Article: Only time will tell: Examination and analysis of an early German watch
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ONLY TIME WILL TELL: EXAMINATION AND ANALYSIS OF AN EARLY GERMAN WATCH

Meg Loew Craft

Abstract

The authenticity of a small early German watch (WAM 58.31) in the collection of the Walters Art Museum was questioned. In preparation for the reinstallation of the Renaissance and Baroque galleries, research, examination and analysis of this watch were undertaken to determine the provenance, construction, condition and composition in an attempt to resolve questions about the watch. Problems were encountered evaluating the watch, a functional object where wear, repairs and alterations to improve accuracy are expected. A great deal of information has been discovered but a final conclusion may never be determined.

1. Introduction

William Walters (1819-94) and his son Henry (1848-1931) collected fine and decorative arts objects during the second half of the 19th century, and into the early 20th century until Henry Walters' death (Johnston 1999). Their intent was to amass a comprehensive collection of art throughout the ages, which was bequeathed to the City of Baltimore in 1931. The museum opened to the public in 1934. Included in the collections are nearly 300 horological objects, primarily watches, dating from the late 15th century through the very early 20th century. In keeping with the Walters' love of decorative fine arts, the focus of the horological collection is aesthetic and visual merit rather than the quality of the movements. The provenance of many of the watches is unknown. Receipts in the Walters' archives frequently do not describe the watches adequately enough to associate the paper trail with specific watches in the collection.

In preparation for the reinstallation of the 1908 Italian Palazzo-style museum in 2005, the watch and clock collection was surveyed. One discovery was the existence of a gilt brass spherical watch with an iron movement dated 1530 that once belonged to Philip Melanchthon (1497-1560), a German reformer and contemporary of Martin Luther (Figs.1 and 2). Although once recognized and documented, some time after Henry Walters' purchase in 1910 from the Parisian dealer Jacques Seligman, the significance of the watch was forgotten (Gahtan and Thomas 2001). The spherical shape, also called a musk ball or Nuremberg egg, is one of the earliest forms of a watch. Probably made in Augsburg or Nuremberg, both centers of early watch production, the watch is not signed or marked by the maker. Also rare is an inscription appropriate to Melanchthon's religious avocation, "PHIL[IP]. MELA[NCHTHON]. GOTT. ALEIN. DIE. EHR[E]. 1530." (Philip Melanchthon, to God alone the glory, 1530) engraved on the bottom of the watch. While watches were known to have been made in the late 15th century from surviving documents, no dated or documented examples have been discovered, making the Melanchthon watch the earliest recognized dated watch. Until this rediscovery, the commonly cited example was a German watch dated 1548 and marked "CW", possibly Caspar Werner of Nuremberg, in the collection of Wuppertaler Museum, Wuppertal, Germany. The Melanchthon watch moves the date back 18 years. Given the great significance of the Melanchthon watch, attention was directed to other early watches and clocks that had not been carefully studied.

Figure 1 (left). Spherical watch (WAM 58.17). South German. Engraved on the underside: "PHIL[IP]. MELA[NCHTHON]. GOTT. ALEIN. DIE. EHR[E]. 1530." (Philip Melanchthon, to God alone the glory, 1530). Gilt brass case and dial, blued steel hand, iron movement. 4.8 x 4.8 cm. Walters Art Museum, Baltimore, MD.

Figure 2 (right). Iron watch movement with verge escapement, gut line driven fusee and foliot oscillator. Spherical watch (WAM 58.17).

An enameled gold and rock crystal German pendant watch (WAM 58.31) came under scrutiny, encouraged by wildly varying evaluations ranging from a rare 16th century survivor to modern forgery from visiting dealers, scholars and collectors (Fig. 3). The provenance of the watch was uncertain at the outset of this examination. Archival records indicated only that the watch was part of the collections bequeathed to the City of Baltimore after Henry Walters' death in 1931. Therefore, curatorial research, conservation examination, and scientific analysis were warranted. Initially, a basic examination was undertaken to confirm methods of manufacture, basic condition and to review past information and comments in the object's record file.

Figure 3. Pendant watch (WAM 58.31). German, Nuremberg (?). Marked "HK" and "HK 15+60". Gold, champleve enamel, gilt brass, brass, iron alloys. Case: 4.5 x 3.1 x 1.8 cm. Movement without dial: 3 x 2.5 x1 cm. Walters Art Museum, Baltimore, MD.

