation, the escapement wheel, which is also newly made, must be considered inauthentic.

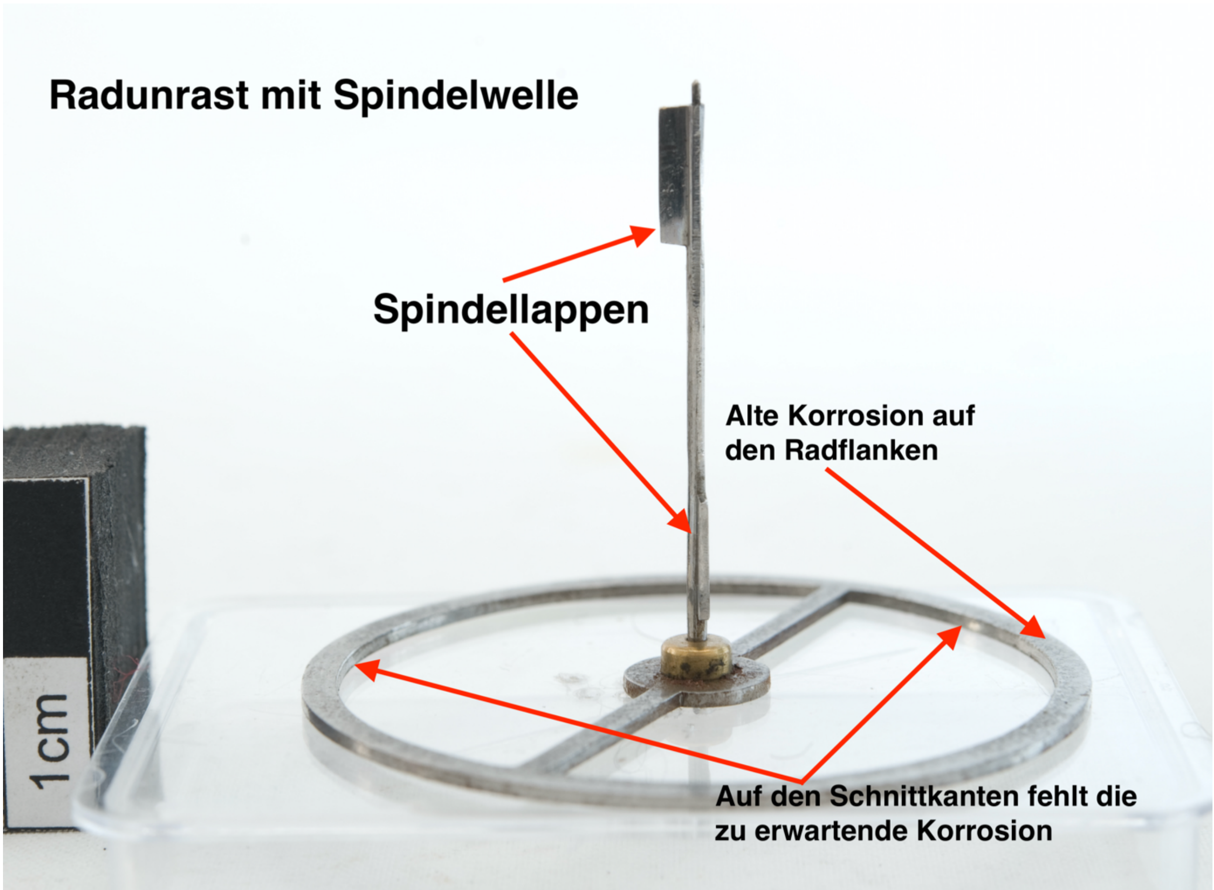


Investigations on the verge with detent wheel:

The verge with detent wheel is a complete new creation made using old iron.

The lobes of the shaft show no signs of wear on their engagement or running surfaces.

The detent wheel is coated with old corrosion on its outer flanks, which should also be present in the tooth edges of the wheel and the arms, but it abruptly stops at this point.



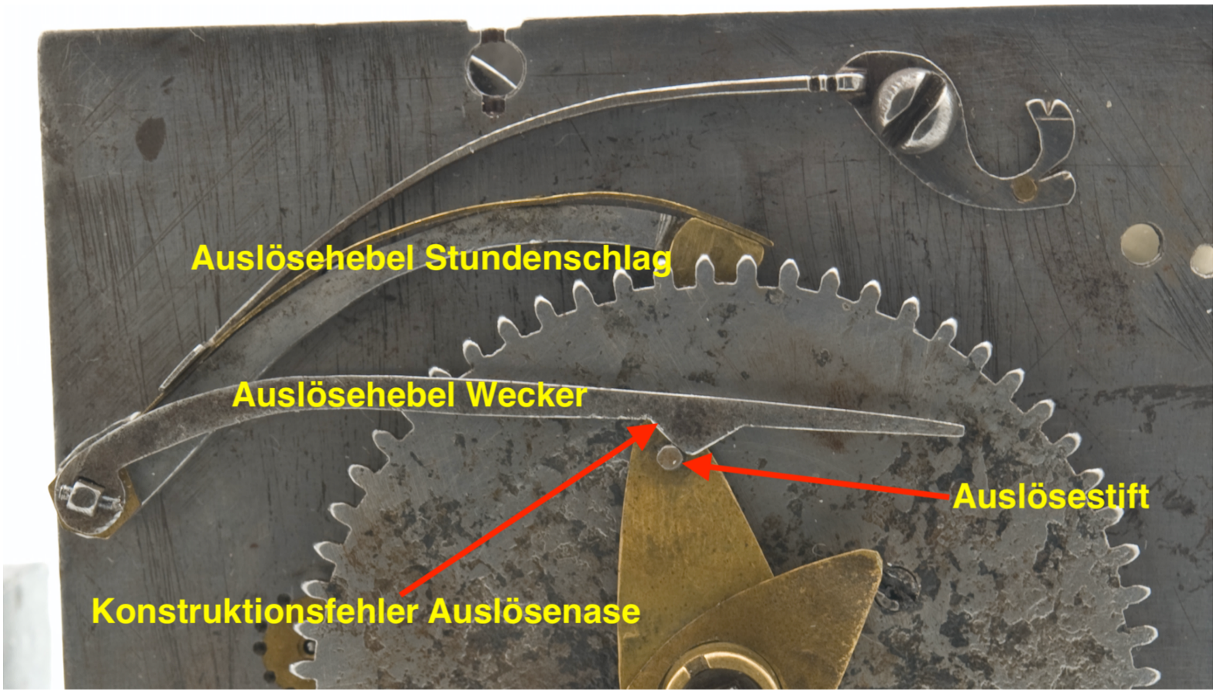
Investigations on the alarm and strike mechanism:

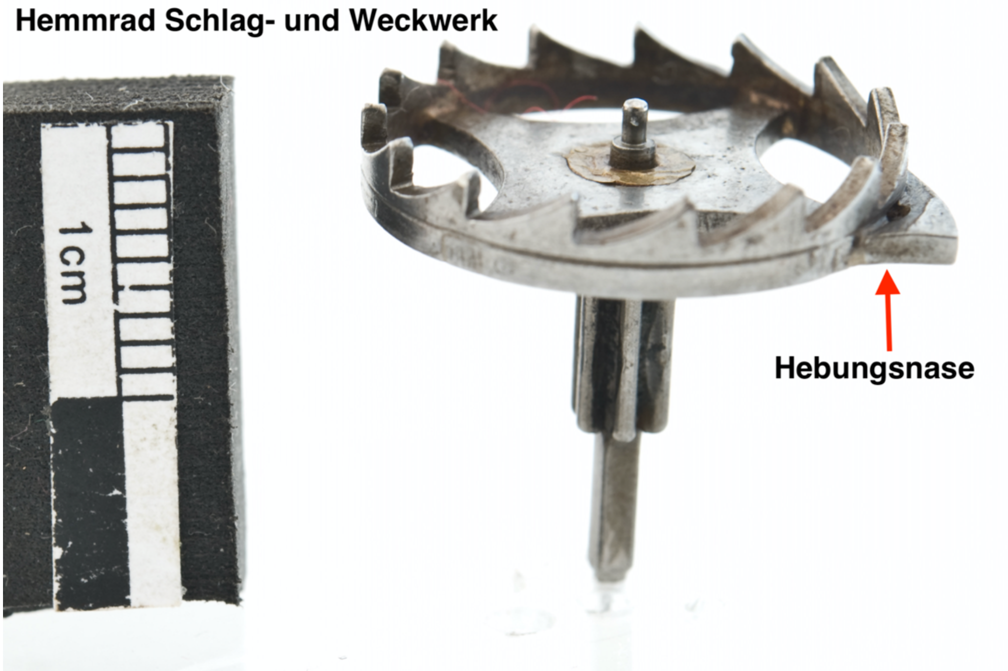
The alarm mechanism is a complete re-manufacture made from old parts and old iron. The escape wheel could very well be from another old clock.

An unusual feature, which I have not encountered before, is the activation of the alarm mechanism every full hour, essentially an “en passant” activation through the alarm mechanism. In this case, the mechanism activates the alarm every hour via a stork's beak on a 24-tooth trigger wheel. This results in a very short, alarm-like sound with 15 strikes on the same bronze bell shared with the alarm.

The alarm is triggered by a separate lever, which is non-functional due to incorrect design. This lever, along with the stork's beak, is mounted on a square, attached to the end of the trigger and stop lever, which controls the movement and locking on the alarm escape wheel. Due to the design, the lifting action at the triangular trigger is incapable of starting the alarm. The triggering lug should either engage deeper, or the trigger pin should have been placed higher. A lug soldered onto the alarm escape wheel seems to be intended to control the completed operation of the alarm until the entire wind of the mainspring is finished.

Conclusion: All parts associated with the strike and alarm mechanism were either newly manufactured or purposefully repurposed for use in this mechanism.





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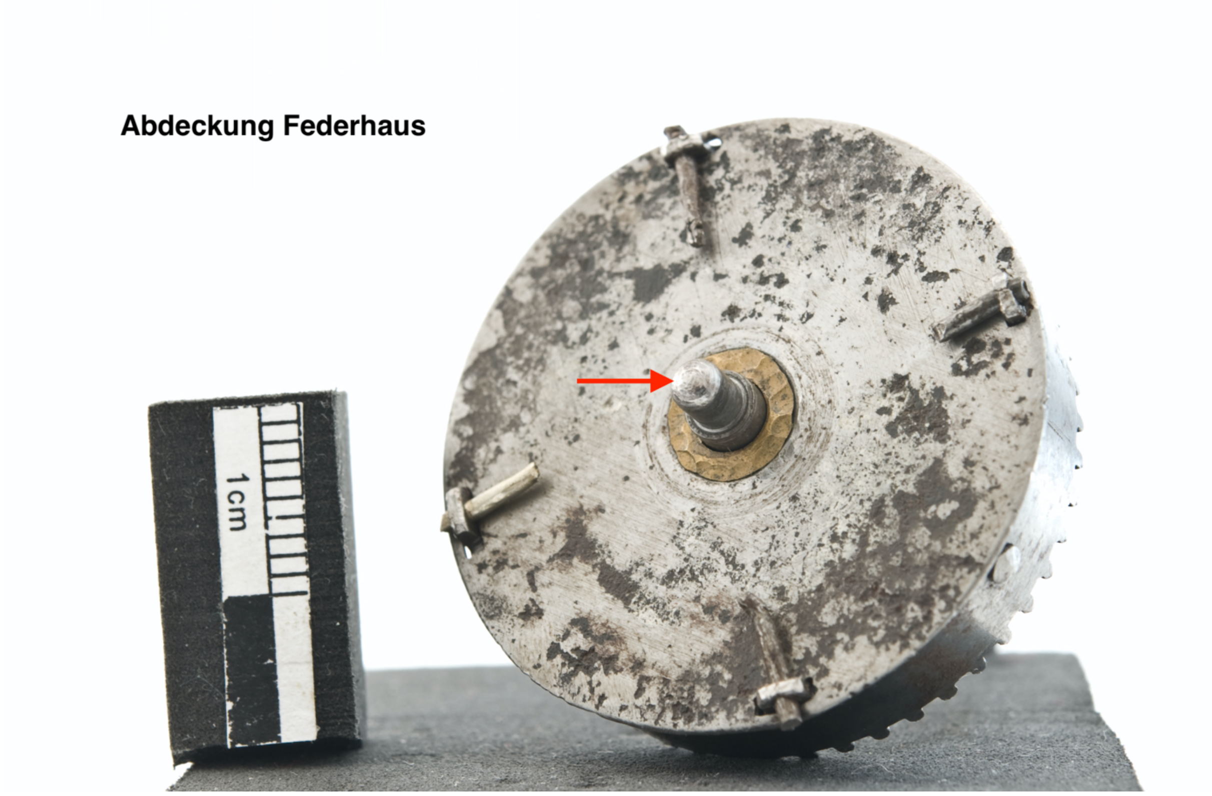
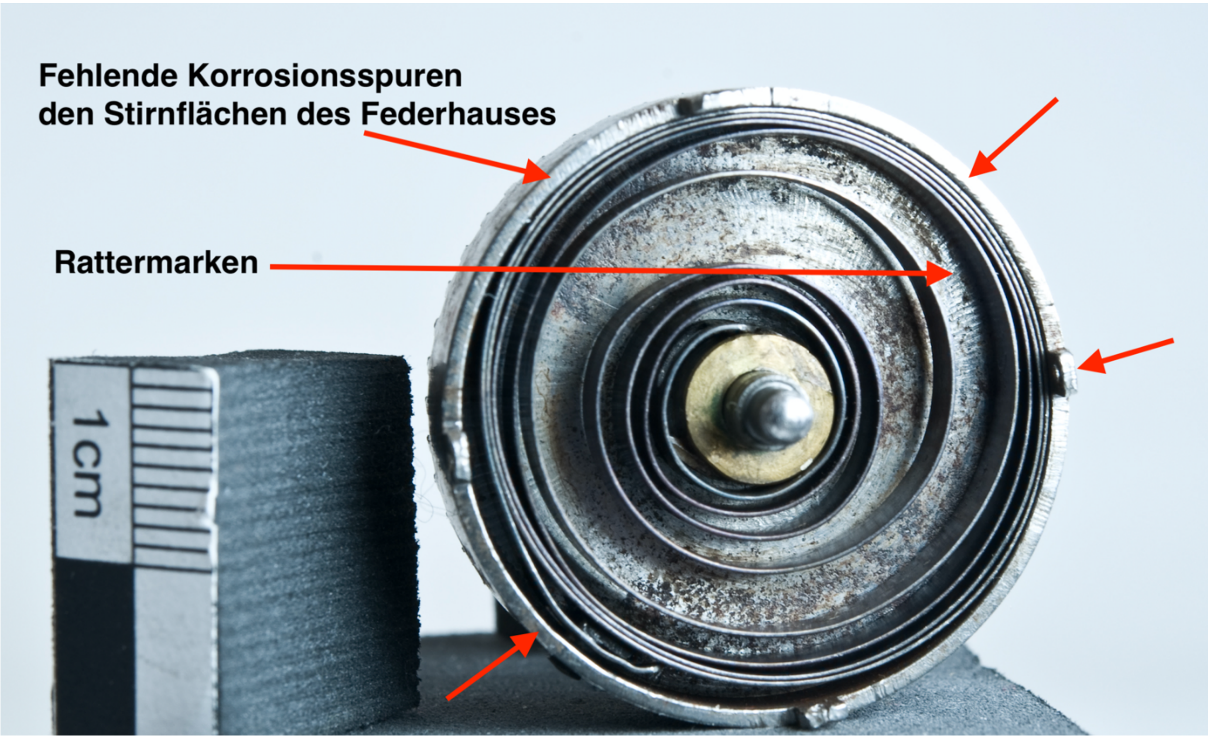
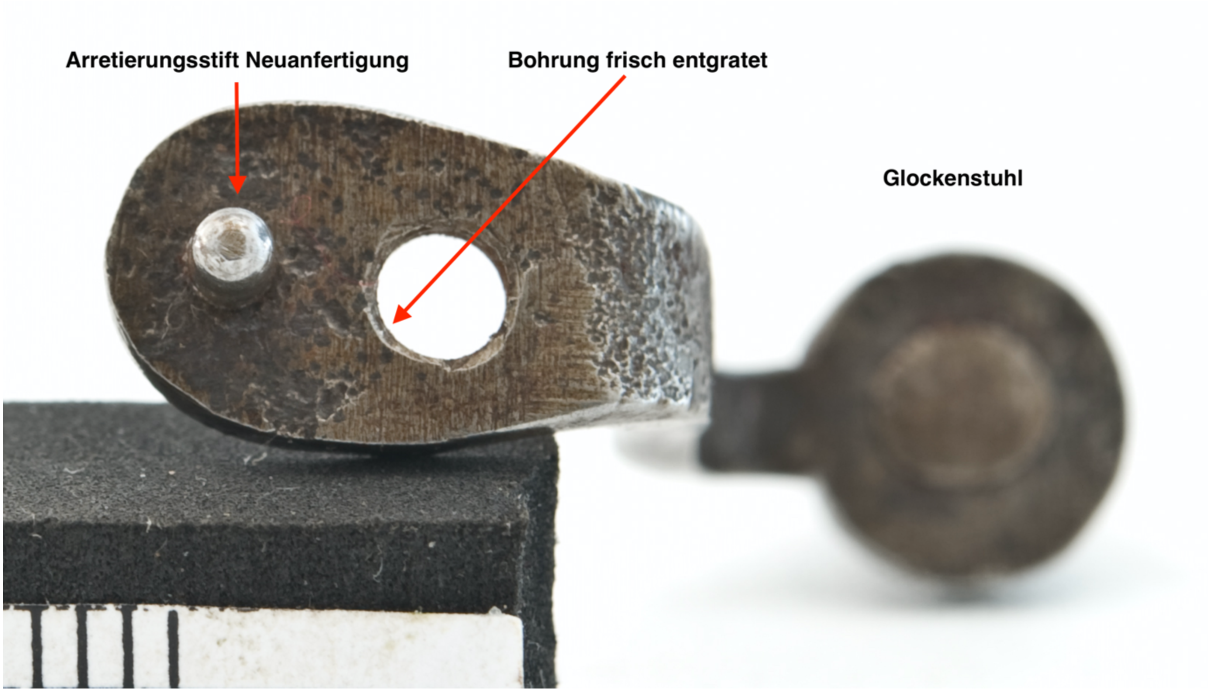
A lug soldered to the escape wheel (see photo) is intended to keep the escape wheel free until the complete winding down of the alarm spring when the trigger lever is lifted to a certain height. The wear marks on the driving wheels show artificially introduced traces and, additionally, on the non-engaging side, old identical wear marks, which, however, do not correspond to any engagement in this movement. This evidence proves that the shaft is an old, reworked shaft from another clock with an inverted running direction.

Alarm mechanism barrel: The barrel, shaft, and gear train are also completely newly made from old parts and old iron.

The use of modern machine technology cannot be concealed in this component either. For example, ratchet marks, created by the cutting tool of a high-speed lathe, are visible on the bottom surface. As with the previously described anomalies, we also find the absence of coherent corrosion transitions in the direct adaptation of components here.

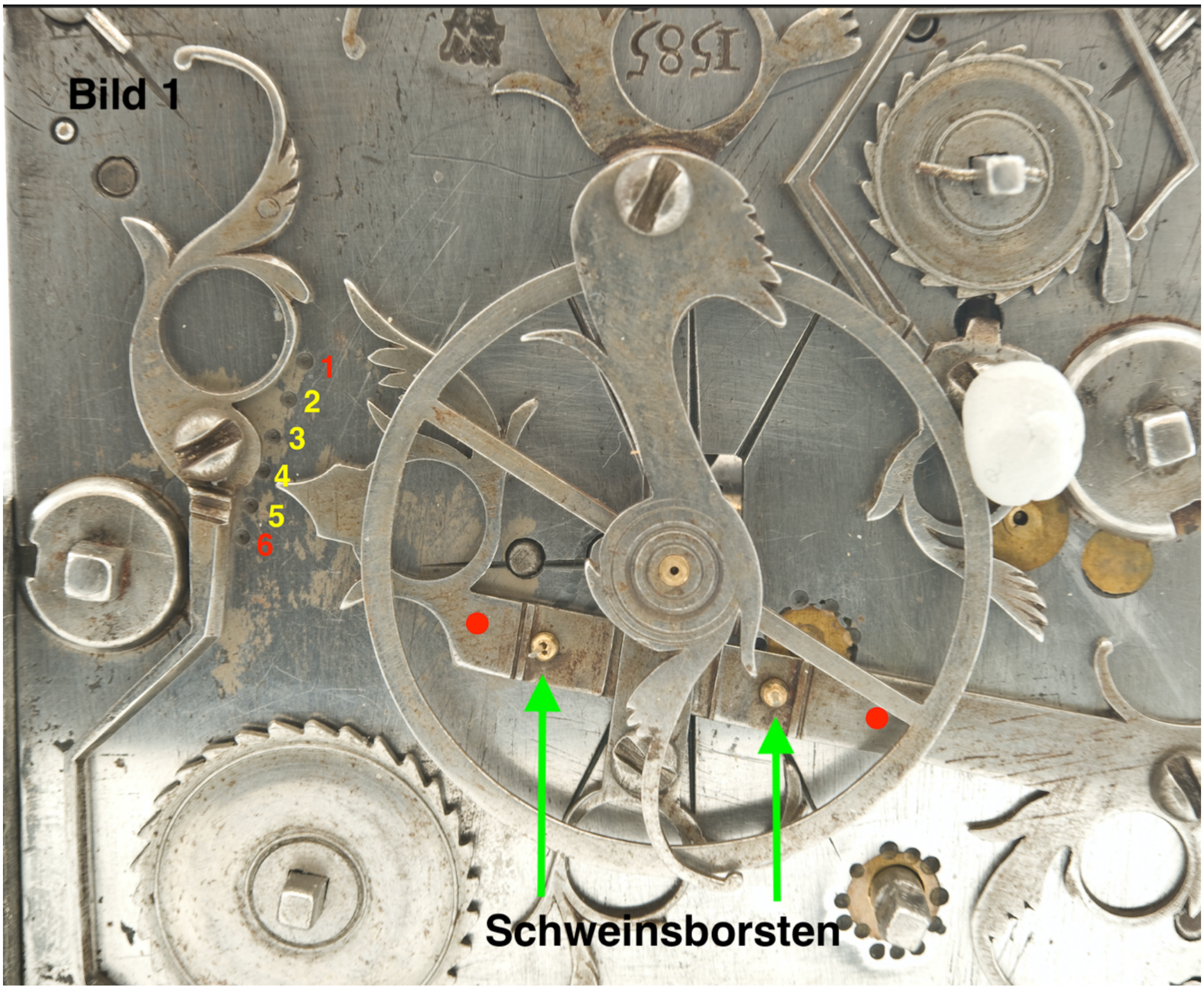

Abdeckung Federhaus
1cm


Fehlende Korrosionsspuren
den Stirnflächen des Federhauses
Rattermarken
1cm



The bronze bell is new and sits atop a bell frame that was made for this timepiece using old materials. It is quite possible that this bell frame originally belonged to an old clock and was adapted to the required dimensions for this timepiece.

