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March 2001



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EDITORIAL & EXECUTIVE OFFICES
AWI, 701 Enterprise Drive, Harrison, OH 45030
Phone: (513) 367-9800 Fax: (513) 367-1414
E-mail: awi@awi-net.org Web Site: www.awi-net.org
Office Hours: Monday-Friday 8:00 AM to 5:00 PM (EST)
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COVER

This month's cover feature is an American watch imported from England—The Keene Story.



President's Message

Ron DeCorte, CMW

This year's dues increase has met with mixed reaction from the members of AWI. Although most members have decided to continue their membership they have made it clear they expect better membership services for their money. I concur with them completely and want to make it known that AWI will be improving its member services starting immediately.

One of the biggest complaints I have heard from the membership is that our educational/ technical programs such Bench Courses and Continuing Education (formerly Project Extend) have been on the wane for the past few years. Our Executive Director, Jim Lubic, and the Board of Directors recognize this problem and through Mr. Lubic's position as Education/Technical Director will be addressing this issue in the very near future.

The AWI web page has also been mentioned by many members who wish to see improved internet services. A cost analysis of improving the AWI web site will be made very soon, you should start to see these improvements within the next few months. One of the first additions to our internet services will be the availability of a wide range of horological books and technical material. Through our exclusive affiliation with a major Swiss publishing company, combined with the current selection of AWI published books and videos, we will be offering one of the largest selections of horological material available anywhere, with discounts for AWI members. A "Members Only" area is also in the plans that will provide enhanced member services on a 24/7/365 basis.

Early this spring the AWI membership will be surveyed by a private survey company. This survey will be extensive, and although I don't think every member will be contacted directly, the results will be used to make intelligent plans for improving member services. I hope that all those members who are asked to participate in this survey will take the time to help AWI move ahead in a positive and meaningful manner.



Executive Director's Message

James E. Lubic, CMW

Times they are a changin'! AWI has a toll free phone number. Now you can call us with your latest request or question for free. The following number will be activated and in operation by March 1, 2001. 1-866-FOR- AWCI or 1-866-367-2924.

The toll free number had been a point of discussion for several years. I along with a co-worker had pitched it to the Finance Committee back in the early 90s. Just this past February the topic came up again at the mid-year Executive Committee's meeting via Membership Committee Chairman, Terry Kurdzionak's report. This time it stuck. We understand the convenience of having a toll free number to our members and wanted to provide that convenience. So please use it the next time you need to request a tech sheet, borrow or purchase a book or video, register for a class, need a Material Search, inquire about becoming certified, donate something to the ELM-Trust, or just have a question. We look forward to hearing from you.

I would also like to announce another new benefit to AWI members. Starting March 1, 2001 AWI members and only AWI members will be able to purchase individual books that the Institute sells at a 10% discount from the retail price. Not only should you the member have access to the most up to date horological information, but also since you support the Institute, you should be able to get that information at a discount.

Another new member benefit, or promotion, is for those of you who aspire to become certified. If you take one of the Institutes' initial certification exams and pass it, you will be awarded one-year free membership. This applies to the Certified Watchmakers Exam (CW), Certified Clockmakers Exam (CC), and Certified Electronic Watch Technician Exam (CEWT).

We have also re-thought our shipping charges as they relate to items borrowed from the library. We feel that this is a valuable member benefit that for practical reasons if nothing else, you the member should only pay the return postage. When you borrow a book from the library you are entitled to the book for one month and will only have to pay the postage and insurance to return it to the Institute. The policy for renting videos will also revert to the original policy of $5.00 per video. After two weeks you return it to us, and you pay the postage and insurance.

You should now be able to access our website to for lack of a better term, "vote" for the bench course or courses that you would like to come to your corner of the world. We hope that this will help us to jump start, as President DeCorte puts it, our waning traveling programs. Before we can schedule a Bench Course anywhere we have to be able to identify where the interest is. So don't be shy, go to our website at www.awi-net.org and vote.

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Questions & Answers

Question

Can you help me identify this pocket watch? The open face case is coin silver and is marked: Duber Coin 66 86 95 4. What does the "4" mean? This size 18 pocket watch is a very thick (fat) watch and it measures, case wise: 59.8 mm diameter x 17.9 mm thick with a .45 mm diameter x 2.8 mm thick bevel edge glass crystal (cracked).



The movement's plate is full and appears to be made by Hampden Watch Co. The parachute regulator arm is missing and the barrel bridge is identical to Hampden's "Oriental" model 18s-15j-LS-SW. The barrel bridge plate seems to be missing something. Do you know what that is? The movement is marked: Richmond, Springfield, Mass, Pat. Pending and its serial number is 191688.

The white porcelain dial features very thin elongated roman numerals but the recessed seconds dial has regular numbers on it. The dial is marked: Rovelstad Bros., Elgin, Ill, and from what I learned from the Elgin, Illinois Historical Society is that they were jewelers and in business from 1859 to 1909, then they merged with another jeweler's company after the deaths of both brothers.

I could find no mention of the "Richmond" model in the Shugart/Gilbert's *Complete Guide to Watches*, Volumes 15 through 19 (C. 1995 to 1999), under the Hampden Watch Co. listings. Hopefully, in your library, you'll have more information than S&G has.

F.S.G., Chicago, Illinois

Answer

There is little doubt in my mind that the watch you have was made in the Hampden factory and is a Series II movement. But I can't find a reference to the "Richmond" model. Since it was made in their Springfield factory, it would have been made between 1877 and 1888, the time period between which the company was organized and the time it was bought by John C. Dueber and moved to Canton, Ohio. I suspect from the style of the movement and the serial number that it was made around 1881.

Hampden was formed from the old New York Watch Company and used a redesigned New York movement as its original production movement, once it finished using up the remaining NY stock.

I would guess that Hampden made the "Richmond" movement to market as an alternative brand to their Hampden brand at the time. Perhaps for a time it was the brand that they used for the "private label market" (i.e., the practice of putting the local retailer's name on the movement and/or dial; a common practice among American movement manufacturers of the time.) Perhaps the Rovelstad Brothers had Hampden put the Richmond name on the movement.

I don't think there is anything missing from the barrel bridge, the "barrel bridge plate" that you refer to is a shield for the winding arbor in an earlier key wind model (Hampden Series I).

I don't know what the "4" in a shield on the inside case back refers to. Dueber used an anchor in the same shield to denote the case used gold joints (hinges) and a gold crown. They also used "925" in the same shield to denote the use of sterling silver joints and crowns. Perhaps the "4" in a shield indicated the use of gold-filled or plated joints and crowns, or more likely in this case, silver-filled or silver plated joints and crown.

Perhaps some of our readers will have more definitive answers to your questions when they see this "Question and Answer."

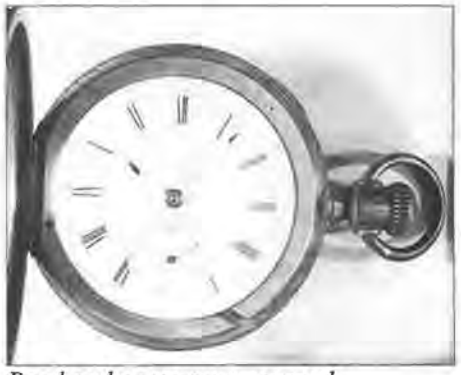
David A. Christianson, Technical Editor



Bezel/cover—closed







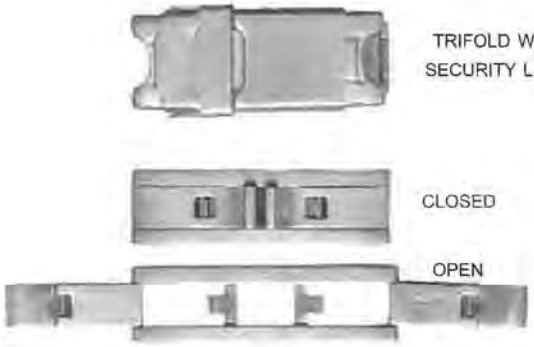
Bezel and case cover—opened

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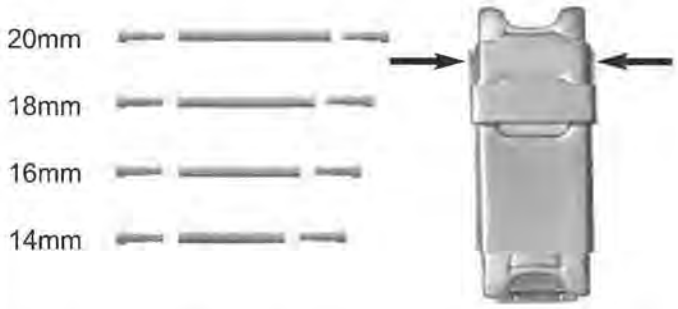


Contains 12 pieces, one each of the following; 10, 12, 14, 16, 18, & 20mm trifold buckle w/security lock, 12, 14, 16, & 18mm trifold buckle without security lock, 8, & 10mm butterfly deployment buckle. Comes in a 12 compartment plastic box. All types & sizes are available individually.



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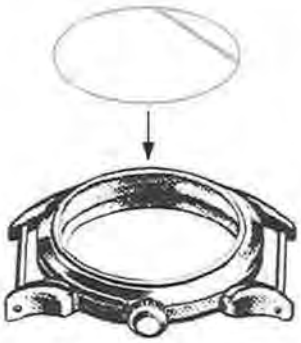
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Ask Huck

Metric and English Measurements

Question

Do you use Metric or English measurements in your work as a clockmaker? What are the relative merits of the two systems?

Answer

Yes, I use both systems. I have measurement devices for each system. I probably use the English system most of the time.

In the Metric system, 25.4 mm equals one English inch. No matter what you call this dimension, it does not change the piece being measured. To translate the terms does not change the device being measured. Therefore, just use what suits you.

Metric dimensions are in the decimal system and thought to be easier to understand. However, the decimal system of inches is equally easy to understand.

What about measurement devices that have both systems? Bad! Half of the read-out is of no value, depending on which system you desire.

The bottom line is that translation is simple arithmetic that can be a mental process in most cases.

I believe it is prudent that we understand the two systems and we make choices as we work.

Question

What system of numbers are lathe collets?

Answer

I'll answer this with respect to the watchmaker's lathe. Most collets are in the metric system with a multiplier of ten times. For example, a 5-mm collet is #50 and a 2-mm collet is #20. Collets are also available in proper English fractions, drill number sizes, and wire gages. Collet blanks are available that can be machined to special dimensions.

My 10-mm Derbyshire lathe and Micromill use the Magnus Elect style collets; and have about 70 collets with various dimension methods: proper fractions from 1/16 - 5/16 inch, drill and wire gages and metric valves. Those tools were used for military production during World War II.

I do not consider the measurement systems we use to be a problem, and they are not difficult to understand. Further, we also have a variety of screw-thread systems to understand and use.

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...BUT WE MASTER THE TIME THAT SEPARATES US FROM IT!



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TIB

American Watches Imported from England
The Keene Story



This month's cover feature is part of the collection of watches in the Orville R. Hagans Museum of the American Watchmakers-Clockmakers Institute. The donor of this watch was Fred C. Staib.

This watch represents a period in American watch industrial and marketing history. Charles A. Keene was an enterprising retailer with a store at 180 Broadway in downtown New York City and president of the Independent Watch Dealers Association.

In the early 1920s the Waltham Watch Company was trying to gain a market for its surplus products at the end of WWI. Thus, the selling price abroad was lower than the domestic price for the same product. For example, the cost to an American jeweler for a Riverside Waltham was $17.35 while in England it was but $12.00. The Royal Waltham model cost the American jeweler $11.42 while in England it could have been bought for $7.00. Elgin also was in such competition that they pegged their 15 jewel watch at $11.42 in the U.S. against $8.00 in England

Mr. Keene set up a blind buying agency in England. He bought thousands of these exported Waltham and Elgin watches and brought them back to the United States. Since these were made in the United States, no import duty could be levied. Henry B. Fried noted that he remembered seeing Keene's window at 180 Broadway literally piled high, like coal in a bin, with Waltham and Elgin watches which were brought back from England and offered at prices well below competitors down the street.

Earlier he had tried to involve former President Roosevelt. He was well known for his trust-busting activities in this trust scheme. The former President refused to become involved. Keene's next door competitor, William Barthman, the "Tiffany" of downtown Manhattan, was most unhappy with Keene's window display and involvements.

The legends appearing on the case back of the outside hunting case of this "especially engraved presentation to Roosevelt" are: "Presented to President Roosevelt As A Demonstration of the Methods of the American Watch Trust by Charles A. Keene, President Independent Watch Dealers Association, 180 Broadway. Refused by President Roosevelt, Accepted by Hon. Henry T. Rainey, Presented by Charles A. Keene, Jeweler, 180 Broadway, New York."

On the back cover: "Difference in Home and Foreign Price of American Watches

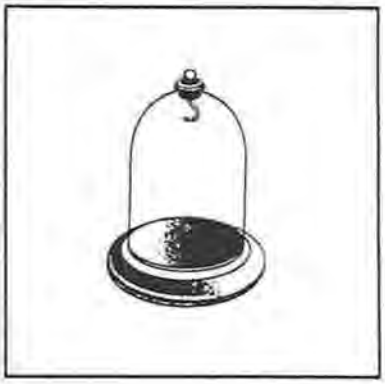
Home		Foreign
$17.35	Riverside Waltham	$12.00
$11.60	Royal Waltham	$7.00
$10.50	Lady Waltham	$8.00
$11.42	15 Jeweled Elgin	$8.40
$4.76	7 Jewel Elgin	$3.04
$6.60	0 Size Elgin	$4.30

Pocket Watch Domes:

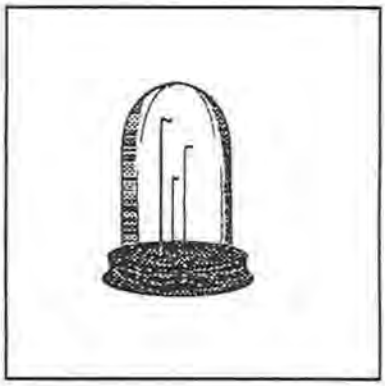
WT940.340	3 x 4 Oak	$ 9.95
WT940.342	3 x 4 Walnut	$ 9.95



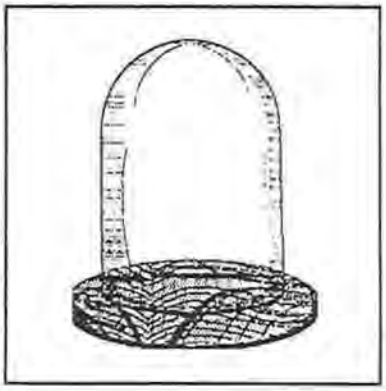
WT940.344	3 x 4 Oak	Top Hook	$14.95
WT940.346	3 x 4 Walnut	Top Hook	$14.95
WT940.348	3 x 3 Brass	Top Hook	$19.95



WT940.470	4 x 7 Oak	1-Hook	$14.95
WT940.472	4 x 7 Walnut	1-Hook	$14.95
WT940.474	4 x 7 Oak	2-Hook	$18.95
WT940.476	4 x 7 Walnut	2-Hook	$18.95
WT940.480	4 x 8 w/o Base		$18.95



WT940.511	5 x 11 w/o Base	$19.95
WT940.512	5 x 11 w/ Base	$24.95



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Mark Butterworth

The Modern German Clock Movement

Part 11

Clock Movement Identification: Kieninger

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The Kieninger Clock Co. was founded in 1912 by Joseph Alden Kieninger at Moenchweiller, Germany in the Black Forest. In 1917 he moved the factory to Aldingen, Germany also in the Black Forest region. In 1936 the founder's three sons took over active management and in 1968 the third generation took over. Karl Mahr KG purchased the company in 1989 and in 1993 Howard Miller bought the company and changed the official name to Kieninger GmbH. Miller invested a large sum to modernize the plant and its future is assured. It manufactures mantle, wall, and grandfather clock movements and also is a major seller of finished clocks in Europe. Historically, Kieninger has been a much smaller presence in the United States than either Hermle, Jauch, or Urgos. Sligh had been the major user of Kieninger in America before its purchase by Miller. The fact that Kieninger had a much smaller volume here is likely due to the fact that the Kieninger units have been more expensive than those of the other manufacturers. Since purchasing the company, Howard Miller now uses the Kieninger movements exclusively in their grandfather clocks.

