HOROLOGICAL™ TIMES

January 2008

American Watchmakers-Clockmakers Institute

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BG6987 New Case Opener Knife **$ 48.50**

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Side view showing control panel

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COVER

This month's cover features an Astronomical Dial Shelf Clock by Ron Widenhoefer

President's Message

By Dennis Warner, CW21

Happy New Year, it is 2008. It is time for resolutions and setting new goals. AWCI is entering the second half of our year. New directors, new officers, new and revised programs, and new staffing at the AWCI office are all in our future.

Change and growth are all a way of life. A positive and enthusiastic attitude is necessary for the future health of our organization.

Each of us knows the power of the press. If they print and broadcast that we are in a recession, the result can be a recession, which is why even when things look bleak a positive attitude can do a lot to brighten the horizon.

The mid-year meeting of our Board will be in February at Harrison, OH. They will analyze where we are and if any changes are needed for the remainder of the year.

A slate of 9 or 10 candidates for the Board will be presented to the Directors for approval at the mid-year gathering. Those candidates will have an opportunity to introduce themselves to you in a "Meet the Candidate" article in the April issue of *Horological Times*. In May you will receive a ballot through the mail where the candidates have a chance to speak on a subject concerning AWCI. You will be asked to vote for only three candidates of your choice.

At the AWCI Annual Meeting in early August at St. Louis, MO the Board of Directors will elect your slate of officers for 2008-09.

Our committees are working hard to improve the AWCI Matters site, revise the Strategic Plan, formulate an Ethics Code, implement the Case Mark System, improve the content of *Horological Times*, increase membership, and offer you an excellent annual convention. The Trade Fair Booth Committee has again contracted for a booth at the June "JCK Show" in Las Vegas. This proved to be our biggest publicity campaign last year. Jewelers from across America were exposed to AWCI and shown the steps needed to start and/or improve their watch repair departments.

Heather Weaver greeted people who called the AWCI office in the past. Heather has left our employment and is being replaced. Our Watchmaking Instructor/ Certification Coordinator Manuel Yazijian, CMW21, has tendered his resignation and has moved to California. Both persons have been an asset to AWCI and will be missed.

Mr. Thomas D. Schomaker, CMW21, has been hired to take over the duties of Manuel. We welcome Tom who comes to us with professional credentials.

I encourage you to become involved in any of the activities mentioned above by becoming a member of a committee. The most important role you can play is to vote for the candidates who most meet your expectations of AWCI.

Executive Director's Message

By James E. Lubic, CMW21

I hope everyone had a wonderful Christmas and Holiday Season. Now it's time to get to work on those New Year's resolutions. If you had trouble coming up with any resolutions for this year I would like to help you with some ideas.

If you don't do so throughout the year, you should look at your pricing structure for repairs. Make a resolution to monitor what your turndown rate is on various repairs that you quote to customers. Many of you may know this already, but for those of you who don't, a good rule of thumb when monitoring your turndown rate on repairs is 20/80. You want to set your prices so that 20% or 2 in 10 customers walk out your door without leaving the repair because the price you quoted is too high in their opinion. I know watchmakers and clockmakers want to be heroes and repair everything their customers bring in, even though we all know better. Don't be a hero; be a smart business person. Don't be afraid to set your own supply and demand line. If your backlog is too long using the 20/80 approach, jump it up to 30/70. You might be surprised at the results.

The *AWCI Business and Pricing Surveys* may also help you to improve your bottom line for 2008. There is a lot of valuable information in these surveys.

Take some time to clean up your shop, and get organized. Trade those shoe boxes in for proper cabinets. You will feel much better about yourself and your business. Don't be shy about projecting a professional image through your appearance. Invest in one new piece of equipment for your business. It could be a computer, computer upgrade, software, or test equipment. Stay current with technology. Some day you will want to retire. A clean organized and up-to-date business can easily be sold to supplement your retirement. A dirty, disorganized, outdated business usually ends up closing and the contents selling for pennies on the dollar; that just isn't right when you've worked so hard for all those years.

Reward yourself and take a vacation this summer. How about July 31st through August 3 in St. Louis, MO for the AWCI 2008 Annual Convention and Educational Symposium. The Convention Committee is busy putting together another fantastic Convention. Soon we will have all the details here in the *HT*.

Get certified or upgrade your certification: The Twenty-First Century Certified Watchmaker (CW21) exam has become the industry standard. If you are one of the members that have been thinking about upgrading your present certification, don't wait too long. The window for upgrading the AWI CW and CMW to the AWCI CW21 and CMW21 will not be open forever. At some point everyone wanting to take the CW21 exam will have to take the full exam. Those of you with Rolex spare parts accounts will need to become AWCI CW21s by June of 2010. Don't procrastinate; we can only examine 120 per year. That is 360 in three years. Between both of these groups (upgrades and Rolex account holders) space is going to be limited. I encourage you to add certification to your "to do" list for 2008. Please see the certification exam schedule on page 37.

Continued on page 33.

Questions & Answers

By David A. Christianson, CMW21, FAWI

Question

These photos are of two watches in my accumulation. I would like to know if you could tell me anything about them.

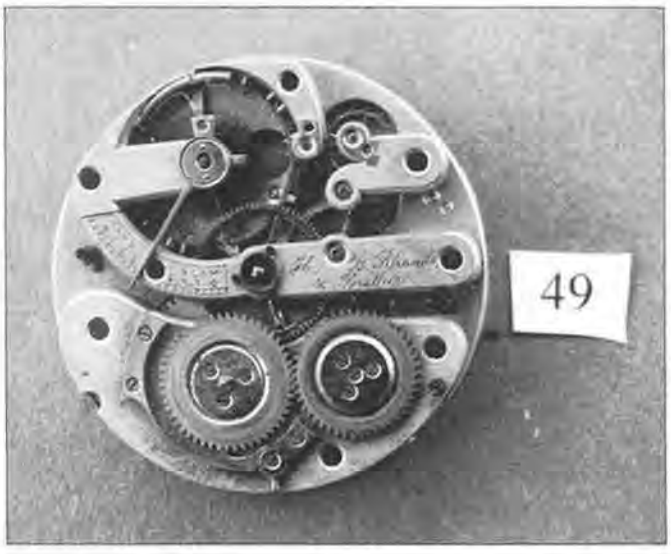
Milt Stevens
North Bend, OH

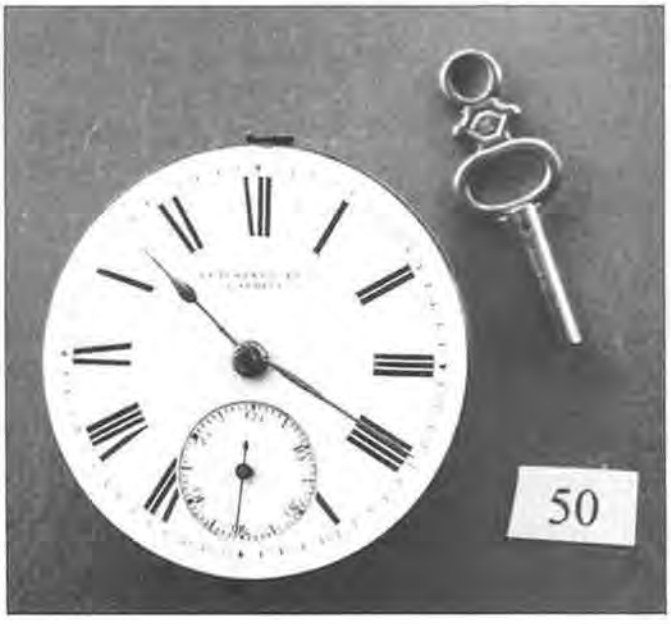
Answer

Your #49 movement is a high-grade Swiss bar movement, stem wind and key set, with a longer than normal regulator arm to give a more precise adjustment of the balance's oscillation rate.

Your movement is marked "H.Z. Rhoads & Bro." Henry and his older brother Charles were watchmakers in Lancaster, PA, doing business together between 1865 and 1882. Tardy shows a similar rough movement (ebauche) as having been in production between 1867 and 1878. Henry and Charles could possibly have purchased the rough movement from Switzerland and finished and timed it out themselves, or they more likely purchased the finished movement from a Swiss finisher and had their name engraved on it before offering it for sale in their shop.

Your #50 is a Liverpool-style non-jeweled fusee driven movement with a crown/verge escapement. This ordinary English full-plate movement with pinned pillars dates to the early 19th century, and was made as a rough movement in one of the numerous movement shops of Liverpool. It was apparently finished by Hutchings, Ltd. of Cardiff in Wales (about 200 kilometers west of London). There is no listing of Hutchings, Ltd., but I would assume that Hutchings, Ltd. was probably Charles Hutchings who is listed as working in Sturminster, England, about 75 kilometers southeast of Cardiff. Perhaps he moved to the Welsh capital of Cardiff later in his career and set up shop there.





UNITED STATES DISTRICT COURT – NORTHERN DISTRICT OF CALIFORNIA

If You Are a Watchmaker Currently Operating in the United States and Are Not Authorized By Richemont to Repair Cartier Watches, You Are Entitled to Apply to Richemont to Become An Authorized Cartier Repair Shop.

There is a Proposed Class Action Settlement with Richemont North America, Inc. ("Richemont"), the distributor of Cartier watches. The class action lawsuit, *Fleury, et al. v. Richemont North America, Inc.*, Case No: C-05-4525 EMC, is pending in the U.S. District Court for the Northern District of California. The Proposed Settlement is subject to Court approval.

What Is the Class Action Lawsuit About?

The lawsuit claims that Richemont has violated the antitrust laws by allegedly conditioning the purchase of Cartier watch parts on the purchase of Cartier watch repair service. The lawsuit asks the Court to declare Richemont's actions unlawful, to order Richemont to discontinue its allegedly unlawful practice, and to award money damages and penalties to members of the class.

Richemont has asserted several factual and legal defenses to the lawsuit and denies that it did anything wrong. The Court has not decided which side is right, and the Proposed Settlement does not mean that any law was violated. Richemont's position is that it has entered into the Proposed Settlement to avoid further expense and inconvenience.

Am I a Class Member?

The class is made up of two sub-classes, the Watchmaker Settlement Sub-Class and the Consumer Settlement Sub-Class. The members of the Consumer Settlement Sub-Class have been notified by mail of the Proposed Settlement. The Notice you are reading is intended for members of the Watchmaker Settlement Sub-Class only.

You are a member of the Watchmaker Settlement Sub-Class if you are a watchmaker currently operating in the United States and are not an authorized Cartier dealer or an authorized Cartier repair shop.

What Are the Terms of the Proposed Settlement?

Members of the Watchmaker Settlement Sub-Class are entitled to apply to Richemont to become authorized to repair Cartier watches. Richemont will evaluate applicants based on an agreed upon Evaluation Form, which can be requested by sending an email to watchrepairsettlement@gardencitygroup.com or by calling toll-free 1-800-918-1029. Richemont retains sole discretion to determine which applications will be accepted. Richemont's decision on whether to approve an application will be final unless there is evidence that, in applying the criteria set forth in the Evaluation Form, Richemont breached the covenant of good faith and fair dealing, in which case the Court may become involved.

Applications must be submitted within six months of the date that the Court gives final approval to the Proposed Settlement. Each member of the Watchmaker Settlement Sub-Class who applies to Richemont within six months of final approval, and is accepted to become an authorized Cartier repair shop, will be entitled to:

(1) Receive from Richemont free of charge a set of the Cartier-specific tooling that all authorized Cartier repair shops presently must maintain to perform repairs on Cartier watches (the total initial cost of the tooling would otherwise be approximately $2,000); and

(2) A 50% discount off the list prices for Cartier watch parts that are purchased for the repair shop's own use during the two year period after becoming an authorized Cartier repair shop (up to a total maximum two year discount of $750).

What Are My Legal Rights?