Amplitude limitation of the verge
So-called pig's bristle regulation



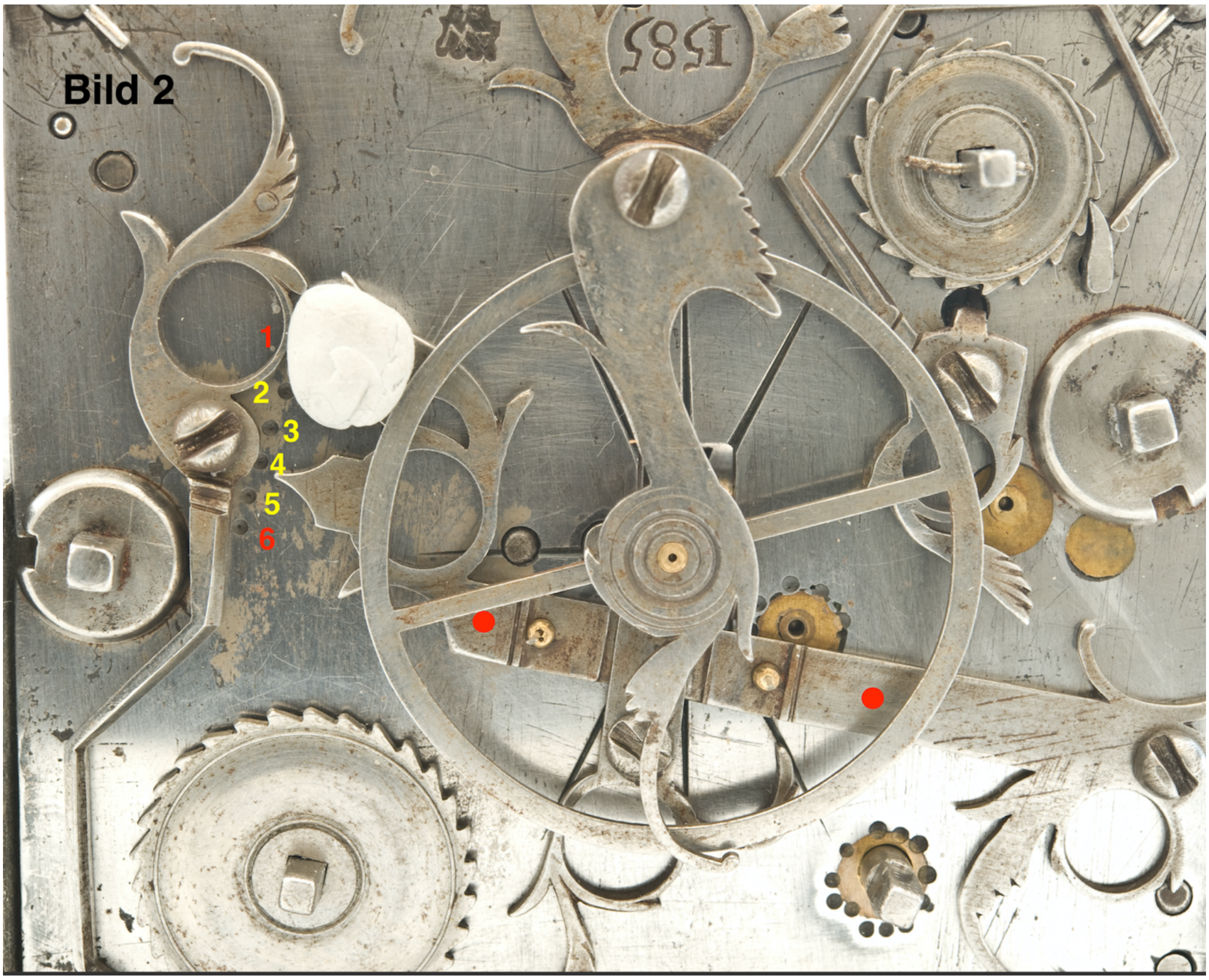
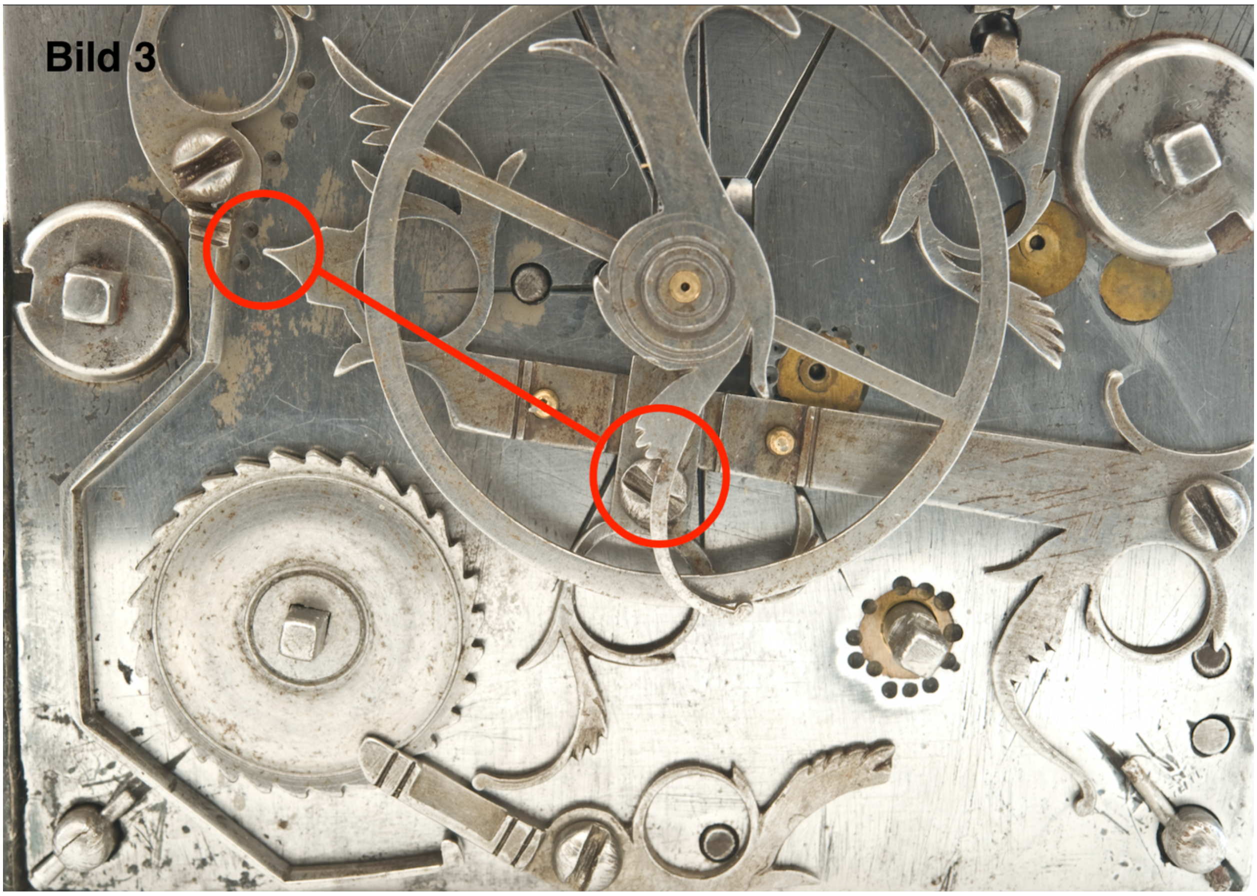


Bild 2
1585
1
2
3
4
5
6



The oscillating verge receives a trigger pulse through the lifting of the verge pallets, which is transmitted via the verge wheel. The amplitude of the verge is limited by two opposing pig's bristles. See the green marking, which is inserted into the movable regulation arm, riveted to the plate (in this clock, plastic threads are used instead of pig's bristles).

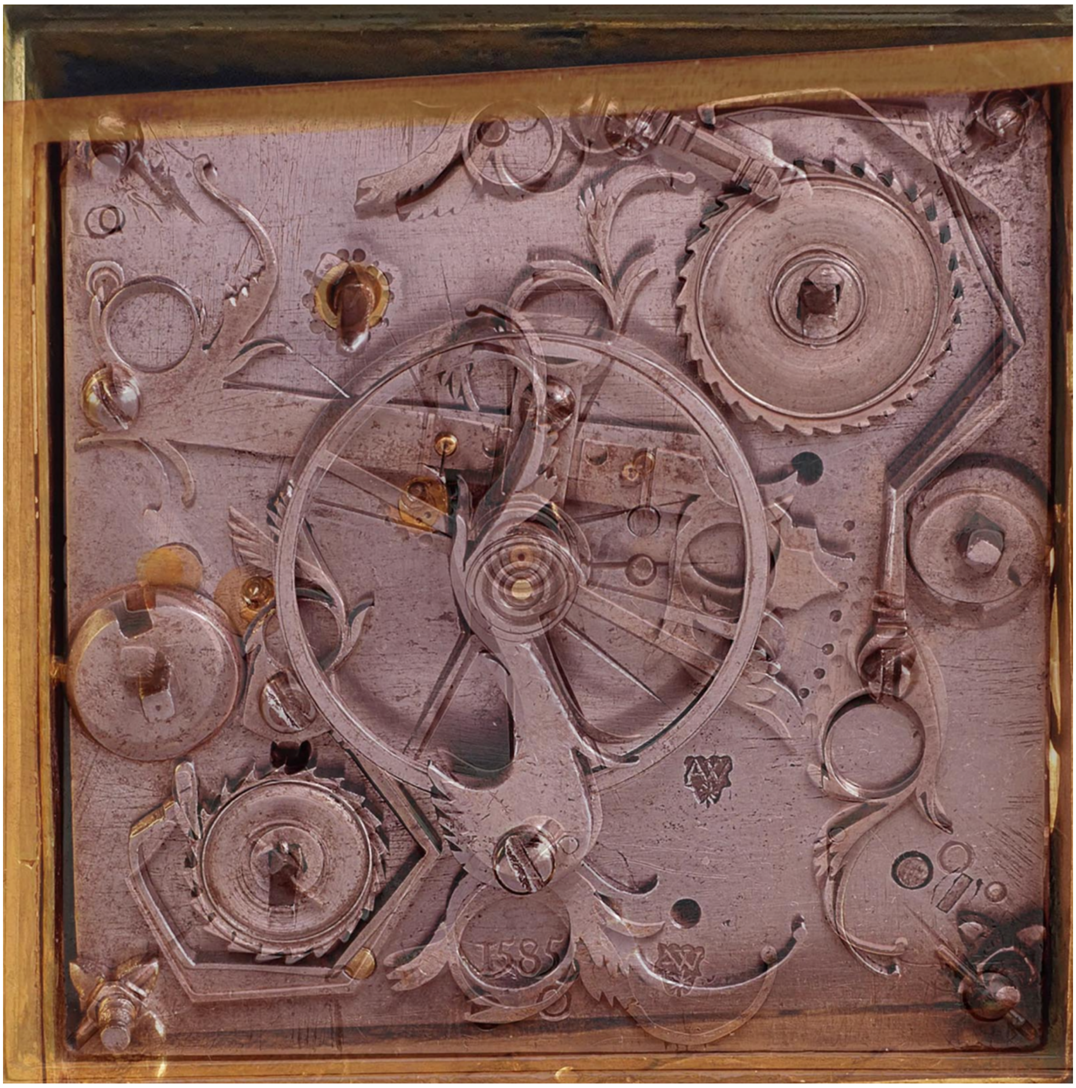
Originally, the wheel arms of the verge would rebound from the bristles and follow a reverse path. By shifting the lever and thus changing the distance between the wheel arms and the pig's bristles, the speed of the gear mechanism changes in proportion to the distance. This, in turn, regulates the clock's advance or delay via the hour wheel and the hand placed on it.

The clock under investigation is a random construct that cannot function properly.

The positions, marked by struck round punches, on images 1 and 2 labeled 1 to 6, represent the regulation points. Points 2 to 5 would theoretically provide a physical possibility for amplitude limitation, if the clock's driving system possessed enough power. However, this clock only has enough power to enable a limitation with points 2 and 3. For this, it would be an absolute prerequisite that the regulating bristles be positioned at the locations marked with red dots.

The pig's bristles, marked with green arrows, are positioned absolutely incorrectly and are non-functional as amplitude limiters.

It is noteworthy that the red-marked regulation points 1 and 6 are irrelevant. At position 1, the opening angle is so narrowly positioned that the verge only reaches a brief tremor. Meanwhile, regulation point 6 cannot even be reached by the regulation slider with the bristles on it. The regulator lever already hits the screw that locks the guide arm of the regulator lever shortly after leaving point 5. (See red circle marking on image 3).



The overlap of the two clocks, "Muser and Warner Bros.," shows striking similarities!


Q
E
N
O
I
d
G
D
S
R
M
H
B
J
C
A
F
L
T
1585
P
K

Evaluation of the upper plate signed with 1585 and a punch:

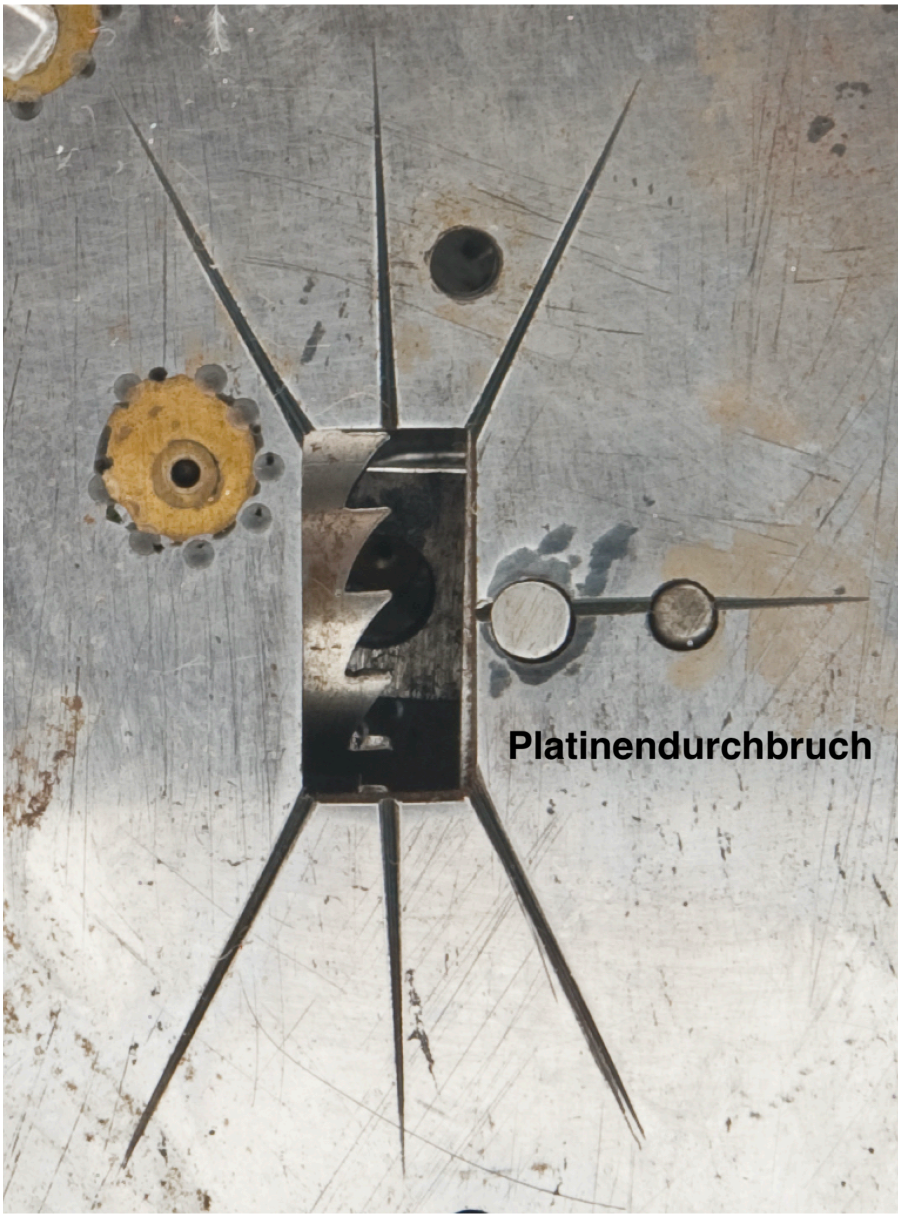
The components on the reverse plate, labeled alphabetically from A to Q, all show significant alterations, some even being completely newly fabricated.

A: **The block** for the upper limit of the verge, with newly inserted brass bearings for the upper spindle arbor. The block has been soldered together from old parts and specifically adapted for this plate.

B + C: Locking spring for the locking cone and the locking wheel (**F**) of the alarm and strike mechanism's barrel. These locking springs, like the locking spring (**C**) of the barrel for the movement, are made of old iron. Both springs show heavy pitting corrosion on the back, which is in direct contrast to the corrosion-free upper surfaces of the springs. **It is also impossible** for components that lie flat with their corroded side on the upper plate—like here— to leave no marks on it. This provides another strong indication that the upper plate is not original. The absence of authentic, coherent contact marks on the upper plate is evident at all points where components are in contact with the plate.

In the stereoscopic analysis, it can be proven that the hole for the verge in the upper plate was machine milled.

This evidence alone disqualifies the upper plate under investigation for this timepiece. This implies that the signature "**1585"** and the punch with the ligature **AW** on the plate <u>cannot be original.</u>

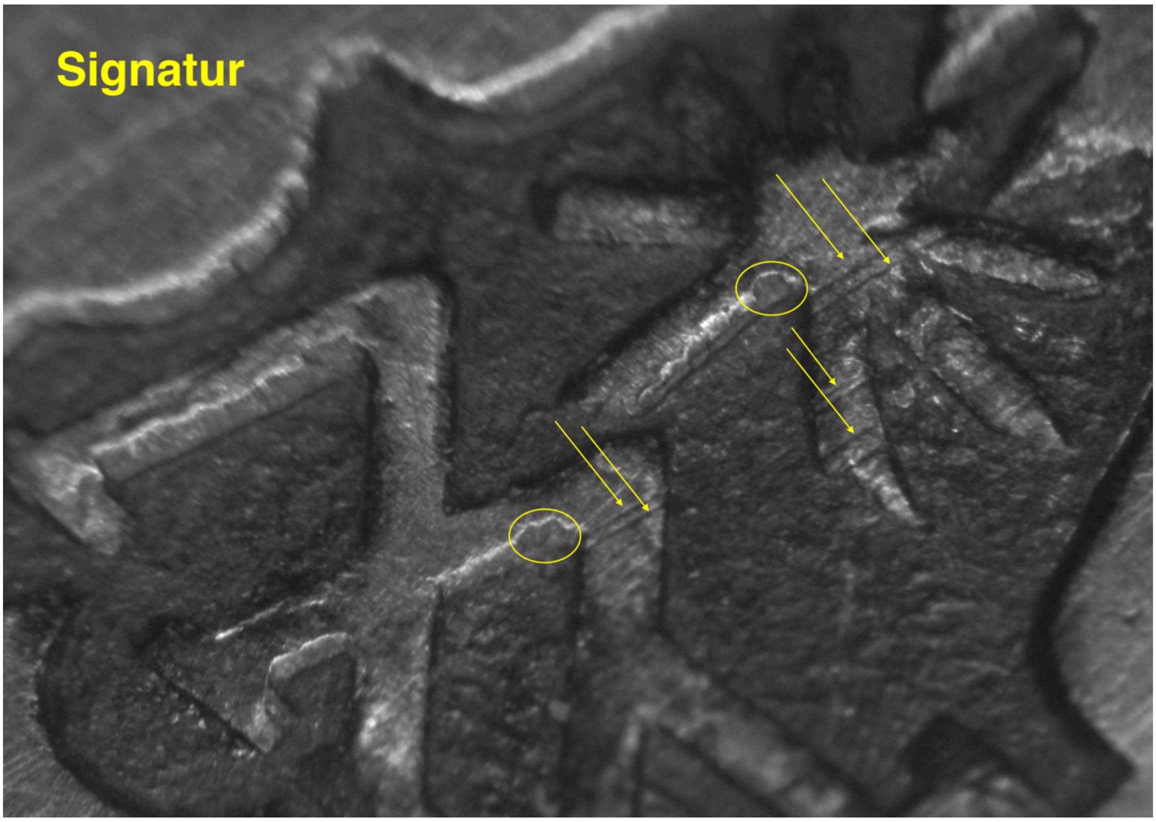


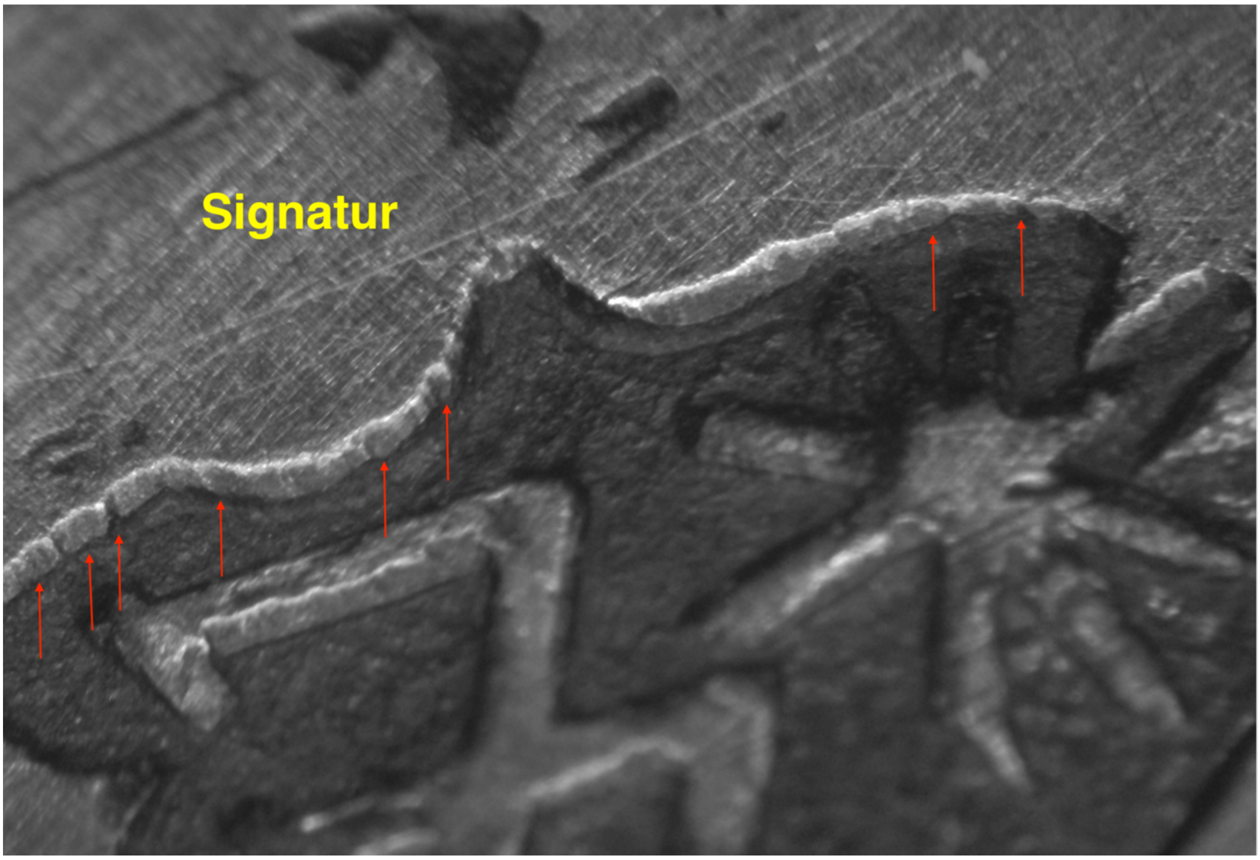
The signatures:

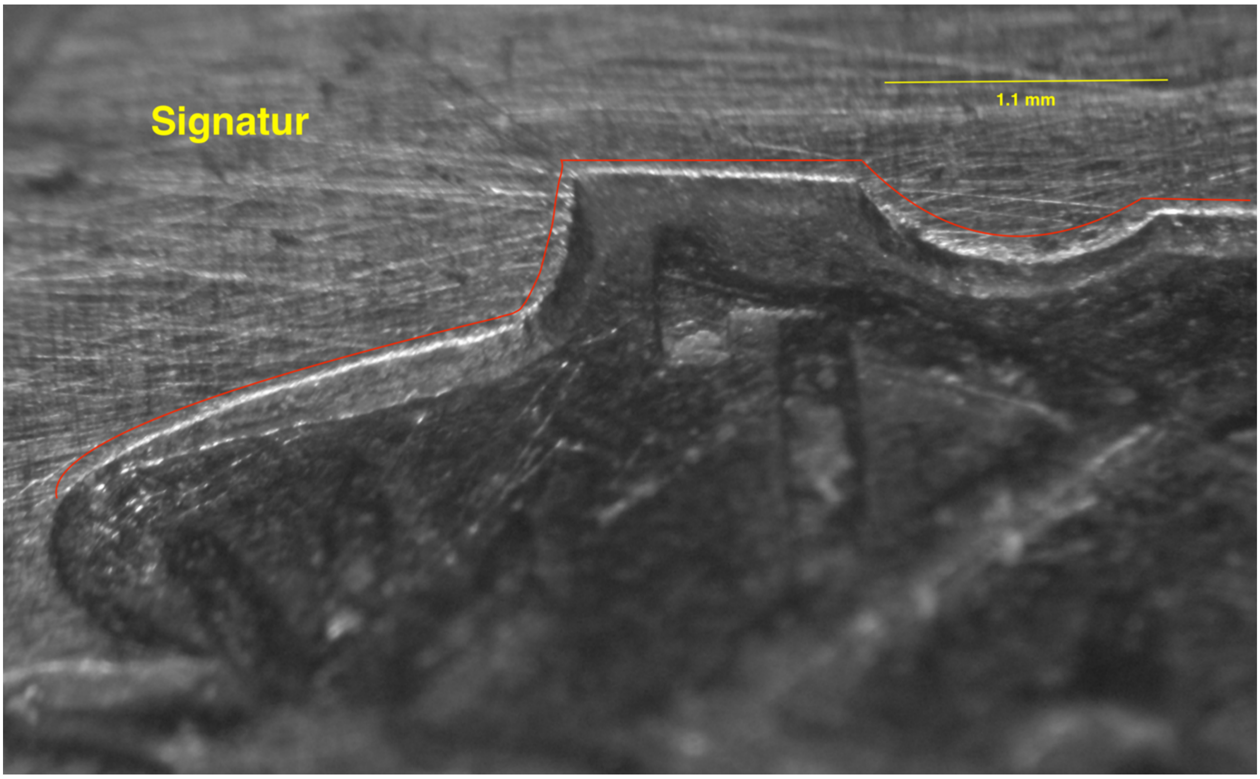
The punch with the ligature AW and star does not exhibit the typical characteristics of a mark struck into iron. There are usually slight to strong indentations and deformations with such punches, which are absent in this case. On the contrary, the stereoscopic examination reveals features that suggest it may have been produced using modern engraving techniques or "sink erosion" under high voltage, which cannot be ruled out.

