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September 1998



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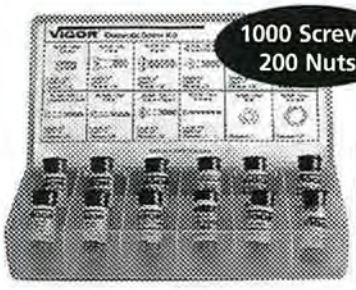
New

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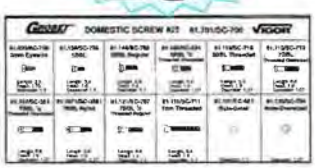
New design features ***over-sized*** plastic handles with swivel heads. Special shape of the standard blades help grip the screw. These screwdrivers offer excellent "torque" for removing those stubborn caseback screws. 3-Piece set; two standard - one Phillips.

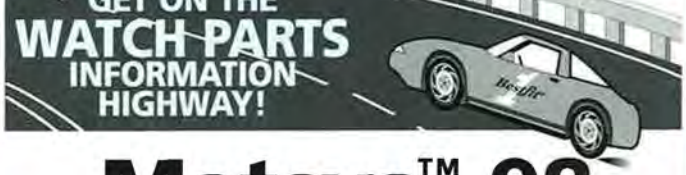
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EDITORIAL & EXECUTIVE OFFICES
AWI Central, 701 Enterprise Drive, Harrison, OH 45030
Phone: (513) 367-9800 Fax: (513) 367-1414
E-mail: awi-info@awi-net.org
Office Hours: Monday-Friday 8:00 AM to 4:00 PM (EST)
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William J. Ewbank: Editor-in-Chief
Donna K. Baas: Managing Editor, Advertising Manager
Katherine J. Ortt: Associate Editor, Layout/Design Associate

William J. Ewbank: Executive Director
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COVER

This month's cover feature is the site of the Mid Atlantic Horological Symposium (see page 10).



President's Message

By David A. Christianson

The foundation of AWI is our member committees. Although the Board of Directors makes the policy and staff administers these policies, the committees define these policies, implement them, guide them, and propose new policies for the Board.

This year AWI is functioning with 25 committees. Of these 25, five are called Constitutional committees because their functions and memberships are defined by the Constitution to insure the smooth running of AWI.

The **Judicial Committee** is made up of all living Past Presidents, with the Immediate Past President serving as its chairman. It has the final authority regarding an interpretation of the Constitution and Bylaws in those cases where the interpretation is challenged.

The **Constitution & Bylaws Committee** traditionally has between three and five members and must consider all properly presented proposals for changes to the Constitution and bylaws; present these proposed changes to the Board and membership; and may even make recommendations for or against the proposed changes.

The **Finance Committee** consists of the Treasurer of the Institute and at least two other members of the Institute. This committee is the financial advisor to the Board, and with the Executive Director, puts together the annual budget for the Institute.

The **James M. Dodson Perpetuation Fund Committee** is charged with overseeing the principal moneys that we received from the sale of our Packard Watch collection. It is the interest from this principal that provides nearly half of the operating capital and member benefits of AWI. By constitutional decree this principal must remain intact and must be invested only in securities guaranteed by the U.S. Government. It is the mission of the Perpetuation Fund Committee to see that this principal is not only invested wisely, but is invested so that it gives the maximum return to AWI. The membership of this committee consists of five trustees: the President of the Institute, the Executive Director, and three Past Presidents.

The **Nominations for the Board of Directors Committee** is charged with finding and securing qualified members to run for the Board of Directors. It generally consists of between three and five members who review the qualifications of candidates and present the slate of candidates to the membership for their selection.