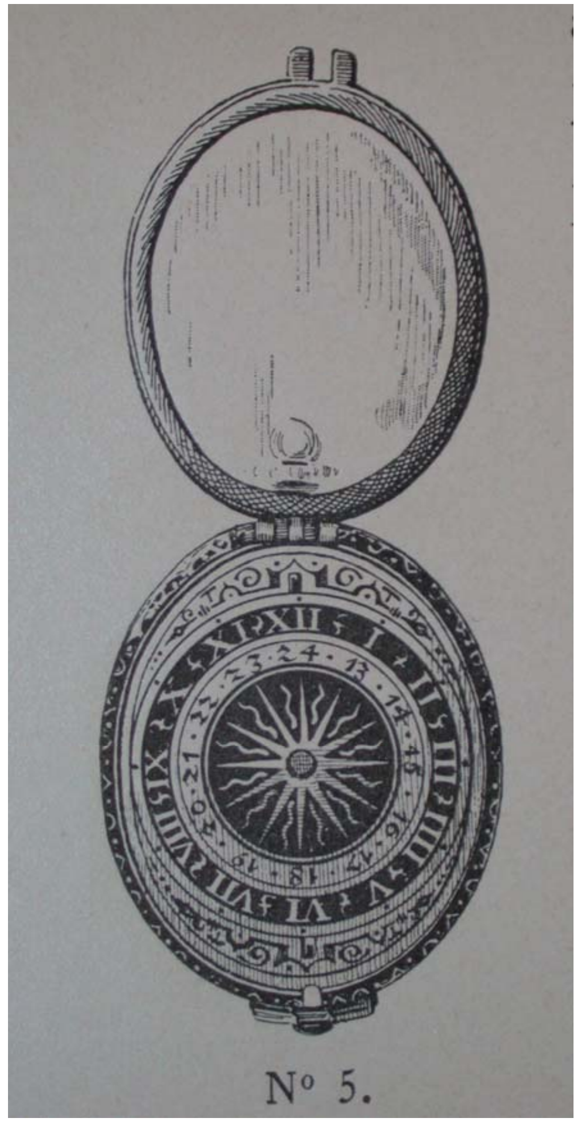

Figure 4. Illustration of the watch in Bode's 1890-1892 *La Collection Spitzer*, Volume 5:54, Montres #5.

2. Provenance

As a first clue, an image of the watch was found in a photograph album of objects dating no later than 1915 in the archives, proving that Mr. Walters acquired it prior to 1915 (Walters Archives).

Research has revealed that the watch was in the collection of Baron Frédéric Spitzer (1815-1890) and was sold in 1893 with the dispersal of his collection (Fig. 4) (Bode et al.). Mr. Walters acquired several objects directly from the Spitzer sale that are documented in the Walters archives, but the watch is not mentioned. Spitzer, a dealer and collector, had 4,000 objects in his home in Paris that was known as the Musee Spitzer. His collection is noted for objects of rarity and importance, such as the George watch now at the Metropolitan Museum of Art, and, at the same time, for notable forgeries and pastiches (Leopold and Vincent 2000). The illustration of the Walters watch pictured in the catalogue *La Collection Spitzer* shows a frontal view of the watch but without a hand, suggesting that there may have been an intermediate owner since all images in the Walters show the watch with a hand (Bode et al.). Where Spitzer acquired the watch and its prior history is unknown at this time, but Spitzer acquired many objects from other established European collections, including those of Prince Soltykoff and Alessandro Castellani.

3. Description of the watch

3.1. Case

The oval pendant watch would have been worn as jewelry, typically suspended on a ribbon or chain as a necklace or from a belt (Fig. 5). The suspension loop is circular with a dark translucent blue enamel band on each face. The pendant, the stem connecting the case to the loop, is decorated with a white enameled multi-lobed bow. The watch case is a rock crystal cylinder (see below, Section 3.4) with enameled gold mounts. The case without the pendant and suspension loop measures 3.6 high x 3.1 wide x 1.8 cm. deep. The gold rim mounts on the case are decorated with transparent blue running lozenges alternating with transparent green ovals executed in champleve enamel. The gold end pieces or straps at the top and bottom of the case are decorated with fruit and floral motifs covered overall with transparent green, blue and opaque white, yellow, green and turquoise enamels. The end pieces are cast with applied fruits secured by pins or dowels.