Identifying the Kieninger movements is not easy for two reasons: first, there were changes in how the movements were marked over the years, and second, until very recently, there was not enough information on the plates to uniquely identify the execution even through these changes. We will go backward in time to describe the telltale identification on these movements.

The latest movements do contain a model number which does uniquely identify the unit. The plate is marked with a laser with both a model number and a serial number which also provides a dating code for the unit. An example of this is KSU33. This combination of letters and number tells us that the unit is a cable drive, triple chime, pendulum length 116 cm, and handshaft length of 47 mm. It also has a beat rate of 3600 beats per hour. Table 1 shows most of the currently available models and their alphanumeric system. In Table 1, the first letter of the series indicates the series number and as a result, the plate size.

Starting in 1985, the plate was marked with a letter and a two-digit number, the pendulum length or cm number, and usually, but not always the Kieninger logo (see Figure 1) and/or the stamp "Original Kieninger." As an example the unit could be marked 01 K....116 cm. Our dating code (see Table 2) would tell us that the 01 is the year code 1985, the K refers to plate size 142 mm x 200 mm (see Table 3), and the pendulum length is 116 cm. Unfortunately this does not tell us whether the unit is cable or chain wind, Westminster or triple chime, or handshaft length. It is important to note that the pendulum length is measured from the suspension post to the center of the bob in cm in the Kieninger system. The handshaft is measured from the front plate to the tip in mm. Also, as a result, when ordering movements or their parts, it is critical to give this information. It is also possible that the unit could be marked K 13 with the year code after the letter code instead of before. This was most common after Howard Miller purchased the company.

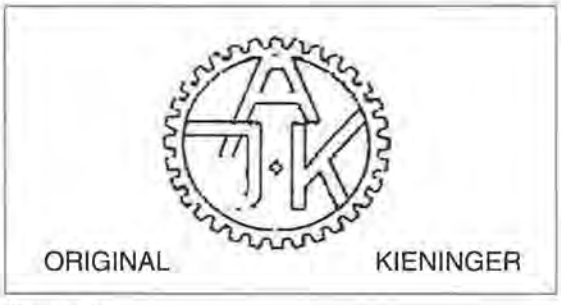


Figure 1

TABLE 1
KIENINGER 2000
GRANDFATHER UNITS II, K, & R SERIES

SERIES#	CHIME	CH/CA	BPH	PL(CM)	HS(MM)
H0001	W	Chain	3600	116	56
HK002	T	Chain	3600	116	56
HTU01	T-9 Tube	Cable	3600	116	56
KK 25	W	Chain	3600	116	47
KKU 26	T	Chain	3600	116	47
KS 57	W	Cable	3600	116	47
KS 58	W	Cable	3800	100	47
KSU 33	T	Cable	3600	116	47
KSU 36	T	Cable	3800	100	47
KSU 38	T	Cable	4000	93	47
KSU 50	T-Sequential	Chime	3600	116	47
KSU 63	Beethoven	16 Rod	3600	116	47
RK0l4	W	Chain	4260	80	36
RK022	W	Chain	4000	93	36
RK023	W	Chain	3600	116	36
RK032	W	Chain	3600	116	48
RU010	T	Chain	3600	116	36
RU012	T	Chain	4000	93	48
RU013	T	Chain	3600	116	48
RU027	T	Chain	4000	93	36
SKS12	W	Chain	3600	116	36
	PS SERIES (TIME & STRIKE CABLE WIND):				
PSO26	Gong	Cable	4725	65	32
PSO27	G	Cable	4260	80	36
PSO37	G	Cable	4260	80	32
PSO38	BIMBAM	Cable	4260	80	32
PSO39	BB	Cable	4725	65	32
PSO40	BB	Cable	4260	80	36
	RWS SERIES: TIME WEIGHT, STRIKE & CHIME SPRING, WESTMINSTER CHIME				
RWS13	West	C/S	4725	65	32
RWS23	West	C/S	4260	80	32
RWS25	West	C/S	3600	116	48
RWU-03	9-Bell	Spring	10651	15	36
	J SERIES: TRIPLE CHIME, AUTONIGHT OFF				
J0204-01	Triple	Spring	18000	BAL	32
J0218-04	Triple	Spring	18000	BAL	36
J1204	Triple	Spring	6086	43	32
J1208	Triple	Spring	5325	54	32
J1212	Triple	Spring	6750	35	36
J1213	Triple	Spring	6750	65	32
J1216	Triple	Spring	5742	48	48
J1218	Triple	Spring	6086	43	48

TABLE 2
KIENINGER MANUFACTURING CODES

CODE NO.	PRODUCTION YEAR
01	1985
02	1986
03	1987
04	1988
05	1989
06	1990
07	1991
08	1992
09	1993
10	1994
11	1995
12	1996
13	1997
14	1998
15	1999
16	2000

Before 1985, the plate was usually marked with a two-year marking such as 78R where the "78" referred to the year of manufacture and the "R" for the plate size 131 mm x 131mm. Going even further back, the plates were often marked with only the year of manufacture in month and year such as 2/68 for February 1968 and no pendulum length markings at all. This information and a matching plate size found in Table 3 would identify the unit as a Kieninger. Table 3 also gives the plates sizes in mm for the common Hermle and Urgos units to further help identify units among the manufacturers.

There are 25.4 mm or 2.54 cm per inch so to convert from mm or cm to inches, divide by these factors. I would, however, encourage the reader to obtain a simple metric measuring ruler and tape. Metrics is very simple to learn and if we are to work with products of foreign manufacture, it is most accurate and helpful to measure in the same way the manufacturer did to meet their specifications.

Final thought: *"We make a living by what we get, we make a life by what we give." - W. A. Nance*

TABLE 3
PLATE SIZE SPECIFICATIONS IN MM

HERMLE SERIES:

130	90 mm diameter
140, 150, 241	85 x 98 mm
261	100 x 100 mm
341	120 x 120 mm
351, 451	120 x 120 mm
1051, 1151	120 x 120 mm
461, 1161	140 x 200 mm
471, 1171	152 x 220 mm

KIENINGER SERIES:

H	158 x 230 mm
J	100 x 104 mm
K	142 x 200 mm
P	99 x 144 mm
R	131 x 131 mm

URGOS SERIES:

UW03	130 x 230 mm
UW32	130 x 130 mm
UW66	130 x 210 mm

HANDSHAFT LENGTHS IN MM

HERMLE: 28, 33, 53 mm
KIENINGER: 28, 32, 36, 48, 56 mm
URGOS: 37, 49, 65 mm

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Dear Editor:

I do not know why the initial confrontation occurred between AWI and the Ohio Tax Commissioners. That be as it may, it is quite apparent it was not AWI who was at fault.

Milton Stevens questioned this initially and for good reason. William Ewbank pursued the matter during his tenure. They are both to be credited to a large extent with the decision by the First Appellate District Court of Appeals.

AWI legal counsel Richard Melfi done well, along with attorneys Wersching and Leik. Attorney Melfi had faith in his pursuance and AWI Board of Directors is to be complimented in their acceptance of his advice.

Hopefully this will be the end of this potentially costly issue.

Gerald G. Jaeger,
Director, AWI

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Dr. Matthew Clark

Analyzing the Sounds of a Watch

The warm sound of a ticking watch is part of the lasting allure of a mechanical timepiece. It is a constant reminder of the passage and continuity of time. Some say that the similarity to the beating heart is comforting. I often listen to my great grandfather's pocketwatch and reflect on how he must have listened to the same watch ticking many years ago.

For watchmakers the ticking sound is also the reward of a job well done. A strong, even ticking watch is the joyful culmination of a repair. However, there is more to the ticking than a nice sound. A close analysis of the sounds of a ticking watch can reveal the rate, the amplitude of the balance wheel, as well as diagnose faults in the escapement. I began the study of the sounds while devising experiments to measure the effects of balance wheel amplitude on positional error and isochronism. It led to new areas of research and new diagnostic techniques based on analysis of the sounds.

Analysis of the Ticks

Each tick of a watch is actually composed of several sounds created by the escapement. The exact series of sounds depends on the nature of the escapement. For example the chronometer, or detent, escapement is significantly different than the Swiss lever escapement and therefore sounds much different even to the casual listener. The lever escapement is the most commonly encountered by most watchmakers,

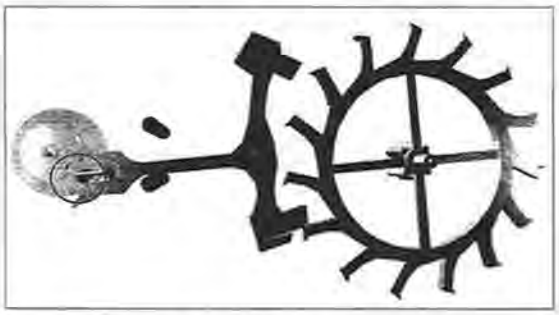


Figure 1. Sound 1 - Unlocking.

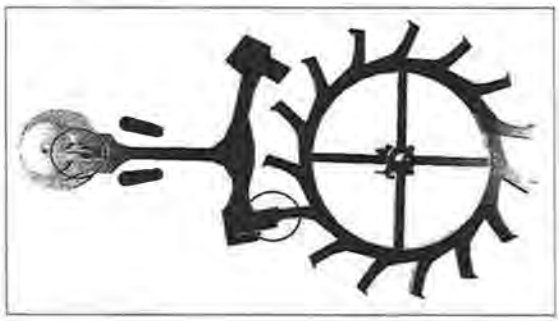


Figure 2. Sounds 2, 3 - Impulse.

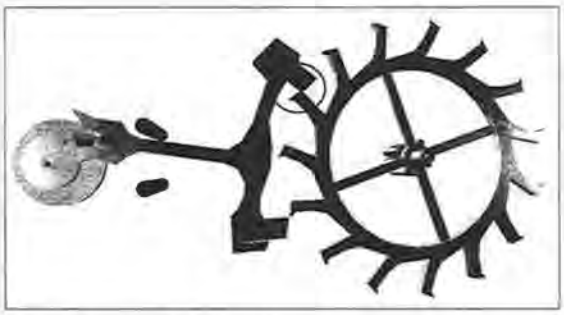


Figure 3. Sound 4 - Locking.

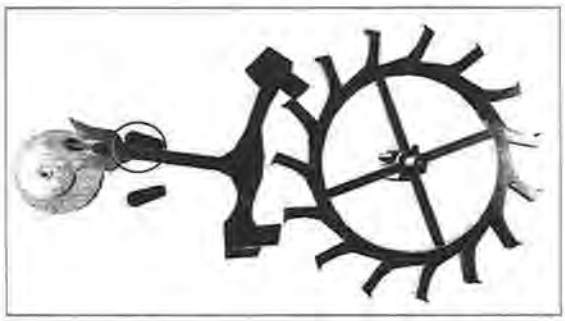


Figure 4. Sound 5 - Pallet fork striking banking pin.

and the sounds of the lever escapement will be discussed in detail. The pin pallet movement found in inexpensive watches and many alarm clocks is similar enough to the lever escapement to create the same sounds and benefit from the same analysis.

The lever escapement can create up to five sounds. These sounds are:

1. The impulse pin striking the slot to begin the unlocking of the escapement.
2. The tooth unlocking and the tooth of the escape wheel moving across the face of the pallet stone. This is a faint sound in jeweled lever movements, but is louder in pin-pallet movements
3. The slot striking the other side of the impulse pin as the escape wheel moves the pallet fork.
4. The tooth of the escape wheel striking the jewel as it locks.
5. The pallet fork striking the banking pin as the draw pulls the pallet fork into position ready to receive the impulse when the impulse jewel returns on the next rotation of the balance wheel. This is also called the slide.

Other sources of noise may interfere with the analysis of the sounds from the watch, these include:

1. The hairspring coils touching each other due to the spring not being centered correctly.
2. The impulse pin rotating around far enough to strike the other side of the fork, also known as "knocking the banking" or "rebanking."
3. Rattles and groans from other parts of the wheel train and mainspring.

Figures 1 through 4 illustrate the source of the sounds.

In many cases examination of the ticking sounds does not reveal one or more of these sounds. The unlocking is loud and always present. However, the second sound is difficult to detect in most cases. The third sound, the fork striking the impulse pin to give the impulse, can be detected some of the time, especially when the watch is fully wound and the pallet fork snaps across with maximum power. The locking sound is the loudest nearly always heard. The fifth sound, the pallet striking the banking pin is often indistinguishable from the fourth. The appearance of this sound depends on the adjustment of the escapement.

Figure 5 shows an oscilloscope view of a watch tick. The positions of the sounds are annotated and numbered. In this example the fourth and fifth sounds form one continuous sound and



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are not distinguishable. I use a Microset III timer, and my own software to digitally analyze the individual sounds of each tick (a software package is also available from the manufacturer)[1]. This timer model can analyze all the sounds of each tick and output a stream of digital data that represents each sound that makes up the tick.

The following is an example of a pin-pallet Packard alarm clock from the 1950's. Although it is not glamorous, and is somewhat uneven, it is noisy enough to distinguish all five noises for each tick. In most fine watches only the first, third, and fourth sounds can be detected. In Figure 6 the ticks are lined up left to right as they occur, five per second. The sounds are digitized and aligned on the unlocking noise so that the events can be compared, and the Y-axis is amplified to allow detailed analysis of the sounds from each tick. The initial block is the start of the noise, and the length of the rectangle is proportional to the duration of the noise.

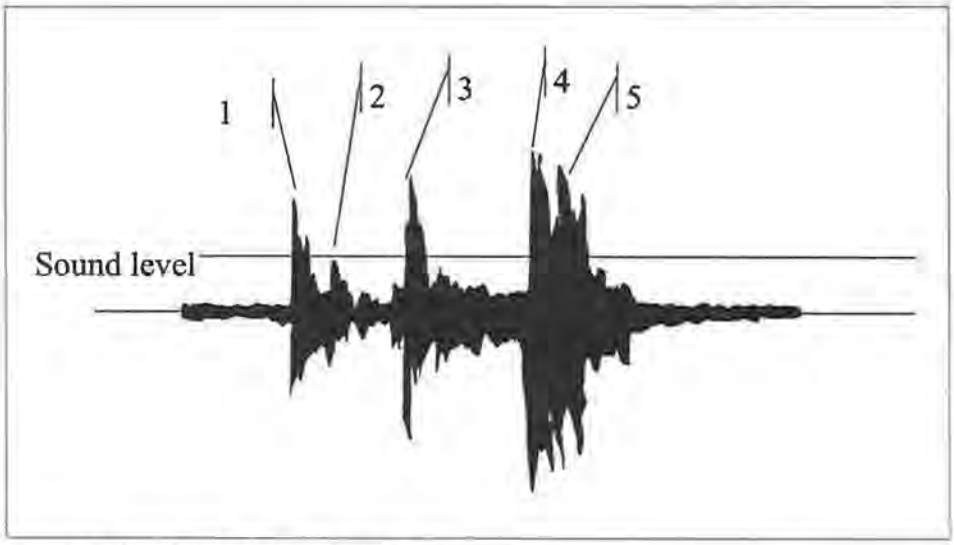


Figure 5. Oscilloscope view of watch tick.