If you believe you are a member of the Watchmaker Settlement Sub-Class and wish to apply to Richemont to become an authorized Cartier repair shop, you may request an application by sending an email to watchrepairsettlement@gardencitygroup.com or by calling, toll-free 1-800-918-1029.

If you do not want to be legally bound by the Proposed Settlement, you have the right to opt-out of this lawsuit. In order to opt-out, you must submit a written request to be excluded as outlined in the Notice of Pendency and Proposed Settlement of Class Action, which can be viewed at www.watchrepairsettlement.com or can be obtained by calling toll free 1-800-918-1029. Your request to be excluded must be postmarked no later than March 17, 2008. If you opt-out, you are no longer part of the settlement and are not entitled to apply to Richemont to become an authorized Cartier repair shop. If you opt-out, you will not have the ability to object to, or comment on, the Proposed Settlement.

You can tell the Court if you do not like this Proposed Settlement or some part of it. To object or comment, you must send a written statement that is postmarked no later than March 17, 2008, as outlined in the Notice of Pendency and Proposed Settlement of Class Action. If you object or comment, you are still part of the settlement.

Am I Giving Up Anything in Exchange for the Benefits of the Settlement?

Yes. Unless you opt-out of the Proposed Settlement, you will be bound by its terms. That means that in exchange for the benefits you will receive, you will be giving up your right to pursue certain claims against Richemont and its related entities. Details about the released claims are contained in the Stipulation of Settlement, which can be viewed at www.watchrepairsettlement.com or can be obtained by calling, toll-free, 1-800-918-1029.

Will the Court Approve the Proposed Settlement?

The Court will hold a Final Approval Hearing on May 7, 2008 at 2:30 p.m. to consider whether the Proposed Settlement is fair, reasonable, and adequate and to consider the motion for attorneys' fees and expenses. If comments or objections have been received, the Court will consider them at this hearing.

Who Represents Me?

The Court has appointed the following attorneys to represent the Settlement Class:

Bruce L. Simon
Esther L. Klisura
PEARSON, SIMON, SOTER, WARSHAW & PENNY, LLP
44 Montgomery Street, Suite 1200
San Francisco, CA 94104

Geoffrey Spellberg
MEYERS, NAVE, RIBACK, SILVER & WILSON
575 Market Street, Suite 2600
San Francisco, CA 94105

These attorneys intend to apply to the Court for an award of attorneys' fees and costs to be paid by Defendant in the amount of $2 million, which is based on the percentage method authorized by *In re Activision Securities Litigation*, 723 F.Supp. 1373 (N.D. Cal. 1989). As of the date of this notice, the attorneys have incurred approximately $921,458.50 in attorneys' fees and approximately $104,367.67 in out-of-pocket expenses. The request for the award of $2 million will be inclusive of all costs and inclusive of $10,000 in special awards ($5,000 each) for the Consumer Settlement Sub-Class Representative and a Watchmaker Settlement Sub-Class Representative.

How Can I Get More Information?

If you have any questions regarding this Notice, you may call toll-free 1-800-918-1029, or visit www.watchrepairsettlement.com, where a complete copy of the Stipulation of Settlement and the Notice of Pendency and Proposed Settlement of Class Action can be obtained. However, please read this entire Notice carefully before calling.

1-800-918-1029 **www.watchrepairsettlement.com**

Figure 1

Astronomical Dial Shelf Clock

Ron Widenhoefer

Introduction

The idea for the astronomical dial clock was formulated after two different presentations at the Minnesota Clockmakers Guild meetings. The first was a program on a true pendulum astronomical regulator clock and the second was a presentation on the repair and adjustment of platform balance escapements. During the discussion period, the presenter mentioned the availability of inexpensive Russian-built platform balances. With these two items, the plans for the clock with an "astro" dial looked like an interesting project. Also, with the platform balance, a shelf clock of up to 10 inches in height could be designed without a pendulum. See Figure 1 for a view of the completed Astronomical Dial Shelf Clock.

Design Criteria

The criteria for the design of the clock included:

- Astro style dial
- Shelf clock height of 10 inches
- Engraved and filled dial
- Platform balance escapement
- Longer than one week run time

- Reasonable timekeeping performance
- Glass case with wood base
- Gear module selection to meet clock height requirements

Design

The design of the clock started out based upon the criteria listed, but that required turning ideas into usable dimensions.

The Russian-built platform balance runs at 18,000 BPH. The gear train design had to meet this requirement and have the hour, minute and second hand all rotating in the proper direction.

This required one idler gear between the hour wheel and the minute wheel. The gear train required seven (7) gears and five (5) pinions.

A summary of the gear train is listed below:

Wheel	Tooth Count	Pinion Leaf Count
Barrel	80	10
Hour	96	8
Idler	60	
Minute	64	8
"Third"	60	8
Contrate	80	8
Escape	15	

This train has the following BPH.

$$\frac{64}{8} \times \frac{60}{8} \times \frac{80}{8} \times 15 \times 2 = 18{,}000 \text{ BPH}$$

Working down the gear train, the hour wheel of 96 teeth turns a pinion of 8, which gives the desired 12 to 1 ratio needed for this wheel in relation to the minute wheel.

The barrel has 80 teeth and mates with a pinion of 10 leaves on the hour shaft. The barrel, when fully wound, will rotate 10 times to the unwound position. Using an estimate of 80% of the barrel yields the following run time estimate:

> 10 turns of the barrel x 80/10 ratio of barrel to pinion x 1 day/2 turns of the hour hand gives 40 days run x the 80% of use = 32 days run at optimum

The barrel is a recycled #54 Hermle unit. The shaft is made from 0.375 drill rod with a # 8 key square and the clock winds from the rear. The spring used is:

> 21.0 mm x 0.42 mm x 75 inches

The first and last pinions in the train are leaf style and the remaining pinions are all lantern pinions made to match the M = .5 module of the gears.

The original calculations were done using a module of 0.80. This made the gears larger than desired. For example, the 96-tooth gear, using the O.D. formula[1] is:

> OD = [T + 2.76] x M
>
> OD = [96 + 2.76] x 0.8
>
> OD =79.008 mm or 3.11 inches

The same gear, using a module of M = 0.5 gives an OD of 49.38 mm or 1.944 inches. This module yielded an overall height for the complete clockworks of 7½ inches, which with the case and base is within the desired limits of not exceeding 10 inches in total height.

The final dimensions for the clock with the case, in inches, are: 10 wide by 9¼ high by 5 deep.

Tooling and Fabrication

Gear Cutters

One of the many challenges in building this clock was the shop fabrication of the multitooth gear cutters for the M = 0.5 module cutter for the gears and the M = 0.225 module cutter for the contrate wheel. The gear cutters were made following the drawing and tool making process as outlined by Archie Perkins in his book[2] and the cutter form tool was made with tooling adapted from Robert Porter's

Figure 2

Figure 3

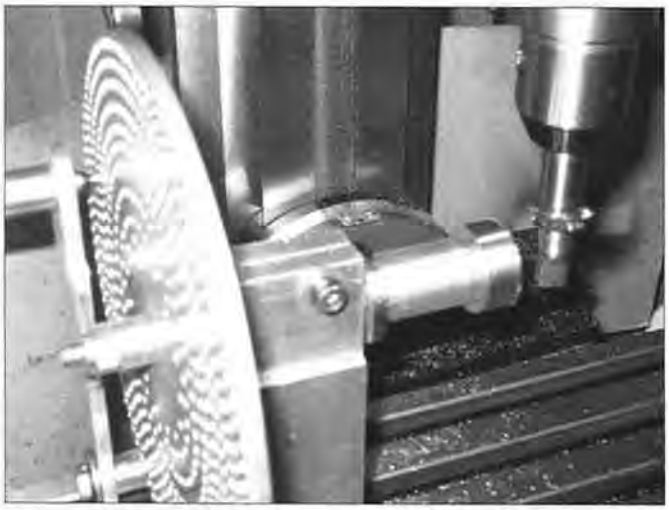


Figure 4

book[3]. Figure 2 shows the M = 0.5 cutter made by these processes. The cutters are made of steel that can be hardened when heat-treated to full hard and drawn back to a light straw. The gears were cut using a mill and shop-made fixtures with an index plate. See Figure 3 for a typical setup for my gear cutting. The M = 0.5 cutter was used to keep the gear size within the design parameters and yet be strong enough for the spring load placed upon them.

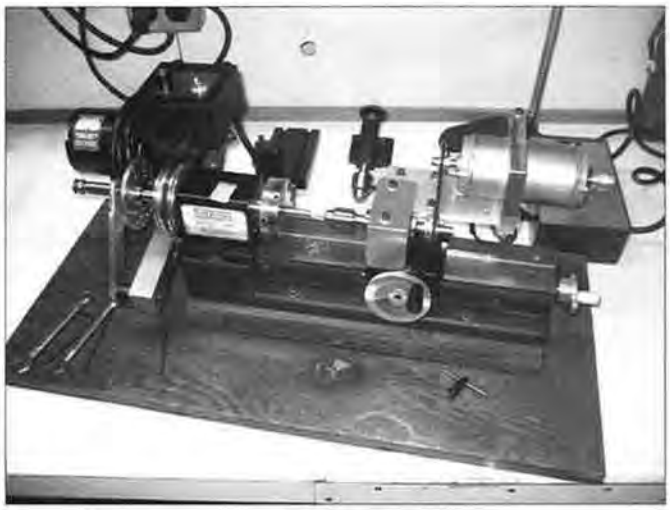


Figure 5

Figure 6

The contrate wheel was cut in the mill using a similar tooling set up, Figure 4. The M = 0.225 cutter was required for the contrate wheel because the escape wheel pinion for the Russian-built platform balance has a smaller outside diameter pinion, which implies a different gear module than the pinion used by the Swiss in their platform escapements.

The module for the contrate wheel was calculated from measurements taken from an actual escapement pinion. A rather inexact method, at best, and after two tries the gear cutter and the cut gear meshed with the pinion on the escapement.

Pinions

Lantern pinions were used because of their mechanical efficiency and the ease of fabricating them with the lathe and cross slide drill setup. The lantern pinions were fabricated on the lathe with a shop-built drilling machine which mounts on the lathe cross slide. (See Figure 5.)

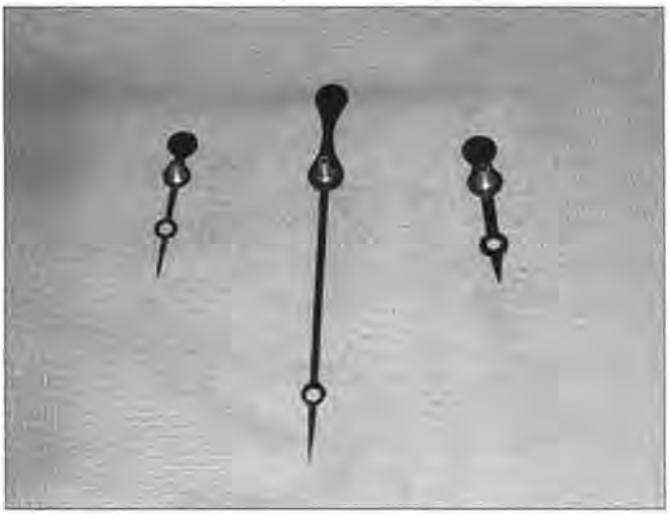


Figure 7

Figure 8

The drilling machine is powered by a D.C. motor with a variable speed motor control. The indexing is accomplished via an index plate mounted in the lathe spindle and located at the rear of the headstock. See Figure 6 for the headstock index plate.

Clock Plates

The clock plates were rough cut with a band saw. Index holes were drilled and reamed in the clock plates one at a time. The locating pins were installed as each hole was drilled and reamed to fix the orientation of the plates. When all the pins were installed, the plates were filed to the finished size. The index pins are used to orient the plates in the ongoing fabrication process of the clock.

Hands

The three hands were made of 0.020 steel. The hand designs were laid out on blued stock and all the holes drilled.