Figure 5. Oval rock crystal case with champleve enameled gold mounts. German watch WAM #58.31.

The cover is hinged to the lower part of the case, or 'cup', which holds the movement. The movement is not hinged to the case but is secured in the cup by spring clips located at 12:00 and 6:00, or north and south, as opposed to the more common 3:00 and 9:00, or east and west directions. The movement is wound through a hole in the back of the case.

3.2. Dial

The gold dial is decorated with dark blue-black, transparent blue and green champleve enamel (Fig. 6). The outer hour chapter ring has a dark blue-black enamel background with gold Roman numerals I through XII. The '4' is represented as IIII as opposed to 'IV.' An inner hour ring is gold with dark blue-black enamel Arabic numbers 13 through 24. The Arabic 2 is formed as a z. S-shaped scrolls or dots indicate the half hours. Since the marking of hours during the day was not yet standardized, this system of numbering allowed the telling of time using the Italian system of 24 hours starting at sunset and the two sets of 12 hours used by most of Europe in the 16th and 17th centuries (Bruton 2004).

Figure 6. Dial of German watch (WAM 58.31). Gold with champleve enamels.

The blued steel hand is an appropriate style and may be of the period, although it is not original to the watch since no hand was present when the watch was sold in the Spitzer sale (Bode et al). As all watches without a balance spring, the watch was not a good timekeeper and probably had to be wound at least once a day. Some contemporaneous watches included a compass and sundial to correctly set the time. Minutes, and hence the need for a second hand, were not commonly measured until after the introduction of the balance spring in about 1675.

The center of the dial is decorated with a sunburst having alternating straight and wavy gold rays on a translucent dark blue ground. The arcs at the top and bottom of the dial are filled with scrolls executed in dark blue-black and transparent green enamel on the gold support.

The dial is secured to the front or dial plate of the movement by two lugs attached to the back of the dial that pass through holes in the dial plate. Swinging iron clasps mounted on the underside of the dial plate catch indentations at the ends of the lugs.

3.3. Movement

The movement is housed between two mercury gilded plates, the dial plate and the back plate (Figs. 7 and 8). Measurements of the size of the movement (max. 2.96 x 2.42 x .96 cm.) and the thickness of the plates (plate thickness range .72-.96 mm.) are not uniform based on the metric system established in France in 1799. Some 19th century forgeries have been identified by a 19th century craftsman's consistent adherence to the metric system (Stone 1998). Prior to the introduction of the metric system, a myriad of non-standardized measurements were used in different European cities or regions (www-history.mcs.st.-andrews.ac.uk/HistTopics/Measurement.html). Use of the metric system would prove manufacture of the watch some time after 1799. The metric system was finally fully adopted by France in 1840, northern Germany in 1868 and in the U.S. in 1866 but employment was never made mandatory.

The back plate is chased and engraved overall with interwoven leafy vines and scrolls. In a tear-drop shape, conjoined initials "HK" are engraved at the bottom of the plate. An "N" is included in the center of the overall decoration near the opening for the foliot or dumbbell balance. "HK˚ + 1560" is scratched or incised on the dial plate between the plate and the dial. No oil sinks, introduced in the early 1720s, are present on the plates (www.horologia.co.uk). An oil sink, a shallow well drilled in the plate to keep the oil lubricant in place at pivot points, improved performance and reduced pivot wear. Oils sinks were included in manufacture and often added during repair of functional watches after the 1720s. The absence of oil sinks is a feature that suggests a pre-1720's watch that was not updated or heavily repaired over time or a watch made later as copy or forgery based on style rather than functionality. The plates are held apart and supported by three gilt brass pillars, two waisted baluster pillars and a rectangular pillar that provides a pivot point for the escape wheel shaft (Figs. 9, 10) (Smith 1975). This tapered pillar is rectangular, not round in section, and decorated with S-shaped scrolls and diagonal hatching.

Figure 7. Back plate of watch (WAM 58.31). Engraved initials "HK" at bottom of plate. Chased and engraved gilt brass.

Figure 8. Dial plate, located under the dial of watch (WAM 58.31), engraved with initials and date "HK 15+60".