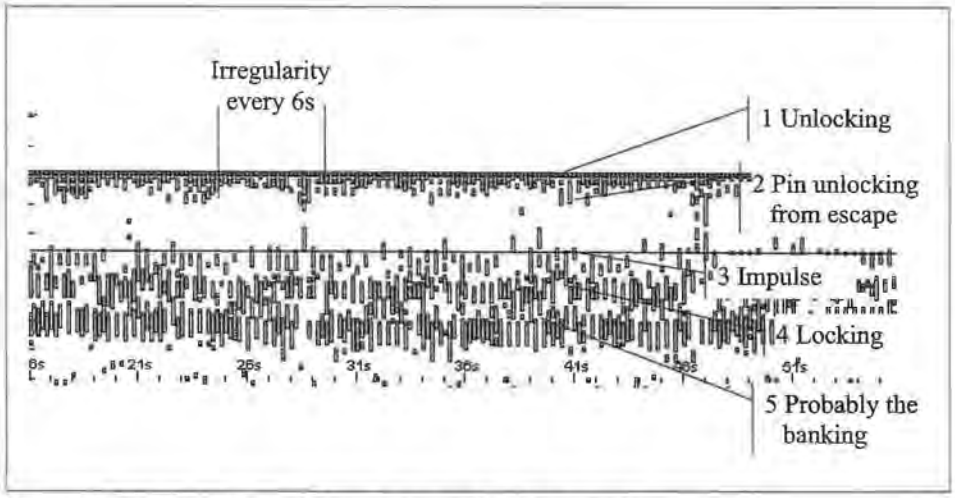


Figure 6. Analysis of sounds from a pin-pallet alarm clock.

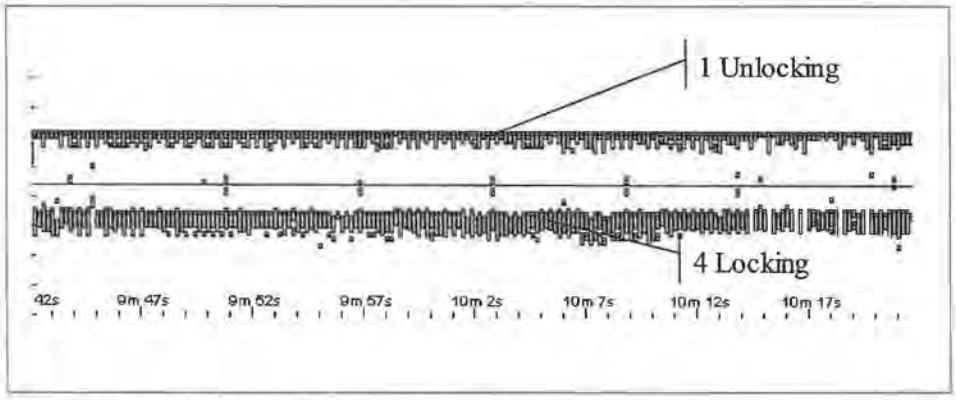


Figure 7. Analysis of sounds from an A. Schild automatic watch.

The length of the rectangle is the amount of time the sound level is above the sound level line in Figure 5. The time progresses from top to bottom, so the unlocking is at the top, followed by the impulse and the unlocking. As you can see, some of the sounds are rather long so in many cases sounds run together and cannot be distinguished from each other. From the graph you can clearly make out the unlocking, the impulse, and the locking.

In addition we can observe that the impulse has some irregular features. The second and third sounds jump around every 6 seconds that suggests an irregular or worn tooth on the escape wheel.

Figure 7 shows a more typical wristwatch. The specimen here is an A. Schild automatic wristwatch movement. In this case the unlocking and the drop-locking are the only sounds detected. There again is some kind of sound occurring between the locking and unlocking about every six seconds.

Determining Amplitude From the Ticks

Several watch timers can compute the amplitude of the balance wheel in addition to measuring the rate of a watch. How do they do this? The amplitude of the balance wheel can be computed from the time elapsed between the first and fourth sounds of the escapement.

The motion of the balance wheel during a complete cycle at 18,000 bph is shown in Figure 8. The

graph shows the balance wheel starting at the center position, 0°, and moving counterclockwise denoted by a negative amplitude. The maximum amplitude is reached at 0.1 seconds, and then the balance rotates back and crosses the zero point again at 0.2 seconds. As the balance continues rotating clockwise it reaches its maximum amplitude again at 0.3 seconds, then rotates back toward the center to complete the cycle at 0.4 seconds.

As Figure 8 illustrates, different amplitudes have the same sequence of motions (assuming that the rate is isochronous, or the same for the different amplitudes). However, the slope of the line as it crosses the 0 amplitude line is different for different amplitudes. At 220° the balance wheel moves more quickly and therefore the slope is steeper as it passes through the 0 point than when the amplitude is 110°. The

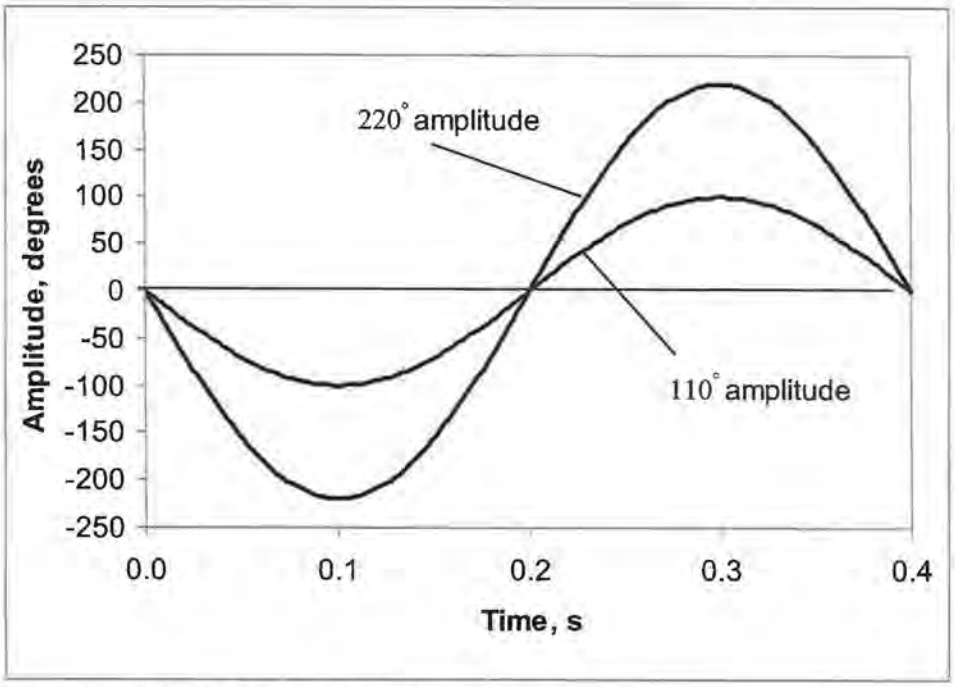


Figure 8. Cycle of balance wheel amplitude.

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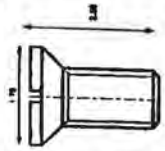
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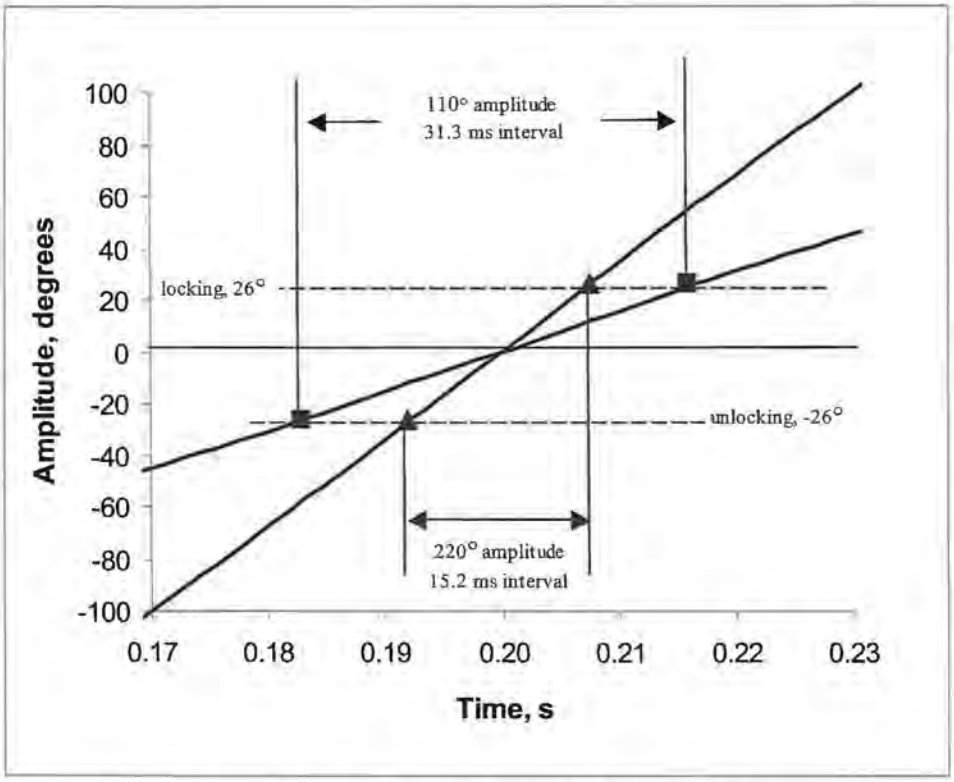


Figure 9. Time vs amplitude for the impulse region of the escapement.

slope of this line is the basis used to calculate the amplitude of the balance wheel.

From the previous discussion the lever escapement makes a sound before and after the balance wheel crosses the midpoint. This is usually the first sound and the fourth sound, or a combination of the fourth and fifth sounds. In addition to measuring the timing of these sounds we need to know the lift angle. The lift angle is the angle of rotation of the balance wheel while it is in contact with the pallet fork. In most modern watches the lift angle is 52°. It is important to actually verify this by winding the watch just a little to achieve an amplitude of about 180° that can be verified visually and compared with the value from the timing machine. The lift angle can then be set to make the value on the machine correspond with the observed amplitude.

If the lift angle is 52° the first sound, the unlocking, occurs when the balance wheel is 26° before the center point, and the locking occurs about 26° after the center point. Using these reference points and the time between the first and fourth noises, we can calculate the amplitude. A close up of the balance wheel motion and the timing of the sounds is shown in Figure 9.

The amplitude at any given time t is given by the formula:

Amplitude(t) = Maximum Amplitude * sin(t/rate * 360°)

Where t is the time, and rate is the rate in seconds per tick (e.g. 0.2s for a watch at 18,000 bph). Using some mathematics we can derive the formula for determining the amplitude from the interval between the first and third sounds.

Maximum Amplitude = Lift Angle / sin (180° * (t_4-t_1) / rate)

In Figure 9 the triangles note where the sounds for unlocking and drop-lock occur when the amplitude is 220°, the squares mark where the sounds occur when the amplitude is 110°. We can measure the time interval between these two noises, in this example 15.2 milliseconds, which is t_4-t_1 in the formula above using a precision timer. The higher the amplitude, the shorter the time between the unlocking and locking sounds.

The lift angle determines the positions on the Y-axis – the first sound is 26° or ½ of the lift angle before the zero point, the second sound is ½ of the lift angle after the zero point of the balance wheel rotation. As the amplitude decreases the balance wheel moves more slowly and the interval between the unlocking and locking sounds increases, and the slope of the line decreases.

Conclusion

Many interesting things can be diagnosed from analysis of the sounds of the ticks. The amplitude of the balance wheel can be computed by analysis of the sounds that make up each individual tick. In addition the condition of the escapement can be evaluated by viewing the sounds of each tick.

[1] Microset III, Mumford Micro Systems, 3933 Antone Road, Santa Barbara, CA 93110 http://www.bmumford.com/microset.html

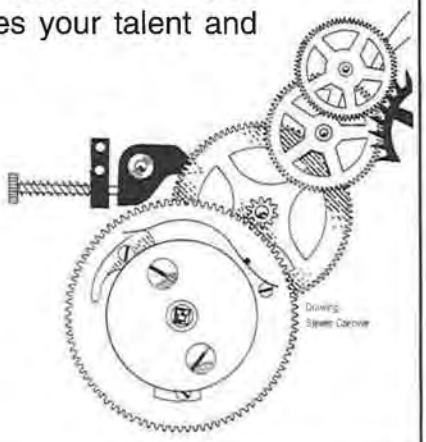
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Technically Watches

Pocket Watches and Their Maintenance
Part 34
Making Fusee Clicks and Maintaining Clicks

Archie B. Perkins,
CMW, FAWI,
FNAWCC, FBHI

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Quite often when restoring fusee watches, it is found that one or both of the fusee clicks are damaged or missing entirely. Figure 1, View A shows a damaged click that needs to be remade. These clicks can be made from prepared click wire. This click wire, shown in View C, is made by drawing wire through a special draw plate. Sometimes click wire can be obtained from suppliers in England. View B shows a finished click which was made from click wire.

Figure 2 shows the steps used in making a fusee click from prepared click wire. The click wire of the proper size is placed in a flat-jawed pin vise as is shown in View A, Figure 2. The wire should extend through the vise jaws enough for the click post to be filed on the end of the click wire. The wire should be placed in the vise so it is square with the vise jaws; otherwise, the post will not be filed square with the wire. A safety edge pillar file is used to file the post on the click wire. The safety edge of the file should rest on the top of the vise jaws while the filing is being done. The safety edge of the file should not damage the vise jaws. First, the post is filed to a square form as is shown in View B, Figure 2. Then the post is filed round as shown in View C, Figure 2. The position of the post in relationship to the click is very important. The center of the post should be located at a point two-thirds of the length of the click from the tip of the click or one-third the length of the click from the butt end of the click, and it should be located in the center of the width of the click as shown in View C, Figure 2. The shape of the