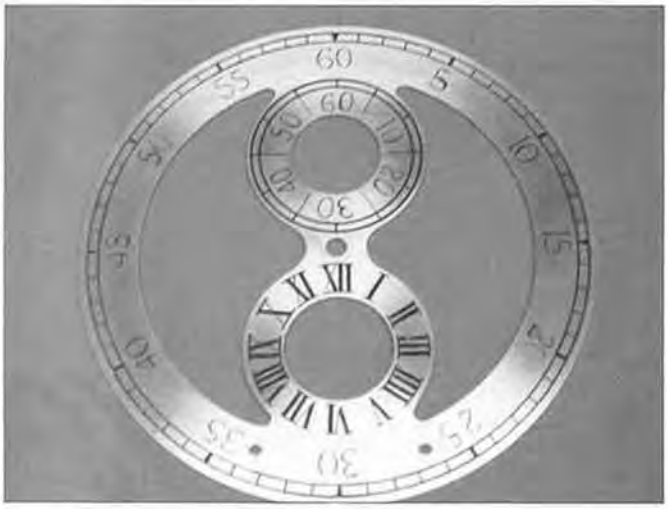


Figure 9

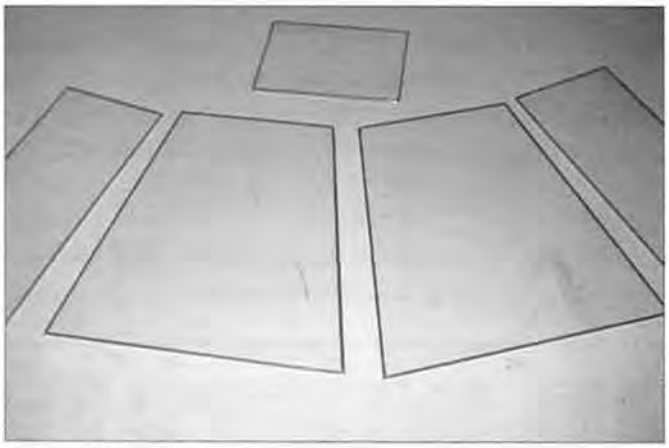


Figure 10

Figure 11

Figure 12

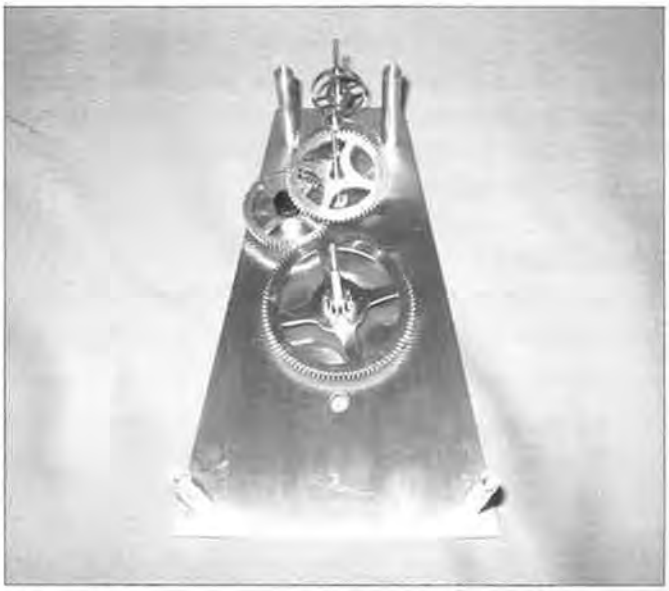


Figure 13

Then the hands were cut out, ground, and filed to finished shape. They were polished, cleaned, blued in a bed of brass shavings and oiled[4]. (See Figure 7.)

Screws

The screws used in the clock are 4-40 thread size and were all hand made. They were darkened by the same process as the hands; that is, polished, cleaned, blued and oiled.

The exception is the small screws used to hold the platform balance and its support plate.

Dial

The dial was made out of 1/8-inch aluminum plate. It was hand engraved, filled with black wax, polished and sealed with paste wax[5]. The dial was finished using successively finer grits of wet-or-dry paper until the desired shine was obtained. After polishing it had a sheen, not unlike a

Figure 14

silvered dial. See Figure 8 for the dial blank and Figure 9 for the completed dial.

Case

Old glass was used in making the case. The pieces were hand cut and the edges finished with diamond stone. The individual pieces were then prepared for soldering using an adhesive backed copper tape. See Figure 10 for the taped individual glass pieces. The process of joining the glass pieces is similar to that of making a leaded glass window where the individual pieces are held in position by soldering the lead bead surrounding the individual pieces. This case was assembled in a similar manner; that is, all the individual glass panes were held by soldering the tape. Figure 11 shows the completed case and the soldered tape joints. The solder joints were treated with a purchased chemical to form the dark patina.

Assembly

Figure 12 shows all the fabricated parts for the clock. The base is walnut with an oil finish. The pillars, wheel assemblies, screws and all parts are now completed. The wheel assembly locations were determined by the use of a depthing tool. The pivot locations were then drilled and reamed in the cock plates. The plates were completed by adding the oil sinks to the pivot locations.

The wheel assemblies are shown assembled into the back plate in Figure 13. The assembly went smoothly except for the platform balance. The meshing of the 8-leaf pinion and the contrate wheel required careful adjustment. The assembled clock with the platform balance is shown in Figure 14. It runs well and has a run time approaching

Figure 15

Figure 17

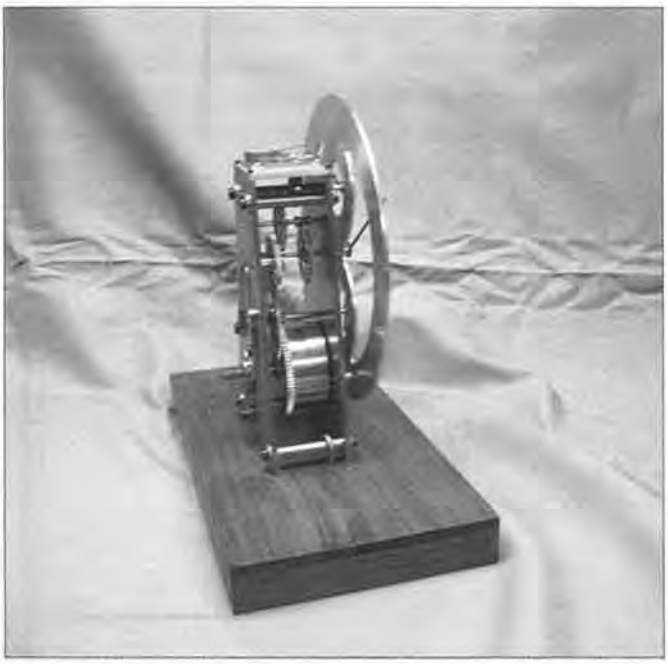


Figure 16

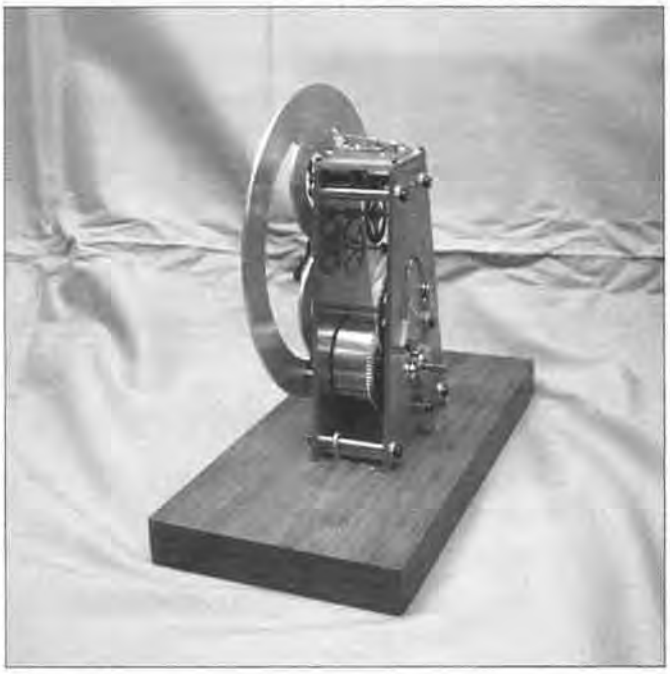


Figure 18

4 weeks. It always gives great personal satisfaction when a newly constructed timepiece runs for the first time.

Figures 15-18 show four views of the completed clock: front, left side, back and right side without the glass case.

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5. Ibid, p. 132 - 135.

Hermle
Movements Needed

The AWCI Board of Examiners needs your help. The 21st Century Clockmaker Certification program is seeking Hermle 1161.8531 movements, 114 cm or 94 cm pendulums, fair condition, no bent shafts, no solder, and no WD-40®. You can donate these to the ELM Charitable Trust and receive a tax deduction and help with AWCI's clock certification material supply all at once!

Please help AWCI and dig through your stock of older items and see if a tax deduction might not be better than the dust they now collect.

Contact Jim Lubic for more information: Toll Free 1-866-FOR-AWCI (367-2924), ext. 310 or e-mail: jlubic@awci.com.

AWCI Announces New Watchmaking Instructor

AWCI is happy to welcome Tom Schomaker, CMW21, to the staff as Watchmaking Instructor and Certification Coordinator. He assumed his duties on December 3, 2007.

Tom received his initial watchmaking training at the Ohio Valley Watchmaking Institute, and later became an instructor there. He also has made several trips to Switzerland for additional training. In 1981, Tom became an AWI Certified Master Watchmaker, and upgraded his certification to CMW21 in 2006.

Twenty-five years in the trade have afforded him a great deal of experience at all levels of watch repair—trade work, luxury watch retailers, owned his own business, and worked in brand specific modern service centers.

Before joining the staff, Tom was already an active member of AWCI. He had been the evening watch course instructor since that program began. He also has presented seminars at AWCI's Conventions, is a member of the AWCI Board of Examiners, and is trained as an assessor for the AWCI CW21 exam.

Tom is a life-long resident of the Harrison, Ohio area, along with his wife, Melissa, and their three children. In his spare time, Tom pursues his passion for cars and drag racing.

AWCI and its members will benefit greatly from Tom's experience and expertise. He is a great addition to our team.

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By Mark Butterworth

The Modern German Clock Movement

Part 73
Identification Checklist and Resources

It is common to see questions posted on various e-mail lists about where to obtain replacement parts such as spring barrels or train wheels for movements in for repair . Sometimes it is the movement itself that is sought. Often the material house is consulted. Historically, some of the movements were not well marked, which makes it more difficult. This article is an attempt to help in the process of accurately ordering parts and/or movements to obtain a correct match. Fortunately German movements were far more standardized than others.

It goes without saying that the first and most important thing is to accurately write down the information from the rear plate of the movement. Very rarely is any information on the front plate useful. There are shortcuts in some cases, as listed below.

It is important to know the actual manufacturer. Sometimes it is stamped on the movement, but quite often it is a private label with the name of the case maker such as Howard Miller, Sligh, etc. This can still be helpful.

For the largest and still existing manufacturers:

1. Hermle—Unless very early, the movements are stamped with a 6 or 7 digit number which is hyphenated. Examples are 340-020 or 1161-853BS. If it has a pendulum, the pendulum length is usually stamped under the series (or execution) number. In the latter example it could be 114 cm. Under that will be another number, in this case 60, which represents the number of beats per minute. Hermle also made most of the Seth Thomas movements after 1956 and a special coding was used on those. Seth Thomas did not want the public to know that Hermle was making their movements. As an example, the S.T. #401-003 becomes the Hermle 340-020. A cross-reference list is on my website at www.butterworthclocks.com

2. Kieninger—The movements were not well marked, but they usually had a letter code indicating plate size series such as J, K, P, R. The letter code is often preceded by a year code such as "80" indicating 1980. This is very important because pendulum hanger (or leader) design changes occurred in that year. In addition, the pendulum length in cm should be stamped on the unit.