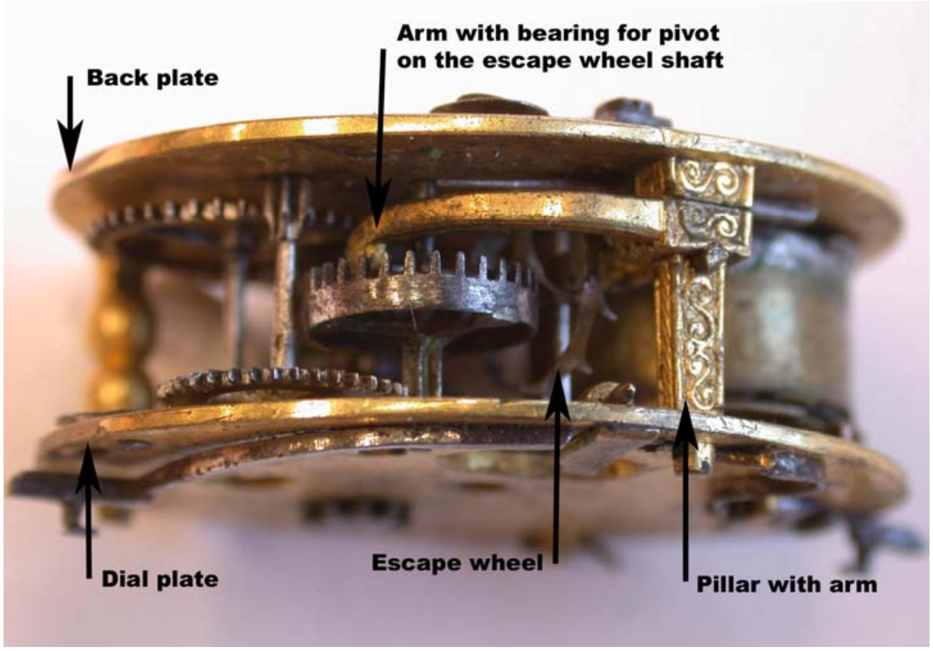

Figure 9. Movement of the watch (WAM 58.31) showing the mainspring barrel with failed lead solder repairs. The cone-shaped fusee, which functions to even out the power from the mainspring, now has a chain connecting to the barrel, which was originally a gut line.

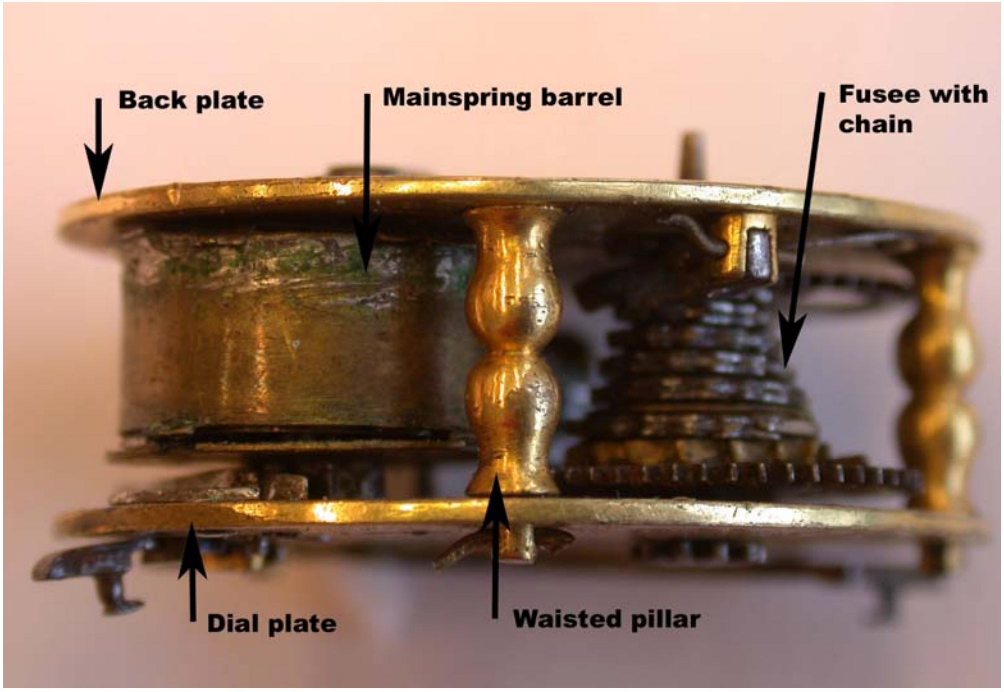

Figure 10. Movement of watch (WAM 58.31) showing the contrate wheel of the going train. The third pillar functions as an adjustable arm providing a pivot point for the escape wheel shaft.