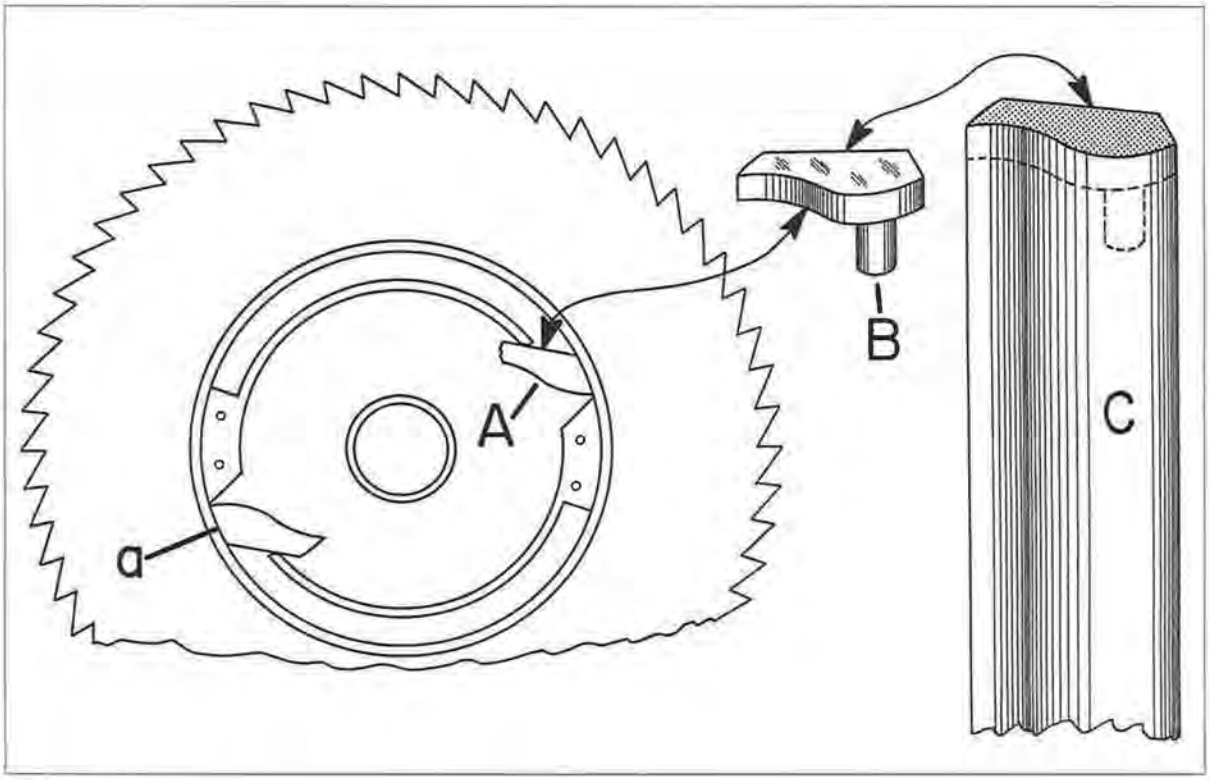


Figure 1

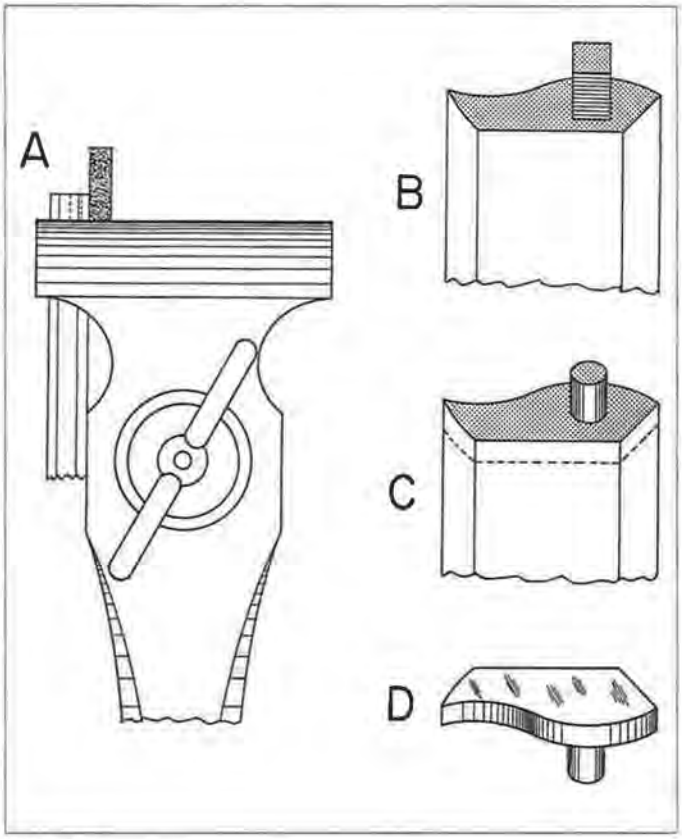


Figure 2

click is also important. The angle on the back end of the click should be such that it rests against the rim on the maintaining ratchet wheel, as shown at point "a", Figure 1, when the point of the click rests at the bottom of the ratchet wheel teeth. If the points of the clicks are too far in, it will be difficult to assemble the fusee and its ratchet wheel to the maintaining ratchet wheel. This is due to the fact that the clicks will not be at a proper position to go between the teeth on the ratchet wheel on the fusee.

After the post has been filed round and to the proper diameter, then the click is sawed off of the click wire leaving the thickness enough for finishing the top of the click. The click can be held by its post in a pin vise while the top of the click is flattened and smoothed with a fine file. The top of the click can be ground flat on a frosted glass lap with Linde A and alcohol, and it can be polished on a lead-tin lap with Linde A and alcohol. The click can be held on a piece of pithwood while being ground and polished or it can be held by its post in a screwhead tool. View D, Figure 2 shows the finished click. This type of click is left soft since it needs to be riveted into the maintaining ratchet wheel. *Note: The click must not be too high so it rubs the underside of the fusee. Usually the height of the click is such that its top is flush with the ring on the maintaining ratchet wheel.*

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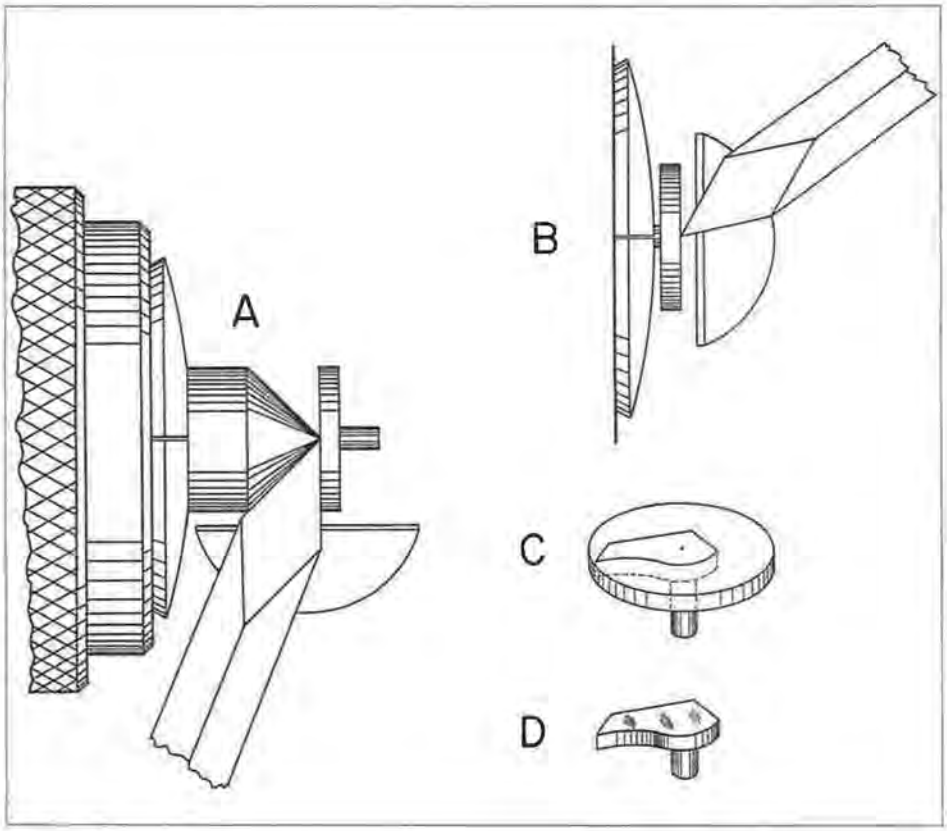


Figure 3

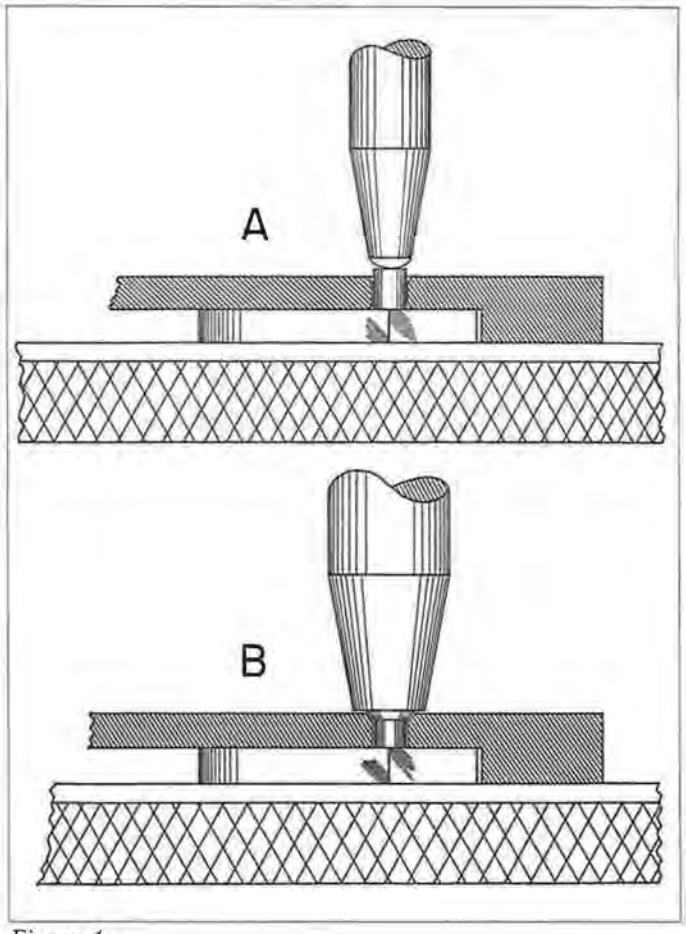


Figure 4

Using the Lathe to Make a Click

If prepared click wire is not available, then a new click can be made from a piece of round drill rod as shown in Figure 3. The drill rod must be large enough in diameter to form the click. The rod is chucked in the lathe as shown in View A, Figure 3. To make the click, first the post is turned on the end of the rod making sure that the post is smooth and to size. Also make sure that the surface is turned flat leading up to the post. This surface will be the bottom of the click and should be flat and smooth. A straight edge can be used to check the flatness of the surface. Next, the disc that the click will be formed from is cut off of the rod as shown in View A, Figure 3.

Now, the disc is chucked in the lathe by its post and a center is spotted in the disc with a graver. The center should be very small. This is to locate the center of the post for the purpose of locating the position of the click on the disc. This is shown in View B, Figure 3. View C, Figure 3 shows the shape of the click scribed on the face of the disc. After this, the click is filed to shape and thickness. The finished click is shown in View D, Figure 3.

After the click has been made, it is then riveted into the maintaining ratchet wheel. Figure 4 shows this process. Before attempting to rivet the click into the maintaining ratchet wheel, make sure that the hole in the wheel is chamfered at both ends. The end of the hole where the head of the rivet will be formed on the post of the click should be chamfered quite an amount to clear the head of the rivet. Also, the post of the click should fit the hole in the wheel with some sideshake to prevent it from becoming tight in the hole during the riveting process. In other words, during the riveting process, an adequate head should be formed on the post of the click to hold it in position on the wheel and the click must still be free to move back and forth, yet not be too loose on the wheel. During the riveting process, the click is supported on the die plate of the staking tool, and a round face solid punch is first used in the center of the post to spread the end of the post as shown in View A, Figure 4. The spreading of the end of the post is more effective if a center is first made in the end of the post with a graver. This should be done before the unfinished click is removed from the rod. Then a flat face solid punch is used to flatten the end of the post to finally form the head on the post as shown in View B, Figure 4. *Note: The post should extend through the wheel a sufficient*

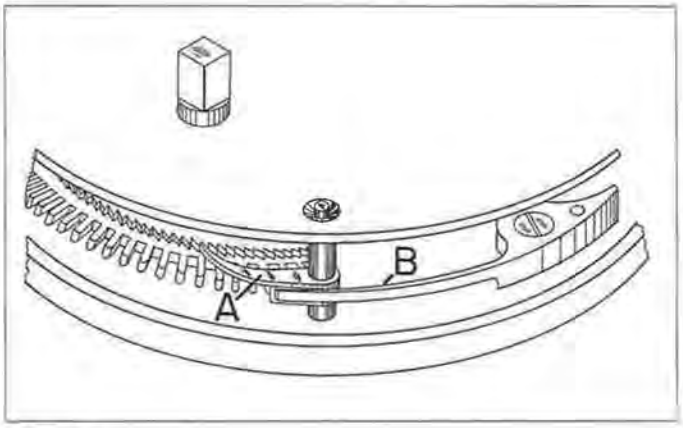


Figure 5

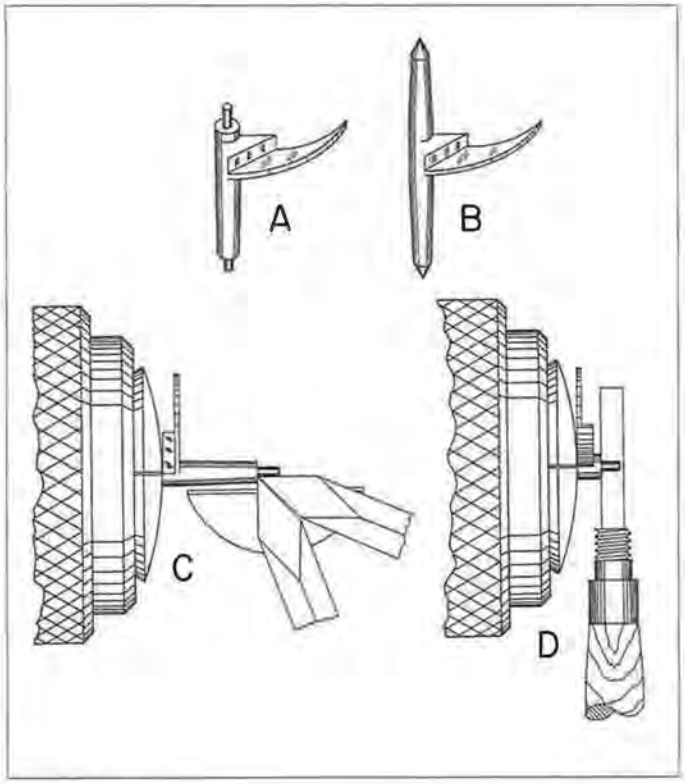


Figure 6

amount for the head to be formed on the end of the post and have the end of the head about flush with the surface of the wheel. Any excess can be filed or stoned off flush with the wheel. ***CAUTION:*** *If the click is supported on a bench anvil for the riveting process, the punch is not likely to be held upright and the rivet could be unevenly formed which could prevent the click from being free on the wheel.*

Making a Maintaining Click

In continuing the discussion of making clicks for fusee watches, we will now discuss the making of a maintaining click. The need for making one of these clicks can be because the click is badly rusted, damaged otherwise, or perhaps is missing entirely from the watch. Since the click is pivoted between the plates of the watch and not held down by a screw or a rivet, it is more likely to become lost than clicks that are held down by some means.

Figure 5 shows how the maintaining click is situated between the plates of the fusee watch. View A shows the click and how it works in the teeth of a maintaining ratchet wheel. View B shows the maintaining click spring and how it works with the click to apply pressure on the click to keep the point of the click engaged between the teeth of the ratchet wheel.

The process used in finishing an unfinished click is shown in Figure 6. View A shows the bottom side of a finished click. The making of this click is a complicated process unless the watch restorer can locate some blank unfinished clicks.

View B, Figure 6 shows a blank unfinished click. It might be possible to locate some of these from suppliers in England or Switzerland. These are usually finished except for the pivots. The unfinished blanks are made in one piece and have a very unusual shape for a watch part. Both of these conditions cause it to be very complicated to make.

View C, Figure 6 shows how the blank unfinished click is chucked in the lathe and how the pivots are turned on each end of the blank. *Note: It is important to check the blank click with a fine file to see if it has been hardened and tempered. If it has not been hardened, then it*

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should be hardened and tempered to blue before the pivots are made on it. Since the lower end of the arbor is very short, it is extremely important to turn and finish the upper pivot first as is shown. If the lower pivot is done first, there will be nothing to chuck onto while doing the upper pivot.

View D, Figure 6 shows the lower pivot being burnished with a sapphire burnisher to smooth it prior to polishing it. The polishing is done with a boxwood slip or a slip made from hard French pegwood. The polishing material applied to the slip can be Linde A or diamantine. Some alcohol is applied to the slip prior to applying the polishing material. This is to hold the polishing material on the slip.