The corrosion covering the base of the signature forms a closed pattern, which would not be expected. The etched edges of the signature in the indentation are free of corrosion, as seen in the red arrows and the red edge. This is not possible, as homogeneous corrosion would not remain on the edges. Moreover, this corrosion extends over the edges of the ligature AW and the star, covering them as well as the surface. The yellow markings point to processing marks that were applied in the form of engraving strokes before the corrosion developed.

Conclusion: The corrosion was produced after the entire forged punch was stamped, by applying an etching medium. The edges of the coat of arms, the ligature, and the star were re-engraved, making a definitive identification of the punch's origin impossible. On one hand, the punch could have been made with a laser or micro-engraving computer, while on the other, a hand engraving is also a possibility. The seamless post-applied corrosion has made the work traces harder to read. However, the uniformity of the punches in the previously discovered watches suggests that they were likely produced with a computer-controlled laser or diamond cutter engraving, which was later touched up with a burin.




Signatur

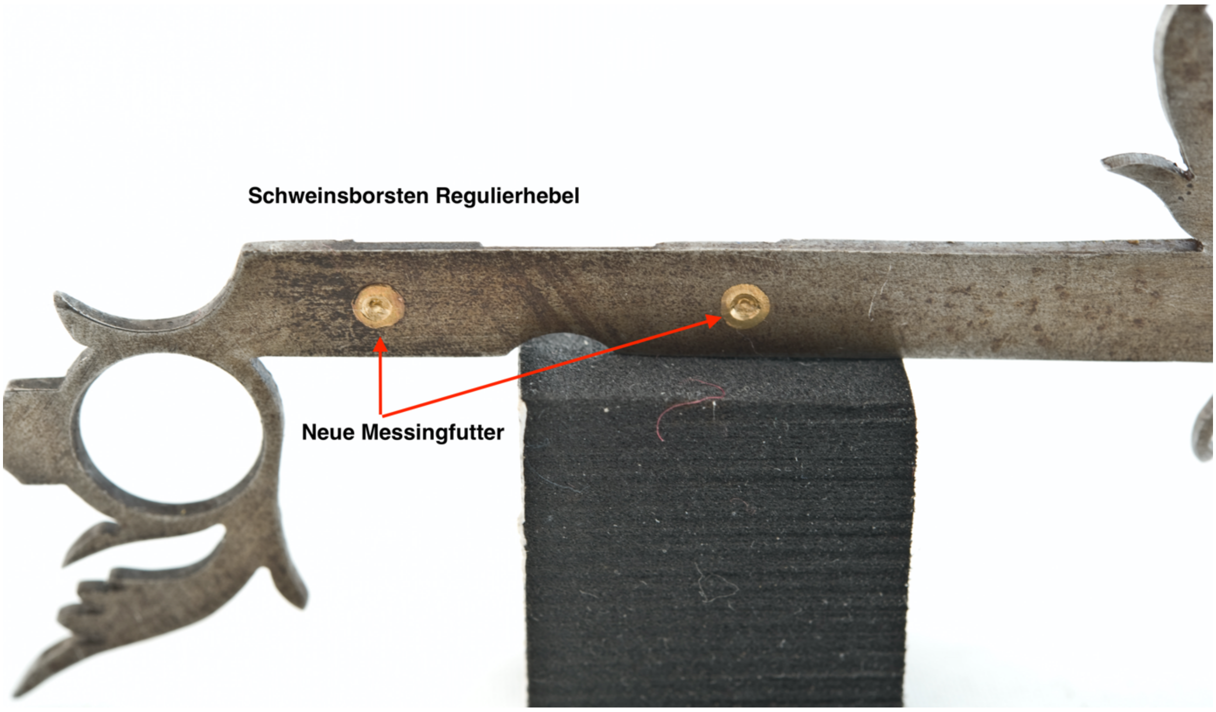

Signatur
1.1 mm


Vergleichs-Punze


Ausgestochene Kante mit abrupter
Begrenzung der Korrisionsfläche

The manually engraved year "1585" on the plate has also been treated with an etching medium to simulate old corrosion.

D. The examination of the regulator lever revealed that it is also a newly made part created from old iron. In the microscopy, the cutting marks of an industrial spiral drill are detectable. As already described in the amplitude limitation, it also does not have a coherent function. The simulated pig bristles made of plastic are fixed in brass bearings that have been drilled into place.



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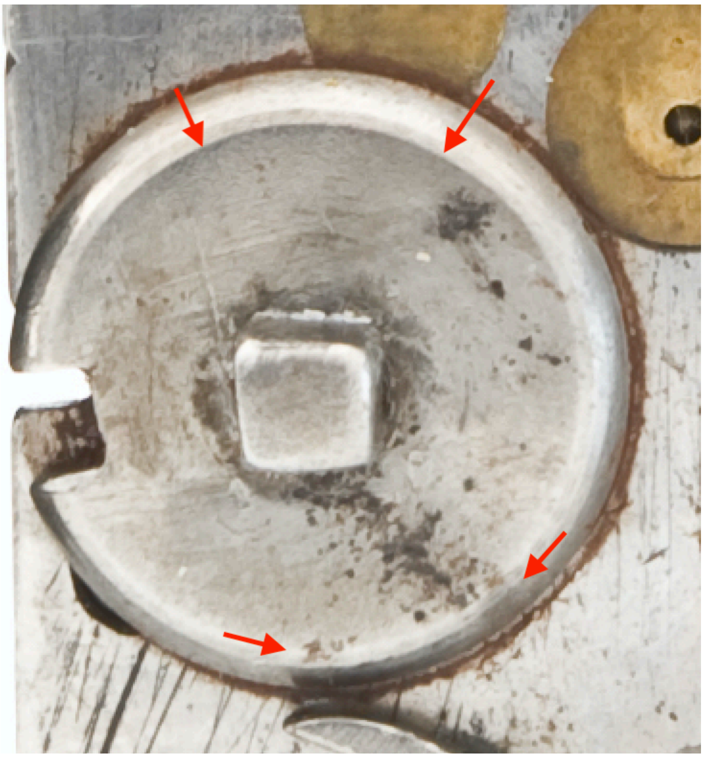
The macro image clearly shows the cutting marks of a spiral drill. The attempt to rework these telling marks has only been inadequately done.

The other two circular openings in the regulator lever were certainly also produced mechanically. However, due to their larger dimensions, there was a better opportunity to finish and remove machining marks. This, however, points to a more modern manufacture. The measurement of the diameter at all points within 360 degrees showed an exact accuracy with a difference of +/- two hundredths of a millimeter. This accuracy, however, contradicts the generally rudimentary craftsmanship of the other parts in the clockwork.

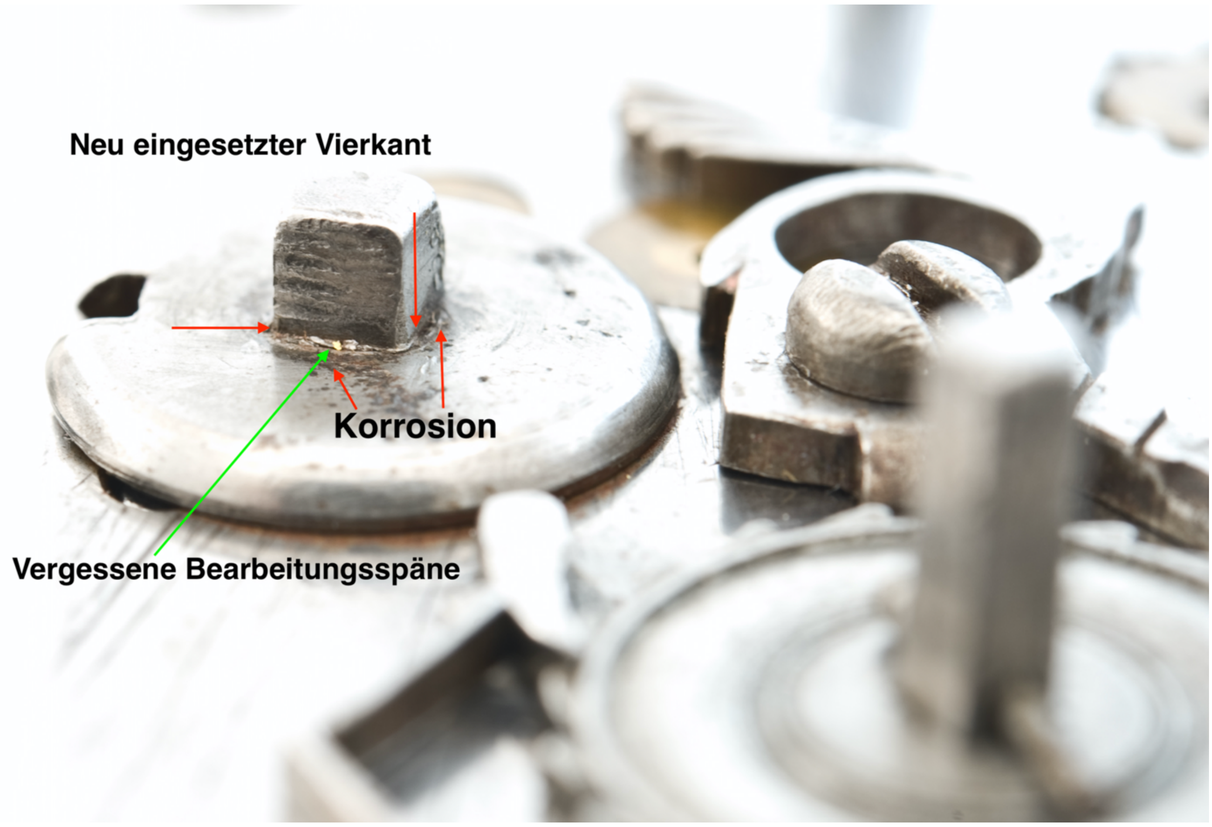
E The locking lever for the mainspring winding could at best come from a different clock, but like the two reworked and modified locking gears **F** and **G**, it does not belong on this plate.

H The locking gear that secures the plate to the movement cradle in the case does not align precisely with the cut-out on the plate and has been re-riveted on the back. This riveting is also found on the second locking gear. Both gears are made from old iron and show signs of corrosion on their flat surfaces. However, the edges have been machined, and they should also show corrosion traces, which would not stop abruptly at the rounded edge.

The square for adjusting the closure shows, notably, that there are no corrosion transitions at the junctions between the closure disc and the square. The corrosion on the surface of the closure stops abruptly at the square. This square was separately worked into the closure and is used below the movement plate for riveting. The macro image clearly shows machining shavings that were forgotten to be removed.



An investigation of the closures on the underside would have required rivet removal and was omitted for reasons of reversibility.



I+J The punches struck into the movement plate all show a dark discoloration at their base, which is typical when iron is heated. It can be assumed that the later described construction of the movement frame was created using hard soldering of the pillars. For this, significant heat was applied to the metal surfaces. The resulting thermal discoloration on the iron, particularly on the plates, was abrasively removed. However, the thermally induced discolorations in the recesses were not reached and thus retained their color.

Thermal discolorations in the recesses.

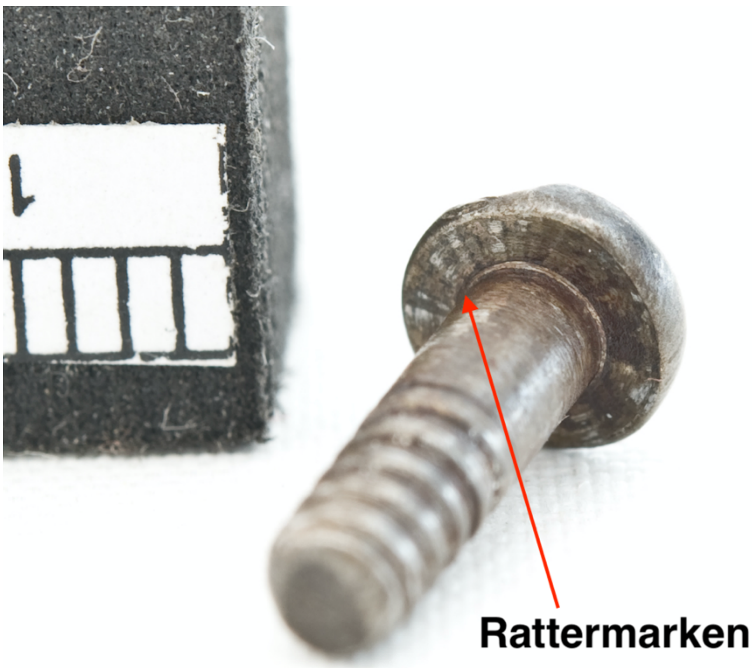
Thermal discolorations in the recesses.

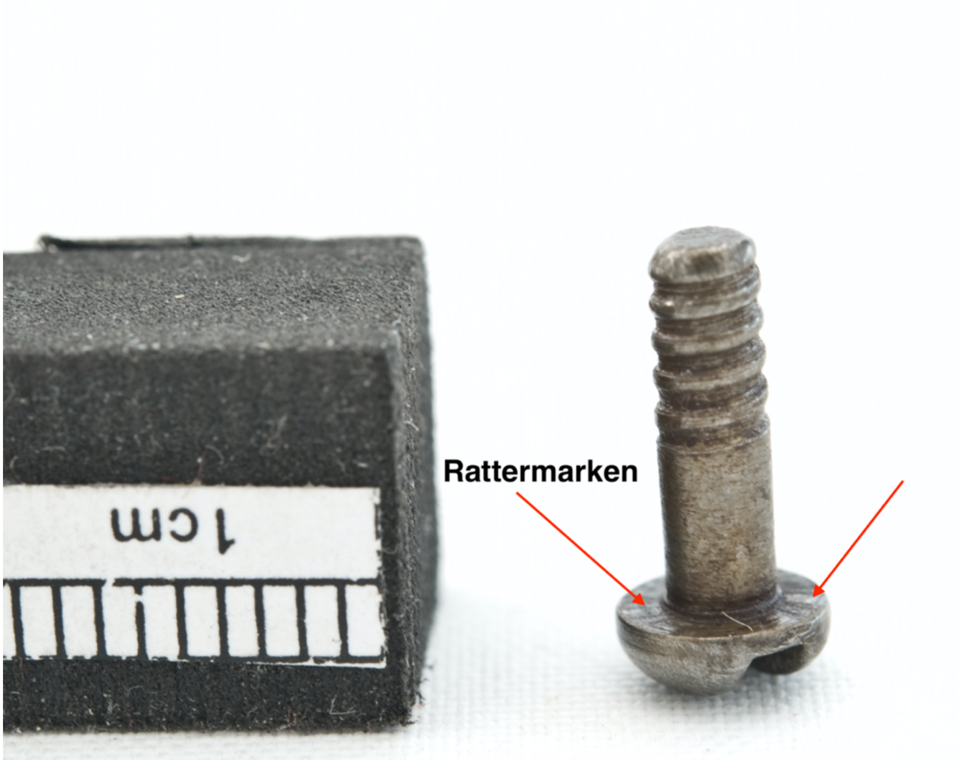
K to Q The round holes in the top plate are for the locking pins of the parts inserted and screwed in from below.

The screws used are mostly newly manufactured, except for a few exceptions. They correspond with the threads drilled and cut into the plates. For the screws and threads, a rising thread was made, as it was used in the 16th century.

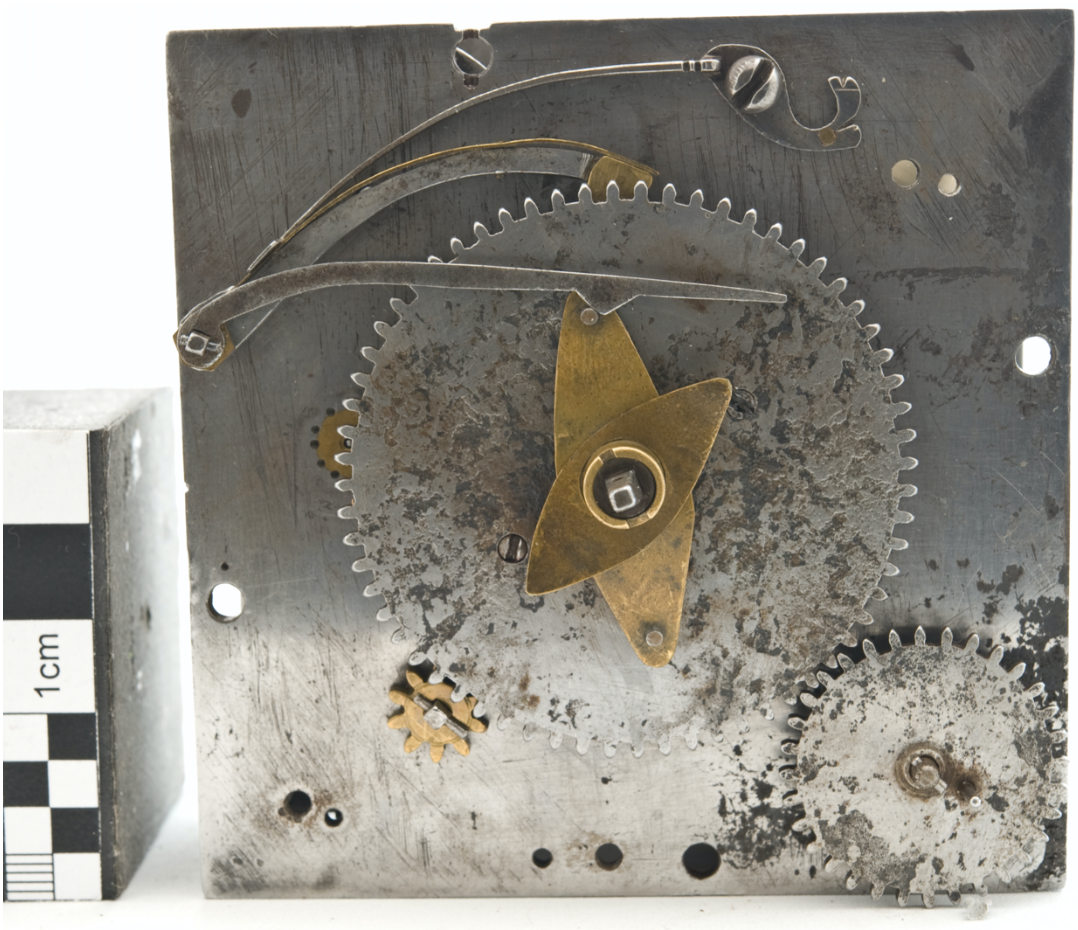
However, we miss the inaccuracies typically found in hand-made threads from that era. Variations in the accuracy of measurements meant that the screws could not always be interchanged. Watchmakers had to remember the placement of removed screws during repairs.

In the watch under investigation, the screws are uniform and interchangeable. They all have a thread size of approximately 2.8 mm and 2.25 mm and show no deviations in the pitch. The blanks for these screws were made on a modern lathe and show chatter marks under some of the screw heads. The characteristic brown coloring of the screws may result from a bluing process after manufacturing, where the screw is heated and then quenched in oil. However, there are other methods of bluing metal. This is not relevant for my investigation, as the other detected features in the watch already allow for a clear judgment at this point.




1cm
Rattermarken

Evaluation of the lower plate

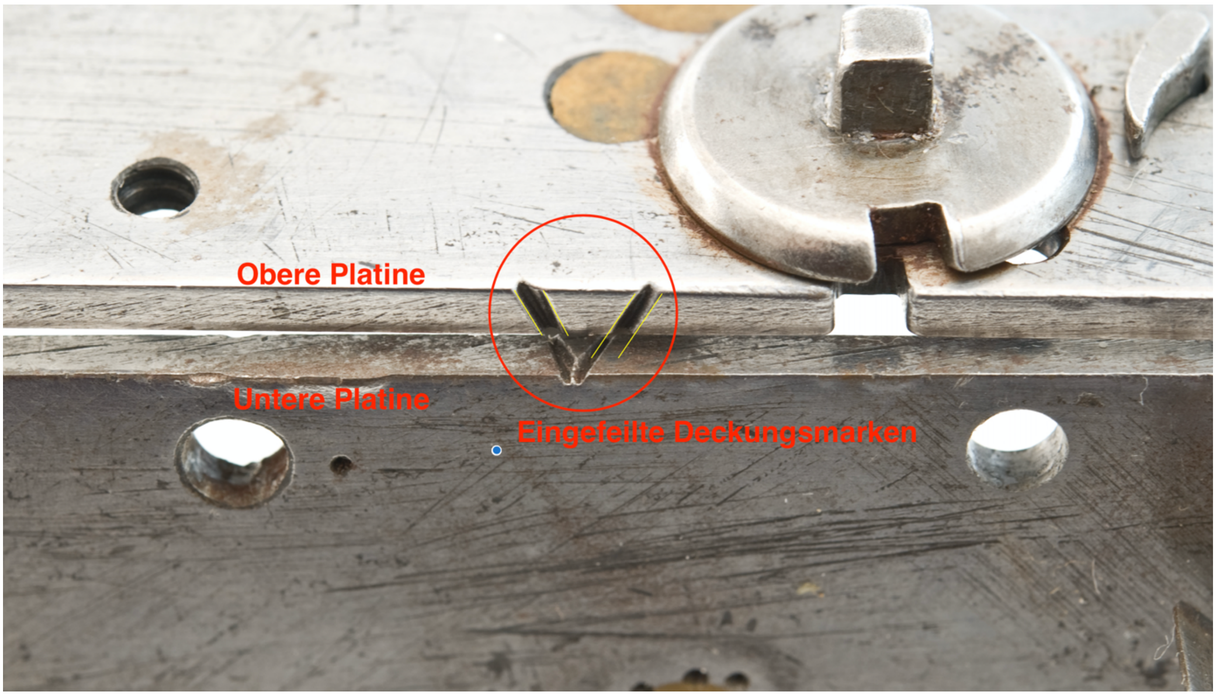


The lower plate is also a new construction made from old iron. It could possibly be an old plate from another timepiece from a later century. Under two of the four pillars that connect the plates, newer silver-solder connections could be visually detected under the microscope.