Executive Director's Message

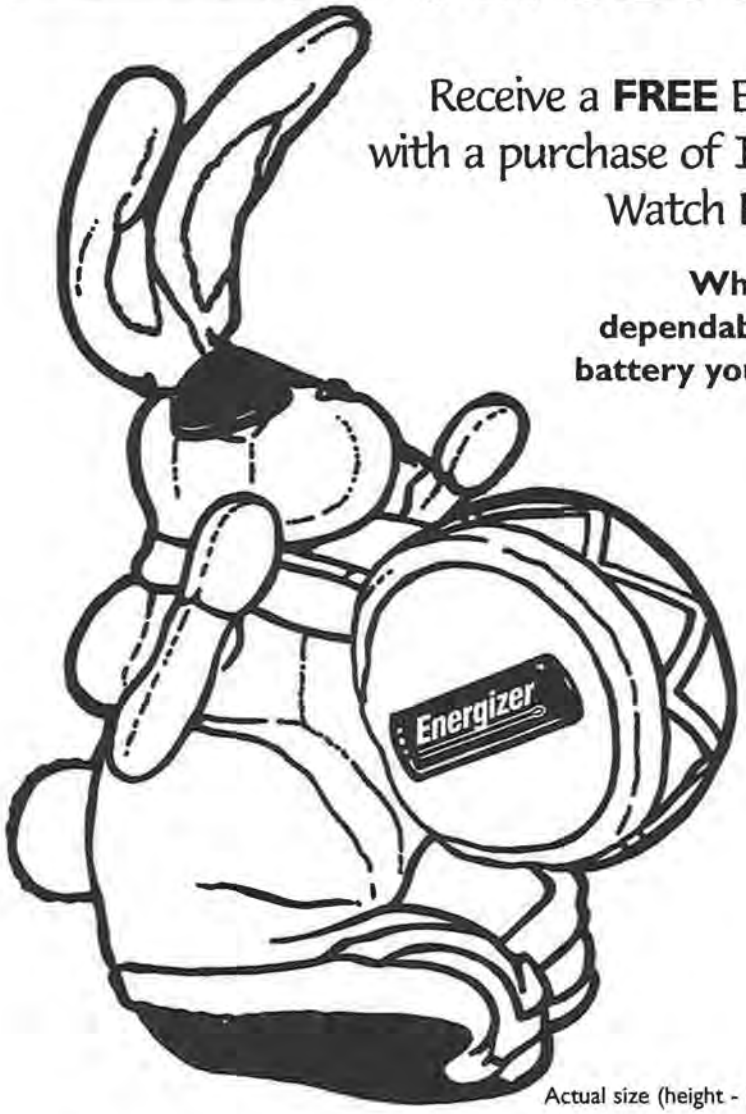
By William J. Ewbank

By now you have probably noticed that we decided to put a big building on the cover of our venerable *Horological Times*. This is our recognition of the importance of the first Mid Atlantic Horological Symposium sponsored by the State Affiliate Chapters of Maryland, Pennsylvania, and Virginia. We believe that this is one of the most important initiatives sponsored in the world of American horological education in many years. There is still time to register, and to have the opportunity to meet some of the finest expert watchmakers and clockmakers practicing in the world today. We encourage all of you to attend.

My topic of business for this month is the fact that next month, our annual dues statements will be going out to all members. We have been hearing for many months that the members are pleased with the direction AWI is taking. Let's all hope that this is reflected in a record high renewal rate.

We are going to do more this year than just ask for money. You may recall that one of the amendments to the AWI constitution that passed in this year's annual election repealed restrictions on the use of the AWI membership list. Our first program that will be permitted with this amendment will be to update and expand our watchmakers and clockmakers referral program. Quite often, we get calls from persons who desire to contact a watchmaker or clockmaker in their area. We simply haven't been able to make these referrals because of our existing restrictions on releasing member names and addresses. This year's dues statement will include a check-off that will allow you to add your name to the AWI referral base. Remember, your name will NOT be automatically added to the referral base or released to inquirers. You must agree to be included. This may not be a great business generator initially, but we hope that it will provide the basis for future promotional efforts on our members' behalf. Look for it in mid-October.