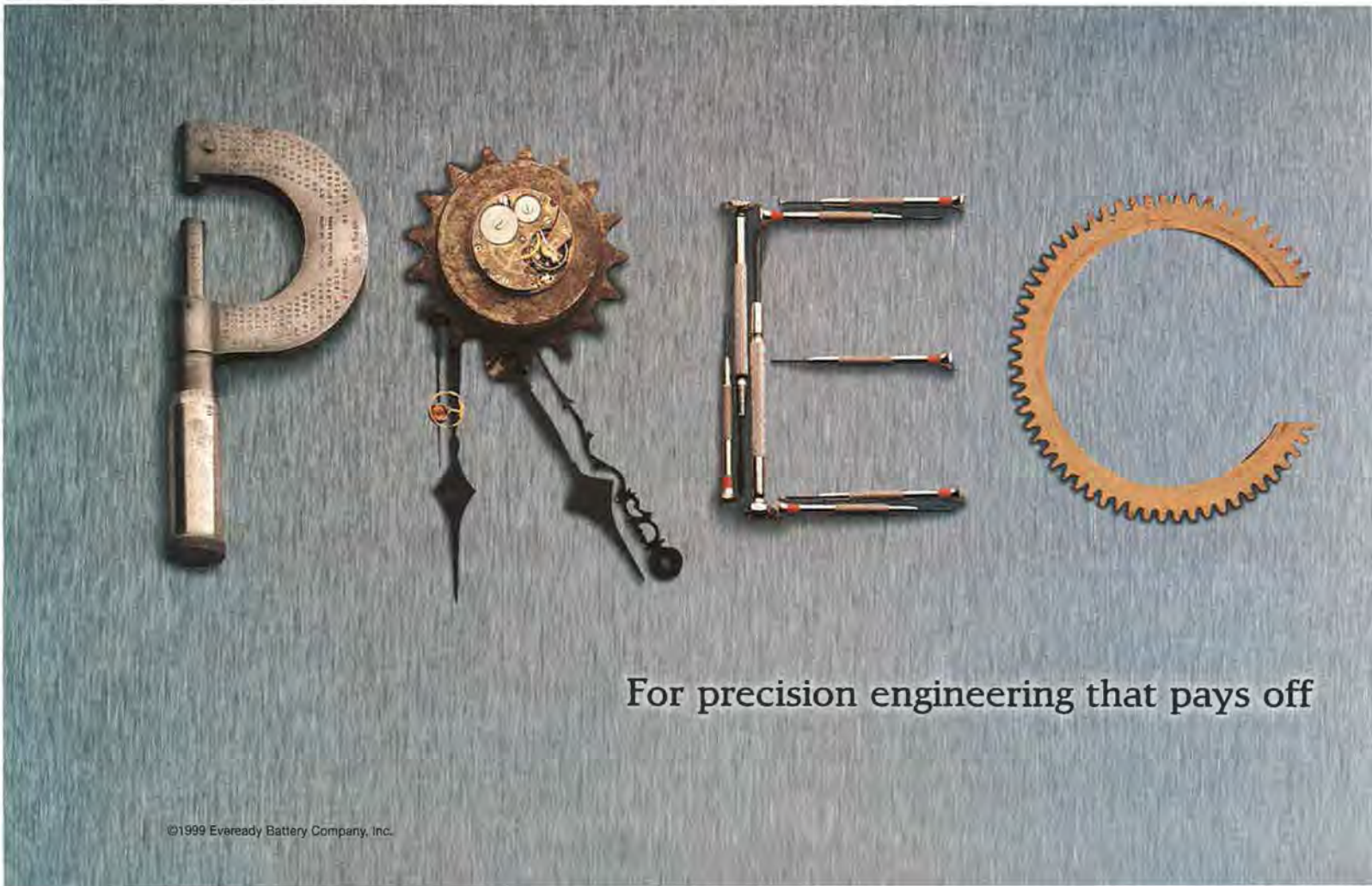
Making a Maintaining Click from Raw Material

In case a blank unfinished click cannot be obtained, then the following procedure is used to make a maintaining click. Figure 7 shows this process. A high carbon steel rod is selected which is large enough in diameter to form the length of the click. This rod is chucked in a large lathe or a 3-jaw chuck in the watchmaker's lathe and a blank is roughed out so it can then be chucked in a wire chuck in the watchmakers lathe as shown in View A, Figure 7. The rough blank is then turned to size as shown. There will need to be two discs turned on the click arbor as shown. The larger diameter disc is used to form the click and the smaller diameter disc is used to form a ledge for the end of the click spring to rest on to apply tension on the click when it is in use.

View B, Figure 7 shows the click blank after it has been turned to size and shape. The shape of the click that will be made from the blank is shown in dotted lines. All of the excess material is removed from the blank by sawing, filing, or grinding to form the click.

View C, Figure 7 shows the blank click after it has been formed from the rough blank. After this, the blank click is hardened and tempered.

To harden the blank click, it is first wrapped with iron binding wire to build up the mass so the click will harden uniformly. If this is not done, there is danger of overheating the delicate tip of the click. The end of the wire can be twisted up to form a handle to hold onto while the blank click is being heated for hardening. The binding wire used should be #28 (.008 inch). After the click blank has been wrapped with the binding wire, it is then heated slightly over the alcohol lamp flame and then placed in powdered boric acid so a uniform coating of the powder is formed on the wrapped click blank. This procedure is used to help keep the click blank from oxidizing (turning dark). After this, the click blank is then reheated over the alcohol lamp flame to a light cherry red color, then it is plunged into a container of cold water to harden it. Now the binding wire is unwrapped from the click blank, and the blank



is tested with a fine file to tell if it has been sufficiently hardened. If the file bites into the arbor of the click, then it has not been sufficiently hardened and the process must be repeated. If the file does not bite into the arbor of the click blank but just slides over it, then the click blank is hardened enough.

Now that the click blank has been hardened, it must be tempered to a blue color so it will not be brittle which could cause it to fail when placed into operation. Tempering the click blank also allows the pivots to be formed on the blank.

Before the blank click is tempered, its surfaces should be cleaned off with fine emery paper and then it is cleaned thoroughly with cleaner and rinsed in alcohol and dried.

To temper the click blank, a bluing pan is used. Some clean ash tray sand is used in the bluing pan. The click is placed on the sand, making sure that the click blank touches the sand at all points. Now, the pan is heated uniformly over an alcohol lamp flame. The change of color on the click blank should be carefully watched. The first color will be a pale straw color, then the color will change to light straw, then to the following colors: medium straw, dark straw, brown, purple, and then to blue. When a full blue color shows up, then the click blank is removed from the sand and cooled on a slab of glass.

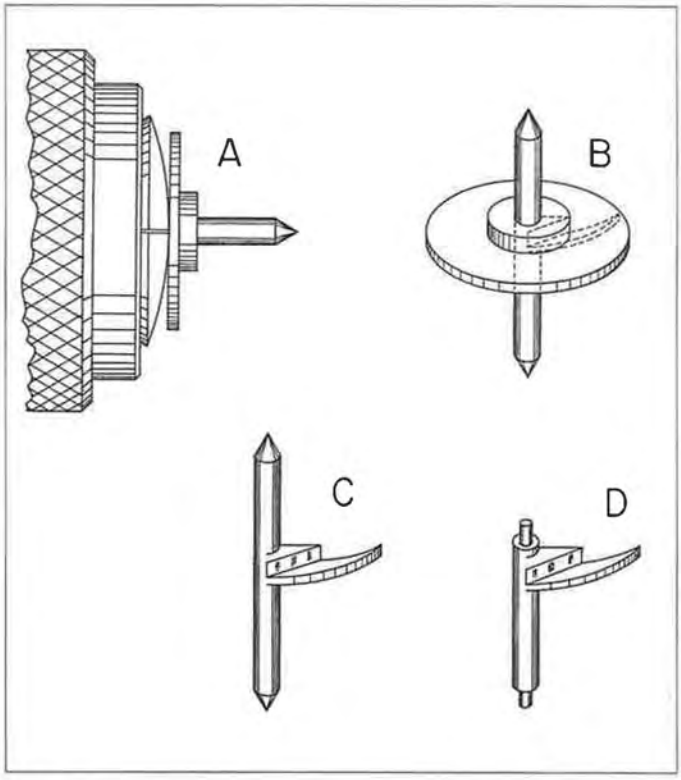


Figure 7



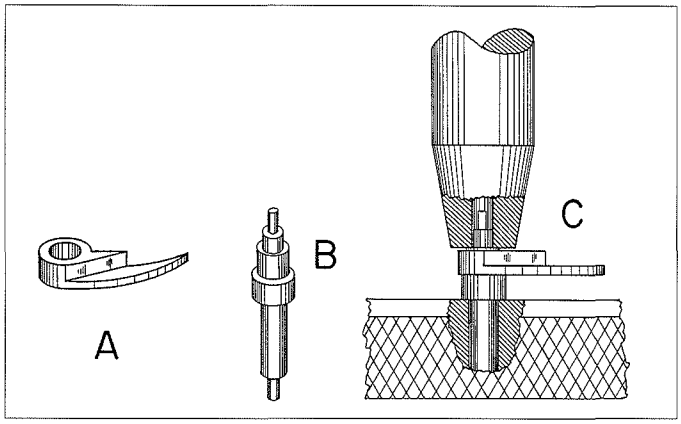


Figure 8

The blue can be removed from the click blank by placing it in L & R rust remover or Duro Naval Jelly. After the blue has been removed, the click blank must be cleaned thoroughly.

Now, the surfaces on the click blank that are to be polished should be polished. Usually the top of the click finger is polished as well as the surface where the end of the click spring touches and the back edge surface of the click finger. These surfaces can be smoothed with hand held grinding slips and then polished with a boxwood slip with Linde A and alcohol.

The arbor of the click can be polished in the lathe as the pivots are made on the arbor. The pivots are made on the arbor as shown in Figure 6. View D, Figure 7 shows the finished click after the pivots have been formed on the arbor of the click.

Some maintaining clicks, especially the ones in marine chronometers, are made in two pieces as shown in Figure 8. The click finger is made in one piece as shown in View A, Figure 8. The arbor shown in View B can be a riveted type or a friction type. View C, Figure 8 shows a staking tool punch being used to rivet an arbor into the click. The punch is a flat faced hole punch. The hub on the arbor rests on the die plate of the staking tool in a hole that just clears the body of the arbor for the riveting process. If the arbor is of the friction type, it can be pressed into the click with a friction jeweling tool. A friction arbor can also be staked into the click by the use of a staking tool.

Making Fusee Watch Mainspring Hooks

When restoring antique English and French fusee watches, it is common to find two types of mainspring and barrel hook combinations. One type has a round hook fastened through the wall of the barrel with a round hole made near the outside end of the mainspring to fit the round hook. The second style has a hook riveted to the mainspring which hooks into a hole of the same shape in the wall of the barrel.

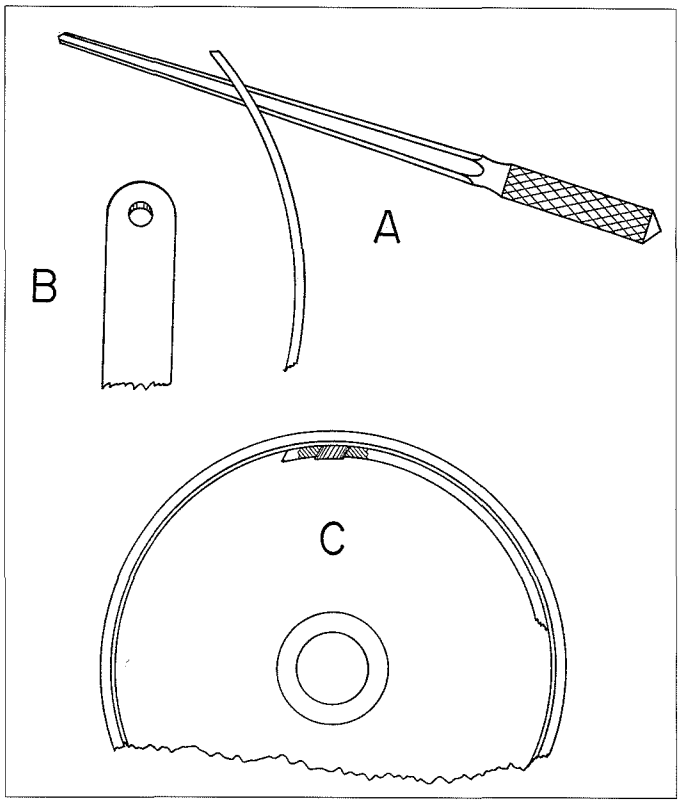


Figure 9

The first style of mainspring and barrel hook combination is shown in Figure 9. After the hole has been drilled in the mainspring, a cutting broach is used to broach the hole at an angle as shown in View A, Figure 9. The hole is broached at an angle in the mainspring to match the shape of the hook where the hook extends from the barrel wall. If this is not done, there is danger of the mainspring slipping off of the hook as the mainspring is being wound. Note that the hole in the mainspring is made the same distance from the end of the mainspring as it is from the sides of the mainspring end. This is to help prevent the mainspring from slipping off of the hook as it is being wound which could happen if the hole is made some distance from the end of the spring. When the hole in the mainspring is broached at an angle as shown, the edge of the hole becomes sharp and, as a result, the mainspring is less likely to slip off of the barrel hook. View B, Figure 9 shows the hole in the mainspring after it has been broached at an angle. View C, Figure 9 shows how the mainspring fits onto the barrel hook.

The second style of barrel and mainspring hook combination used in fusee watches is shown in Figure 10. This style was used mostly in English fusee watches. In this combination, the hook is riveted to the mainspring and fits into a hole of the same shape in the wall of the barrel. The hook is usually rectangular in shape but it is sometimes made oval or round shaped. When replacing one of these hooks on the mainspring, the following procedure is used. First, select or make a piece of steel material that will fit the hole in the barrel wall as shown in View A,

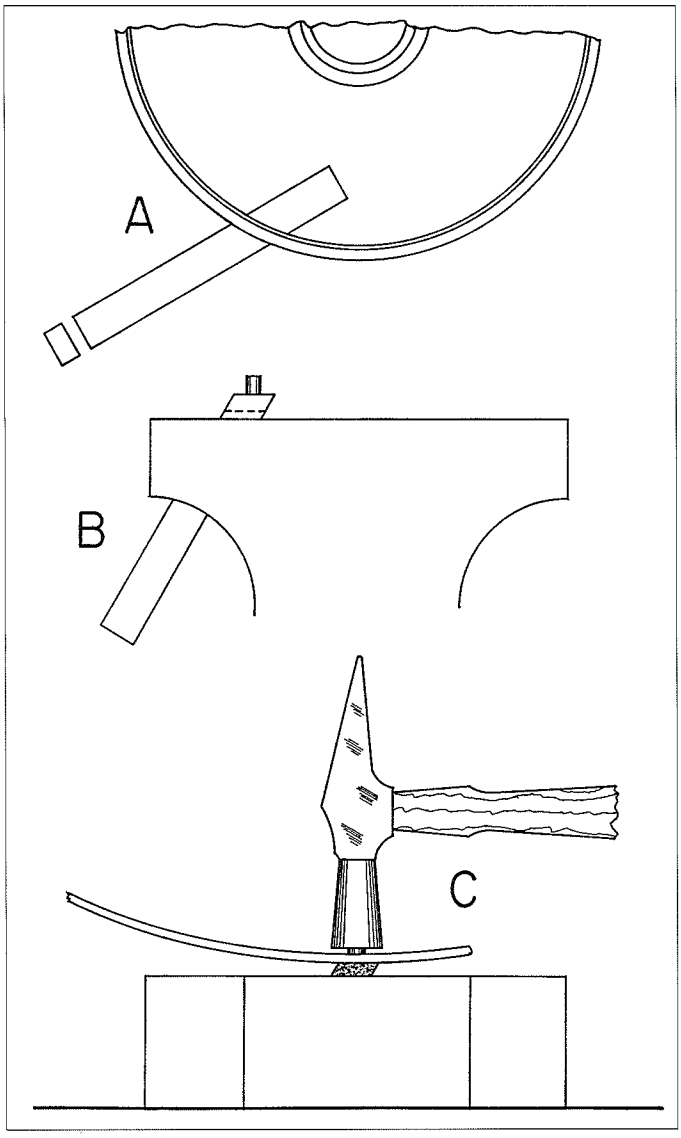


Figure 10

Figure 10. Next, place the material in a bench vise as shown in View B, Figure 10, and file a round peg on the material as shown. This peg should fit the hole in the mainspring made for the peg. The length of the hook is marked and the hook is cut off of the material with a jeweler's saw which has a fine saw blade. Next, file the end of the hook flat, then insert the peg of the hook through the hole in the mainspring. After this, the hook is riveted to the mainspring as shown in View C, Figure 10. *Note: The peg on the hook should only extend through the hole in the mainspring approximately .25 mm for riveting.* If the peg on the hook is too long after it has been inserted through the hole in the mainspring, it can be shortened the required amount with a fine file before the riveting is done. The riveting is done with a small steel hammer as the head of the hook is supported on a bench anvil. The riveting can also be done with a flat face solid staking tool punch in the staking tool.