3. Urgos (now owned by Hermle)—Unless it is a very early movement, it will be stamped with a UW number. It is a unit with three weights. The UW number is sufficient for the cross-reference on our website and this number is still current. Earlier movements may be stamped "Urgos" along with a cm number. If not, you will need to identify the information in the checklist below.

4. Regula—Is usually stamped as such, but there was also private labeling. They were usually stamped with a series number such as 25, 34, 35, 70, 71, or 72. Sometimes they also had the cm number stamped, but usually not. The pendulum is measured from the suspension post to the center of the leaf and will be in cm: 19.1, 23.5, 28.5, 40, or 60.

5. Hubert Herr—The movement is usually stamped as such. The movements are usually identified by the plate size in cm and also 1-day or 8-day. There are two common 8-day varieties in the two-train version. One was used in cuckoo clocks (KW 80) and the other in the New England Clock Co. chalet clock (KW 80/1). There were two common 1-day versions, and the one with the plate size 75 mm x 75 mm is now obsolete.

In ordering parts for obsolete movements especially, and for some current models, the following template should be useful in addition to rear plate information:

1. Manufacturer:
2. Execution #:
3. Pendulum length:
4. Plate size:
5. Number of trains: 1/2/3:
6. Train type: Spring/Chain/Cable:
7. Hand shaft length (front plate to tip):
8. Hammer location: bottom/side/rear/top:
9. If striking: gong/bell(s)/ bim-bam on rods:
10. If chiming: Westminster only/ triple/ other:
11. Date or date code:
12. Digital picture of the part and movement:

Certainly all of this information is not necessary for the current models when ordering parts if the execution number is known exactly. (1161-853BS and 114 cm states what is needed to order either parts or a movemen,t with the possible exception of suspension post length.) That will be fine 90% of the time. There is always the caveat that the movements will interchange but the internal parts do not 100% of the time.

Take advantage of the catalogs supplied by the various material houses. They often have pictures of the parts, which help greatly in identification. A number of them also have online catalogs. Their contact information is listed below:

NAME	LOCATION	PHONE NO.
Black Forest Imports, Inc.	CA	(714) 637-4307
Butterworth Clocks, Inc. (movement specialist)	IA	(563) 263-6759
Clocks Unlimited (accessory specialist)	MI	(800) 266-8458
Empire Clock	MN	(800) 333-8463
H & W Perrin	ON, Canada	(416) 422-4600
Merritt's	PA	(610) 689-9541
Plymouth Hollow Clock (obsolete clock parts)	AZ	(480) 557-8537
R & M Imports	OH	(513) 897-5015
Ronell	OR	(800) 334-0135
Timesavers	AZ	(480) 483-3711

Hopefully, the information above will help find your match in clock accessories, movements, and parts.

Final thought: *"The only nice thing about being imperfect is the joy it brings to others."—Doug Larson*

Watch Repair in America

Part 2

Factors Influencing the Number of Watchmakers

By David A. Christianson, CMW21, FAWI

Of the many factors that could have influenced the number of watchmakers throughout American history, only a very few actually did. The American watch manufacturing industry certainly had an impact. Its quest for interchangeability of spare parts culminated in true interchangeability by watch manufacturers worldwide. Replacement parts no longer needed handfitting and adjusting, speeding up the repair process just as world watch production was poised to dramatically and rapidly increase. The post war years brought substantial disposable income and a desire for watch ownership, but these watches needed regular, periodic servicing to maintain their reliability. They were subject to shock and water and dust penetration. And they were costly enough that repair was far more economical than replacement.

With the rapid rise in watch production came a growing need for more repairmen. The U.S. Government's retraining efforts after WW II resulted in at least 82 watchmaking schools and a plethora of new watchmakers coming into the field. The skill set for watch repairmen began to change. By the 1960s there was less need for making and altering component parts and more need for servicing and exchanging interchangeable parts as consumers, who had abandoned their old watches for modern ones in the 1940s and 50s, now began to need their newer watches serviced.

Technology changed with the advent of the self-winding watch in the mid-1940s; the electric watch of the late 1950s; the electronic watch of the 1960s and the quartz watch of the 1970s. But it was only the quartz watch technology that had significant impact on the watch repairman. The quartz watch became so cheap so fast that the demise of the watchmaker seemed imminent. Many abandoned the profession out of fear that the quartz watch would not need service (just throw it away and buy a new one). Watch school enrollment dropped dramatically. The profession was dying!

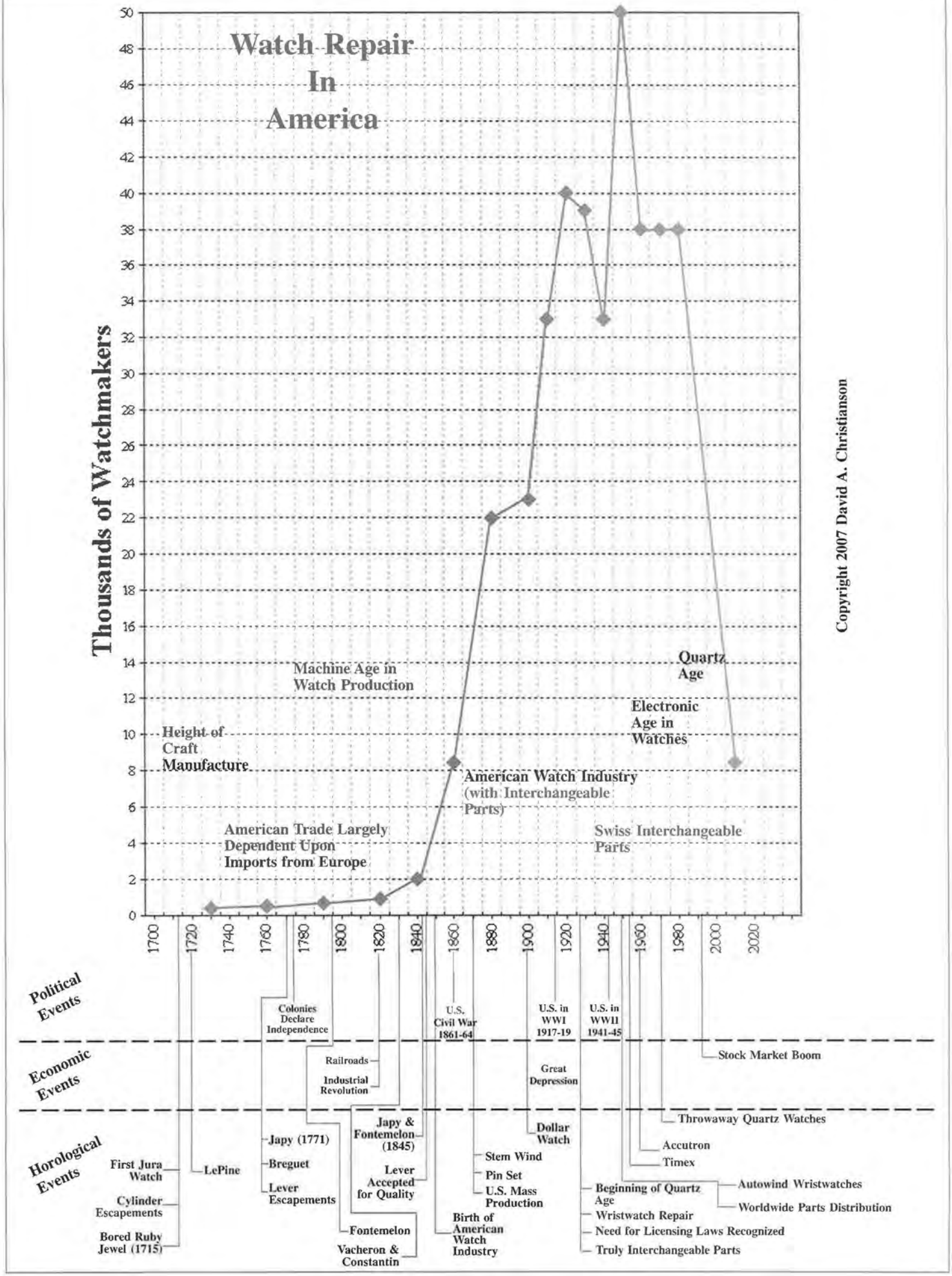
But for those who stayed, there was plenty of work servicing the watches of those consumers who were reluctant to switch to the quartz watch and servicing the higher quality electrical, electronic and quartz watches. These watchmakers learned that they could and should be serviced economically and they learned by the thousands how to do it through the continuing education programs of the American Watchmakers Institute.

Then the 1990s happened. The mechanical watch resurfaced. The Swiss began producing high-quality luxury watches with mechanical movements just as a prolonged stock market boom and a vibrant economy allowed consumers to buy these luxury mechanical watches, as well as luxury quartz watches. At the same time a curious nostalgic phase brought a desire for the older vintage watches of the 1950s and '60s, as well as the antique timepieces of the late 19th and early 20th centuries.

The need for the watchmaker with both the skill for servicing the modern mechanical and quartz watches, and the traditional watchmaking skills to restore the antique and ancient watches is growing. The need to service the millions of currently purchased watches is imminent.

In America, watchmaking schools are growing, modernizing and putting an emphasis on traditional skills as well as modern skills. The watch industry is investing in the school system and is working with the American Watchmakers-Clockmakers Institute to certify watchmakers in order to ensure a core of qualified professionals to service and maintain their highly sophisticated watches.

The 300-year history of watch repair in America appears to have a bright future, not at the levels of the mid-20th century, but certainly many times brighter than that at the turn of the 21st.


Watch Repair In America
Thousands of Watchmakers
50
48
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1920
1940
1960
1980
2000
2020
Machine Age in Watch Production
Quartz Age
Electronic Age in Watches
Height of Craft Manufacture
American Watch Industry (with Interchangeable Parts)
American Trade Largely Dependent Upon Imports from Europe
Swiss Interchangeable Parts
Political Events
Economic Events
Horological Events
Colonies Declare Independence
U.S. Civil War 1861-64
U.S. in WWI 1917-19
U.S. in WWII 1941-45
Railroads
Industrial Revolution
Great Depression
Stock Market Boom
Throwaway Quartz Watches
Accutron
Timex
Autowind Wristwatches
Worldwide Parts Distribution
Japy & Fontemelon (1845)
Dollar Watch
Japy (1771)
Breguet
Lever Escapements
Lever Accepted for Quality
Stem Wind
Pin Set
U.S. Mass Production
Beginning of Quartz Age
Wristwatch Repair
Need for Licensing Laws Recognized
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First Jura Watch
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Fontemelon
Vacheron & Constantin
Birth of American Watch Industry
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By Laurie Penman

Fusees

There is a variation on the spring drive that is seen mostly in British and European antique clocks, but also in some American antiques; it is the fusee. The fusee is a system of maintaining a constant driving force by means of a conical (more or less) barrel driven by a cord or chain from the mainspring barrel. The load that a spring exerts varies as it winds down, but if the lever arm to which the force is applied gets longer (that is the effect of winding a cord around a conical barrel), the torque should remain constant. Just to remind you, torque is the multiple of force and the length of the lever to which it is applied. In the case of a cone or a cylinder, the lever arm is the radius at the point of attachment.