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Questions & Answers

Question

The enclosed photos are of a 21-jewel Longines split-second timer brought back from Europe by a friend who was told it may date to the Luftwaffe. If the serial number (8272764) follows Longines' sequence in *The Complete Price Guide to Watches*, No.17, by Shugart and Gilbert, then 1950 would be closer. There is no caliber marked on the movement, only the serial number. It is repeated on the heavy case with an additional four digits (4507) which is probably the case style. Telephone queries to the Swiss repair center (NYC) and to Longines HQ (PA) drew blanks—especially with no model ID (it is not under the balance).

The stem is missing. I can't tell if it had a normal crown (there are very few wear rings on the pendant). The knurled ring is threaded and has a cutout (turned to the front for the photo) on its bottom, possibly for access to a screw on the back to release the stem. The movement size is 54 mm.

Any information as to history and material source would be appreciated.

Gene Hall
New York, New York

Answer

Your very excellent photos reveal a 21-jewel Longines split-second double action chronograph. (Your hour hand is not original!) The double action feature allows the stopped hand in split-second timing to jump ahead to its still- running mate and proceed together as one again for multiple event timing (more than two). (See Figure 3.)

Longines has long been known for its scientific sport timing, and has been making watches for sport timing since 1878.

In 1905 Longines experimented with the idea of electrically activated watches for sporting events. (See Figure 4.)

I suspect that your 1950-era Longines chronograph was part of an electrically activated timing device, necessitating the two pusher designs and the unusual crown design.

The chronograph portion of your movement is the same as used in Longines calibre 262, but seems to be built on a different (perhaps earlier) main platform, since there is no calibre and it's 21 jewels. (See Figure 5.) The calibre 262 is shown in a circa 1960 catalog.

Nevertheless, your chronograph is definitely 1950 manufacturing, not W.W.II.

David A. Christianson,
AWI President



Figure 3.

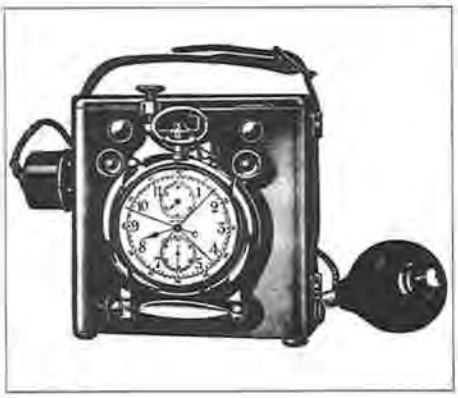


Figure 4.



Figure 1.



Figure 2.



Figure 5.

Tips on ordering Miyota Movements

Some models of Miyota brand watch movements do not have caliber numbers on them, neither printed nor stamped. While it is inconceivable that one of the world's largest manufacturers of watch movements does not know better, it is true. This makes ordering the correct replacement movement, or parts for these models very difficult. Here are pictures and descriptions that should be helpful in identifying your unmarked Miyota movement. If you have an unmarked Miyota movement that uses their popular 6¾ x 8 mvt as a base, then compare it to the functions and thickness below to determine which model you have.

For the latest in movements ask for our September movement listing. This is the list of over 450 movements in stock with prices. Now includes TMX. We print this twice a year to provide a useful guide for availability and pricing.



6¾ x 8 ligne (15.3 x 17.8mm), Non-sweep, or sweep only



Back view



MIY 2025
6¾ x 8 ligne, 3.15mm thick
Non-sweep
Hands - 70/120



MIY 2035
6¾ x 8 ligne, 3.15mm thick
Sweep
Hands - 70/120/20

6¾ x 8 ligne (16.3 x 17.8mm), Sweep with date or day-date



Back view



MIY 2015
6¾ x 8 ligne, 4.15mm thick
Sweep, Date at 3
Hands - 70/120/17



MIY 2005
6¾ x 8 ligne 4.15mm thick
Sweep Day & Date at 3
Hands - 70/120/17

10½ ligne (22.6 x 22.0mm), Sweep with date or day-date



Back view



MIY 2115
10½ ligne, 4.15mm thick
Sweep, Date at 3 or 6
Hands - 70/120/16



MIY 2105
10½ ligne, 4.15mm thick
Sweep, Day & Date at 3
Hands - 70/120/16

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Ask Huck

J.M. Huckabee,
CMC, FAWI, FBHI

Measurement Tools

Question

Please give some advice on tools for measurement. What do you recommend for the clockmaker?