After the hook has been riveted securely to the mainspring, the mainspring is inserted into the mainspring barrel with the new hook in position in the hole in the barrel. A fine flat file is used to make the end of the hook flush with the outside wall of the barrel if it extends beyond the barrel wall. If this is not done, the end of the hook could interfere with the correct action of the fusee chain as it is wound and unwound from the wall of the barrel.

"Pocket Watches and Their Maintenance" will continue.

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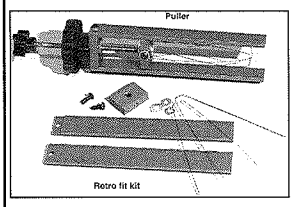
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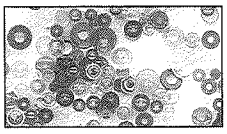
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As a Clockmaker Turns

The American Clock Movement and Restoration Problems

Part 3

J.M. Huckabee,
CMC, FAWI, FBHI

Review

The first part of this series involved framework problems and solutions to framework distortion and damage. The second part continued and moved to some gear train problems. With that material in mind, this article will both review some of those problems and add additional solutions to similar subjects. It will be well to study the three parcels as one continuous teaching.

Revisiting the Distorted Framework

Skewed, twisted, and distorted framework is commonly found in these pieces of American history. Warped wood cases, broken mainsprings in time past, and poor workmanship are the source of most of the problems. The end result is problems of latent-stoppers, not able to run a full eight days, and an abnormally unstable rate.

The problem depicted in Figure 1 may show when the movement is disassembled, fully wound, or after it is cased. The stress may not show up at all, or it may prevent any success of movement operation. It frequently shows immediately after a "good bushing job." The job is good, but a racked framework brings the close fitting pivots into a bind. Skewed plates mean upright arbors are in a bind.

Let's check for skewed plates. Rest the movement on a flat surface. A bench block is used in Figure 2. A perfectly flat piece of lumber is also suitable. Do all the edges land down at the same time? If no, the front-to-back plates are twisted. This requires work on all pillars.

Now check with a small square as pictured in Figure 3. An error in squareness indicates pillar problems. The plates are skewed. You may find both twist and skew in the same pair of plates.

Drop an arbor across the plate edges. This gives an indication of endshake you may expect to find. Those examples are shown in Figures 4 and 5. With flat plates and no skew or twist you should pass the Figure 5 test. However, you may fail the Figure 4 test. The escape wheel bridge will then need adjustment from front-to-rear of the front plate. And, the escape wheel bridge may need some up-down adjustment.

Figures 6 and 7 show how the escape wheel bridge pivot position is found. Compare

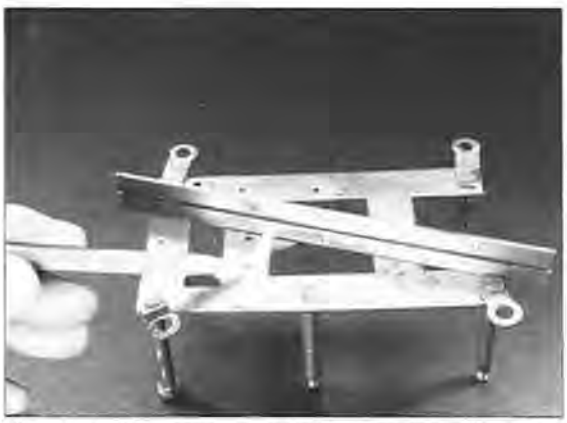


Figure 1. The movement plates are easily distorted. This one is not flat. The mounting lugs are not a perfect fit to the case.



Figure 2. Rest the plates on a flat surface. This one is twisted. Wheels will not be upright.

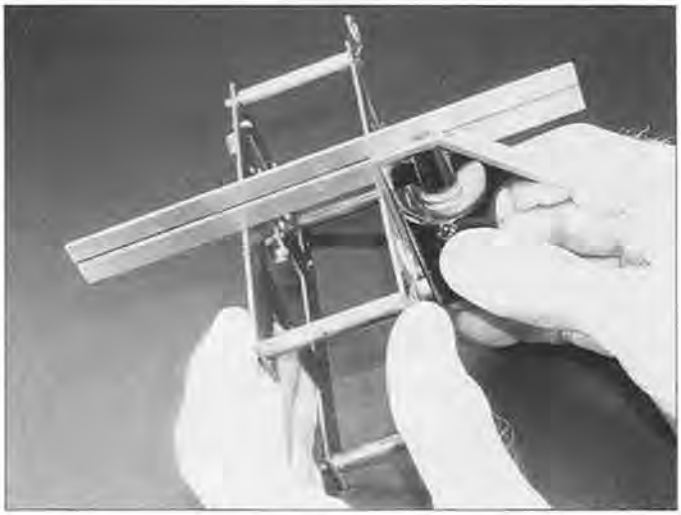


Figure 3. Check with a small square. This framework needs to be straightened.

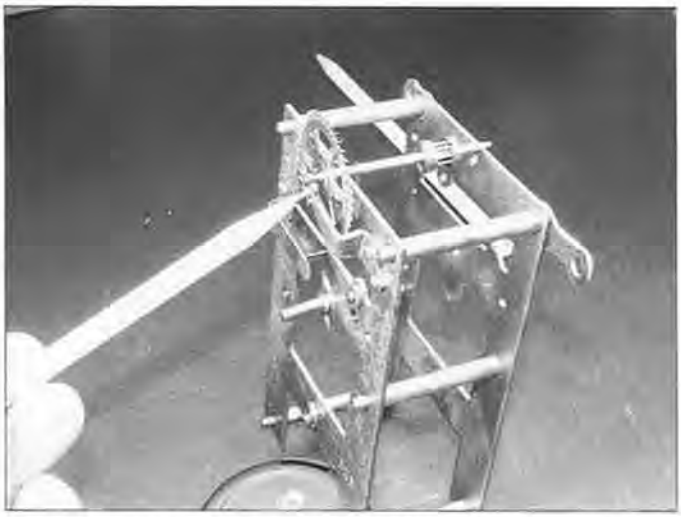


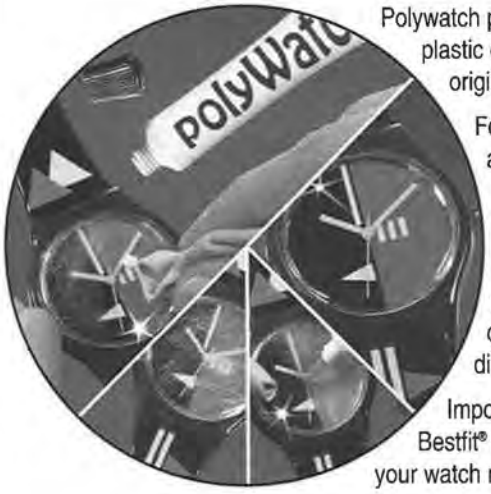
Figure 4. This escape wheel bridge needs front-to-rear adjustment.

the escape wheel pivot position in its bridge to several positions on the back plate. By the Figures 6 and 7 tests, the bridge pivot position is found. A wrench on the bridge is a suitable tool. It is similar to adjusting the mounting lugs in Part 1 of this series.

More on Pivot Clearance

Revisit the pivot clearance study in Figures 8-11. The respective captions give an evaluation of each item. However, let me expand the thought about Figure 8. The compounding of plate twist, skew, pivot and wheel runout, and less-than-straight arbors can often consume the running clearance of a closely fitted pivot. These movements never had, nor were ever intended to operate at the close clearance of clocks built by our European friends. They were made to run in a market of less than the best care and maintenance; and they are one of the great success stories of the American industry.

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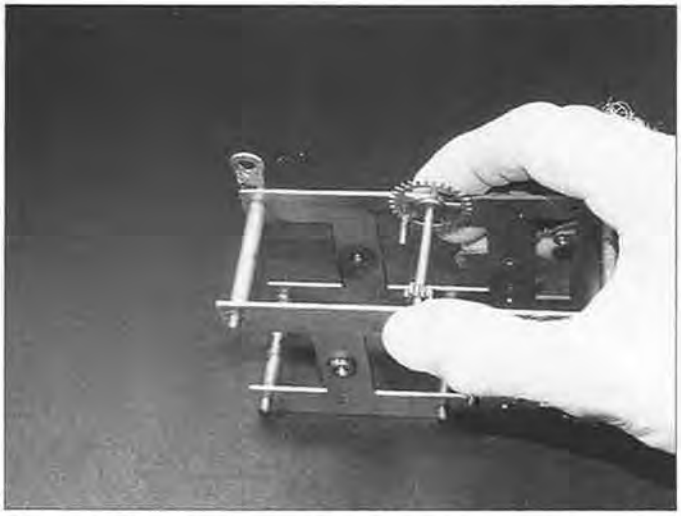


Figure 5. Place a wheel on the plate's edge to estimate plate distortion. This is similar to that of Figure 4.

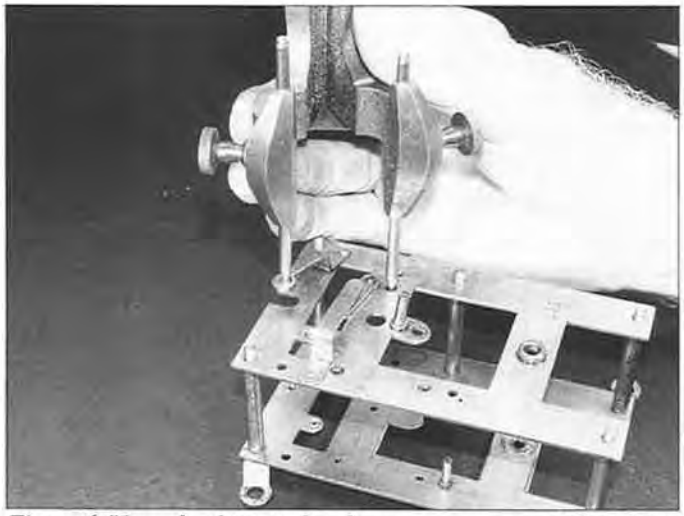


Figure 6. Use a depthing tool and compare escape wheel position to pivot distance on rear plate. Also see Figure 7.

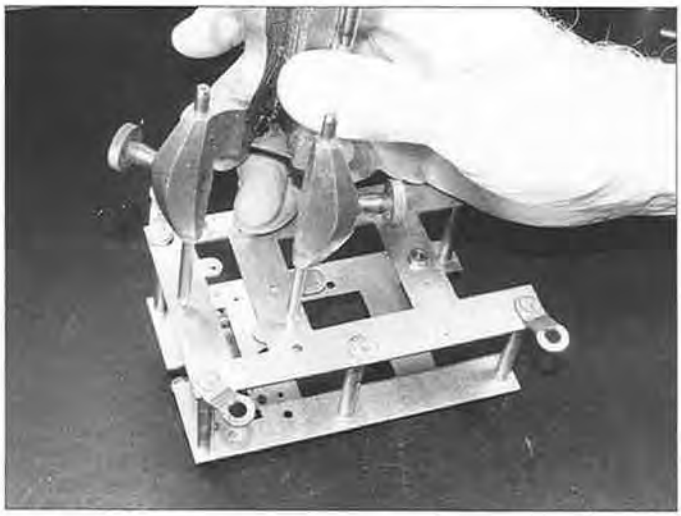


Figure 7. Compare pivot distance to the front plate. Also see Figure 6. Escape wheel bridge may need adjustment. Check several other pivots.

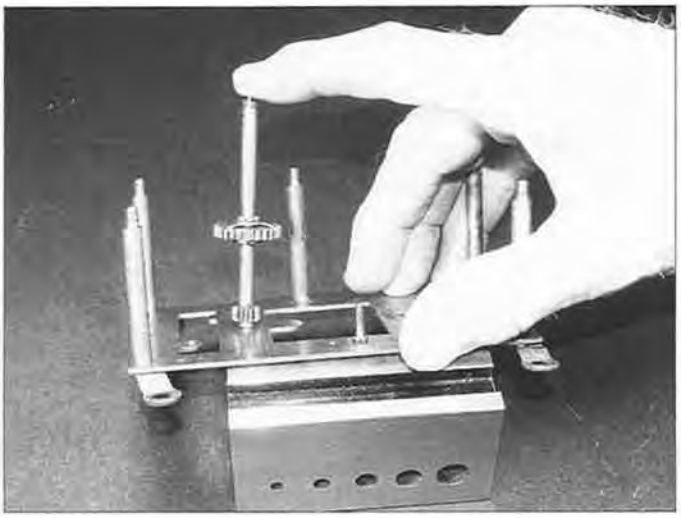


Figure 8. This shows nominal pivot hole size for the center shaft. A twisted framework may cause a bind here.

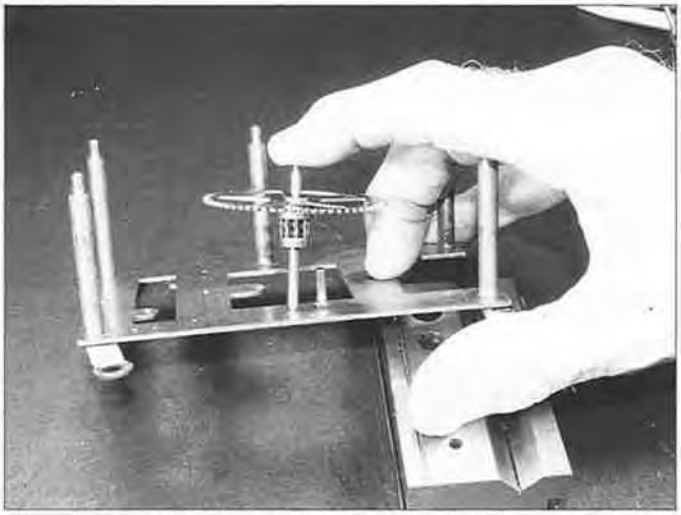


Figure 9. This illustrates a nominal bearing clearance for this movement; check in all directions.

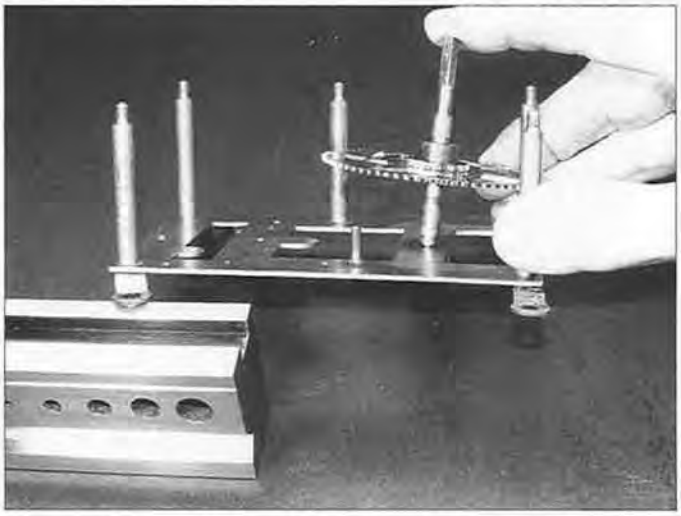


Figure 10. Rear plate bearing for the winding arbor. This nears the time for a bushing.