"HK" is unidentified and may be either a maker or an owner. Two known watch and instrument makers working in the late 1500s with the initials HK are identified as Hans Koch and Hans Kiening. Both are listed in the Adler Planetarium's Webster Maker Database (historydb.adlerplantarium.org). The marks on the watch do not match the accessible known marks of either maker. If the watch is later in date than 1560, a likely scenario, the initials may belong to an owner. It was popular in the early 19th century to hide the name or initials of the owner or maker within the decoration, such as in the pierced work on the cock, a decorated bracket on the back plate with a pivot for a shaft. This conceit may be a clue to the watch's origin that has not been fully explored.

A steel mainspring housed in a brass barrel provides power for the movement. The barrel is currently attached to the fusee by a steel chain, similar to a bike chain (Fig. 9). The conical-shaped fusee acts as a pulley to even out the power coming from the mainspring. When tightly wound the mainspring supplies more power and as it winds down less power is transmitted. Correspondingly, the chain moves down the fusee to give greater mechanical advantage as the mainspring winds down. The mainspring barrel was attached to the fusee in the earliest watches by a gut line. The 6-turn brass fusee was originally designed to be driven by a gut line. Spiral grooves on the fusee were originally curved or c-shaped to carry the round gut line but have been crudely distorted by the replacement rectangular chain. The gut line was reactive to changes in temperature, relative humidity, and was not as strong or long lived as a chain. Chain began to replace gut sometime after 1600. Conversion from a gut line to a chain was a common modification during the 17th century (Bruton 1999).

The going train is the series of interlocking gears that transmit power from the mainspring to the escapement, where the beat or pulse is produced (Fig. 10) (Bruton 1999). The watch has five large gears or wheels, most with three arms, in the train: fusee great wheel, second, third, contrate and escape wheels. The wheels are interconnected by smaller gears or pinions with five leaves attached to the opposite end of a shaft shared with a wheel. The barrel and fusee are yellow copper alloy, which was not analyzed but is usually brass, but the train wheels, pinions and arbors are made entirely from iron alloys, white metal alloys attracted to a magnet. Very early movements are made entirely from iron, as is the Melanchthon watch discussed in the introduction. Later movements are primarily made of brass, with only steel arbors and pinions (Leopold and Wayland 2000, Smith 1996). If authentic, this movement appears to be transitional with both brass and steel.

The movement has a verge escapement (www.horlogia.co.uk/escapements.html). Alternative escapements were not widely introduced until the 18th century; all early watches originally had verge escapements (http://en.wikipedia.org/wiki/Verge_escapement). The verge, an arbor with two palettes or flags set at slightly less than 90˚ to each other that engage with the teeth on the escape wheel, passes the power from the mainspring to the oscillating foliot creating the beat of the watch. The foliot, which looks like a dumbbell visible on the back of the watch, is controlled by a bristle regulator that consisted of a hog's bristle set into a movable blued steel j-shaped arm on the back plate. The hog's bristle acts like a spring to reverse the direction of the foliot. A blued steel, reverse s-shaped cock provides the pivot point for the verge and foliot.

4. Condition

At the Walters Art Museum conservation treatment of watches is currently being kept to a minimum until study and research is complete. Old repairs, wear and damage are part of the watch's history to be preserved unless threatening the stability of the watch. Preservation of past use is necessary to study the watch's condition and for authentification. No watches function while on display. The Walters lacks the manpower to wind watches and clocks, does not focus on the operational aspects of movements as part of its interpretation of horological objects, and does not have a horologist on staff. Watches are stored at ambient conditions of approximately 70˚ F and 50% RH in cases or drawers with acid free, conservation-quality housing materials. Tarnish inhibitors, such as Pacific Silvercloth, are kept in the cases and drawers to reduce and slow tarnishing of silver. Minor treatments are undertaken on cases, for example, to remove fingerprints, stabilize flaking enamel, inpaint minor losses in enamel or to remove tarnish or polish residue on silver elements.