Unfortunately the accurate prediction of the force exerted by a mainspring as it winds down is complicated. What is worse, a simple formula was devised in the 19th century to describe the shape of the cone that would maintain a constant torque as the spring wound down, and the formula was incorrect! Prior to the calculated curve of the fusee cone, a practical method was used to obtain the curve by measuring the actual resulting torque at different stages of the wind. This worked quite well and so we have the

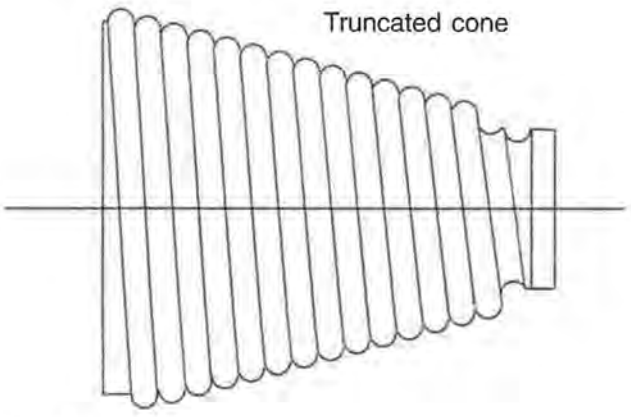
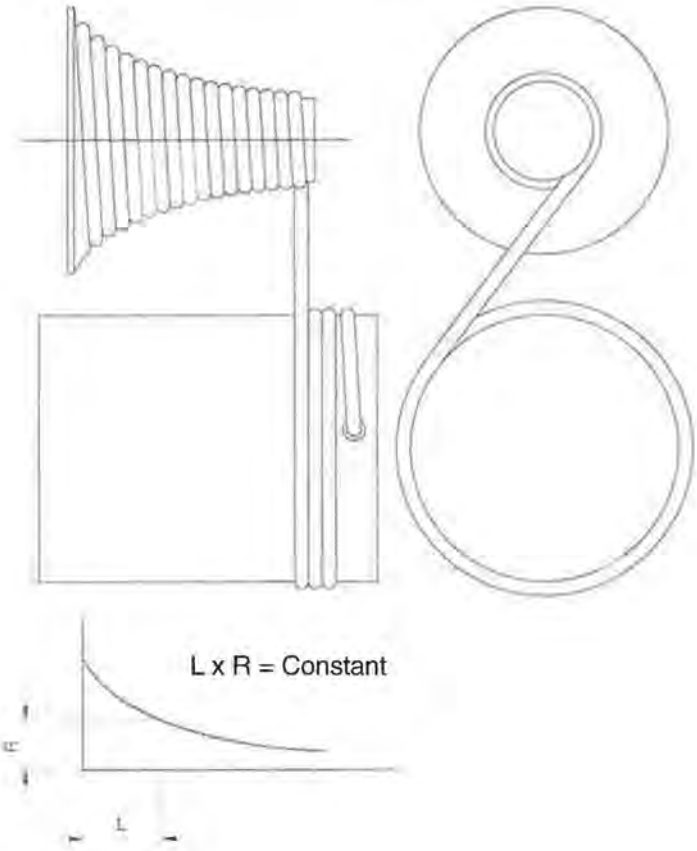


Figure 1



This is the erroneous curve often shown in textbooks

Figure 2

curious state of affairs where a perfectly good method was improved by a mathematical system, and was inaccurate. Theoretically, the calculated fusee should have performed better than the going barrel, which is the normal spring container for French and German clocks of the period. The fact that it was not, was expensive to make, prone to damage if the cord or chain broke, and expensive to maintain, had a good deal to do with the decline of the British quality bracket and mantel clock trade. It did not affect weight-driven clocks of course.

Not all fusee cones conformed to a curve. Many American and Black Forest models used a truncated cone. Figure 1 shows what I mean by this. Figure 2 shows the British fusee form, and the formula that was taught until quite recently. As you can see, the formula is too simple. It is:

R x L = Constant
where R = radius or lever arm.
L = the distance from the largest radius

A.L. Rawlings examines this thoroughly in his book, *The Science of Clocks and Watches,* on page 236 and following. There have been disagreements with his math but I do not know of anyone who now supports the simple formula.

Fusees are found in chronometers, but these are arrived at from a prototype that has been produced by measuring the torque at evenly spaced parts of the wind and then copying the form in production. In the case of the older chronometers, the fusee cone would then be tested with a torque bar and, if necessary, modified. This was done

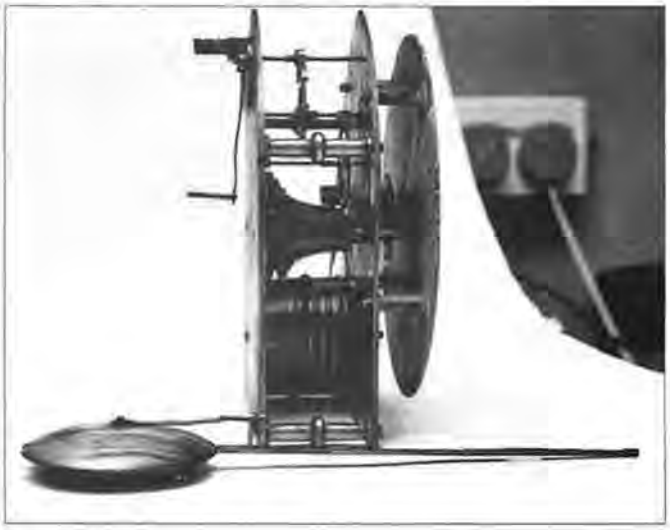


Figure 3

because any slight differences in the characteristics of the mainspring would make slight differences to the fusee curve, even if the movements were otherwise identical in their frictional losses.

Figure 3 is a photograph of a typical fusee clock (British bracket clock). I must apologize for the quality of the photograph. It is the only photograph that I could find that shows more than the front and rear of the clock. You can see the profile, which is a typical Victorian calculated curve. As I recall, this clock had a rate of around plus or minus fifteen seconds in a week, about the same as a good going barrel movement.

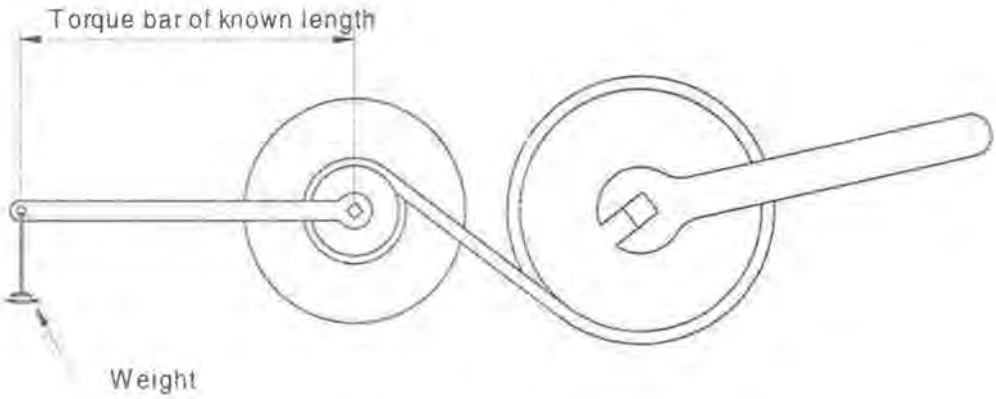
Making a Fusee Cone

There seems to be little point in making a fusee to the formula. If it is to drive a Graham deadbeat or a Brocot, the escapement will contribute more to accuracy than the fusee. If it is a recoil escapement, it is doubtful if the fusee will improve on the rate of plus or minus 15 seconds in the week that can be obtained from a French-type clock with a going barrel and well-designed recoil pallets.

The practical method can be described as trial and error. An approximate curve is established first and a test fusee made; this is then mounted in the movement. Figure 4 shows the setup, with a torque bar fitted on the outside and over the square of the winding arbor. The spring barrel arbor will be wound with a wrench. If the output from the barrel to the fusee is correctly modified by the form of the fusee, it will produce a constant torque and the torque bar will remain horizontal. If the radius at the cone is too great at any point the bar will lift; if it is too low the bar will drop. However, there is a lot to do before the clockmaker can use the torque bar.

The first thing is to establish what part of the mainspring is to be used during the eight days of the clock's running time. A cord is attached to the spring barrel and anchored beneath the movement (so that the movement is not pulled to one side during winding). The barrel's winding arbor is turned until it can be felt to be starting the wind. It is a small rotation but needs to be noted. Then the wrench is used to wind up the spring until it is locked completely. The anchoring of the cord is allowed to slip until the spring has wound down but is not sloppy, and the number of turns on the outside of the barrel is noted accurately. These are the "turns of development".

It is common practice to use the middle 75% of the spring turns for operating the going train, because the relationship between turns and the torque produced is most "flat" there. The torque will increase when wound through this 75%, but the rate of increase from turn to turn is more nearly constant than at the beginning and end of the turns of development. Suppose that our barrel has 6.5 turns of development, 75% of that is 4.875 turns. No one is going to set up a fusee to this accuracy, but 4.75 turns is reasonably easy to measure, which leaves 1.75 turns in total for the start and finish. (Five turns would have been a close approximation too, but it is better to use a shorter amount of spring if possible.)



Torque bar set up

Figure 4

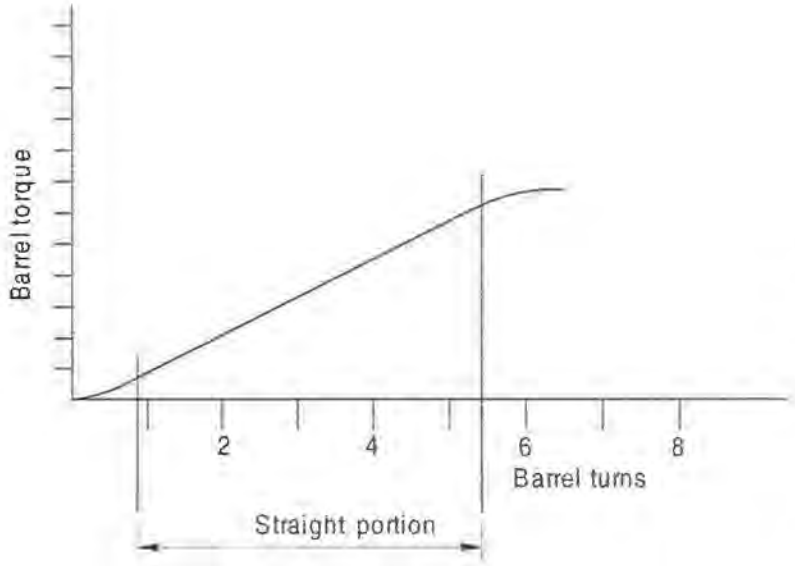


Figure 5

The fusee cone must be constructed so that it only winds off enough cord to turn the barrel 4.75 times. This is the first complication. The total number of turns that the cone can make is limited by a hook at the small end that catches another hook mounted between the plates, and is moved by the cord as it moves towards the small end during winding. That marks the one end of the 75% of turns. At the large end the cord is anchored into a hole so that when the cone has reached the end of its permitted rotation, the cord no longer exerts a torque but pulls out, almost straight from the anchoring point (Figure 4).

During the 4.75 turns that the barrel makes, a length of cord winds off that is equal to the diameter of the barrel (D) multiplied by Pi and multiplied by the number of turns (N).

The length of cord for a 2.25" diameter barrel is: 2.25 x 3.142 x 4.75 = 33.58 inches.

Most British fusees make 2 turns a day and the number of turns for the 8 days is therefore 16. The 33.5 inches of cord must make exactly 16 turns to wrap the cone from start to finish. If the clockmaker only has a rough idea of what the shape of the curve will be when all is done, then matching the length of the cord to 16 turns is very difficult.

The spring must be strong enough when fully wound, and the radius lever long enough at the useful 75 percent of the small end of the cone, to run the clock. This is the small end of the cone. At the finish of the 8-day run, the multiple of the spring pull and the radius at the large end of the cone must still run the clock. Consequently, if the clockmaker mounts a blank brass cylinder on a winding arbor and installs it in the movement plates with the rest of the train, it is possible to determine what the radius should be at each end of the curve. However, the distance between these two is a matter of conjecture and experience.