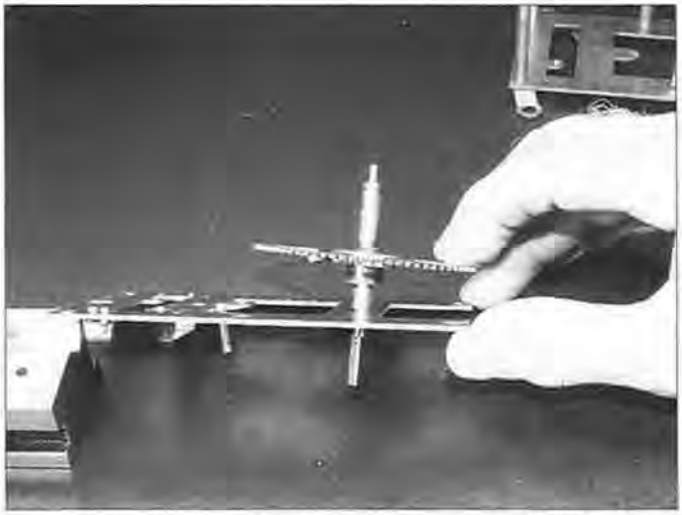


Figure 11. Winding arbor in the front plate. This plate has a long bushing and is worn more than a similar view in Figure 10 reveals.

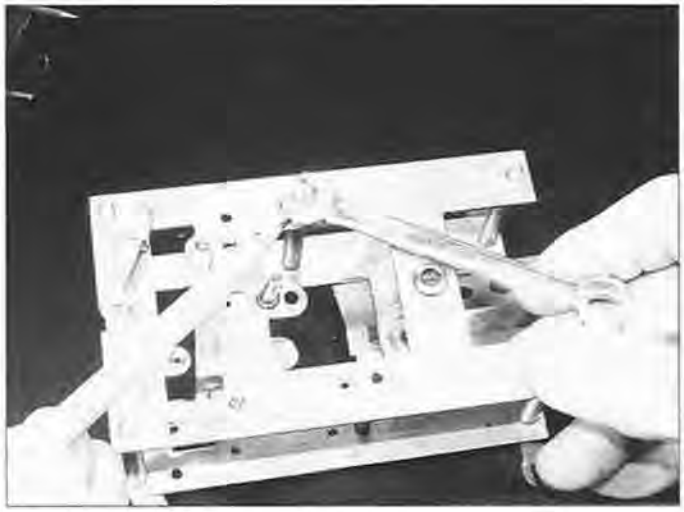


Figure 12. Always use a wrench on the pillar nuts. These pieces must last for future generations. Observe the winding arbor bushing of Figure 11.

Figure 12 pleads for us to use proper tools. Our great-grandchildren will appreciate our preservation of our grandparents wedding gifts of the far past.

Conclusion

This concludes the 3-part series on "American Clock Movement and Restoration Problems." I have not mentioned a multitude of problems that are well treated in available literature.

For a deeper look into the American clock, pick up a copy of the book, *The Top 300 Trade Secrets of a Master Clockmaker*. It is totally dedicated to the American clock with 314 close-up photographs along with easy-to-read instructions.

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Stanley McMahan

Affiliate Chapter Report

Chapter Highlights—Horological Association of Maryland

As we head into the new year I would like to encourage every member of AWI to join an affiliate chapter of our great organization. The local level is where the rubber meets the road when it comes to hands-on education and problem solving. The horological professional knows the value of this type of association and benefits greatly because of his or her participation.

Some of our members are unable to attend a local guild because of geographic location. For those individuals, AWI offers theme-based guilds that stay connected via the Internet and periodic newsletter.

The Horological Association of Maryland (HAM) is one of a number of outstanding regional guilds, and anyone living within 100 miles of their meeting location would be well served to join. I recently received a communication regarding their group from HAM member George Painter. What follows is his description of the Horological Association of Maryland.

The HAM has been devoted to the education and skill level development of its members since our inception. To this end we meet every month of the year except December. Each meeting month we have a program and business meeting on the 2nd Monday and a workshop on the 4th Monday. The Program meeting consists of a business meeting that is then followed by an educational program. Some of the most noted programs this past year included a presentation by the below listed individuals:

Laurie Penman	Dennis Warner
John Nagle	Stan Craig
Dan Fenwick	Dan Spath
Stan Palen	Fred Crow

The workshops consist of individuals bringing in their clocks and watches, with which they may need assistance. In addition, we have an ongoing program for both clocks and watches to teach the basics of theory and repair.

Periodically, we conduct special programs such as a review of AWI Watch and Clock Certification requirements and then study material for the tests.

Three times a year we conduct an all day workshop for members instead of the Monday workshops. In this case we meet on the Sunday before the regularly scheduled Monday night workshop. The next all-day workshops are planned for March 25, July 22, and October 21.

This past December the Board of Directors discussed and changed our educational planning for this year. We decided to institute a series of "theme" educational programs in order to meet member needs. We will present an overview and the details of the theme at the regularly scheduled program meeting in preparation for the upcoming workshop meeting. For example, several members have asked for instruction on the watchmaker's lathe. Member Stan Craig just conducted a lathe overview and planning session at our program meeting on January 8. Members will come prepared with lathes and materials for the workshop on the 22nd.

Late last year we had an introduction to the lathe and a workshop on sharpening gravers, so we will next start cutting metal and our first project will be how to make pivot drills.

We will still have some special Monday programs such as on February 12 when we will have our yearly auction of watches and clocks, tools and materials.

In March we have Dan Fenwick presenting a program on the latest Swiss watches his company supports. We also have trips planned to the NAWCC museum in Columbia, PA and to a special showing of the horological collection at the Smithsonian museum.

Other things we are engaged in are continuing efforts to advertise ourselves and recruit new members. We participate in local NAWCC regional activities, and marts where we set up information and display tables manned by HAM members. This has been successful in bringing

in several new members. Also, our chapter was instrumental in joining with the Pennsylvania and Virginia guilds in establishing the Mid-Atlantic Horological Symposium, Inc.

Finally, we are busy planning for a two-day symposium in September 2001. As you can see, we are a very active and busy chapter. I would be glad to answer any questions and expand on any subject I may have not addressed in sufficient detail.

George Painter, Vice President, HAM

The affiliate chapters of AWI have a lot to offer. George did an excellent job of detailing the benefits of being a member of HAM. All of their members enjoy a well-run club with strong leadership and have a willingness to share their time, talents, and skills. Go ahead, join today. You won't be disappointed.

If you would like further information about the Horological Association of Maryland, contact President John Bishop at:

Horological Association of Maryland
John L. Bishop, President
2 Lynhaven Court
Severna Park, MD 21146
(410) 544-8155
jlbishop2@juno.com

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New York State Watchmakers & Clockmakers Association Convention

Dale LaDue, CMW

The New York State Watchmakers and Clockmakers Association held their 62nd Annual Convention, Saturday, September 30th in Gang Mills, NY. Gerald Jaeger, CMW, CMC, CMEW, presented his AWI 2-day "Repair of the Atmos Clock" course prior to our convention.

Gerald conveyed to us that the Atmos is not as mystifying as we think it is. "The Atmos Clock Repair" course drives home the different procedures to de-mystify the repair and setup of this unique clock.

President Dale LaDue, CMW, opened our convention with Friday night's Board meeting. Business was tended to and concerns addressed.

A full day of information was presented on Saturday. Amedeo Sylvester presented his program on "Using the Watchmaker's Lathe." Amedeo began with some history and old catalog overheads of lathes and their attachments. The second half of his presentation was on the care, disassembly, and adjustment of the lathe. A table full of lathes and attachments were explained in a hands-on manner.

After a short break Mark Mongillo presented his demonstration of re-covering cuckoo clock bellows. Mark has not bought a bellows or bellows top in 10 years, he recovers them instead. His procedure was quick, precise, and permanent.

The second half of our convention consisted of a repivoting demonstration, mart, business, and banquet.

Dale LaDue, CMW, presented his techniques on watch wheel repivoting, particularly the making of pivot drills, both carbon steel and carbide. His presentation culminated with the repivoting of a watch wheel, from turning a center, drilling, fitting a steel plug, cutting the pivot, and polishing. We ended our day of programs with a small but quality mart.

Our annual meeting was well attended. We elected three new officers: Jonathan Rowe, Secretary; Bob Waters and Lou Stella, Directors. One issue we discussed was our attendance. We attributed our increased attendance this year, in particular, by getting convention information out early to our members. AWI was generous in giving us three month's notice in *Horological Times*.

Gerald Jaegar, who was the speaker at our banquet, gave us up-to-date information on modern clock movements, and whether to replace or repair them.

The banquet was wonderful. The food and accommodations at the Holiday Inn, Gang Mills, NY, could not have been better.



Amedeo Sylvester looking on as Gerald Jaeger demonstrates repair techniques.



Gerald Jaeger instructing the Atmos course hands on. Participants from left to right: Jonathan Rowe, Bob Waters, Tracy Petrocy, Bob Hatt, Gerald Jaeger (Instructor), Amedeo Sylvester, Lou Stella, and Burt Rought. Not shown is Dale LaDue behind the camera.



Gerald Jaeger instructing the principles behind the Atmos



Mark Mongillo demonstrating cuckoo clock bellows replacement.



Dale LaDue, CMW, demonstrating repivoting watch pinions and balance staffs.



Amedeo Sylvester disassembling and cleaning the watchmaker's lathe.



Talk about pressure. Repivoting watch wheels, both pocket and wrist, generates enough tension on oneself, but all those eyes staring at your work.



The banquet was Saturday evening.



Jack Kurdzionak

From the Workshop

You Are Invited

Do you have a solution to a watch or clock repair problem that you want to share with our membership? Do you have a question about a repair problem you would like to ask? I invite you to participate in this column with your suggestions, questions, and comments. It's easy. Just e-mail me at AWI <magazine@awi-net.org> or write using the old standby known as the postal service. You can even fax me at 513-367-1414. I will do my best to help you help the membership. By sharing your questions and suggestions all of our members can benefit from our combined knowledge and experience.

One Size Fits Many

The genesis for this idea did not come from one of our members, but from a number of my customers. They own watches equipped with round flat mineral glass crystals that are badly scratched and need to be frequently replaced. These watch owners often request a sapphire crystal to replace the glass. They understand that a sapphire crystal is very scratch resistant, stronger than glass, and will keep its new appearance indefinitely. These customers are the ones every watchmaker needs. They come in ready to spend extra dollars to upgrade their watches from a basic glass crystal to a sapphire one. They don't have to be sold on the benefits of the product. This is an ideal situation from a business viewpoint. Of course, Shakespeare said it 400 years ago, "Aye, there's the rub." Nothing is ever as easy as it first appears.

Each time a customer came to me with a request for a sapphire replacement crystal, my supplier could not supply the correct size crystal. Unlike round mineral glass, which is supplied in a wide range of sizes in increments of .1 mm, sapphire rounds are supplied in full and half millimeter sizes. Unfortunately, these full and half sizes don't fit many watches. In addition, it is no easy task to grind a sapphire crystal to size. The essence of the problem is thus. We have a customer who is asking to buy and willing to pay for a product that we cannot supply. All that is needed is a way of easily reducing the diameter of a sapphire crystal by no more than .4 millimeter. The answer proved to be a diamond file. I called Peter Eckel of McCaw Company, writer of the "Material Matters" column, for his advice. I knew I could mount the crystal on a cement chuck in my WW lathe and easily make it run true as the shellac adhesive slowly cooled. What I didn't know was that he could supply an inexpensive diamond hone called an EZE-LAP. Peter sent one for me to try. With the





Heating the crystal and cement chuck



Making the hot crystal run true



Testing the fit of the crystal to the bezel



Lap used for grinding the sapphire crystal



Keep the lap lubricated with water while grinding the crystal

fine grit EZE-LAP I was able to reduce a sapphire crystal from 26.5 mm to 26.2 mm in a few seconds.

The technique is easy. You will need a cement chuck for your lathe. Warm the chuck and apply some flake or stick shellac to its face using a paint removing heat gun to supply the heat as in the photo. Push the sapphire crystal against the face of the cement chuck and apply more heat if necessary to heat both the crystal and the chuck while slowly spinning the lathe. While the shellac is still soft, true the crystal with your fingers. Be careful, the crystal can be hot enough to burn the fingertips. A paper towel held in the fingers will insulate them from the heat.

The crystal can be ground to size as soon as the shellac has hardened. Spin crystal slowly while you gently apply the EZE-LAP to its edge. Wet the lap with water to keep it lubricated and to prevent any sapphire dust from leaving the work area. A paper towel under the work area will protect the lathe bed from water droplets and dust. After a few seconds of grinding, try fitting the bezel to the crystal. Grind more if needed until the crystal fits the bezel with about .05 mm clearance all around. You can put a slight bevel on the crystal's edge at this time. Remove the crystal from the cement chuck, wash off all shellac from the crystal using denatured alcohol, and you are ready to cement the crystal in place. Ultraviolet cement does a neat job when the cleaned crystal is cemented to a clean bezel. Replace the movement and case back. Test for water resistance if it is a water resistant watch.

This technique works just as well when you need to fit a domed mineral glass crystal (GS style LMG) to a bezel. These LMGs are sold in the same .5 mm increments as the sapphire crystals. Use exactly the same procedure as you would use for grinding the sapphire crystal and be aware that glass grinds more rapidly than sapphire. Give this technique a try. McCaw's has the EZE-LAP and most of our advertisers sell generic sapphire crystals. For a very small investment, you can easily fit these sapphire and domed glass crystals to almost any watch. Thanks to Peter Eckel for his help with this article.

Jack Kurdzionak



Laurie Penman

Education Update

We have just finished Phase IV of the new introduction to clock repair courses here at AWI in Harrison which means, of course, that we have completed four weeks of the Introduction to Clock Making. Four very successful weeks I would add.

"Introduction" is a bit of a misnomer because normally this word is used to describe a very low level, simple approach to a subject. That is not the case here and to illustrate this I will detail the work we did in those four weeks.

Phase I - Getting Started

We discussed the setting up of the business, tax questions, registration, typical times for the various clock repair tasks and the matter of quoting and delivering the work. This was the limit of the 'theoretical' work and we switched to practical matters. Spring and weight driven clocks were dismantled and the differences between the two pointed out along with some of the major points to look for and assess (such as spring qualities) so that an estimate of costs can be made. These included the pivots and pivot holes, the gears and the escapement. Then, of course, methods and materials for cleaning and the economics of the different approaches.

After disassembling the movements, they were cleaned and then examined closely. Several holes were bushed, providing the opportunity to discuss the various ways this is carried out and their advantages and disadvantages. Pivots were polished, the meshing of gear wheels explained and tested, a number of other faults checked, and then we reassembled the clocks.



Laurie Penman lectures on wheel and pinion theory.

During this and each of the following classes we dealt with students' problem clocks, mostly problems associated with the week's work but not necessarily.

Phase II - Striking Movements

In the course of the week a number of different striking movements were studied; the typical faults of count plate and rack systems were discussed. A rack and snail were made as a project to show the means of making or repairing damage in a striking clock and the operation of both closely examined.