No treatment records exist for the watch. The case is in stable condition with minor losses to the enamel. The movement is fragmentary and nonfunctional. The movement fits snugly in the case; the edges are not filed or altered to fit. The cover is slightly sprung and does not close tightly.

The cover on the case has been damaged and heavily restored. The bottom or cup of the case is rock crystal, confirmed by visual examination for flaws and inclusions and checking between crossed polarized filters (www.olympusamerica.com/files/seg_polar_basic_theory.pdf. When positioned between two polarizing filters, the crystalline structure of rock crystal alters the path of light passing through it. The cover proved to be glass, probably a restoration. Although not common until the 17th century, the cover and bottom of the case would have been made both of rock crystal orginally; glass was not used until 18th century (Bruton 1999). When examining the glass, air bubbles from manufacture are visible and light was not diverted when the glass is placed between crossed polarized filters, indicating the amorphous structure of glass. The glass is held in a recess as opposed to being secured by clips or prongs projecting from the bezel, more common in early watches. The bezel is split, having an intentional opening, at the hinge. This may have been done originally, or more likely, as part of the repair work to replace the cover glass. The hinge has also been repaired.

The enamel on the case mounts has suffered losses. Damage is most severe on the straps or end pieces with encrusted *en ronde bosse* enamel work, where opaque and transparent enamel are applied over the gold relief surface (Fig. 11). The strap is a cartouche with applied fruit or floral elements. The cartouche is covered with transparent blue and green enamel which has suffered extensive losses, especially on curved surfaces, the outer perimeter and highpoints. The fruit and floral decorations are executed primarily in opaque colors: white, yellow, turquoise and apple green. At the bottom of the case in the center of the cartouche, a finial or drop has been lost (Fig. 12). A pearl or gold and enamel drop may have once hung down from the bottom of the case; file marks are present where there was once an attachment (Britten 1932, Zagorodnaya 1997).

Figure 11. Dial of the case of watch (WAM 58.31). Enamel originally covered most of the gold strap or end piece. The pendant and bow are also covered with en ronde enamel.

Figure 12. Bottom of the case of watch (WAM 58.31). In the center, a ring for suspension of a drop or finial has been filed off. The enamel has suffered losses, especially on curved surfaces and high points.

The back of the rock crystal case is scratched. Small chips are present around the winding hole and under its protective gold collet on the back of the case. Usually 16th century cases were hinged on the front and back to allow easy access for winding. Gold mounts were used as a manufacturing technique to secure the cover and to avoid drilling into the rock crystal, which is easily chipped. The winding hole on the reverse may be an alteration or design change. Without the hole, the movement would have to be removed from the case for winding causing excess handling and wear, especially given the small size of the watch. This is an awkward and non-functional design feature not common on early watches.

Conservation treatment was cosmetic only. No treatment of the movement was undertaken. No corrosion is currently active. Losses have occurred to the dark blue enamel inside the chapter rings requiring minor cosmetic treatment (Fig. 13). The losses were inpainted using Primal WS-24, a colloidal acrylic dispersion made by Rohm and Haas, dry pigments and Golden Fluid Acrylic Colors (Fig. 14). The inpainting was carefully leveled using acetone and micromesh abrasive papers.

Figure 13 (left). Dial of watch WAM #58.31 with damages to the enamel before inpainting.

Figure 14 (right). Dial of watch WAM #58.31 after inpainting.

The movement appears to be earlier than the 18th century in date, based on the gut-driven fusee and early wheel work. The many elements of the movement are worn and heavily repaired. Given the functional nature and age of the watch, damages, repairs and replacement elements are expected. The dumbbell foliot is a crude replacement. The lug of the reverse s-shaped cock below the back plate interferes with the movement of the escape wheel, indicating a nonfunctioning later replacement or restoration. The top and bottom of the spring barrel, originally held with mechanical tabs, have been very crudely repaired with lead solder that has failed in several spots, leaving one end of the barrel detached and held in place by the arbor only.

The iron alloy elements have minor rust. The brass elements have a few spots of green organic copper corrosion products present from past oil lubricants, traditionally from the jaws of porpoises and other animal products, which contain organic acids and attract grime. No additional conservation work will be done on the movement until all study and research options are exhausted. Fingerprints or grime are removed with odorless mineral spirits or ethanol.