By now it must be clear that the task of making an accurate fusee from scratch is not something that a clockmaker would do for a single clock. It is too expensive in time and requires a lot more skill and knowledge than a normal clockmaker would have. If a fusee clock was needed, most clockmakers would submit the task of producing the spring barrel and fusee to a specialist; or they would turn to the method that I disparaged at the beginning of this article, and make the fusee to the calculated curve. It still needs a fair degree of skill, but there are fusee machines that use a template to guide a grooving tool as the blank is rotated. It may not be a completely accurate method, but it does make the job possible for someone who is not a top rate craftsman.

Testing the Mainspring and Fusee

Discounting the actual making of a fusee cone, the torque bar can be used for testing a spring, and (if necessary) modifying an existing fusee. Springs tire, and fusees depend on the fins left by the grooves on the steeper part of the curve to keep the cord or chain in place and not slide. If the fins break, the cord will slip from the higher diameters of the cone. They do get damaged and have to be repaired or replaced, using the original as a pattern. Knowing how to employ a torque bar is very useful.

The time train is fully assembled and a pendulum hung on the suspension; torque bar and wrench are in place as in Figure 4. The business of discovering how many coils are wound onto the barrel from "down" to "full" has been carried out and it has been decided that 1.75 turns will be left at the beginning and end of the wind—0.875 turn at the start and 0.875 at the end. Since this is a clock that has the original spring and cone, it can be assumed that this will be reasonable.

Starting with the cord fully run off the cone and a little short of being drawn to follow the center line between barrel and cone (in other words, the point at which any pull on the cone would have died away), the winding arbor of the barrel is turned until it starts to strain the mainspring. Then it is turned 0.875 of a turn. The torque bar is removed for a moment and the winding key fitted. Since the ratchet often has 8 teeth, the "set" will be 7 teeth. The spring is now set so that when the cone is wound it will be using the straighter part of the spring's torque curve (Figure 5). This curve shows the torque at the barrel along the vertical axis and the number of turns along the horizontal axis. The ratchet click on the barrel arbor is not sprung, except on 17th and 18th century clocks and must have its pivot screw tightened.

The fusee cone has a small amount of wind put on it so that the cord is tangential to both barrel and cone as in Figure 4 (but winding towards the larger diameter not the small one). If the spring is sufficiently strong, the pendulum can be set in motion and the movement will go. The torque bar is now replaced and any small amount of wind needed to bring it up to the horizontal is applied; the clock is still running. Now weights are added to the bar until the escape wheel no longer drives the pallets, but simply rocks back and forth. A true driving torque has been found, and the pendulum and escape pallets should be removed. If the torque bar moves a little after this, the weight should be adjusted until it remains on the horizontal.

Paper and pencil are now needed to make notes. The weights are unhooked and the bar given a full turn, winding one coil onto the cone, and the weights rehung. If the bar lifts, add weight until it remains level and note the additional weight against "1" for the first coil. This is repeated and any addition or subtraction is noted on the paper, until the cord has been wound onto the whole of the cone.

With luck the noted additions or subtractions will be minor. If they are not, first replace the pallets and pendulum and ensure that (when the torque bar is removed) the clock still runs. Secondly, prepare to make some calculations using the notes of weight changes.

Supposing that the weight was originally 1 ounce and at coil #6 it needed to be increased to 1.2 ounces, this is an increase of 20%. The torque at this point is 120% of what it should be; however, by reducing the diameter at this coil's part of the groove the torque can be brought back to the standard.

The diameter must be reduced by 1/6 (120 down to 100), or 16.66%. If the torque is too low at #6, the radius needs to be increased, or the spring changed for a stiffer one.

It is becoming clear that replacing or repairing a fusee is an expensive business. A new spring can be fitted, but the other coils are now probably acting on a diameter of the cone that is too large, so that they need reducing. That reduction is normally carried out with a small round file, a time consuming and boring job, but the consolation is that a valuable clock is being restored and brought back into its original working condition. If left alone, the fusee would continue to lose fins, the cords would keep slipping, and the shocks would damage the train and pivots until the restoration job was even more expensive.

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Examples of questions and answers in these surveys:

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Q. In 2005 what was your annual gross income?

A. The average annual gross income for 2005 is $72,107. This is for respondents who worked in this field full-time during the entire year of 2005.

Job Opportunities

Q. Do you have enough watchmakers, repairers or technicians to meet consumer demand?

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Timing Manipulations

Part 5

The Timing Manipulations *series is taken from* Timing Manipulations *by James Hamilton, first published in 1950. The reader is reminded that at the time of publication many of the watches of that period were primarily pocket watches with parts of a certain design particular to that era. The reader is further reminded that although timing adjustment has a standard theory, in practice, however, not all techniques mentioned in the ensuing paragraphs can be directly applied to modern watches due to a difference in the design of the individual components.*

Section V. Adjustments for equalizing dial and pendant position rates

a. If the pendant positions are slower than the dial positions.

1. Close the regulator pins.

When the regulator pins are too wide, which is the most common error found in watches taken in for repair, the effective length of the hairspring is greater in the pendant positions. This is directly proportional to the drop in the arc of motion from dial to pendant positions, and the pendant positions show a rate that is slower than the dial positions.

2. Check the fit of the roller jewel in the fork slot.

If the roller jewel is too small in the slot of the pallet fork, the pendant positions will show a slower rate than dial positions. This is due to vibration of the fork and roller jewel when receiving impulse. The effect of this loss of impulse appears less in the dial positions because there is less friction there, and the balance arc is greater. Thus, the velocity with which the roller jewel travels through the angle of contact with the fork is greater, allowing less chance for the vibration that causes a slow rate.

3. Check the fit of the pallet arbor.

If the pivots of the pallet arbor are too small in relation to the jewel holes, the effect on motion and rate will be practically the same as with a small roller jewel causing poor power delivery and slower pendant positions.

4. Check the amount of total lock on the escapement.

If there is a heavy total lock on the pallet stones the resistance to unlocking is increased which causes a poor arc of motion and a slow rate especially in the pendant positions.

5. Magnetism.

When there is a slight amount of magnetism in a watch, but not enough to cause the coils of the hairspring to stick together (causing a fast rate), there is a tendency for the pendant positions to show a slower rate than the dial positions.

Section VI. Out-of-Beat Causes

After putting a watch in good mechanical condition, the next step before timing is to put it in beat. A watch that is in beat is a watch that is receiving impulse to the balance assembly equally on both sides of the line of center. It is also a watch wherein the balance assembly is making its arc of vibration in both directions in the same space or period of time, and traveling the same distance in both directions. Thus the act of unlocking and receiving the impulse takes place on both the R-stone side and the L-stone side at equal intervals. Many out-of-beat conditions have little effect on the timekeeping qualities of a watch while others have a great effect. Any out-of-beat condition, however, is considered to be a departure from the correct mechanical condition that the repairman is trying to achieve in doing commercial work in a watch repair shop. There are, of course, innumerable out-of-beat causes, but a few of the most common are listed.

a. Roller jewel not in line of centers with the balance staff, pallet arbor and escape pinion.

The roller jewel is mounted solid in the balance assembly; the hairspring collet is adjustable. It is the purpose of the hairspring to bring the whole unit back to the line of center, because the impulse is being received at that point, if the escapement is properly set up. Nevertheless, due to the unequal tension of the hairspring on the balance assembly, the arc of oscillation will not be equal in both directions. This creates an out-of-beat condition, which is the most common encountered by the watch repairman. The correction for this static out-of-beat condition is to rotate the hairspring collet on the balance staff until the line of centers is reached. The final check for static beat is to ascertain whether or not the escape wheel teeth drop from the let off corners of both pallet stones, or, on the few escapements where it hangs up on both pallet stones to be sure it hangs up equally.

b. More total lock on one pallet stone than the other, commonly due to unequal slide, creates a greater resistance to unlocking on the heavy side, making the arc of motion shorter in one direction, thus causing the watch to be out of beat even though it can appear perfectly in beat in the static test. This is another very common cause for watches being out of beat.

c. Hairspring vibrating heavy on one regulator pin. In the vibrations where the hairspring holds longer on one regulator pin than the other, the vibration of the balance will be shorter than on the other side, creating an out-of-beat condition.

d. Sloppy balance pivot fit shows up more in dial positions. If only one balance pivot is sloppy in its jewel hole, the dial position where that balance pivot is on top will be the dial position showing out of beat. With this condition present in a watch there is sometimes a tendency for one pendant position to show more out of beat than the others.

e. Other out-of-beat conditions include:

1. Sloppy pallet arbor fit, causing a slow rate, slower in pendant position.

2. Loose roller jewel, causing a slow rate, slower in pendant positions.

3. Loose pallet stones.

4. Loose cap jewels or jewel screws.

5. Loose bridge screws.

6. Loose regulator pins.

7. Loose banking pins.

8. Friction against balance assembly—such as guard pin rubbing, etc.

Section VII. Temperature adjustments

(See Figure 36.)

With the development of alloy balances and hairsprings, which have practically no coefficient of expansion or contraction from heat or cold, the watch repairman has very little need for using temperature adjustments. However, we are still working on a great number of watches, good and bad, with the old bimetallic compensating balance, which utilizes the difference in the coefficient of expansion and contraction of brass and steel (sometimes nickel steel) to compensate for the expansion and contraction of the balance arms, and for the expansion and contraction or the changes in the elastic values of the hairspring in high and low temperatures. When the watch with a steel hairspring and bimetallic compensating balance is exposed to higher temperatures, the hairspring becomes more elastic; or it can be said that it expands along its length, becoming longer. In any case, the hairspring has a tendency to allow the vibrations of the balance to become slower, but the balance wheel, in turn, having brass fused to the outside of the rim, with the brass having a greater coefficient of expansion than the steel portion of the rim, will swing inward, thereby compensating for the slower tendency of the hairspring.

Reversing this condition, when the watch is exposed to colder temperatures, the hairspring becomes less elastic or shorter, thus giving a faster tendency to the balance vibrations. However, the balance rims will swing outward due to the greater contraction of the brass in the rim, and will compensate for the faster tendency of the hairspring. (See Figure 37.)

The balance screws are placed on the balance rim to allow an adjustment for temperature compensation. In the factories, in production, the temperature compensation was carefully made into the watch and, depending upon the grade of the watch, was usually within an acceptable tolerance. This correct condition is easily destroyed when handling the balance, removing weight from screws, adding timing washers, truing incorrectly, etc., so that if an adjustment is ever necessary it is as follows:

a. If the balance is over compensated indicating that there is too much weight being shifted in temperature changes, and the watch is running fast when exposed to warmer temperature and slow when exposed to colder temperature, the correction is to shift balance screws in opposite pairs away from the expansion and contraction cuts in the balance rim.

b. If the balance is under compensated, indicating not enough weight shift in warm and cold, and is running slow when exposed to warmer temperature, and fast when exposed to colder temperature, the correction is to shift opposite pairs of balance screws toward the expansion and contraction cuts in the balance rim. Remember, the screws closer to the cuts are going to give a greater change than those closer to the balance arms.