Answer

Clockmakers make and adjust many parts by a trial-fit process. However, for serious parts making and efficient productivity it is necessary to make parts to a predetermined set of dimensions, which brings us to measurement tools. We must be able to make hundreds of measurements per day with great accuracy. In a day of lathe work we may make several thousand measurements.

A first tool should be a good scale of about six inches, engine-divided with ground edges. This may cost up to $20 (1990). Add a good dial caliper with about a 6" range. A 1" micrometer is a necessary item; one with carbide tips is best.

Choose English or metric, but avoid dual-mode instruments. You may wish to purchase both types, but I find it easy to use one and make conversions in your head.

Your caliper, micrometer, and scale should be of very hard material and non-magnetic. Measurement surfaces get lots of use and are subject to wear. A tool that becomes magnetized is a trash collector.

Dial calipers are noted for chip fouling in the rack and pinion. This may offset the zero and give an error in measurement. Cleaning and inspection is a way of life with these tools.

A vernier caliper does not use a rack, and is by nature more reliable and capable of greater accuracy. The negative aspect is that it cannot be read as quickly.

Dual-scale instruments are more expensive and fragile, but half of their readings are in the unwanted mode—a burden we don't need hundreds of times per day.

Accessories for the Watchmaker's Lathe

Question

What compliment of accessories will I need for clock work with a Watchmaker's Lathe?

Answer

This is a growing situation that never seems to end. The lathe is said to be the "king of all tools." However, don't overbuy your skills.

The lathe and motor is our basic tool. Work can only be held in a chuck or collet. Add the tailstock and now we can perform work between centers—almost a lost art, but one of the fastest and most accurate methods known.

Adding a countershaft extends the speed range and increases the size of work that can be turned. A compound slide tool rest adds another range of work.

Tailstock fixtures bring us to drilling and pivot working ability. Each of these adders requires tools (i.e. gravers, tool bits, drill bits, and measurement tools). The need for collets and holding fixtures expands rapidly.

Add a vertical slide and an indexing attachment for gear making. Now we need cutting tools, tool grinders, holding arbors, and countless other small attachments.

It's probably a wise decision to keep things simple. Team up with other members of your local trade guild and swap work loads. Your own needs may never retire the cost of these highly specialized tools.

So proceed with caution. Learn to use the lathe efficiently and exchange work with other craftsmen. We can all gain by using our resources collectively.

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Ewell D. Hartman
CMW, FAWI

Battery of Information

As an AWI member, you recently received a copy of the most complete reference on watch batteries that we know of. While it will help you with routine battery replacements and inventory, you will find it invaluable when you encounter one of those difficult situations.

Take the time to read the introductory pages of your new book so that you will be able to effectively and efficiently use all four sections as needed.

Notice that pages three and four of "Section I" are designed as a quick reference. You may want to carefully remove this page (use a razor blade) and have someone at your local office supply store laminate it for use at your bench or desk.

You can purchase additional copies of the *AWI Battery Number System* for $5 each. Quantity prices will be quoted by AWI Headquarters. (See page 2 in your book.)

Next month we will discuss details on the cost and availability of new labels for your battery cabinets. These labels will help you to use the AWI system with maximum efficiency.