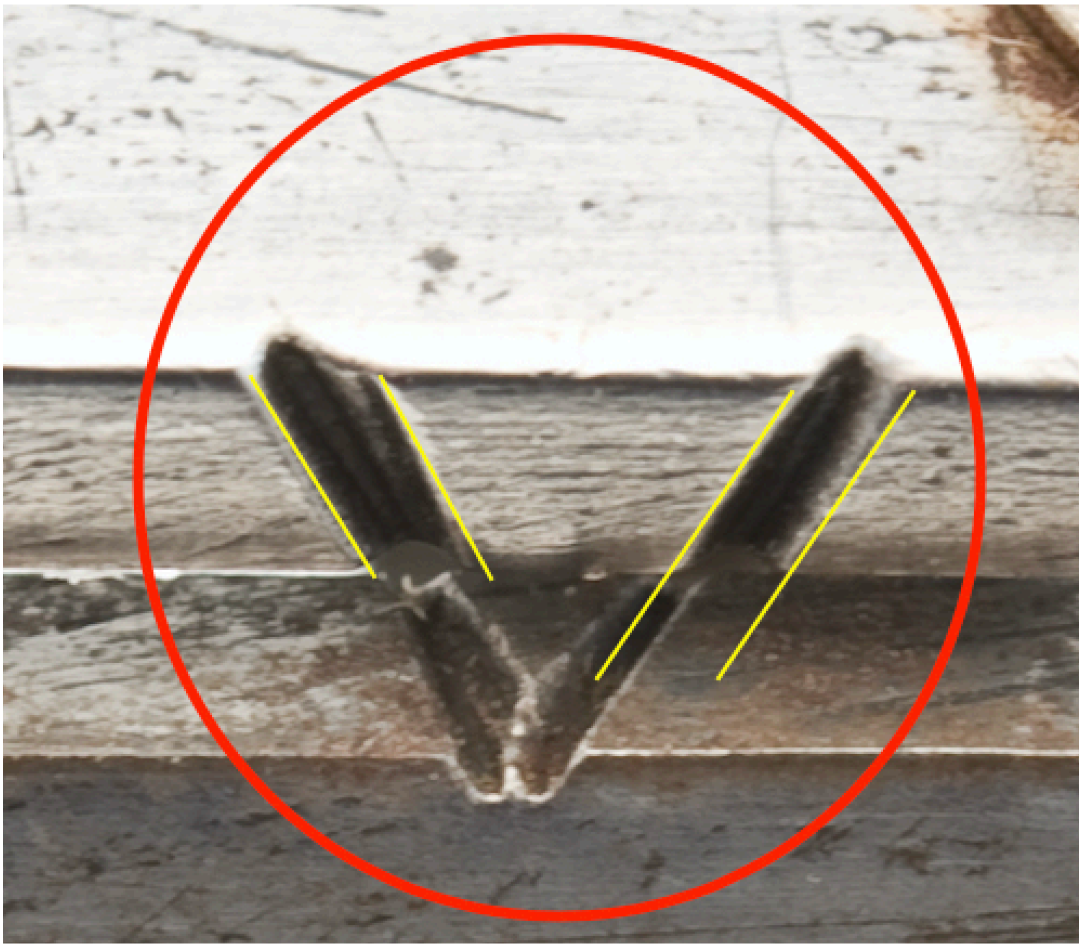
A classification of the entire movement frame into the second half of the 16th century is already ruled out due to the pillar attachment. The pillars of 16th-century table clocks were not soldered. Their common feature is found in a two-sided screw or rivet connection. Both construction methods were used in one timepiece, for example, the screws securing the pillars on the upper plate, while the pillars on the lower plate were riveted, and vice versa.

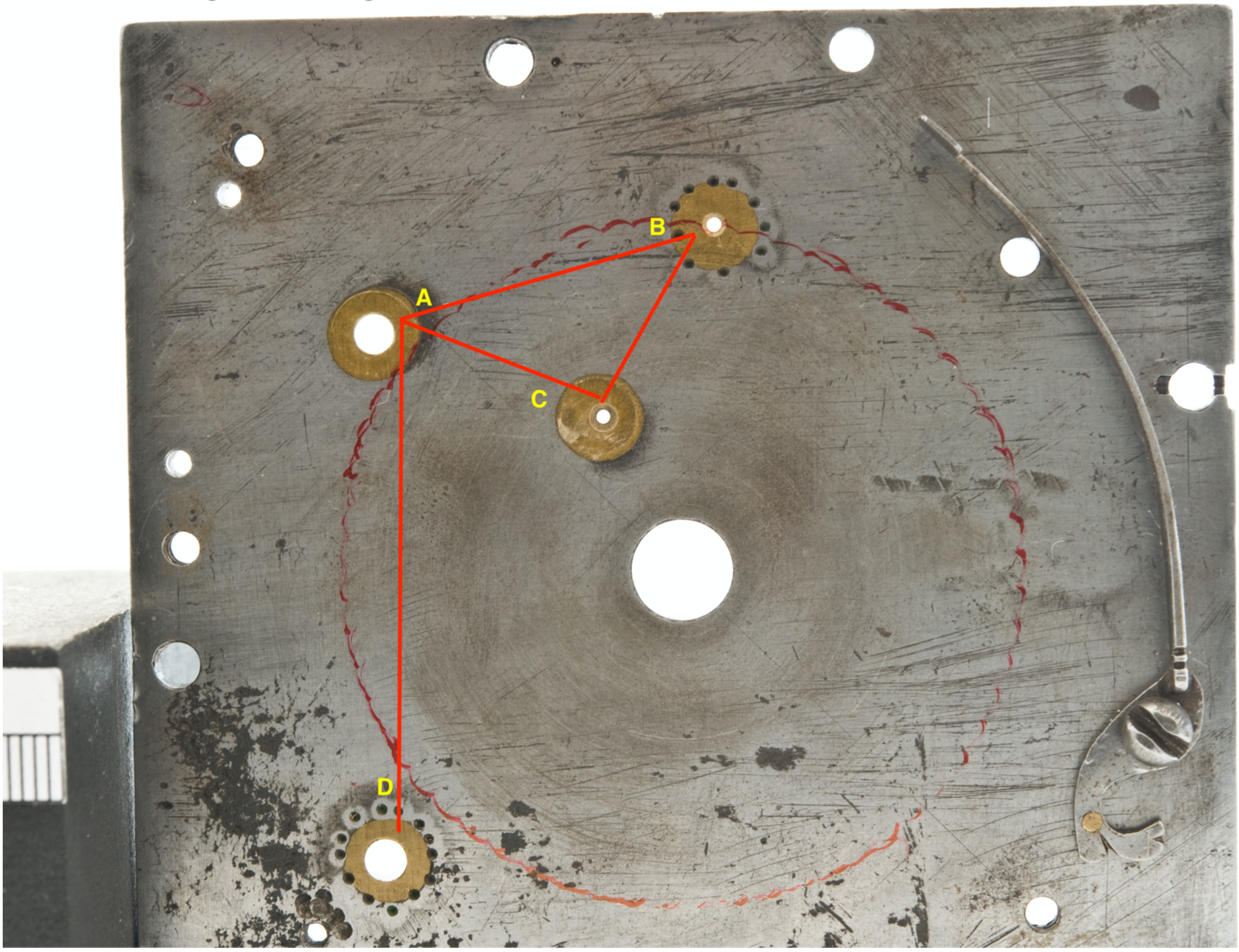
The clockmakers of the 16th century used to place the plates on top of each other for measurements and marked the flanks with a file to create a **V**-shaped alignment. This ensured that the holes drilled through both plates would align perfectly vertical.

In the clock under examination, this marking is rudimentary and not aligned correctly. The marking on the lower plate differs significantly in nature from the marking on the upper plate. The upper marking was made with a different tool than the lower marking. However, the lower marking shows some authenticity, suggesting that the lower plate could be a fragment from an old clock.



"Engraved coverage markings"





The widely drilled plate was filled with old brass. The punches marked with **B** and **D** around the Ms-bearings were not stamped with a punch as expected. In the stereoscopic examination, it became visible that the recesses were milled with a machine-operated cone cutter. Therefore, these marks only have a decorative character. This is also supported by the arbitrary placement without any functional purpose upon closer inspection.

Recesses milled with a conical cutter

Evaluation of the components on the bottom plate:

All of the components listed below and installed on the bottom plate, with the exception of the moon disc and the aspect diagram, are exclusively newly made from old materials.

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2
10
9
8

- 1 Bridge for the moon disc and gears for the hour drive and moon phase movement
- 2 Trigger lever for the alarm mechanism
- 3 Trigger lever (stork's beak) for the hourly chime
- 4 Pressure spring for trigger levers 1 + 2
- 5 Change and transport wheel for the moon disc
- 6 Pressure and locking device for the moon disc
- 7 Transport wheel for the hour hand
- 8 Drive pinion sitting on the snail for the hour and moon wheel
- 9 Pressure spring
- 10 Release disc for the alarm device
- 11 Display for the aspect diagram and moon age
- 12 Display for the moon phase

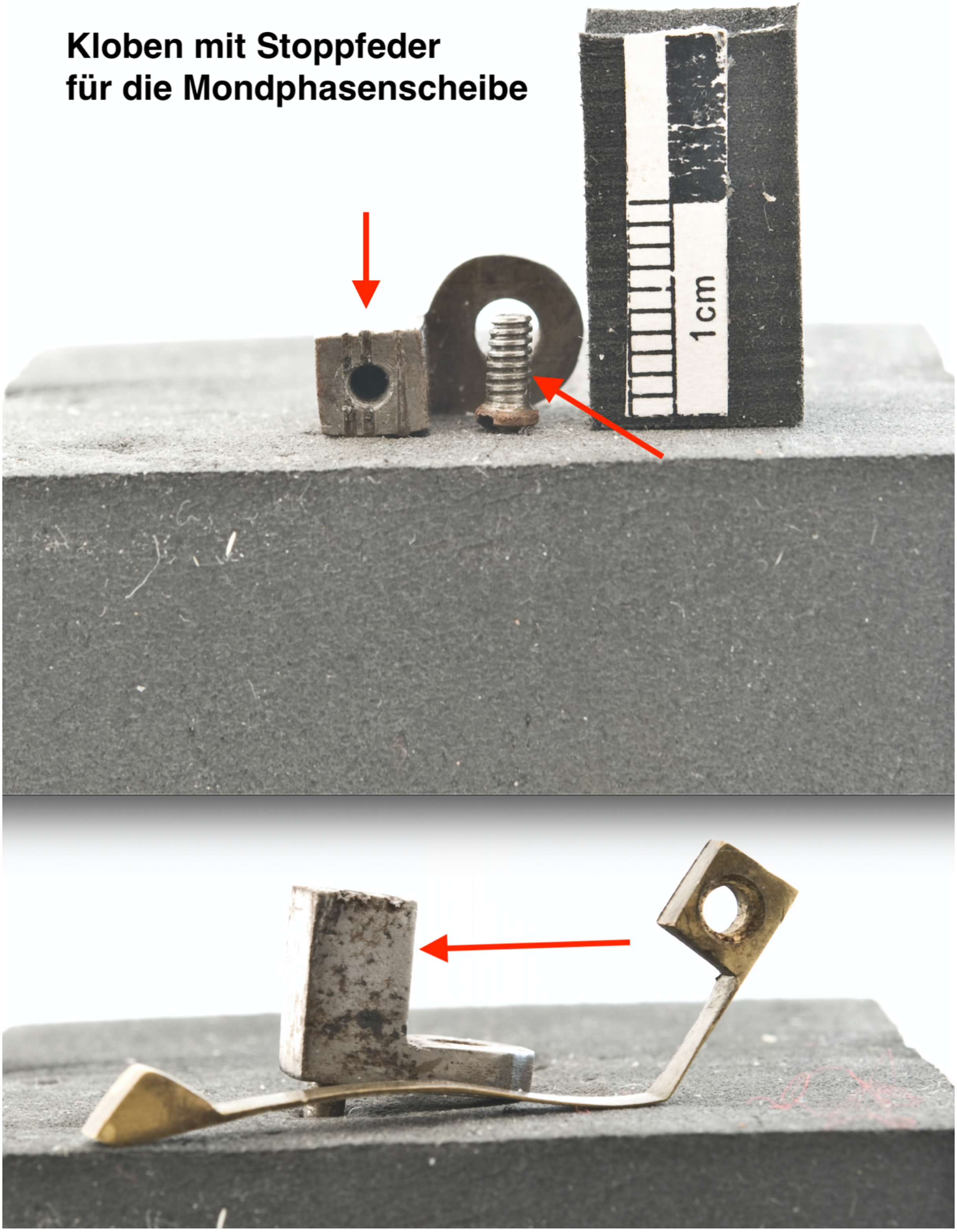
Bridge (1) The bridge is a new fabrication made from an indefinable old part. Former locking pins have been cut off (see red arrows) and replaced with newly placed pins (see green arrows). The central hole and the three threaded holes around the centrally arranged hole have also been newly added. The corrosion stops at the cut edges, indicating the part is newly made.

Trigger lever for the alarm mechanism (2) The previously described trigger lever is made from old sheet iron and shows no coherent signs of aging at its cut edges.

Trigger lever (stork's beak) for the hour strike (3) The trigger lever has been newly fabricated from old brass and iron.

All other components listed under **points 4 to 10** were also newly fabricated from old materials and will not be listed further in detail here.

Special attention should be given to the component listed under point 6: **Pressure and locking mechanism for the moon disk.**

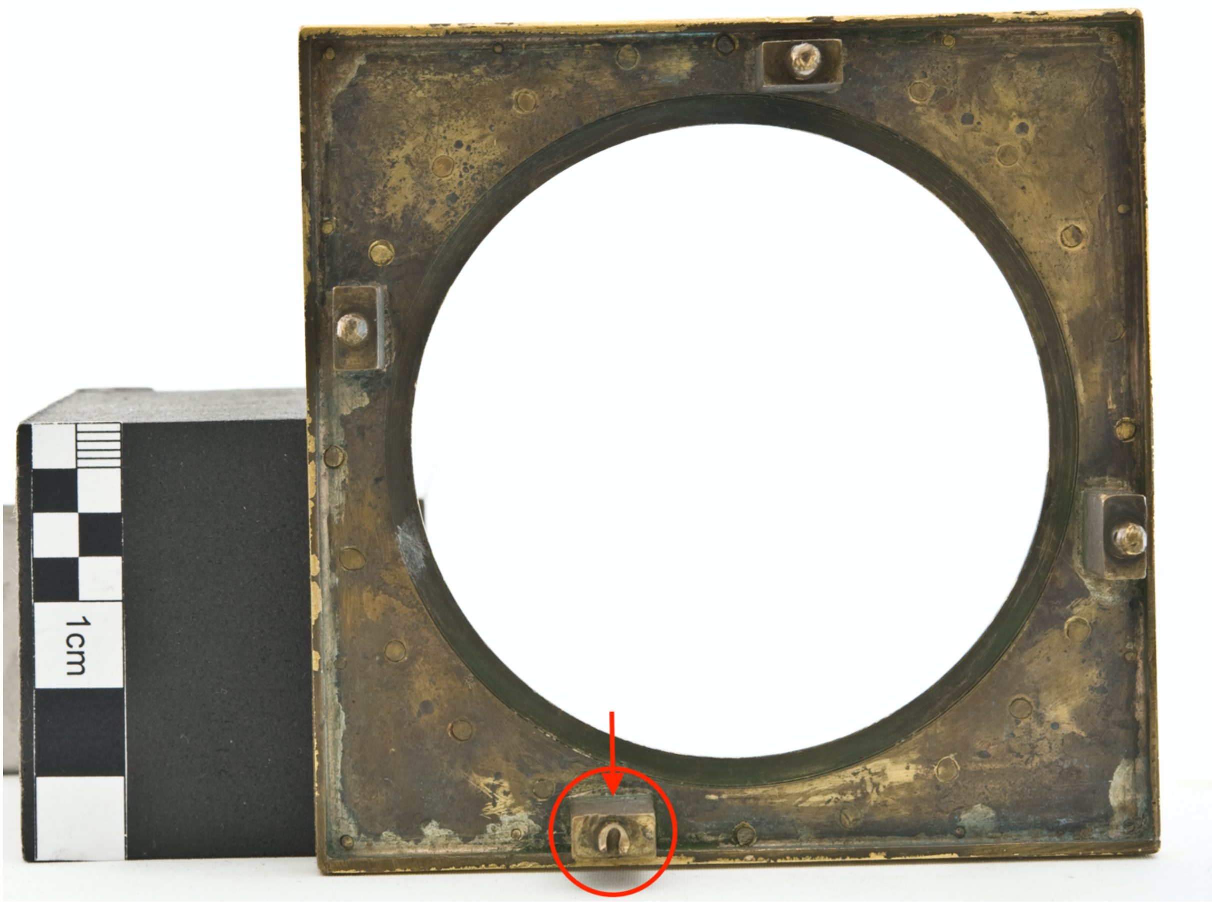


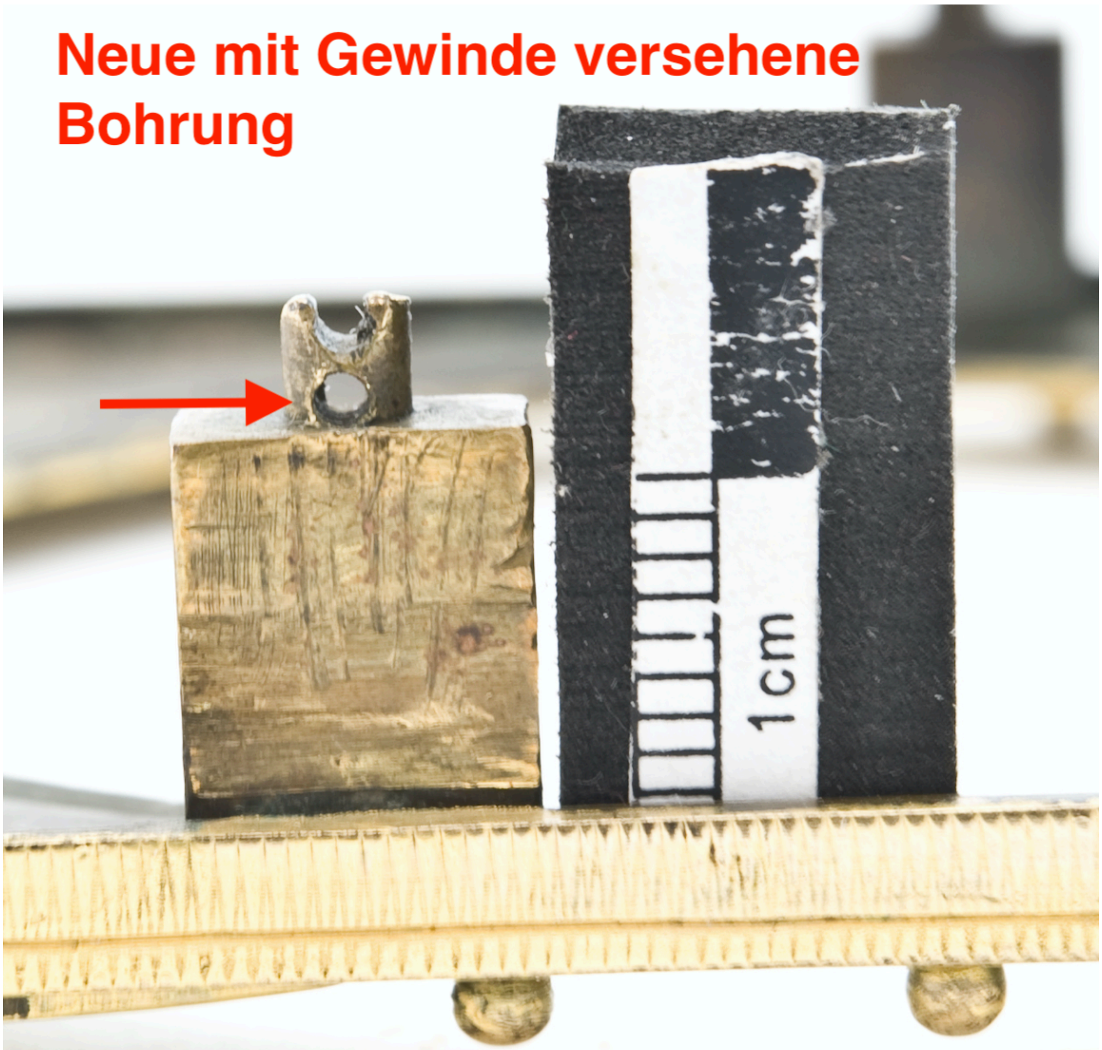
The clamp with the locking spring and screw for the moon phase wheel is a complete new construction. Its locking and mounting on the plate is located in a newly drilled locking hole and a newly cut threaded hole.

An indication of the processing of the upward-facing side of the lower plate is shown in the following photo montage.

Of the four feet that anchor the dial of the clock case into the plate, one is destroyed and broken off in its upper third. As a replacement, a modern metric thread was drilled and cut into the foot. For the new anchoring, a hole was drilled horizontally through the end face of the plate via the vertical bore. This hole was drilled beyond the vertical bore as a blind hole.

During a subsequent grinding process of the plate surface, this blind hole was ground back.