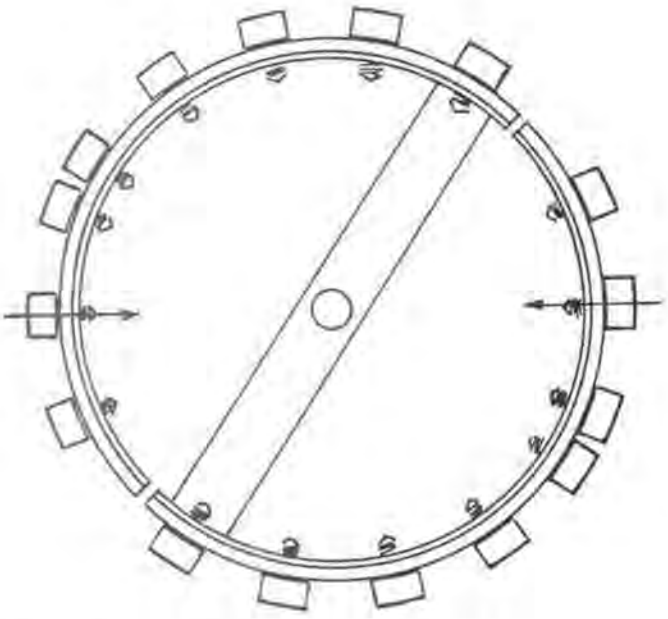

Figure 36

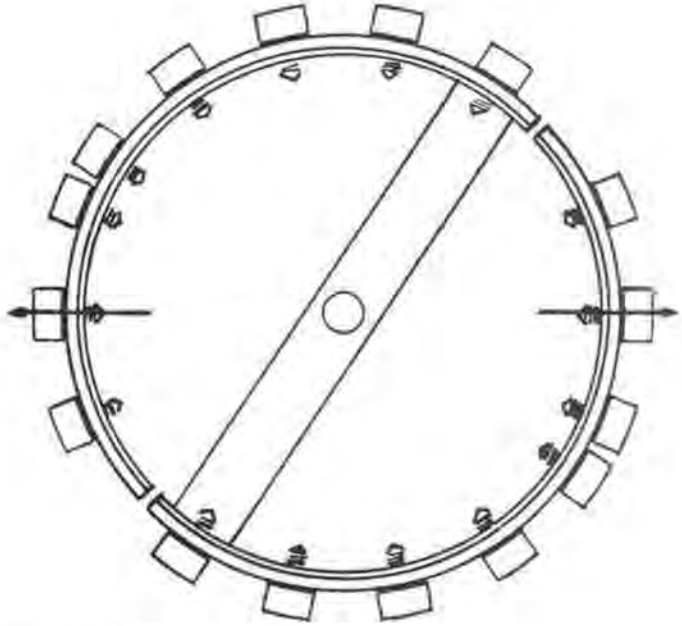

Figure 37

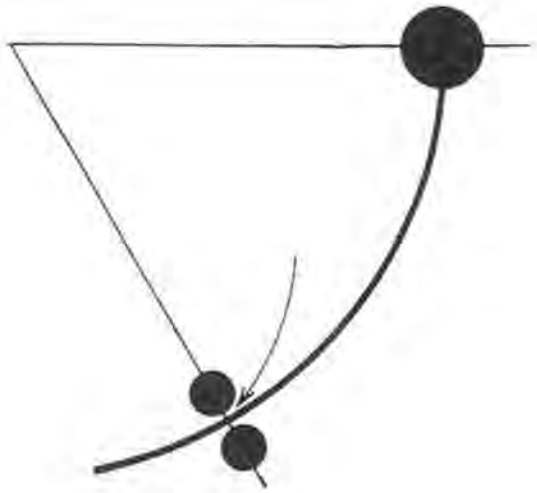

Figure 38

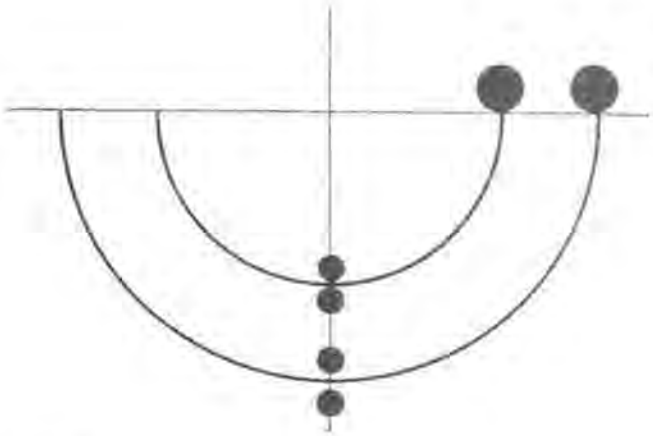

Figure 40

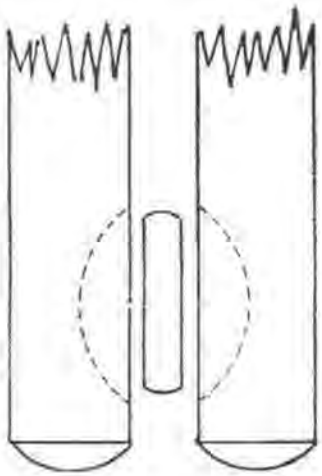

Figure 39

Section VIII. Regulator Pin Conditions

As the fulcrum for the action of the hairspring, the regulator pins occupy a very important part relative to the correct timekeeping qualities of a watch. There is no question that a watch with no regulator pins, free sprung, if properly setup, will give better timekeeping results, but there has always been a need for some arrangement to make possible minor adjustments for mean time, both for the watchmaker and sometimes for the customer. Thus the adjustable regulator with regulator pins attached, riding on a radius from the balance center and controlling the effective length of the hairspring, has been in use ever since the development of the spiral hairspring. The regulator pins, controlling the action of the hairspring, in turn controlling the vibrations of the balance assembly, are the most sensitive point of adjustment for correct timekeeping qualities of the watch.

They must be, as a beginning condition, straight up and down in the watch, solid, of the correct shape, and with the vibrating points on the pins directly on a radial line from the balance staff. (See Figure 38.)

They must be parallel, and have a correct finish where the hairspring is working. (See Figure 39.)

For a correct isochronal rate the closeness of the pins is controlled by the distance the regulator arc rides from the center of the hairspring, and the distance the regulator pins ride from the studding point. (See Figure 40.)

Thus, for correct timekeeping, the regulator pins on a flat hairspring would necessarily be wider than on a watch with a Phillips No. 60 overcoil on which the regulator arc is much closer to the hairspring center. The closeness of the regulator pins must remain an individual adjustment on every watch, but in a watch that is in good mechanical condition, if the regulator pins are closed up to the point where the pendant and dial positions show the same rate, they are correct as far as the isochronal and position rate of the watch are concerned.

The seven basic regulator pin adjustments have been listed, and it must be remembered that they cannot be overdone. A temporary rate can be reached with improperly setup regulator pins, but the watch of today is expected to keep close time, closer time than ever before, and to make it do that the watchmaker must, wherever possible, make corrections in adjustments, not compensations.

This concludes the series on "Timing Manipulations."

By Jack Kurdzionak, CW21

A Word from Vibrograf USA

John Hager of Vibrograf USA commented favorably about November's column, "Deeper and Deeper." John thanked us here at *Horological Times* for regularly addressing the watchmaker's need to keep modern equipment in the repair shop. John also noted that Vibrograf USA is a distributor for the Roxer Natator water resistance testing equipment.

New Year's Resolutions

Each New Year brings an opportunity to make some positive changes in both one's personal and business activities. The old year is gone and the books are closed. Nothing can be done to change what was done last year, but much can de done if we resolve to make some changes right now for the year 2008. The most important resolution is that we will be determined to keep whatever promises we make to others and ourselves. Once we have taken that first important step, we can make the others. This is not the place to address personal issues, but this writer will suggest two areas in business that may need re-examination and modification.

A. Do you need to sort out your workshop?

Every work space accumulates stuff. It just seems to be part of our nature to fill every horizontal space with something. No bench drawer can be left partially full. No one seems to have time to put spare parts back into inventory. No one has the courage to throw away some old used parts, odds and ends, etc., as they may someday be needed for something. The rationale for accepting a disorganized workplace with all of its associated clutter is that it is widely believed that it does not cost anything to keep the accumulation of stuff. Some even think of it as a time and money saving strategy. If all of the shops tools are at hand, on or in one's bench, then there is no need to waste motion going to a supply cabinet to retrieve a tool or spare part. Is that true? How much time is saved if one has to search through layers of parts and/or tools to find something that may not be in that particular location? The most likely answer is that more time is wasted searching for things than is saved by having them close at hand.

It is difficult for many of us to throw away old used parts, especially if we think they may have a future use that is not presently apparent. There was a watchmaker in the suburban Boston area that had a small mountain of old, used spare parts centrally located on his workbench. Each time he replaced a part, the old one went onto the mountain that grew slowly over many years until, at his retirement, it was over fifteen inches high and somewhat wider at the base. The parts mountain also accreted, because any part that flipped out of his tweezers and hit the mountain could never be located. The watchmaker had a rationale for maintaining this mountain of mostly used as well as some new parts. He thought he might have a use for some part in the pile. He was well along in years when he finally retired and closed the shop in the late 1980s. His middle-aged son assisted him as they disposed of most of the store's contents into a trash dumpster. The old watchmaker sadly looked on as his son cleaned his workbench with an industrial vacuum cleaner and removed the parts mountain that had accumulated for forty-plus years. The rest of us may have some accumulated clutter, but probably not to the extent that existed in this old shop either because we routinely sort out items in the shop or we have not yet had forty-plus years to pile the stuff up. An organized, uncluttered workplace is achievable if we resolve to put tools away, inventory our spare parts in a parts cabinet, and dispose of old parts and supplies. This resolution needs to be continually maintained in order to have a pleasant and efficient shop.

B. Does your shop have an inventory management system?

Anyone who has purchased the contents of a watch or clock repair shop can tell you that most of the shops had no inventory control system. The shop without any inventory control usually has numerous and needless duplication of spare parts inventory. Basic parts, such as stems, staffs, crowns, screws, washers, are sold only in packs of three or five pieces. One is used and the remaining ones are placed in a bench drawer, somewhere, with no record made of where they are, or how many are left in the package. Later on, when one of these parts is required for another repair, the ones buried somewhere in the bench are either not found or are forgotten and another pack of three are ordered. One used for the repair and two to get lost in the shop. After a few years, the bench collects many unorganized spare parts that represent both time and money

wasted. Inventory management can control this loss of time and money. For a small shop, the inventory control does not require a sophisticated and dedicated parts department. An envelope system can be very helpful to keep parts inventory manageable. Ordinary coin envelopes can be labeled with part number and description, one per envelope, and filed in small boxes that hold the envelopes upright. One box can be for balance staffs, another for mainsprings, etc. The concept is to have the parts segregated by type and part number. That being done, one can instantly visually check if the part is in stock. For those who use a computer-based bookkeeping system such as QuickBooks™, the parts can be entered as inventory items in QuickBooks before physically placing them into envelopes. The computer counts them, records their value, tracks their turnover time, and has the parts numbers and descriptions ready for e-mailing or faxing purchase orders to your suppliers.

Some may say, "The idea is fine, but I have so many parts scattered around my shop I'll never be able to inventory all of them." That could be true, but any worthwhile task needs to begin somewhere, sometime and January is a good time to start. This year resolve to put every newly acquired part into an inventory system and never put a part into a drawer again. Once the system has been started and maintained, the drawer collection will not get any larger, and the organized inventory will continually grow. Then as time allows, gradually move the drawer contents into the envelopes and computer system, if you have one. Eventually, all of the commonly used parts will be readily accessible for your use. The time spent controlling your inventory will be repaid to you many times over as your business grows.

Parts Is Parts

AWI Matters, the Yahoo chat room for members, hosts many discussions between members and some spare parts distributors about the best way to place orders for spare parts. Most often, these conversations revolve about just a few key issues. The members (consumers) desire spare part orders, accurately filled and delivered in a timely fashion. Price may be a consideration if there are significant variations between suppliers for currently produced and readily available parts. However, is price relevant when one needs a discontinued, hard to find part, especially if having that part makes a difference between being able to accept and complete a highly profitable repair or losing that opportunity? The spare parts distributors' businesses are dependent upon being able to fill and deliver spare parts orders to our membership. Each is striving to satisfy our members, their customer base, by a combination of competitive pricing and service.

That being said, we as consumers can help our spare parts distributors as they serve our needs. First, we can place accurate orders on a regular basis. Accuracy with part numbering and nomenclature is required in order for a supplier to accurately fill an order. Place no orders that ask for the part that pushes or is placed next to another part. Get out the technical guides and order by name and number. If you do not have the proper documentation, get it from the manufacturer or from our library at AWCI. Order parts regularly but not too often. Rather than place four small orders per day, place one large order every three to five days. That helps us with lower shipping charges and allows the supplier to work more efficiently.