5. Scientific Analysis

Analysis of the mercury gilded brass plates undertaken by Jennifer Giaccai, Scientist at the Walters using micro-X-ray spectrometry and by Dr. Philip Piccoli, Associate Research Scientist in the Geology Department, University of Maryland, using wavelength dispersive X-ray spectrometry (WDS) in the scanning electron microscope. These studies revealed that the dial and back plates are high zinc brasses but of slightly different compositions (Piccoli 2005). Both contain less than 30% zinc and traces of arsenic and/or antimony. In Europe during the 16th and 17th centuries, brass was made by the cementation process, which prevents the zinc content from exceeding 32%. Had the zinc content been much greater than about 30-32%, the brass would date to the 19th century or later after co-melting of copper and zinc was developed in Europe (Newbury et al. 2005).

Analysis of the enamels was undertaken by Mark Wypyski, Conservation Scientist at the Metropolitan Museum of Art using a combination of energy dispersive X-ray spectrometry (EDS) and wavelength dispersive X-ray spectrometry (WDS) in the scanning electron microscope. From his report: “The translucent enamels from both the watch face and the case were found to be essentially identical, allowing for some variation due to heterogeneity in the enamels mixtures. The overall compositions as well as the colorants used in all of the enamels from the watch were found to be consistent with previous analyses of other well-dated 16th and 17th century European enamels” (Wypyski 2005). However, Renaissance enamel compositions continue to be used, despite technological changes, until the early to mid 19th century. By the mid 19th century, compositional differences including increased lead content and the use of different colorants and opacifiers, were in use that may distinguish these later enamels (Wypyski 2002).

Scientific analysis determined that the composition of the brass and the enamels is technically feasible for a 16th or 17th century watch (Wypyski 2005, Piccoli, 2005). From the enamel analysis, results suggest a manufacturing date earlier than mid-19th century even if the watch is a complete fake or forgery. The analytical results do not preclude the use of Renaissance enamel compositions in the 18th or very early 19th century, or the assembly and reuse of older elements. While analysis was a useful tool, it did not provide a “smoking gun.”

6. Comparative Study

The making of watches probably began in the late 1400s. The earliest reference to a watch is made by Johannes Cocleus in 1512 in reference to small timepieces made by Peter Henlein, a locksmith in Nuremberg. Currently the Melanchthon watch, dated 1530, is the earliest known dated survivor. If original and not added at a later date, the incised date of 1560 on the dial plate is extremely early. Relatively few early watches survive, making comparisons difficult (Thompson 2008). Without a direct comparison, the initial reaction is to dismiss the object.

One image of a very similar watch was located (Fig. 15). In F. J. Britten's *Old Clocks and Watches & Their Makers* (Britten 1932), a watch from the Prince Soltykoff collection is discussed. The description in the Britten text, which seems to be derived from the 1858 catalogue of the Soltykoff collection by Pierre Dubois, indicated that the author had not personally seen and did not know where the watch was at the time of writing (Dubois 1858). Although not discussed in Britten, the initials "HK" are clearly visible at the center top illustration of the back plate. Britten only notes an N probably for Nuremberg. This watch is clearly by the same unidentified "HK" maker, owner or forger. The current location of the illustrated watch once in the Soltykoff collection is unknown.

A second related watch is in the collection of the Mathematisch-Physikalischer Salon, Dresden (Willsberger 1975). Inquiry regarding this watch has not been completed. Both of these watches have been dated to the late 16th or early 17th centuries.