Phase III - Turning on the Lathe

AWI has just taken delivery of four Sherline lathes and, with the existing lathes and those that some students were able to bring with them, we had more than enough machines for the nine attendees. Turning tools were made from high carbon steel as practice in making and grinding and used afterwards to show just how well these simple tools can handle the clockmaker's needs at the lathe. The use of carbon, high speed steel and tungsten carbide were explained and then we went on to some preliminary turning before beginning the major project—a depthing tool. This tool makes use of simple turning techniques, drilling and facing, milling on the lathe using a fly cutter, truing of diameters to an existing bore, silver solder, (brazing) and soft soldering. Relying on fabrication techniques, this tool can be made to be accurate within a few thousandths of an inch over a span of twelve inches.

Phase IV - Escapements

The major projects in this week were confined to the recoil escapements. The design of recoil escapement pallets for different centre distances of wheel and pallets was detailed and then the first set of pallets made of brass in the style of a typical tall clock or British, French or German table clock. When this was completed a bent strip escapement such as is found in Black Forest clocks was made, and then a fully hardened and polished set of steel pallets were made in the tall clock style. The pallets are only half



Walt Hedglin making parts for the depthing tool project.



L-R: Jason Hull, Jerome Freitag, Andrew Miller, Laurie Penman, Don Florin, Ken Foster, Walt Hedglin, Chris McVetty, Peter Bogy, and Gerry Penman.



Jason Hull works on an alarm clock balance.

of the escapement, of course, and time was taken to cut an escape wheel with a fly cutter, and the techniques of repairing these wheels practised. The week finished with a study of the deadbeat escapements and comparison made between the timekeeping qualities of recoil and deadbeat.

This course will be expanded into the making of Graham and Brocot escapements in Phase VI - with a reprise of the recoil escapements.

As you can see, we got through a lot of work in those four weeks and will get through a lot more in the weeks to come. This is made possible by the use of two instructors for a large part of each course, Laurie Penman being assisted by his son Gerry, it makes for good instruction with hardly any occasions when a student is kept waiting for attention.

We are expecting to receive the regulators from the Observatory for restoration during March. These include a 19th (possibly 18th century) tall case regulator, two high accuracy clocks by Rieffler—one that is usually run in a pressure controlled vessel and a number of simpler regulators due to be refurbished and have new parts made at the AWI over the next twelve months or so. AWI members are invited to become involved in the examination and repair of these clocks. This will be a largely hands-on situation and offers a unique opportunity for studying both the clocks and the techniques that will be used for this very high class of work. Please contact AWI for details of available weeks and the fees.

One final matter; although the content of these classes was set without benefit of feedback from the membership, feedback in the form of suggestions for future classes would be welcomed. These classes are intended to expand the skills and knowledge of clockmakers and increase the number of members who can take on the small but important number of high quality clocks owned by the public. This work not only increases a clockmakers standing in his or her community but it pays well too!

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Industry News

Cas-Ker Expands to a New Location

The Cas-Ker Company, a distributor and importer of watch material, plus tools, supplies, and equipment for both jewelers and watchmakers, has moved into its new facility in Cincinnati. The company has doubled its floor space with its move to the 21,000 square foot building, which the company designed and constructed. The move was made necessary by years of growth and the continual addition of new products. The company will be able to provide its customers with even better service and selection that the additional space will allow, plus competitive pricing through volume purchasing.

The new building is located at 2550 Civic Center Drive, Cincinnati, OH 45231. New local phone numbers are 513-674-7700 for regular calls and 513-674-0600 for fax messages. The toll free numbers remain the same at 800-487-0408 and 800-487-5848 for faxes.

Contact Rick Foster, Vice President, if you have any questions.

Cas-Ker Acquires Fargotstein's Material Department

The Cas-Ker Company, a Cincinnati based distributor and importer, has purchased the watch material division of Fargotstein's, a Memphis, Tennessee distributor which served the jewelry industry. The purchase included the entire watch material, crystals, movements, watch straps, and battery division of Fargotstein's. The Cas-Ker Company has been in the watch material business for over 50 years and will continue to serve Fargotstein's customers from its Cincinnati location. Cas-Ker also sells findings, tools, supplies and equipment for jewelers.

The Cas-Ker Company is located at 2550 Civic Center Drive, Cincinnati, OH, 45231. The phone numbers are 513-674-7700 for local calls and 513-674-0600 for local faxes. Toll free numbers are 800-487-0408 for calls and 800-487-5848 for faxes.

For more information, contact Rick Foster, Vice President of the Cas-Ker Company.

2001 Rio Grande Tools & Equipment Catalog Released

Rio Grande is proud to announce the 2001 Tools & Equipment Catalog. This annual 500-page, full-color catalog contains the latest selection of tools, equipment and supplies for jewelers. Complete product descriptions and specifications make this catalog a useful resource for the shop or bench. Many products have been added to save jewelers time and improve their jewelry-making process. Dozens of helpful tips and a comprehensive double index (by product description and by order number) make this catalog useful and easy to use. Call 800-545-6566 (from the United States), 800-253-9738 (from Canada) or 505-839-3011 (from all other countries) or fax to 800-965-2329. Product orders can also be taken at www.riogrande.com. The e-mail address is info@riogrande.com.

Bond Communications Appoints European Manager

Bond Communications, publisher of *Professional Jeweler* magazine and organizer of the Professional Jeweler industry events, has named Suzanne Rouden, of Rouden, Messmer & Partners, to be in charge of the company's sales and new business initiatives in Europe.

Ms. Rouden most recently was



Suzanne Rouden

public relations director of the Gaba Group, a major pharmaceutical firm based in Basel, Switzerland. Previously, she was with the management group of Messe Basel, where she had been the communications director of the prestigious Basel World Watch, Clock and Jewelry Show in Basel, Switzerland from 1996 to 1999.

In announcing the appointment, Charles Bond, chairman of Bond Communications, said Ms. Rouden would play a vital role in the development of the Company's international business opportunities. "We are fortunate to have Suzanne on our team," he said. Her broad international experience, enthusiasm and determination to succeed will serve her well in this new position."

Professional Jeweler publisher Lee Lawrence added that, "Suzanne's solid knowledge of the jewelry and watch industries, her multilingual capabilities (German, French, Italian, Spanish and English), along with the professional manner in which she functions, will make her a great asset in serving our clients abroad."

Ms. Rouden will provide her services to Bond Communications through her agency, Rouden, Messmer & Partners, a newly-formed Swiss company formed in partnership with Manfred Messmer, a distinguished communications practitioner in Basel. The new agency also specializes in providing strategic planning, creative and communication services for its clients.

AWI EDUCATION

Bench Courses

To schedule a Bench Course in your area please contact AWI for complete information. A list of available Bench Courses is printed here for your convenience. To register for Bench Courses, please mail, phone, fax or e-mail your registration and payment information to: **American Watchmakers-Clockmakers Institute, 701 Enterprise Drive, Harrison, OH 45030. Phone (513)367-9800, Fax (513) 367-1414, E-mail: educate@awi-net.org** PLEASE NOTE: Registrations are limited and will be selected by the earliest date received. Please include a check or charge card number (Visa, Mastercard, Discover or American Express), card expiration date, signature and phone number. All registration fee checks and charges are processed immediately upon receipt. ***DEADLINE FOR REGISTRATION IS 30 DAYS BEFORE THE SCHEDULED DATE OF THE COURSE.*** • Indicates Bench Courses held in conjunction with a convention.

CONTACT THE AWI EDUCATION DEPARTMENT
FOR DETAILS ON HOW TO SCHEDULE A BENCH COURSE IN YOUR AREA

AWI Continuing Education

AWI's continuing education program offers classes in various phases of watch & clock repair techniques. Work alongside recognized leaders in the field of horology. See how they handle the everyday situations we all encounter. All classes are held in AWI's training rooms in Harrison, Ohio. Call or write for information and details for the classes that interest you! ***DEADLINE FOR REGISTRATION IS 30 DAYS BEFORE THE SCHEDULED DATE OF THE CLASS.*** To register for these courses please mail, phone, fax or e-mail your registration and payment information to: **American Watchmakers-Clockmakers Institute, 701 Enterprise Drive, Harrison, OH 45030. Phone (513) 367-9800, Fax (513) 367-1414, E-mail: educate@awi-net.org.** Please include a check or charge card number (Visa, Mastercard, Discover or American Express), card expiration date, signature and daytime phone number. All registration fee checks and charges are processed immediately upon receipt.

DATE	CLASS	INSTRUCTOR	FEE
MARCH 2001			
5-7	ETA Products	Alessandro Betti	$150.00
19-23	Watch Part Fabrication & Finishing	Stewart Lesemann	$250.00
APRIL 2001			
9-13	Introduction to the Watchmaker's Lathe	Stewart Lesemann	$250.00
16-20	AWI Lathe Program	TBA	$250.00

Introduction to Clock Repair
AWI Training Center Harrison, Ohio
Instructors: Laurie Penman & Gerry Penman

MARCH 2001		
5-9	Introduction to Clock Repair, Phase V - Westminster Chimes	$250.00
12-16	Introduction to Clock Repair, Phase VI - Review & Expansion of Escapement Practice	$250.00
APRIL 2001		
2-6	Introduction to Clock Repair, Phase VII - Platform Escapements & Carriage Clocks	$250.00
9-13	Introduction to Clock Repair, Phase VIII - Servicing & Repair Techniques	$250.00
MAY 2001		
7-11	Introduction to Clock Repair, Phase IX - General Clock Part Making	$250.00
14-18	Introduction to Clock Repair, Phase X - Grande Sonnerie Carriage Clocks	$250.00

AWI Bench Courses

Advanced Clock Repair

Clock Case Repair

Clock Escapements

Cuckoo Clock Repair

ETA Products

Filing & Flat Polishing

400-Day Clock Repair

Hairspring Vibrating

Introduction to American Pocket Watches

Introduction to Clock Repair

Introduction to Quartz Watch Repair

Lathe Program

Mechanical Watch Repair

Micro Lathe Operations

Mechanical Chronograph

Organize Your Work Habits for Success

Platform Escapements

Repair of the Atmos Clock

Repair of the Bulova Accutron

Seiko Kinetic Quartz Watch Repair

Sequential Chime

Servicing ETA Quartz Chronographs

Striking Clocks

Swiss Auto Quartz

For details on scheduling a Bench Course in your area, please contact Nancy Wellmann, AWI Education Coordinator at 513-367-9800 ext. 303 or e-mail educate@awi-net.org

BULLETIN BOARD

NEW REQUESTS

Car Clock
Mr. Steven Pizzarella, Worcester, MA, is looking for information on how to repair and/or technical information on a car clock. The car clock's description consists of: a mainspring that is wound by a 6 volt electrical system and it is a lever escapement, circa 1962-63, the face is approximately 64mm in diameter, and the back reads "vdo tachometerwerke germany."

Ladder Chains
Mr. Daniel T. Moore, Kansas City, MO, is looking for 144" worth of strong (11 lb.) ladder chains that have 40 links per foot.

OBAMA Injector
Automatic Watch Oiler
Mr. Norman Shafer, Apache Junction, AZ, is seeking an owner's manual and/or instructions on cleaning and refilling an OBAMA Injector Automatic Watch Oiler.

RESPONSES

Elgin Case
Irv Bard, GF Specialties, Ltd., Milwaukee, WI, responded to Kalevi Hoite's request for an Elgin 16s gold-plated hunting case.

C & E Marshall Company
The following have responded to Russ Bowie's request for an index to the C & E Marshall Company watch jewel system: Paul L. Wirth, Vinton, IA; Bill Schroeder, Chicago, IL; Charles Jackson, Grapevine, TX; Florida Watch & Jeweler's Supply, Inc.

Digital Clock with Large Numerals
Michael Oaks, NTA Custom Jewelers, Owensboro, KY, responded to Leo Jaroslaw's search for a source for a 24-hour digital clock with large numerals. Mr. Oaks suggested Lathem Time Corporation, 200 Selig Drive S.W., Atlanta, GA 30378; Phone: (800) 241-4990. This company makes a Digital Wall Clock, Stand-Alone or System Secondary with 4" Display.

ITEMS STILL NEEDED

Nutone Electric Chime Clock
Instruction Booklet or
Service Bulletin
Richard Sneary, Punta Gorda, FL, is seeking an instruction booklet or service bulletin for a Nutone Electric Chime Clock. It has 4 chime tubes, (46", 37", 39½" and 35"). It has 2 electric motors AIG/4-B3-M2200-4RPM. Made in Cincinnati, OH.

Preciso
Bobby Long, Euless, TX, is seeking information on the watch brand Preciso (Standard). The Preciso watch is a 15 jewel, licence auchere brevetes. S.G.D.G. #1098471.

Atmos Bellows
Ethylene Chloride
Allan Lipney, San Rafael, CA, is seeking patent information on Atmos which might give some insight on the amount of Ethylene Chloride used in the Atmos bellows.

Waterbury Carriage Clock
Pete Warren, Keene, NH, is looking for a "parts only" 4-plate movement as described in the Tran Duy Ly series as "Sage," 8-day, half-hour strike, repeater, jeweled movement. Number 182.

Paul Berguette
Jim Stanley, Fort Wayne, IN, is looking for a supplier of a clasp for a Paul Berguette, Case #A2088.494. He is also looking for someone servicing warranties on this watch brand.

Hamilton-Sangamo Electric Clocks
Service Bulletin
The AWI technical department is looking for a good, clean copy of the Hamilton-Sangamo Electric Clocks Service Bulletin, dated November 1929.

Do you have information regarding this month's requests? Do you need information about one of this month's responses? If so, send your information or requests to:

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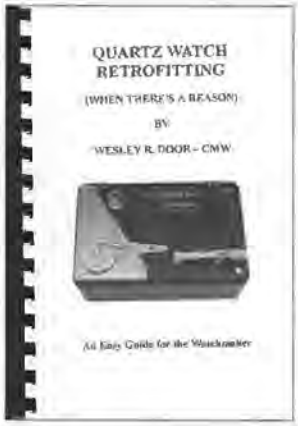
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AWI Movement Bank/ Material Search Network

EDITOR'S NOTE: This column is designed to work in conjunction with the AWI Movement Bank. If you can supply any of the items listed here, please send details to the Material Search Network. **Do not send the items to AWI.** Members requesting these items will be advised of their availability, and will contact you directly.

1M1 Emicar (A. Michel) 15 J, manual wind, egg-shaped silver case with compass, 13 L, 220 caliber movement complete with hour, minute, and sub-second hand

1M3 Seiko (LaSalle), 6730A caliber, coil, Seiko #4002.279

1M5 Rockford, P/W Ser# 332978, balance staff

1M6 Elgin 16s, gold plated hunting case

1M7 Recta, KB caliber, barrel arbor, 195/

1M8 International, C 884/2 caliber, pawl, IWC #52053

If you can supply any of these items please contact: AWI Material Search Network, American Watchmakers-Clockmakers Institute, 701 Enterprise Drive, Harrison, OH 45030-1696. Phone: (513)367-9800, Fax: (513) 367-1414 or E-mail: mhuff@awi-net.org.

The AWI-ELM Trust, in cooperation with the American Watchmakers-Clockmakers Institute, maintains a unique member service to assist professionals in replacing hard-to-find parts for vintage timepieces. When a member cannot locate a replacement part through normal sources, the Movement Bank/Material Search Network (which consists of movements, timepieces and materials donated to the Trust) is often able to help. There is a fee of $10.00 for each search. The fee will be waived if a part or movement of equivalent value is donated to the Movement Bank.

The AWI Material Search Network first contacts several dozen material houses and outlets on behalf of the member to determine if the missing part is available from any commercial source in the United States or Canada. If no other source is available, the Movement Bank is searched for a usable spare part. If found, the fair market value of the part will be assessed and the part made available for sale to the member. If the part cannot be found in the Movement Bank, the search will be listed in the *Horological Times*.

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