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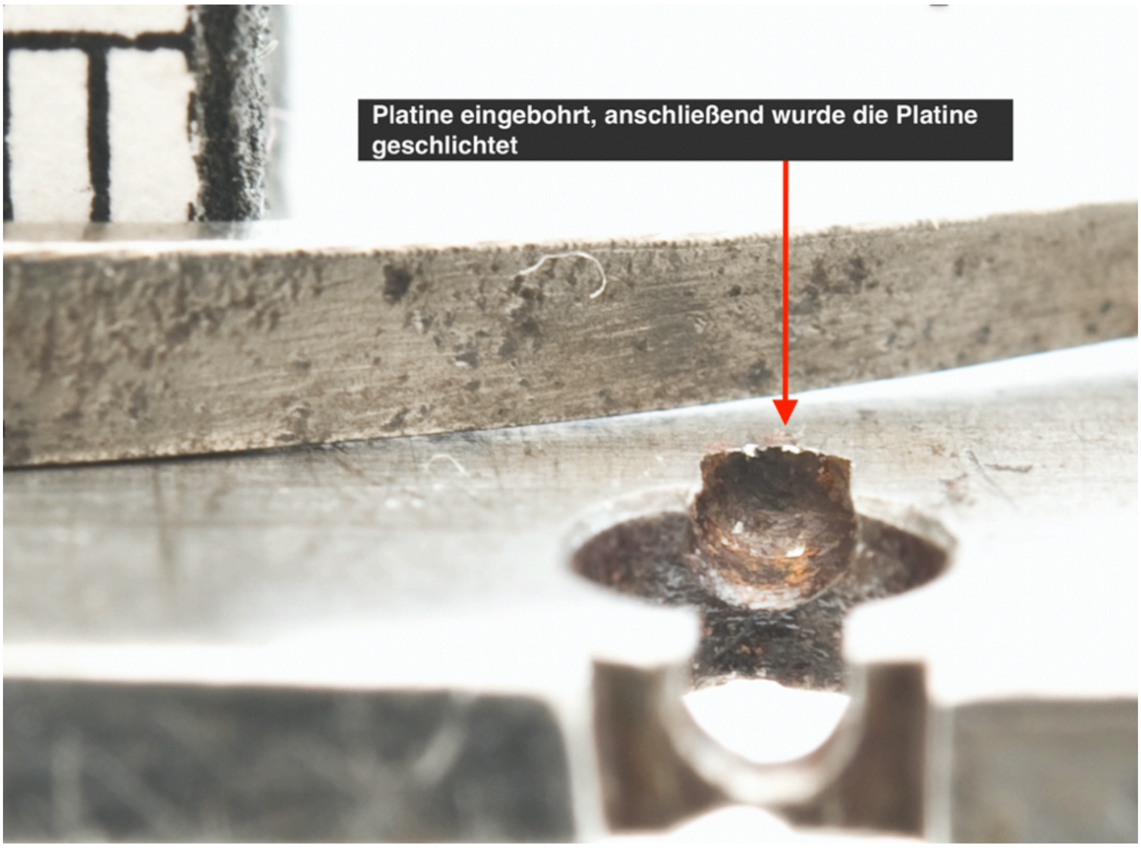
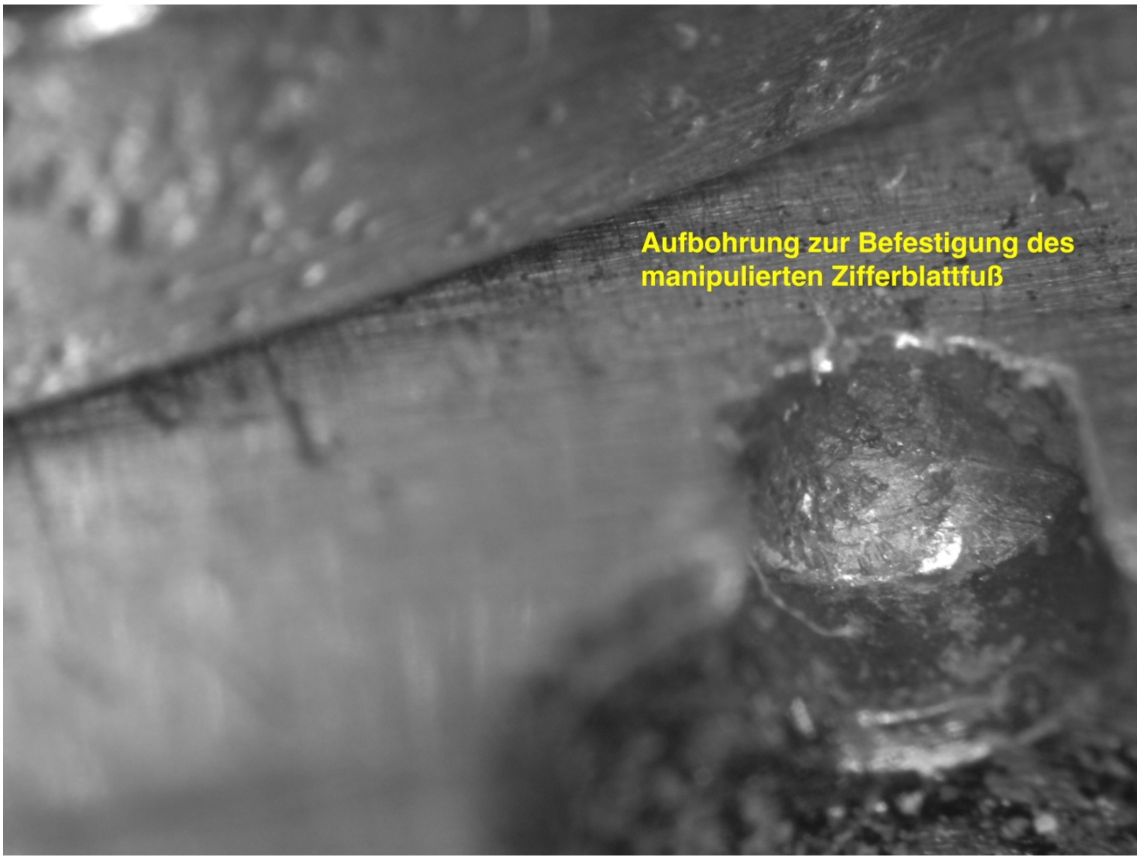
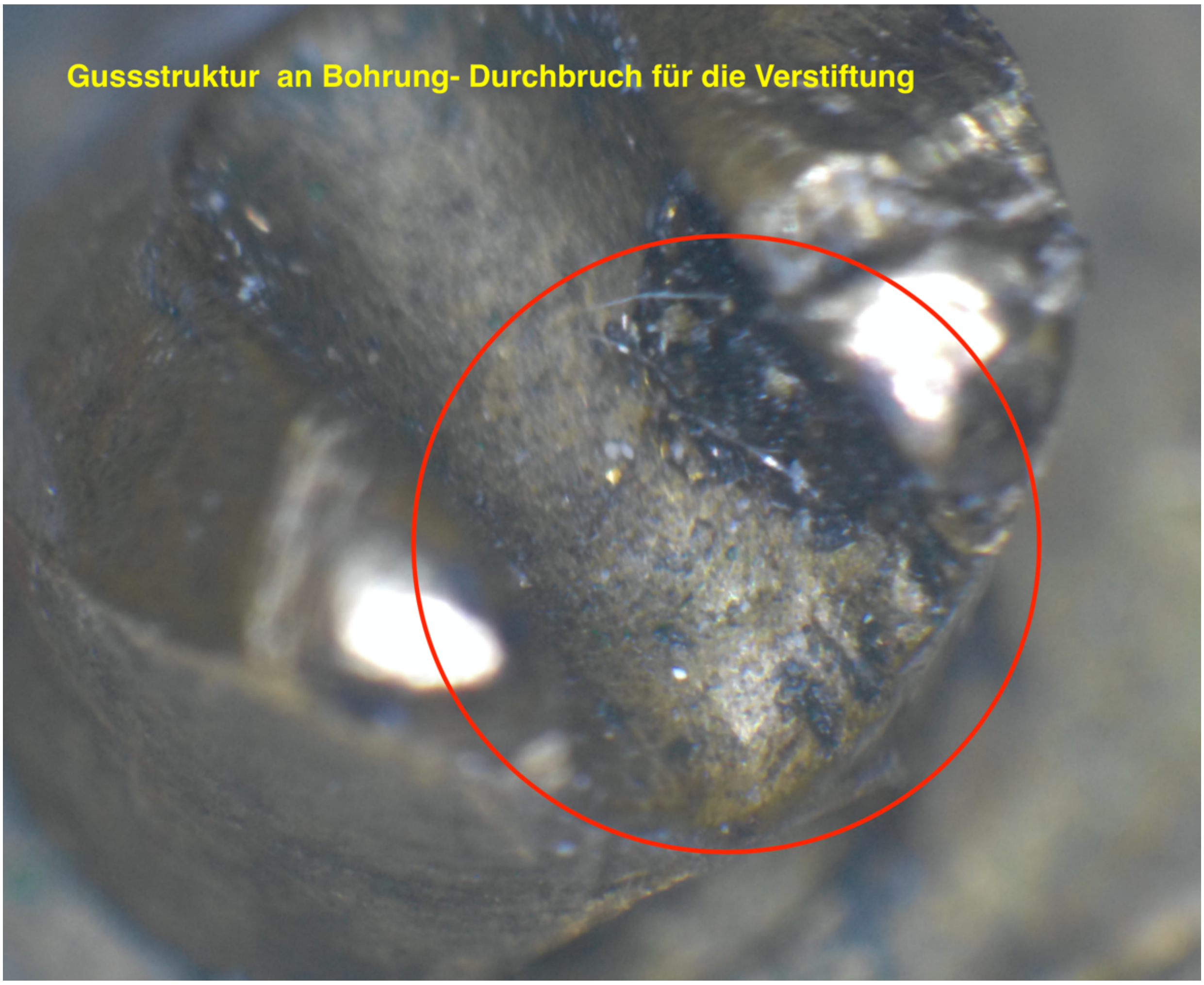
As revealed by the stereoscopy, the pillar with the replacement drilling was already produced with the breakage. The microscopic examination confirmed the initial suspicion that not only the dial but also the soldered dial attachments are cast replicas of dial feet from another clock.

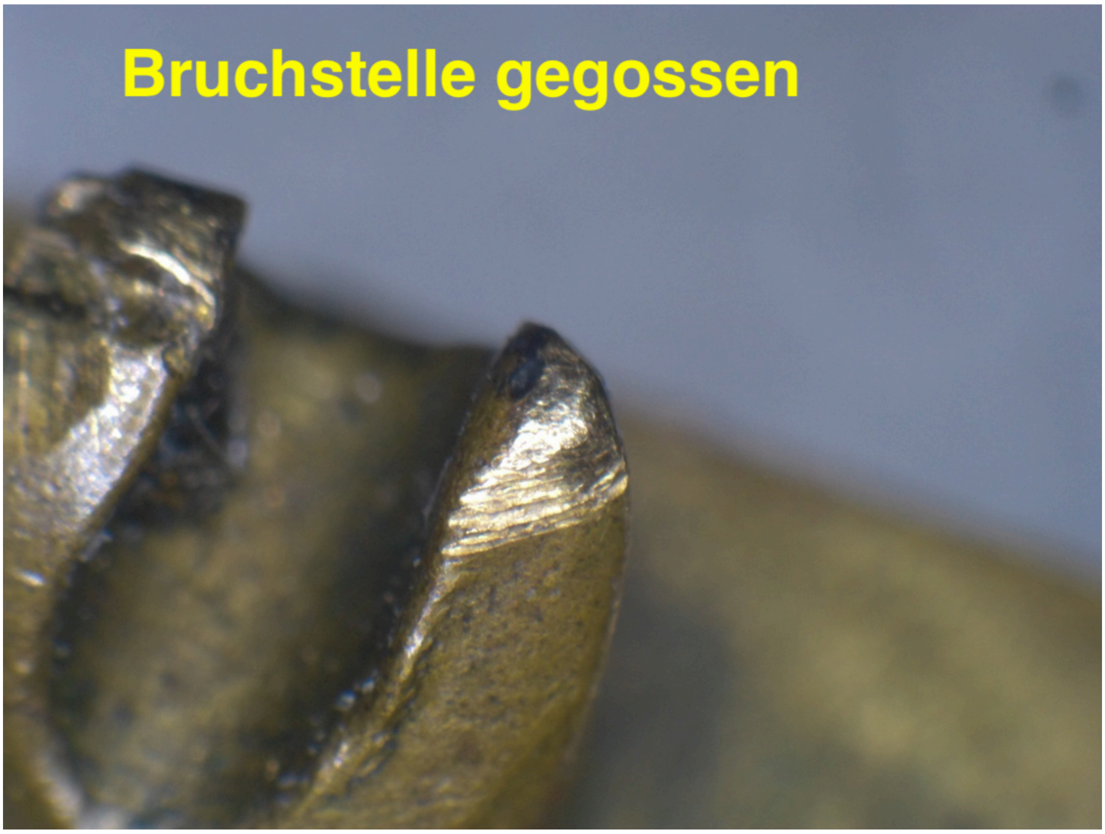
Since it was possible to supplement this dial foot by casting from an intact, undamaged foot, it cannot be ruled out that this manipulation was intended to suggest a transitory repair.

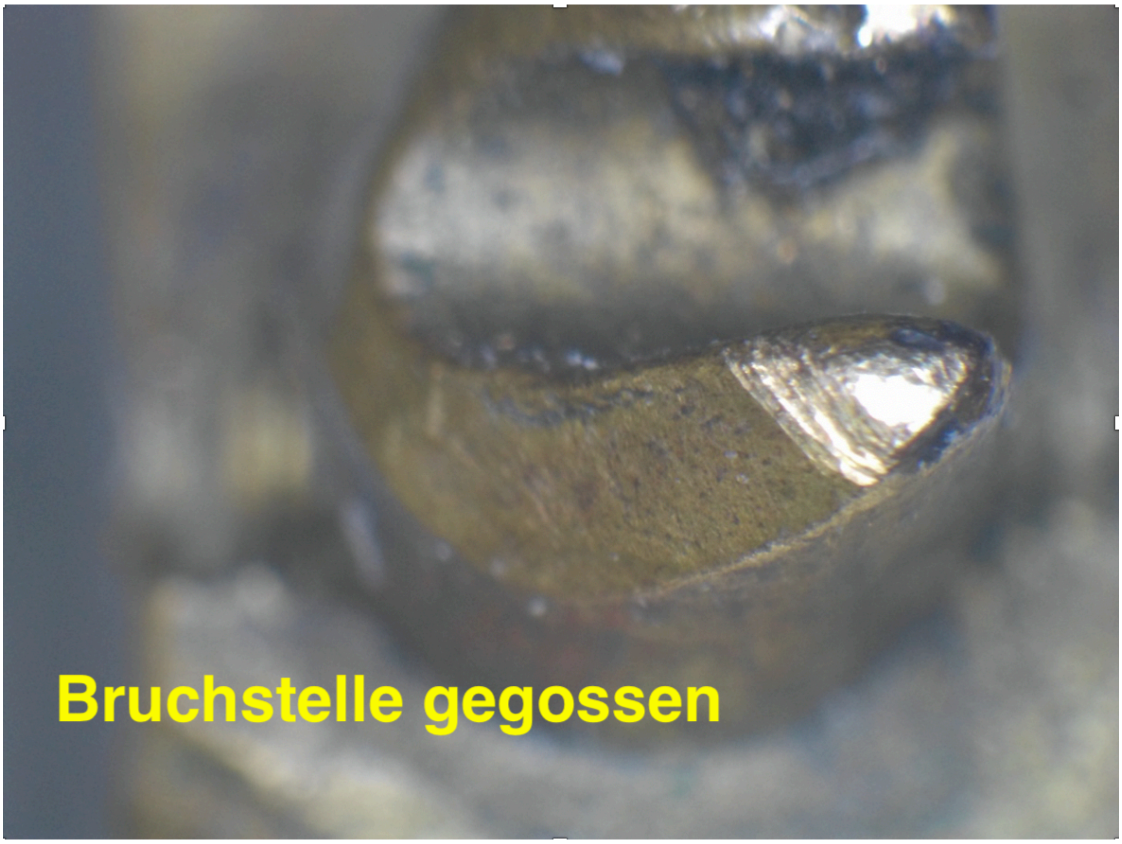
During the drilling, the craftsman made a significant error, causing the material of the plate to break. As a result, he was forced to reduce the thickness of the plate and smooth the surface.


Platine eingebohrt, anschließend wurde die Platine geschlichtet


Aufbohrung zur Befestigung des
manipulierten Zifferblattfuß


Gussstruktur an Bohrung- Durchbruch für die Verstiftung


Bruchstelle gegossen


Bruchstelle gegossen

Another rudimentary empirical approach can be seen in the placement of the escape wheel for the striking mechanism. As previously mentioned in the "Investigations on the Striking and Alarm Mechanism" chapter, the escape wheel is a new creation, with a lifting nose soldered onto it. However, the builder of the movement was faced with an essentially unsolvable problem. The lifting nose did not have enough clearance from the plate to pass through. It had to get stuck, meaning the escape wheel would stop. At this point, a very crude emergency solution was implemented, where the plate was roughly hacked out.

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A lug soldered to the escape wheel (see photo) is intended to keep the escape wheel free until the complete unwinding of the alarm mainspring, when the trigger lever is raised to a certain height.

Milled and hacked plate bottom
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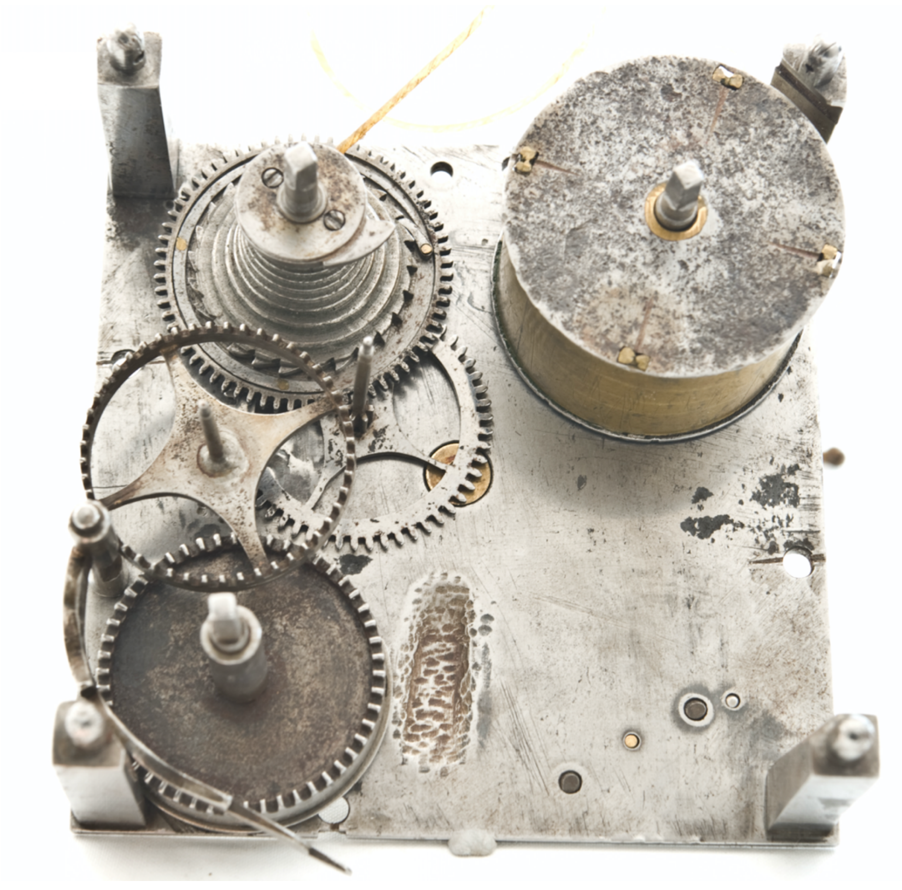

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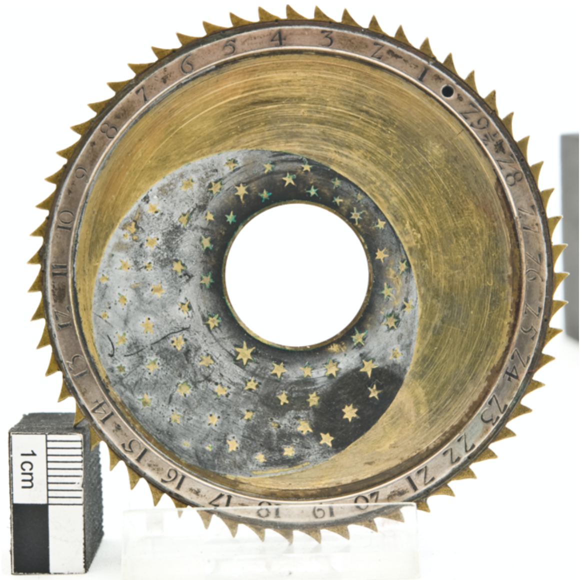
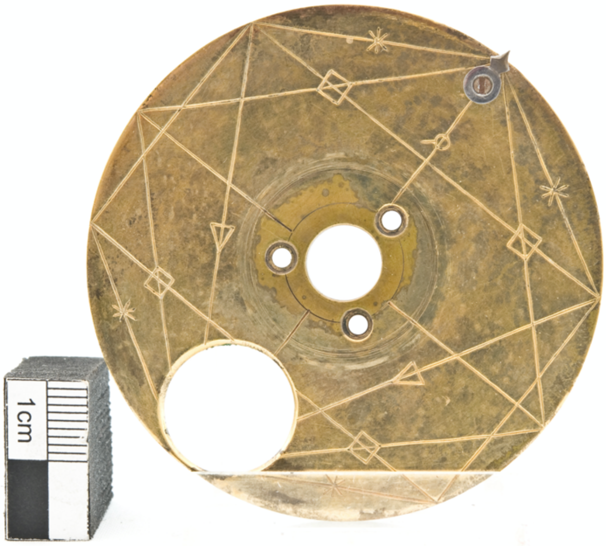
Display of the synodic lunar age

The lunar age display, along with the adapted moon dial in the case, has a toothed gear drive with 59 teeth. The aspect scheme located at the center of the disc is original and is likely taken from another clock.





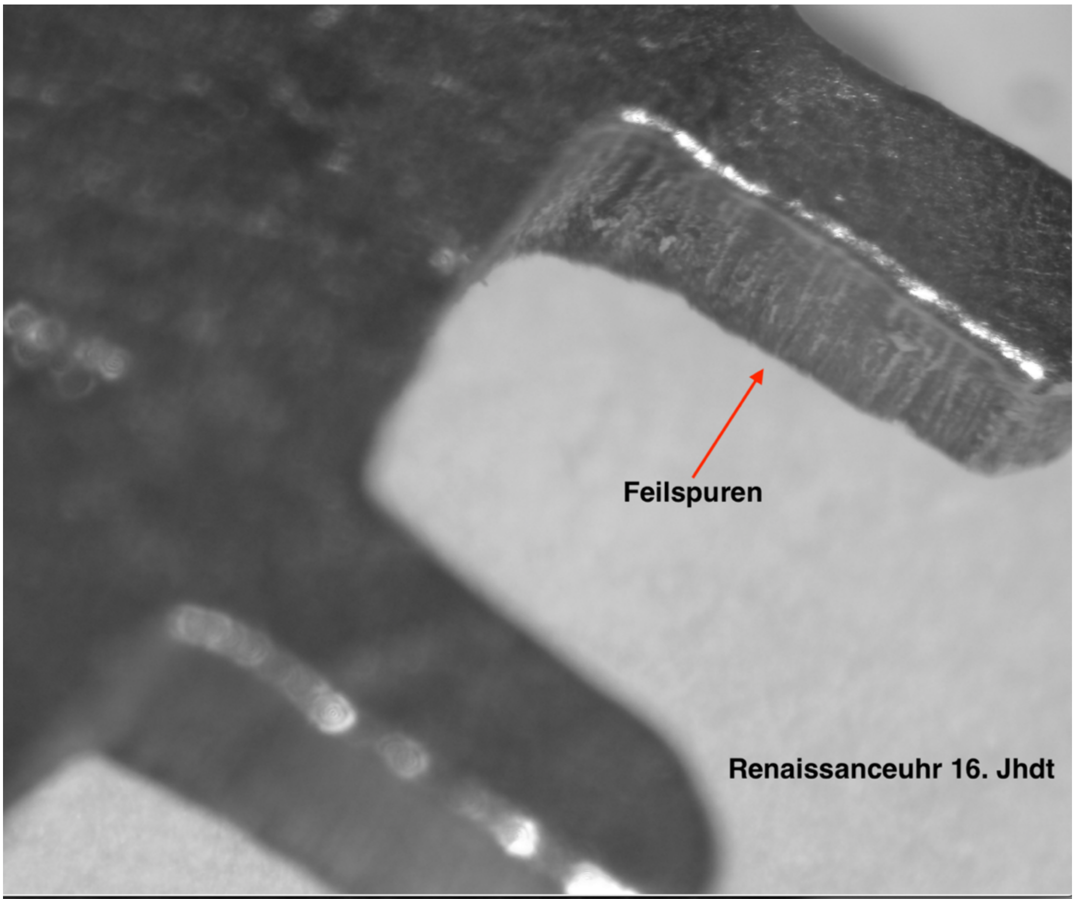
The mechanical drive for this indication is powered by the gear train of the clockwork. The gears and wheels required for this drive are all new creations. Notably, the two drive gears with 64 and 60 teeth are worth mentioning.