Familiarize yourself with the cost of parts. Then there will be no need to call for pricing each time a part is needed. Pricing inquiries are very costly for the supplier. Make certain that you are not only familiar with the general pricing of parts, but that you build in a safe margin of profit for yourself so that an unexpected increase in your cost does not devastate the profitability of a given repair.

Finally, when a hard to locate part is required, go to your primary supplier, ask the price and availability, sell the job to the customer, and order the part. Do not shop around for the best price for that Accutron coil at ten places before you finally order it from the lowest cost source just to save a few dollars. Remember, you are not buying parts for yourself, but on behalf of your customer who employed your shop to repair a watch, not shop around for the lowest price. The few dollars that may be saved is offset many times over in the combination of your expense shopping and the time wasted by nine other suppliers looking for a part and quoting a price.

Jack Kurdzionak

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 is easy. Just e-mail me at AWCI <magazine@awci.com> 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. The ideas, tools, techniques and products presented in this column are suggested by the author and contributing members and are not endorsed by any manufacturer, supplier, advertiser or AWCI itself.

Executive Director's Message
Continued from page 3.

Twenty-First Century Certified Clockmaker (CC21) exam will be available soon. Final arrangements will hopefully be completed by the Executive Committee's mid-year meeting February 9th and 10th. If you're not ready for certification yet, see page 37 for a schedule of courses to be taught here in Harrison.

If you haven't already done so, contact each of the AWCI member benefits providers. Get a quote for health insurance from Health Benefits Provider, 800-450-3040, get your own website through Walker Development's Site Creator. They can be contacted at 513-753-6610. Contact First National for a quote on processing your credit card transactions. If you don't presently accept credit cards, First National can get you started. First National can be contacted at 800-354-3988. This year we have a new partner providing business insurance, and shipping programs for you and your customers' valuables. New Jersey-based Dowell Insurance Agency, Inc., and Integrated Assurance Solutions (Dowell/IAS) can be reached at (201) 794-7144. Go to www.awci.com for more information on these benefits and others that are offered only to AWCI members and designed to save you money. I have talked with members who have taken the time to look into these various benefits and have been able to save themselves money. You owe it to yourself to take advantage of these benefits.

Also remember to thank our *HT* advertisers when doing business with them. Without their support the *HT* wouldn't be possible.

Here's wishing you a Happy and Healthy New Year!

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We are pleased to be able to accept your personal or business check for payment of dues, purchase of books, tapes and merchandise, purchase of education and certification courses and other AWCI goods and services. If your check is returned to us by our bank for any reason beyond AWCI's control, we will impose upon you a USD $30.00 returned check fee. We will invoice you for this returned check fee. This fee will have to be paid before any additional goods or services can be purchased from AWCI.

Upon request, AWCI will redeposit any check which has been returned to us by our bank. If the check is returned a second time, a second $30.00 returned check fee will be imposed upon you and no future deposit attempts will be made for the check. In addition, payment of the returned check fees and the goods and services in question will have to be made by credit card (no debit or check cards), cashier's check or money order.

When paying for goods or services by personal or business check, you are consenting to and agreeing to abide by this policy. AWCI reserves the right to modify this policy as needed.

ETA Calibers

May 19-23, 2008

Instructor: Alessandro Betti

(ETA Swatch Group representative from Switzerland)

AWCI Training Center - Harrison, OH

Course Fee: $600.00 (AWCI membership required)

Mr. Betti accepts 12 students; registration is on a first come, first serve basis

This course will cover the ETA Caliber 2894-2
Additional calibers may be discussed if time permits

For further information, or to register for the class contact
AWCI Educational Coordinator, Nancy Wellmann
E-mail: nwellmann@awci.com
(866) FOR-AWCI (367-2924), Ext. 303 — (513) 367-9800

Academy of Watchmaking Classes

Thomas Schomaker, CMW21 Instructor

AWCI is offering a series of 5-day watchmaking classes. Each 5-day block will cost $600. For additional information, contact Education Coordinator, Nancy Wellmann nwellmann@awci.com or call 1-866-FOR-AWCI (367-2924), ext. 303. Class information is also available online www.awci.com

January 7-11, 2008	Watchmaker's Lathe I
January 14-18, 2008	Watchmaker's Lathe II
February 4-8, 2008	Basic Watch Repair
February 11-15, 2008	Servicing and Adjusting the Lever Escapement
March 10-14, 2008	Modern Automatic Watches
April 7-11, 2008	Basic Quartz Watch and Quartz Chronograph Repair
April 14-18, 2008	Modern Mechanical Chronographs, Servicing and Adjusting
May 19-23, 2008	ETA Calibers - Alessandro Betti, Instructor
June 9-13, 2008	Watchmaker's Lathe I
June 16-20, 2008	Watchmaker's Lathe II
July 14-18, 2008	Basic Watch Repair
September 22-26, 2008	Modern Automatic Watches
October 6-10, 2008	Basic Quartz Watch and Quartz Chronograph Repair
October 13-17, 2008	Modern Mechanical Chronographs, Servicing and Adjusting

21st Century Certification Exam Schedule

Certified Watchmaker & Certified Master Watchmaker

Visit AWCI's website for complete information on 21st Century Certification. To register for an exam or for more information contact Nancy Wellmann, Education Coordinator, at nwellmann@awci.com or call toll free 1-866-FOR-AWCI (367-2924)

February 25-28, 2008	AWCI Training Facility	Harrison, OH
March 31-April 3, 2008	AWCI Training Facility	Harrison, OH
April 28-May 1, 2008	AWCI Training Facility	Harrison, OH
May 12-15, 2008	AWCI Training Facility	Harrison, OH
June 23-26, 2008	AWCI Training Facility	Harrison, OH
July 21-24, 2008	AWCI Training Facility	Harrison, OH
August 11-14, 2008	AWCI Training Facility	Seattle, WA
September 2-5, 2008	AWCI Training Facility	Lititz, PA
October 27-30, 2008	AWCI Training Facility	Harrison, OH

Ask the Chemist

By the Chemists at Zenith Solutions, Inc.

Question: Why do some plastic containers that cleaners and rinses are packaged in seem to "collapse" or "shrink"? Should we, as watchmakers, be concerned?

Answer: Yes, watchmakers should be concerned.

The reason for concern is because the shrinkage of the container indicates that there is transfer of solvents to the outside atmosphere resulting in a change in the product.

Years ago solvent-based solutions were shipped in metal cans. There was **no** chance of solvent transfer or evaporation. For economic reasons and the ease of manufacturing, the packaging industry developed plastic containers to meet customers demand for a cheaper container.

Plastic containers are made by a process known as blow molding. In this process, molten plastic (under high heat and pressure) is blown by air into molds to form the desired thickness and shape. The plastic used to make containers for cleaners and rinses is a special type of plastic commonly referred to as HDPE, short for High Density Polyethylene. HDPE plastic has many outstanding properties when compared to metal such as: low cost, light weight, resistance to corrosion, and good stress and impact resistance.

One major drawback of HDPE is that it is permeable. Permeable means that it will allow solvent to pass through or escape from the container.

The mechanism of solvent transfer is a stepwise process:

1. The solvent in the solution wets the inner surface of the container.
2. In time the solvent is absorbed into the plastic. Chemists call this process diffusion.
3. Eventually the solvent that was absorbed into the plastic evaporates into the air.

The end result is a continuing change in the product's composition. This change will affect the cleaning action of both the cleaner and rinsing solutions. As the solvent escapes through the container and the solution becomes more concentrated; eventually, all of the active ingredients cannot be held in solution and it begins to show suspended particles causing turbidity. When substantial active material comes out of the solution it tends to accumulate at the bottom of the container — this is called settling out and what is formed is a precipitate. If you notice settling out or precipitate on the bottom of the container, it is a strong indication the product is undergoing a change – **not for the good** which is the reason why watchmakers should be concerned.

During the cleaning process when watch and clock parts show some residue or stickiness or tacky substance on the metal parts, that is also proof of decomposition of the product. The cleaning action of the solution is being compromised meaning it is not as effective as when purchased. The shelf-life is greatly reduced and the product must be replaced resulting in an added cost to the watchmaker.

Chemists have developed a means of preventing solvent from penetrating HDPE plastic containers. The process is called fluorination and it is implemented during the container fabrication stage. By using a dilute mixture of fluorine in nitrogen in place of air as the blowing gas a protective fluorocarbon barrier layer is formed on the inner surface of the container. This fluorinated layer prevents solvent from penetrating the plastic making the container resistant to solvent absorption. There is no wetting, diffusion and eventual evaporation of solvent. As there is no solvent loss, the chemical composition of the products will remain the same for a long time.

That is why it is important to make sure that all solvent-based cleaners and rinses are packaged in fluorinated plastic containers.

The next time you order a cleaner or rinse, you should only buy from a manufacturer that uses fluorinated containers.

If you have any questions on watch and clock cleaning, call the chemists at Zenith Solutions: 1-888-777-6887 or send e-mails to: magazine@awci.com

Witschi Watch Expert III and New Tech Handy II

Witschi Electronics USA, Inc. is pleased to announce two new products that are currently available in the USA, the Watch Expert III and the New Tech Handy II.

The Watch Expert III is an economic measuring instrument ideally suited for testing mechanical watches. The diagram is displayed noiselessly on the new, illuminated LCD graphic display. Measured values for rate deviation, amplitude and beat error are automatically calculated and displayed numerically. As with all other instruments, the beat number of all common watches can be automatically recognized. Different measuring modes can be selected for watches with special escapements. Two novelties: the additional display mode "VARIO" and the storage of the last 5 screen contents, which are later callable.

The New Tech Handy II is for repair service, the watchmaker needs a test instrument with a simple way to perform all electrical measurements and tests on quartz watches. The instrument provides all measuring and test facilities required in a professional search for defects in quartz watches. Operation is very easy, due to largely automated measurement functions, the functional layout of operating elements, and the highly readable results and parameters on an illuminated display.

Visit the Witschi website, www.witschi.com for additional data information and interactive programs that you may find useful.

AWCI Correspondence Course in Clock Repair

Based on the original correspondence course written and administered by Laurie Penman, AWCI's resident clock instructor, this course is constructed to provide information and instruction in a manner that is immediately useful in both learning and practicing clock repair. The course contains 16 lessons. At the completion of each lesson you will receive comments and suggestions from Laurie Penman, and a pass or fail grade. Those who achieve a pass grade in each section will receive a certificate of completion. Mr. Penman will be available to answer questions or offer suggestions to each student.

The AWCI Correspondence Course in Clock Repair package contains all the material and information necessary to successfully learn the fundamentals of clock repair, including *The Clock Repairer's Handbook* by Laurie Penman and a one-year subscription to Steven G. Conover's monthly publication, *Clockmaker's Newsletter*. Course participants will be invited to attend a 2-day meeting at AWCI to confer with Mr. Penman and meet other students.

AWCI Members - $800

Non-members - $925

Contact Nancy Wellmann, AWCI Education Coordinator
E-mail: nwellmann@awci.com
Phone Toll Free 1-866-367-2924, ext. 303 or (513) 367-9800

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Elgin Crown Wheel and Minute Wheel
Milton Stevens, North Bend, OH, is searching for an Elgin crown wheel and minute wheel. A partial movement will be fine.

Sonic 4 Ultrasonic Cleaner
Charles Goad, Fairland, OK, is searching for a schematic for a Sonic 4 Ultrasonic Cleaner.

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: *Horological Times* Bulletin Board; 701 Enterprise Drive; Harrison, OH 45030-1696; Toll-Free: 1-866-367-2924, ext. 307; Phone: (513) 367-9800; Fax: (513) 367-1414; E-mail: dbaas@awci.com

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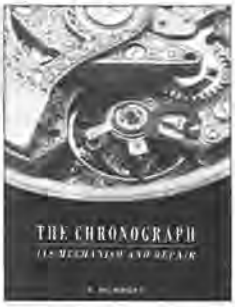

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