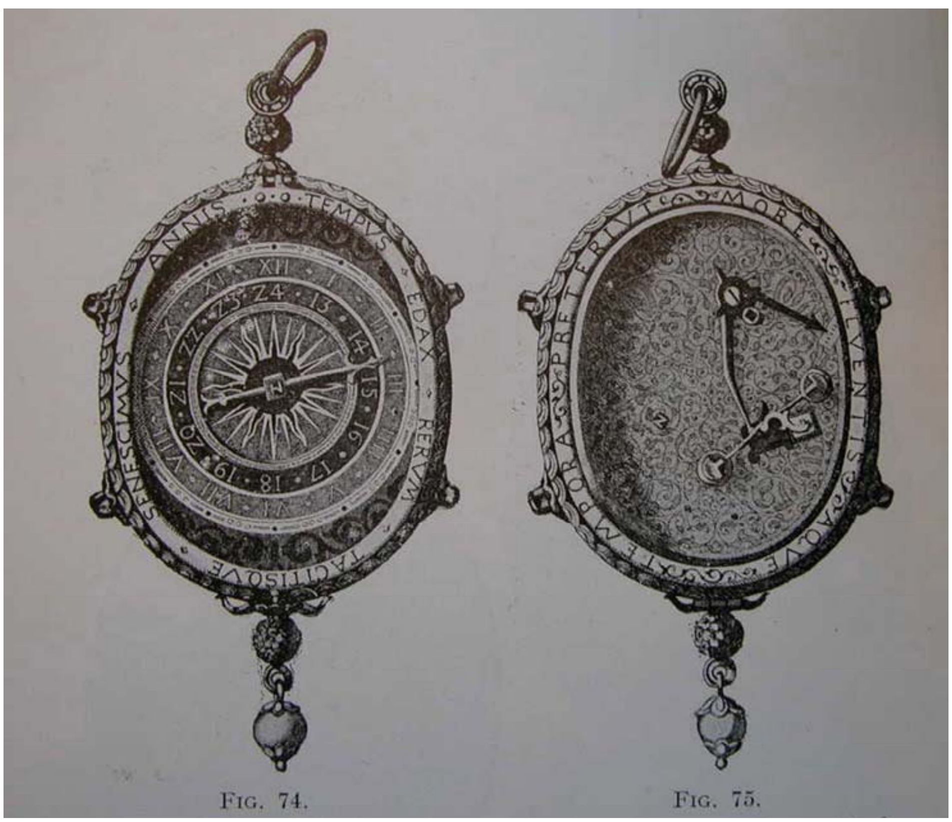

Figure 15. Similar watch illustrated in Britten's *Old Clocks and Watches and Their Makers* (Britten 1932; 78).

7. Discussion

The art market demand for antiques, especially Renaissance objects including watches and clocks, exceeded the supply in the 19th and early 20th centuries (Hackenbroch 1986, Stone 1998). The result was the proliferation of pastiches and outright forgeries that entered the market. The distinction between a heavily restored old watch, a pastiche of old and 19th or 20th century elements and a clever forgery is a difficult one to make. This distinction is more difficult with a functional object than with a strictly decorative object that would not have suffered wear and subsequent repair and continued updating over its useful life.

Frédéric Spitzer, the earliest documented owner of the watch, knowingly and dramatically altered objects, was involved in the production of forgeries and pastiches and sold them to other collectors (Hackenbroch 1986). The association with the Spitzer collection casts doubt upon the watch but, at the same time, his collection also contained many superb works of art including watches (Leopold and Vincent 2000). Further clouding the issue is the lack of provenance prior to the Spitzer collection.

The lack of a body of accessible technical and conservation information about early watches complicates comparative study. In this case, scientific analysis did not affirm or condemn the watch, but left the question of authenticity open. The watch is probably not a late 19th century forgery, based on brass and enamel analysis and the publication of the similar Soltykoff watch by 1858, but it could date from any time prior to the mid-19th century. The existence of two similar watches deserves further study.

The date "15+60" and HK on the dial plate could easily have been added. If the date is not original, could the watch be from the first third of the 17th century? Certainly, rock crystal cases were fashionable in the 1620s but were used earlier (Tait 1983). The 17th century is noted for the development of highly decorative cases, including rock crystal, glass and other stones for cases, painted enamels, gold chases and embossed cases, and form watches in the shape of crosses, hearts, skulls, books and animals. A date in the early 1600s is more feasible than the mid 1500s.

Additional study is needed. Questions remain to be answered. How does the Walters' watch compare to the watch in Dresden? Are both plates of the watch hammered, and not rolled or cast? Can anything be learned from the composition of the gold mounts? At this time, the watch seems not to be a late 19th century forgery, but no other possibilities have been ruled out. The date of 1560 seems too early given the case style and materials. An 18th or early 19th century pastiche of old and new elements or an early 17th century watch with many alterations and an added date on the dial plate seem more plausible. Only time will tell.

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