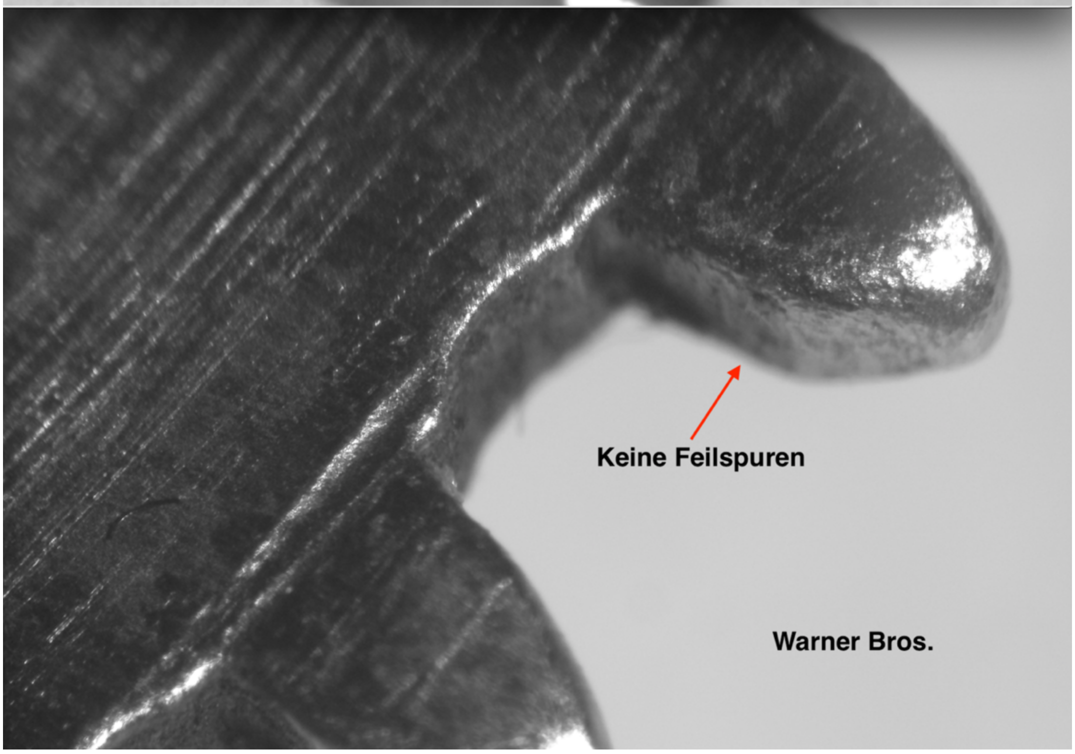
The gears and the 24-tooth release star adapted to the hour wheel for the hourly strike were made of old iron, heavily corroded with pitting corrosion. Notably, we also find no corrosion in the cut tooth flanks or the interior areas of the tooth cycloids on these gears. Stereoscopic examination revealed machine processing traces on these creations. The manufacturer tried, with rudimentary touch-ups, coarsely applied filing marks, and varying depths of tooth cutting, to obscure the machine-made traces. These are unmistakable evidence of the modern manufacturing of these wheels. See below microscopy 01 and 02 when examining the engagement of the tooth cycloids on the hour wheel and the change wheel.

Both gears are merely screwed together with a brass sleeve pressed into place. This allows for the possibility of shifting under friction between the two gears. This is intended to provide friction for adjusting the time on the dial. However, in practical testing, this construction proved to be useless. After frequent adjustments, the pressure of the screw connection loosened, and the pressed gear discs lost their mechanical adhesion. Furthermore, it was observed that the engagement between the hour wheel and the change and transport wheel for the moon disk exhibited uneven surfaces, which also precluded a coherent operation between these wheels.

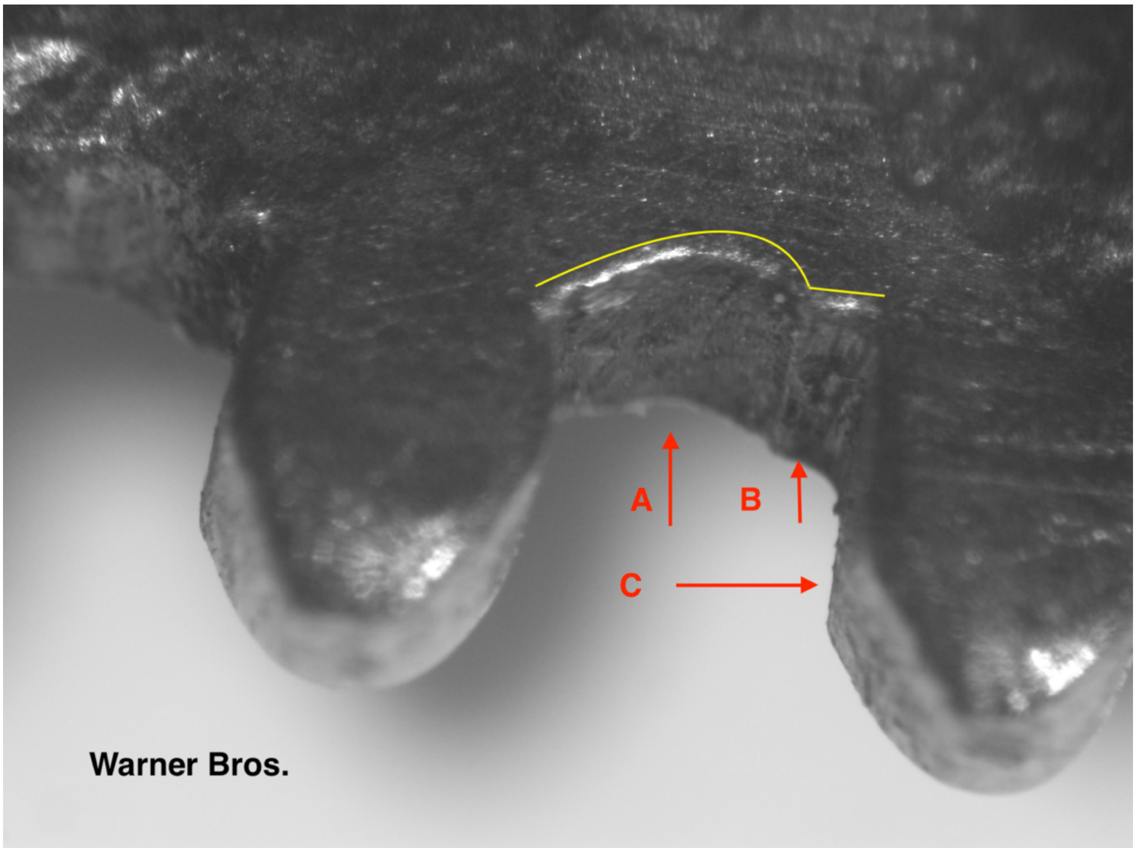
The hour wheel with its screwed-on 24-tooth release wheel for the hourly strike was also subject to a detailed examination. Like the previously described hour wheel, the star wheel was also made from old iron. The drilling and thread cuts also show authentic signs of a modern fabrication. Clearly visible on the screwed inner side are traces of a machine lathe. After disassembling the star wheel, previously trapped brass shavings were found on the inner surface of the hour wheel. It would be plausible to assume that these came from a corrosion surface cleaning of the heavily corroded iron of the hour wheel and were then screwed in together.

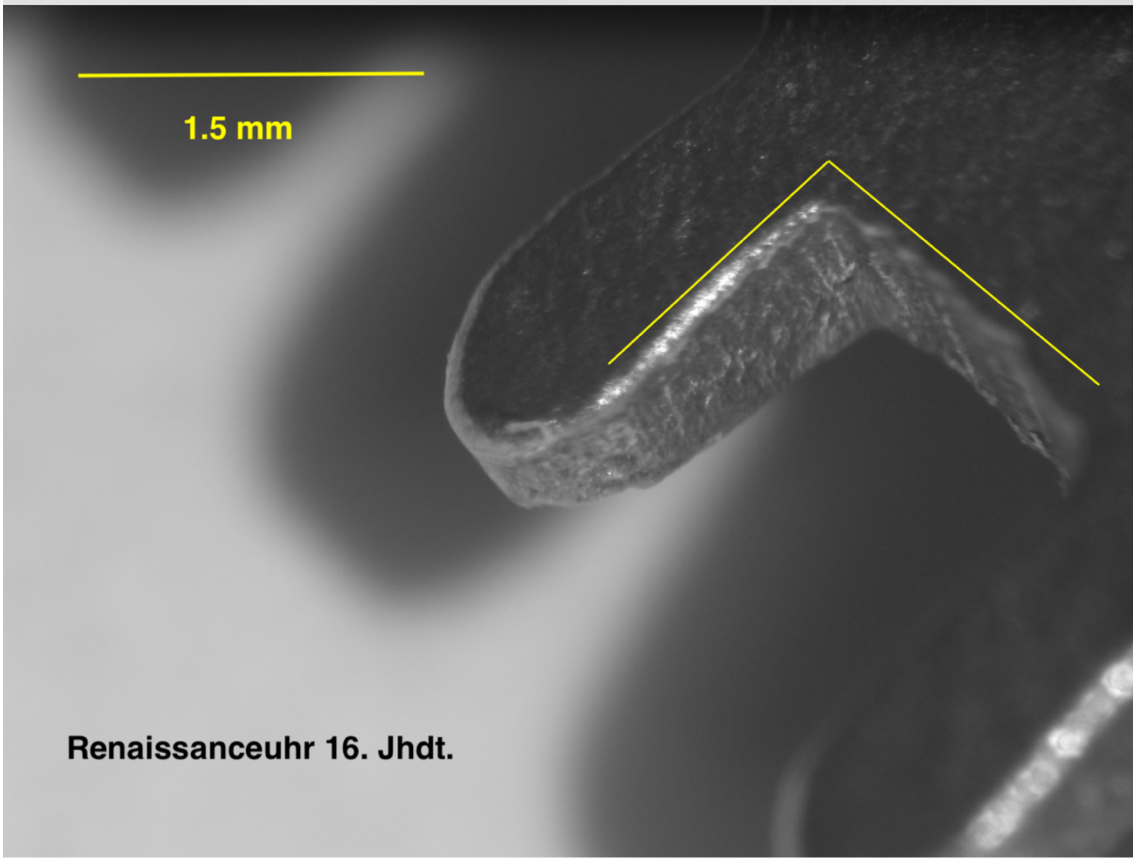
Mikroscopy 01





Mikroscopy 02





Explanation of Microscopy 01 to 03:

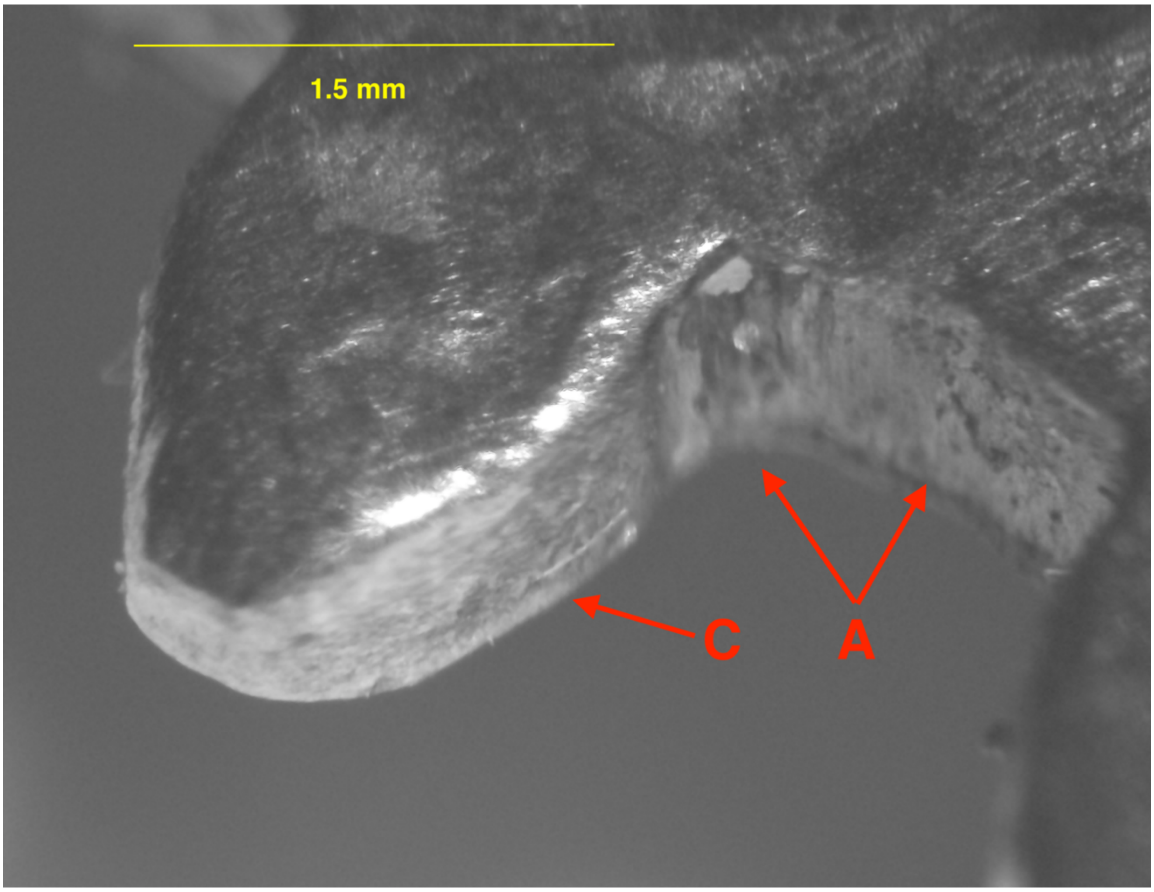
Points A to B mark the manufacturing characteristics of the newly made gear intended for driving the moon phase.

The material is made from old iron sheet with a thickness of approximately 1.24 mm. Both surfaces are heavily corroded with pitting. The division, or module, was cut using a machine milling cutter. This results in the straight tooth flanks, which show no manual filing traces, see C. The tooth flanks and cycloids were subsequently polished abrasively, resulting in a rounded, inhomogeneous surface, which is not typical for either non-operated or operated gears in practice.

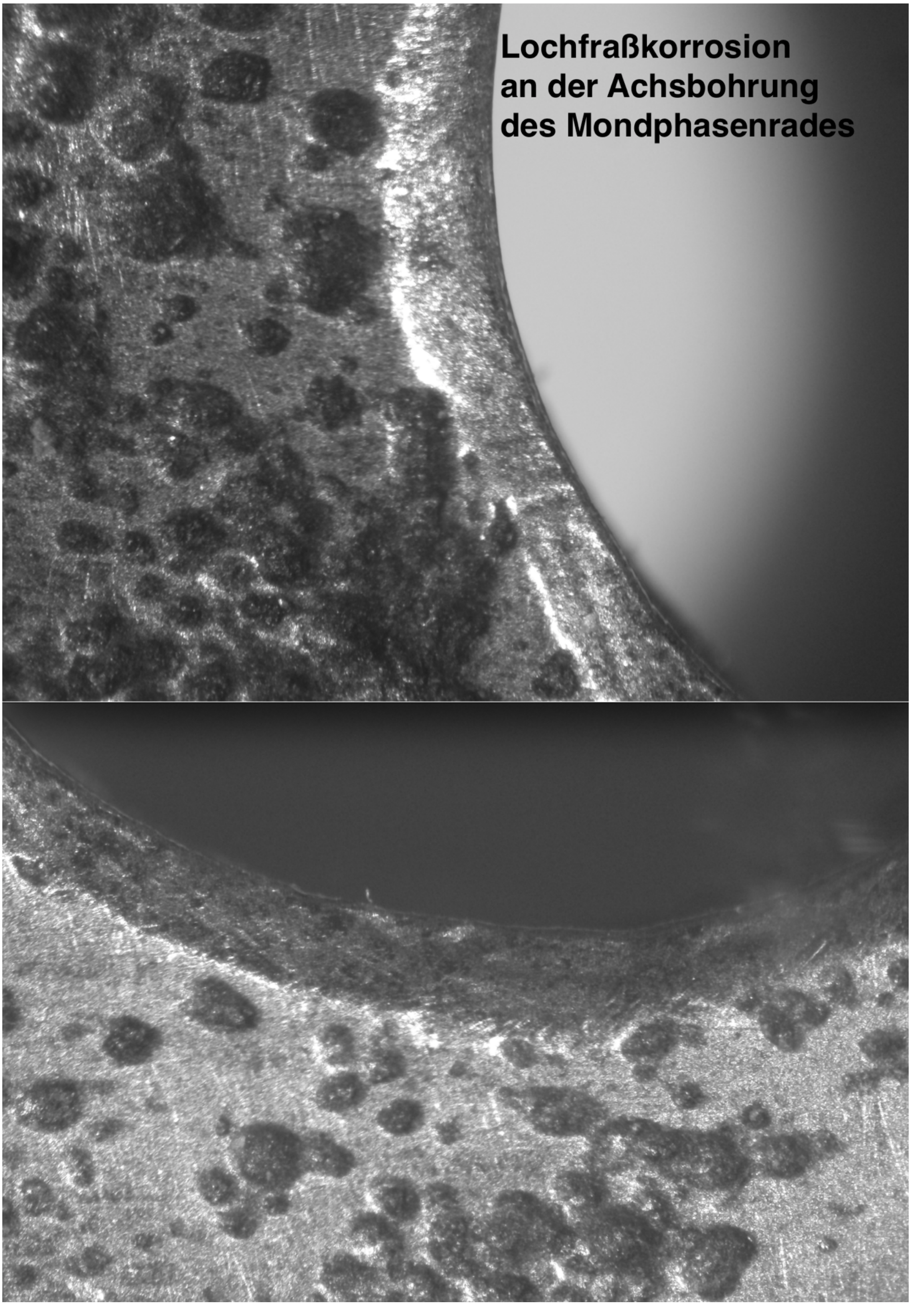
Points A and B show material removal (filing marks) made with a file. These are intended to simulate a tooth profile made by hand using a file.

As a reference object, the hour wheel of a horizontal table clock from the second half of the 16th century was compared. The authenticity of this comparison object has been certified through scientific examination.

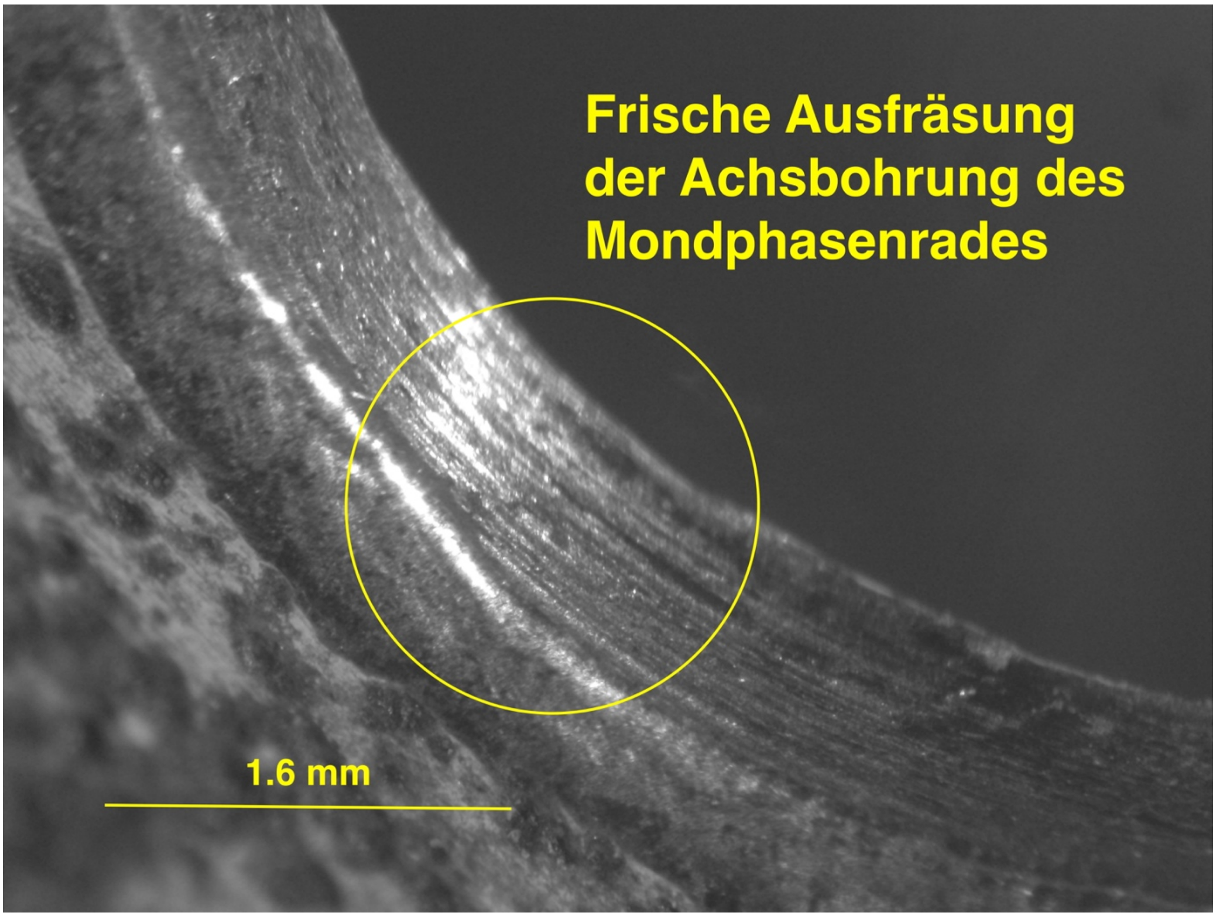
Mikroscopy 03



Mikroscopy 04

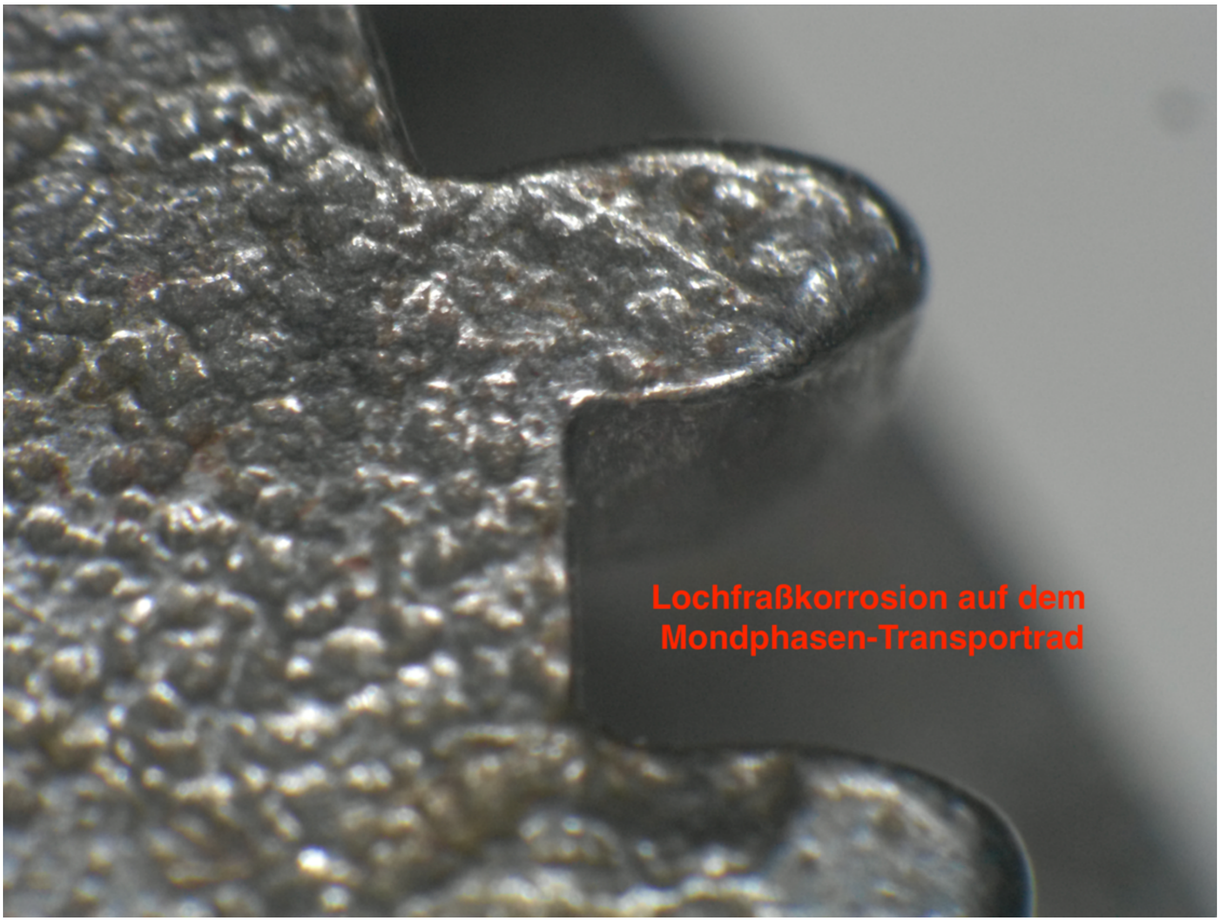


Mikroscopy 05



Explanation of Microscopy 04 + 05:

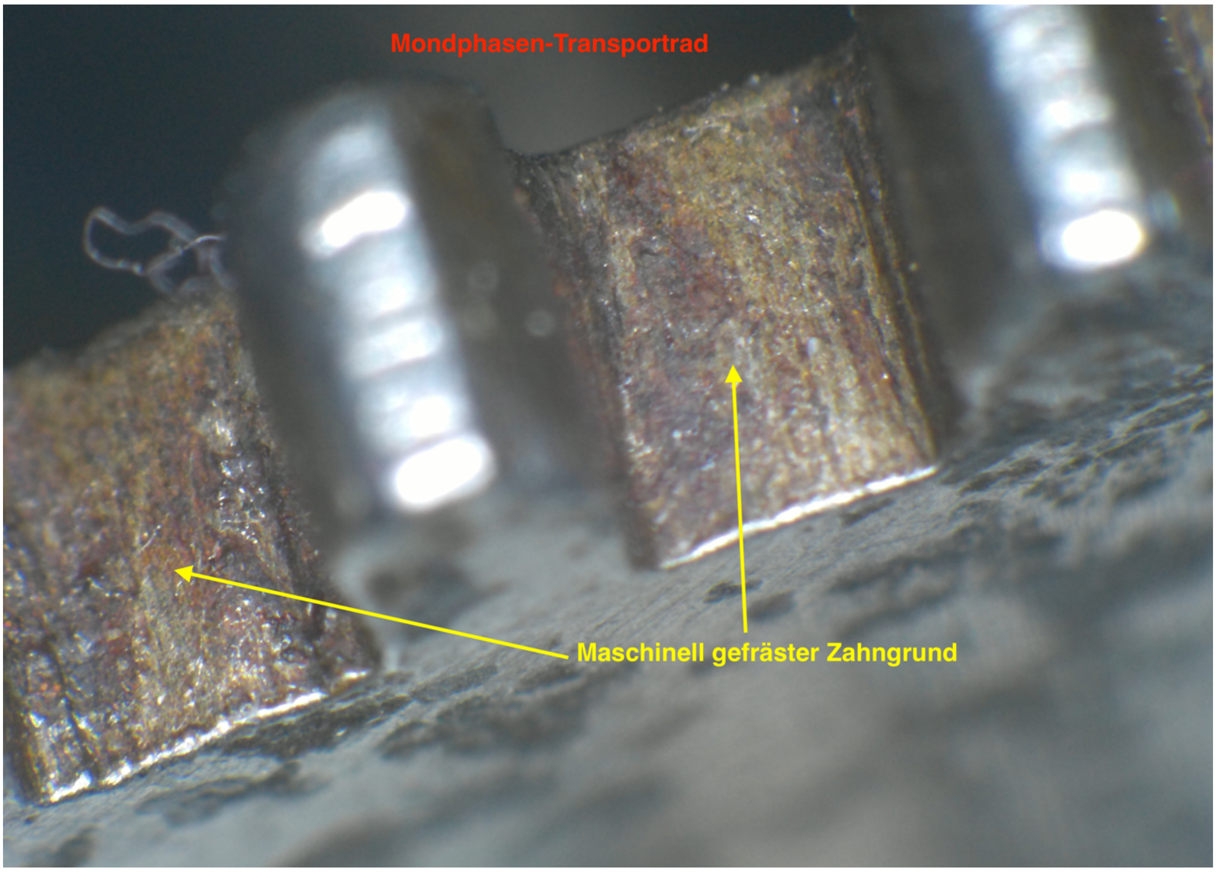
In the stereoscopic examination, the cut axle passage on the moon phase wheel was shown. The reaming passes through the pitting corrosion and reveals the edge beading, visible with a cone or roll countersink.

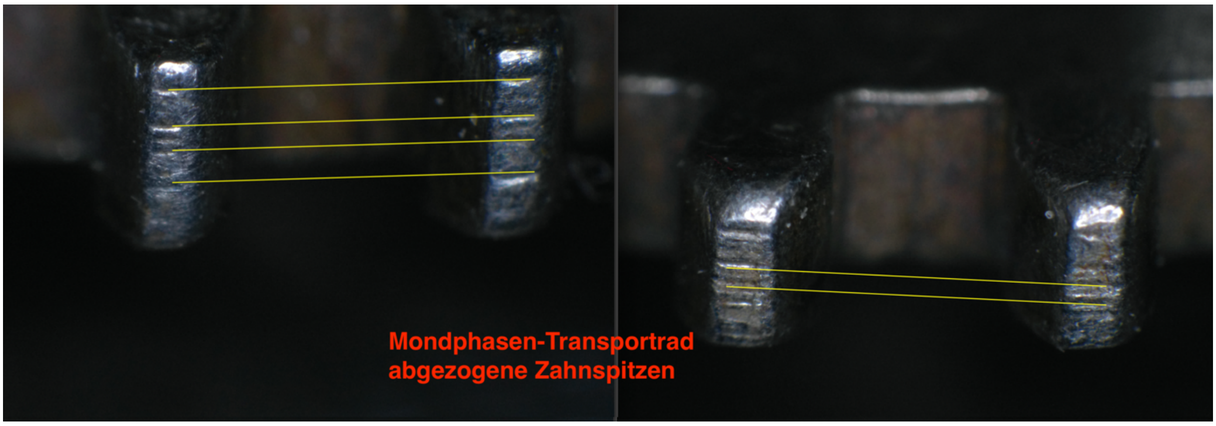

Lochfraßkorrosion auf dem
Mondphasen-Transportrad


Ms-Späne
1cm


Ms-Späne

The transport wheel of the moon phase also shows an inhomogeneous pattern. Such severe pitting corrosion would have also significantly affected the tooth flanks, tooth cycloids, and the machine-milled tooth base.


Mondphasen-Transportrad
Maschinell gefräster Zahngrund


Mondphasen-Transportrad
abgezogene Zahnspitzen

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The tooth tips were filed down

The teeth of the transport wheel were filed down. This method was used to achieve the correct run-out and the required engagement depth into the 59-tooth moon phase wheel. In the process, the cycloidal tooth tips were flattened on some wheels. This is, in my opinion, a very rough approach, which would not typically be expected from clockmakers of the late 16th century. However, this rudimentary method of shortening the teeth has been used by some clockmakers throughout history, even up to the present day. It was and still is common practice to re-file the flattened tooth tips back into their cycloidal form after they have been milled.

Although at first glance, it may appear that this is a crude piece of work that could have come from the forge or gunsmith trade, one must consider the manufacturing technology and execution of all parts in context.

This method of production, regardless of the fact that we are dealing with a new creation made from old iron, is in stark contrast to the previously mentioned points.

It can be assumed that the approach used here is consistent with the tools that would have been employed in a workshop designed for forgery, as was common in the 16th and 17th centuries.

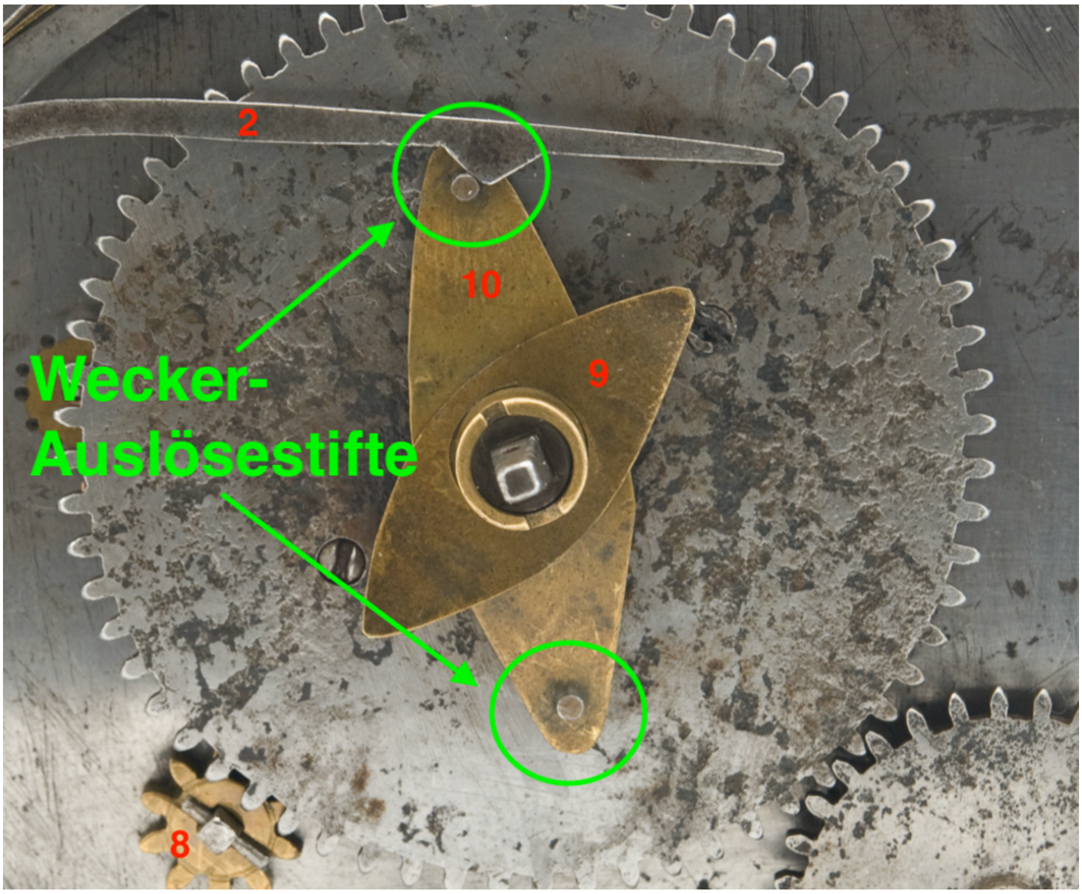
Files, as used in the late Middle Ages and the Renaissance in crafts, were made differently than today's machine-made tools.

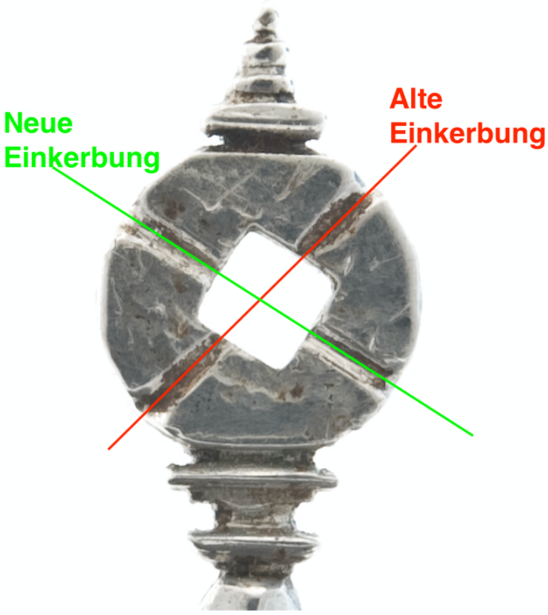
They were made by craftsmen from the "file makers' guild," which was a subcategory of blacksmithing. With hammer and chisel, the notches were hammered into the still-annealed file body, and it was then hardened. Contrary to many misconceptions, the so-called cross-cutting technique already existed at the time; it was applied sequentially in different directions. These files did not have the hardness of modern files and were reworked by the file smith when they lost their cutting ability. Additionally, the quality—especially the uniformity of the cuts, which was the best possible at the time—depended on the skill of the file maker. This also explains the intricate patterns of file marks on the components today. But one thing is common to all of them: they cannot be confused with the machining marks of later centuries.

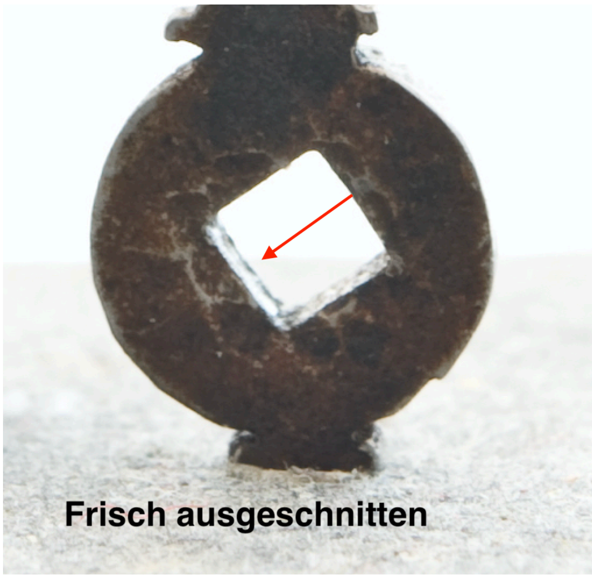
On the tooth wheels for the time and moon display, there is also the release mechanism for the alarm device. This consists of a brass pressure spring with two release pins, whose function I don’t quite understand.

Assuming the brass pressure spring exerted enough pressure to transport with the wheel — which it does not — then the alarm would trigger twice in 24 hours. This means that if you set the alarm disc, for example, from 3 o'clock to 8 o'clock, the alarm would trigger at 8 o'clock, which is correct. However, if I wanted to set the alarm time to 18 o'clock, the alarm would also trigger at 8 o'clock. Therefore, in this configuration, a 24-hour alarm dial with a mechanism that triggers twice in 24 hours doesn’t make sense to me.

The two release pins made of iron are new parts riveted into old brass.


2
10
9
Wecker-
Auslösestifte
8

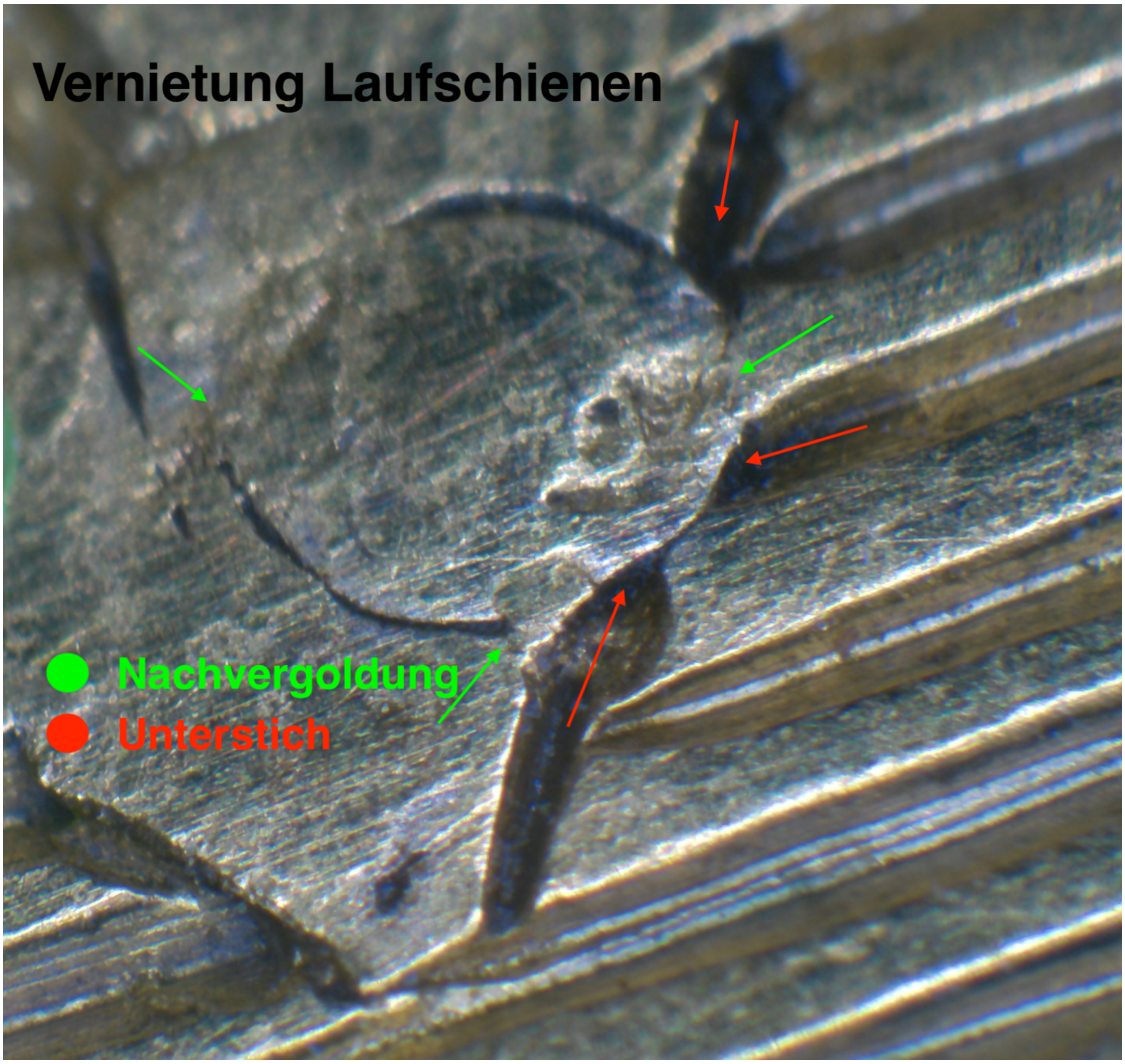




The hour hand could very well be an old hand that was adapted for this clock. The square hole was enlarged at least by filing. The notch for the placement of the retaining pin was adjusted by adding a new notch for the pin onto the square of the hour wheel.

"Anomalies in the clock case"

The explicit examination of the clock case and the resulting description is part of a separate documentation. However, I would like to give a brief preview and insight into this work.



The running rails attached to the movement case are riveted through the case body and show clear signs of engraving on the outside, which must have occurred before the riveting.

To achieve such a flat rivet surface, the rivet head must be filed down to be level with the case surface and then smoothed out after riveting.

It is highly unlikely that such crude work would be performed during the creation of a new case in this sequence. This would require that the engraver and the gilder had already completed their work.

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The interior walls of the case and its patina:

When examining the patina on the inner surfaces of the four case plates, the peculiarities accumulate, leading to the suspicion that it is a more modern fabrication.

At first glance, the typical brown coloring of the brass casting may make us believe we are dealing with oxidation that has developed over centuries.

To preemptively address this, it is now possible, with the aid of modern chemistry, to artificially create such a patina.

The coloration of copper and copper-containing alloys, such as brass and bronze, can be produced using a wide range of chemical substances.

The durability of the patina depends on many factors, particularly the condition of the surface and its pre-treatment. The discoloration can be generated through processes such as pickling, dipping, painting, electrolytic processes, or in contact with chloride-containing carbonates.

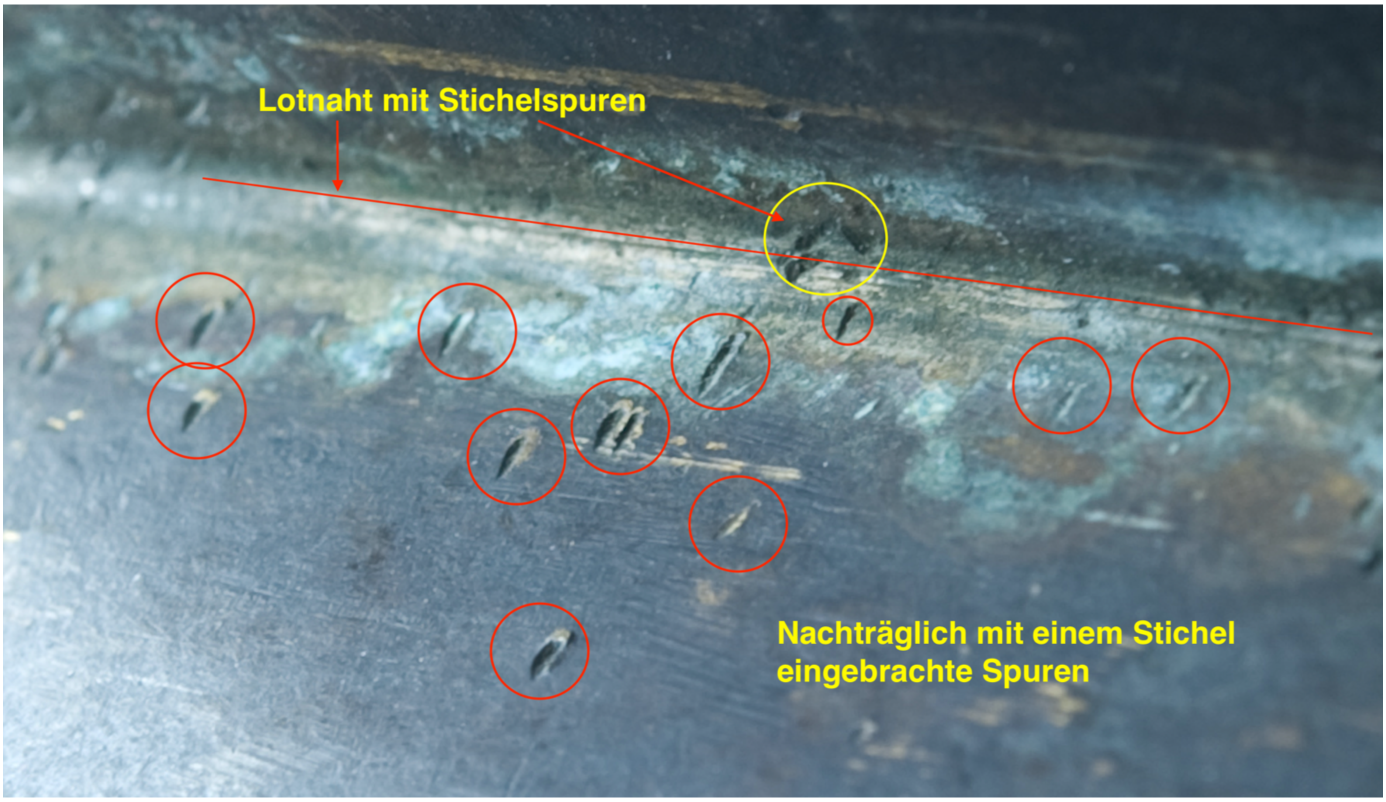
Further information can be found in an excellent scientific publication by the German Copper Institute.

I will not go into the chemical verification of the patina here but will present factual evidence that this cannot be a naturally developed patina over centuries.

Examination of the object reveals that the case walls are constructed from four brass plates that have been hard-soldered together. This is already noteworthy. The solder joints had to be reworked, meaning they had to be smoothed out. The resulting grinding marks should correspond to those from the 16th century. Workmarks, like those left by modern industrial files, should have been avoided. Nevertheless, microscopy revealed the use of modern equipment. The various applied attempts at patination with contaminants, using chemicals and paints, merely covered up these traces.

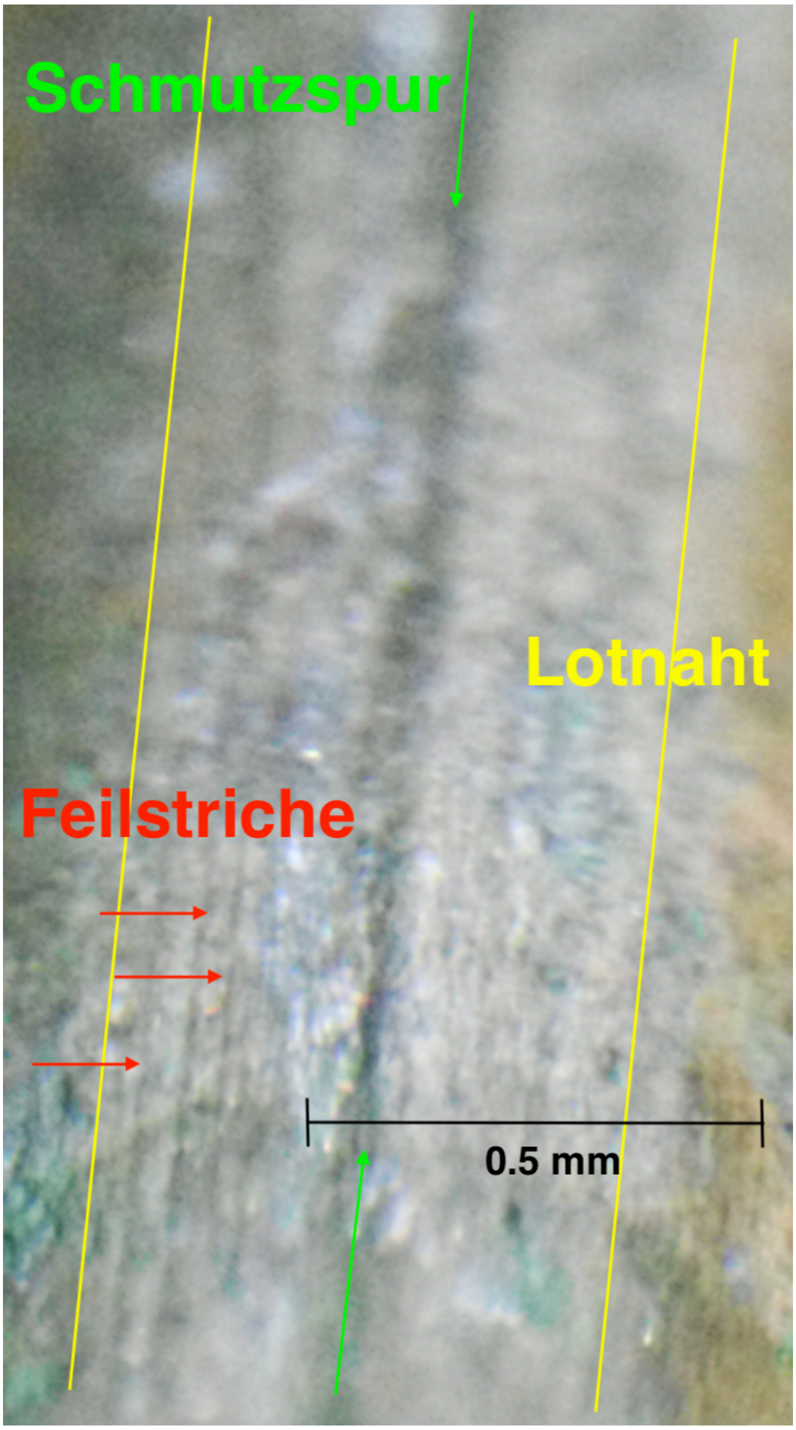
An interesting clue is the subsequent, faked material injury, made with a sharp stylus.

The bluing of the case's interior walls was done later, but it had no patinating effect on the silver solder of the joint. This proves that the artificial aging marks were made after the soldering and into the silver solder. These irregularities in the material could theoretically have been present before the plates were soldered, but their presence in the solder is evidence of a later, deliberate addition.


Lotnaht mit Stichelspuren
Nachträglich mit einem Stichel
eingebrachte Spuren

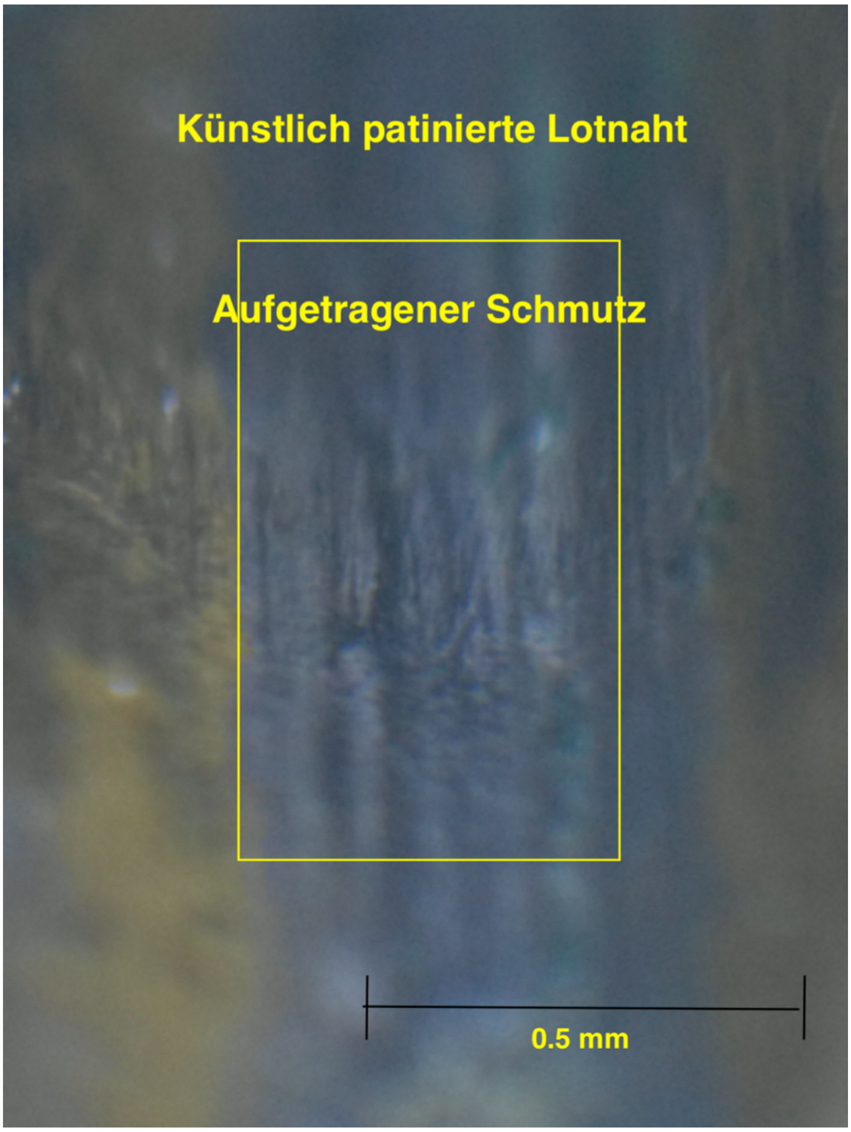
© Restaurierungsatelier Jürgen Ehrt


Vom Schmutz befreite Lotnaht
0.5 mm


Schmutzspur
Lotnaht
Feilstriche
0.5 mm

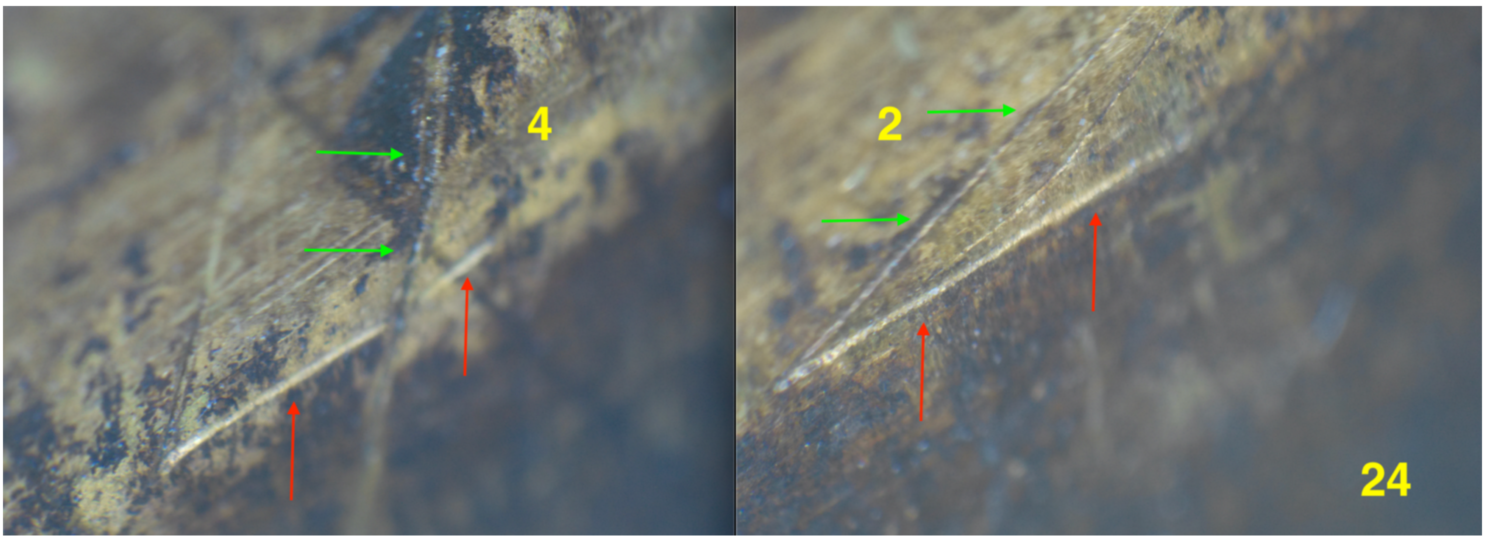
If the protective layer applied on the solder joint is removed using a cleaning medium based on gentle, residue-free surfactants, such as SurTec 104 in this case, the surface dirt is dissolved.

The surface dirt mentioned here is applied as a replacement for patina on the copper solder joint. After removing the surface dirt, even the finest file marks, which were created during the smoothing of the solder joint, become visible. Comparing the resolution of the microscope image at 0.5 mm with the spacing of the file marks makes it clear that this cannot be the work of a tool from the 16th century.

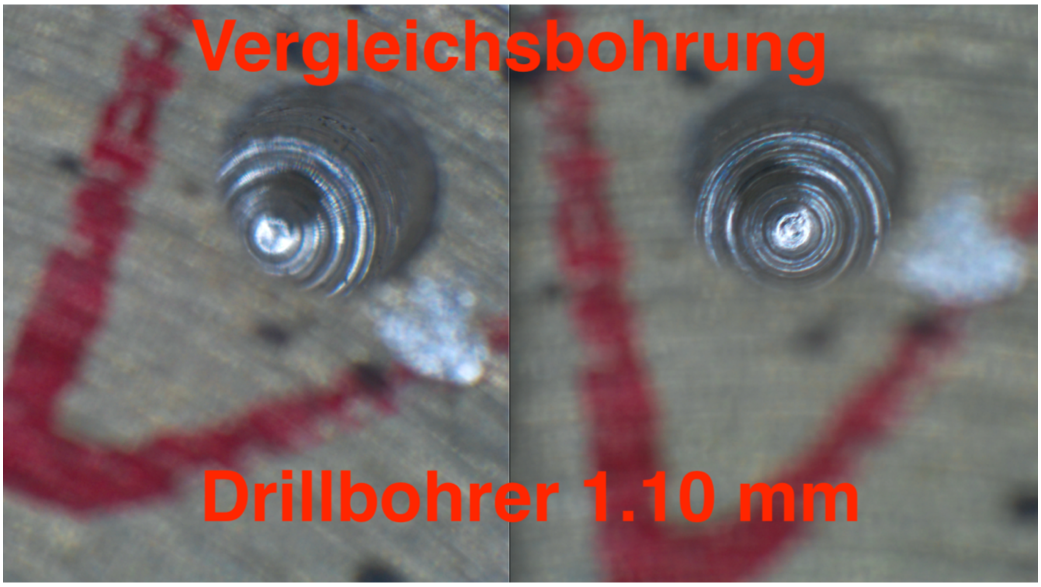


In the inner wall of the case, in the upper area just before the profile strip, there is a number "24" inscribed with a burin or similar tool.

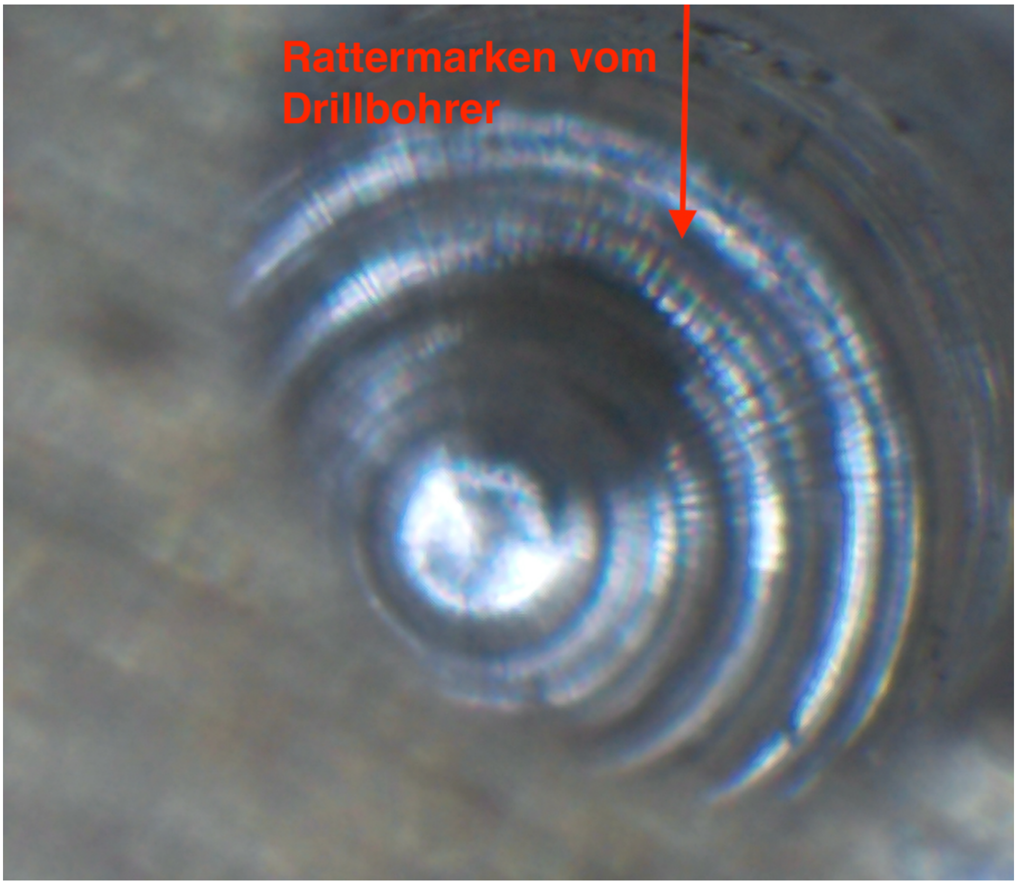
Upon microscopic examination, it is noticeable that parts of the inscription show barely or not oxidized brass, while other areas exhibit significant corrosive aging traces, as indicated by the red and green arrows. This once again raises the question of whether the interior of the case has been artificially patinated.



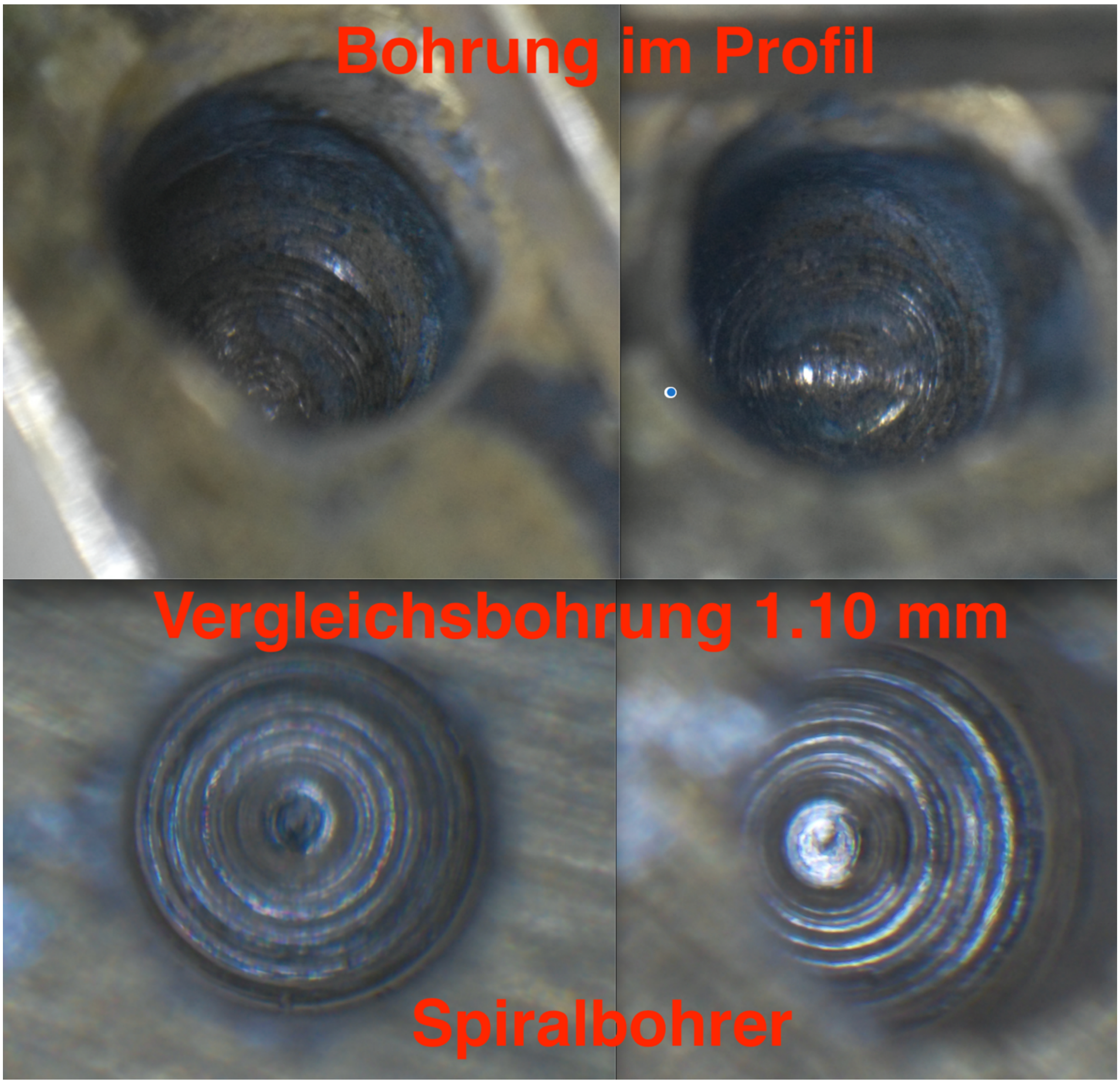
Profiles



Vergleichsbohrung
Drillbohrer 1.10 mm



Rattermarken vom
Drillbohrer


Bohrung im Profil
Vergleichsbohrung 1.10 mm
Spiralbohrer

Summary and Inference:

When reviewing the previously described data and drawing a logical conclusion from the coincidence of the corresponding features of the clocks, it becomes clear that the clock under investigation cannot be an authentic piece from the second half of the 16th century. As mentioned in the introduction, so-called transitional modifications and additions are completely ruled out.

One crucial aspect in assessing this artifact is the undeniable craftsmanship standard expected from 16th-century clockmakers.

As is well known, the clockmakers of that time adhered to strict guild regulations. For their master approval, they had to create a piece with high technical craftsmanship and theoretical knowledge, which means it's highly unlikely that a clockmaker would have produced such a botched piece. Even if some apprentices or journeymen were less skilled, they were still under the supervision of the master. The competitive pressure among the master workshops — where such a clock would have been made — was considerable, which would have ensured a highly qualified production process.

The architectural variation in this table clock, with an astronomical indication in the form of the lunar cycle and age display on one side, paired with the clumsy connection of a striking mechanism with an alarm, is inherently paradoxical.

Looking further at the craftsmanship, one is already puzzled by the creation of the hour and moon phase transport wheels. The adaptation of these two wheels is supposed to create a friction that would allow for setting the hour hand. As previously demonstrated, this is excluded due to the faulty construction.

Lastly, due to the inconsistent methods, materials, and tools used, as well as the insertion of a signature whose authenticity can be disproven, this clock is exposed as a forgery.

The incorrect attribution of this clock to an anonymous 16th-century master leaves no room for considering it a reproduction or copy from the late 16th-century Renaissance.

The previously described hallmark, labeled AW with a star, is referred to by Abeler as follows:

AW unbek. Meister. Arb.; Tischuhr, vergoldet. Messing, 1601 (P-Slg. USA), Tischuhr, schiefe Ebene, ca. 1600 (Aukt. Cro 70/624)[1]

[1] **Jürgen Abeler, Meister der Uhrmacherkunst, 2. Auflage 2010 ISBN: 978-3-00-030830-7**

The abbreviated explanations mean:

- Private collection USA
- Auction Crott No. 70, LOT 624

Not overlooking the fact that the aforementioned clocks have been introduced into trade in the past and assuming there is likely a dark figure of previously unrecognized forgeries, one cannot dismiss the intention of financial gain.

As the forgery has already been validated through the examination of the clock movement, the investigation and further research on the case are not part of this expert report.

However, it can already be pointed out that, subject to the examination results, there are questionable aspects regarding the case.

Furthermore, the association of the movement and the case can be ruled out based on the lack of authenticity of the movement.

Meissen, April 9, 2022

Jürgen Ehrt

§ 6 – Copyright Protection