ENTHUSIASM MAKES THE DIFFERENCE

AWI

American Watchmakers-Clockmakers Institute Battery Number System

1998-2000 Edition
Ewell D. Hartman, CMW, FAWI, Editor
Wes Door, CMW
Donna K. Baas

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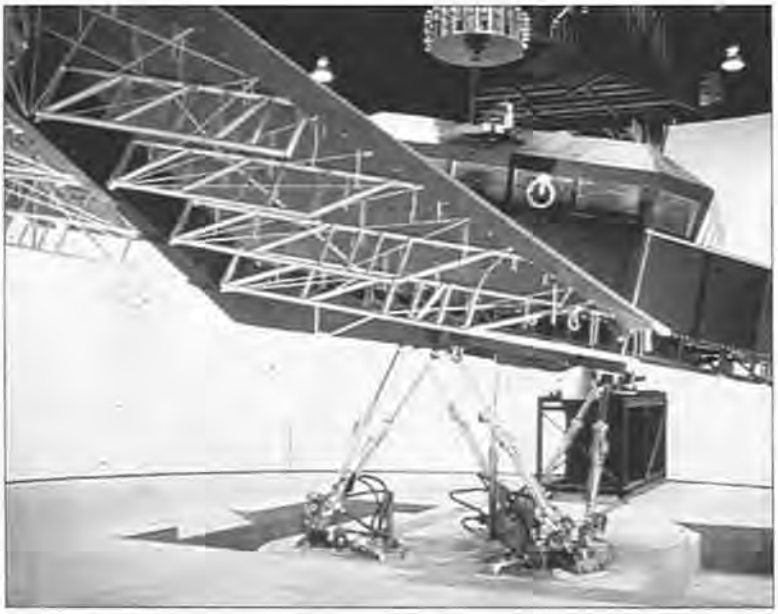
October 3-4, 1998

Like horology, seamanship is as much an art as it is a science. Over two hundred and fifty years ago, John Harrison began his life's work in developing a reliable marine chronometer that would allow accurate calculations of longitude. Harrison's invention changed the history of the world. Ever since, accurate timekeeping and safe navigation have been partners. That is why it is particularly noteworthy that the site of the first annual Mid Atlantic Horological Symposium will be at the Marine Institute of Technology and Graduate Studies at Lithicum, Maryland, a suburb of Baltimore.

MITAGS, as it is known, is the training facility of the International Organization of Masters, Mates and Pilots. The Institute opened its doors in 1972 and has become the most advanced maritime training facility in the world. MITAGS



One of two ship-handling simulators houses a 20-foot wide fully equipped bridge that realistically rolls, heaves, and pitches while the situation is projected on the surrounding surface. From inside, the crew carries out all necessary functions while practicing bridge team management in emergency situations.



catalog states that the sustained health of any industry has always been due in part to the increased competence and productivity of those professionals in the industry. We here at AWI could not have stated our mission any better than this.

With the support of its contracted shippers, the Masters, Mates and Pilots Organization has the opportunity to take world-class training in such areas as: All Weather Navigation, Liquid Cargo, Admiralty Law and Ship's Business, Ship's Control Systems, Shipboard Medical Care, Electronic Navigation, and the Ship Simulator Course. The Institute also provides specialized courses for preparation for Coast Guard licensing examinations.

A centerpiece of the MITAGS educational facility is the two large and sophisticated ship's simulators used to instruct officers in the principals of ship handling in a variety of



The main auditorium where the Saturday panel discussion on preservation and restoration of vintage timepieces will take place.

environmental settings. Many of us are familiar with aircraft simulators and how they work. Picture, if you can, the entire bridge of a giant ocean-going vessel mounted in a simulator!

Located on an 80-acre campus near the Baltimore-Washington International Airport, MITAGS educational facility includes a 350-seat auditorium and 38 conference rooms that can be set up for small classes like AWI's bench courses or large groups of up to two hundred. A complete line of audio-visual equipment; including overhead, 35 mm slide and video projection equipment; sound equipment, VCR's monitors and camcorders; is available for use in instructional programs.

The facility also provides excellent lodging facilities with 229 spacious and comfortably appointed guest rooms. The rooms include private baths, satellite TV, telephones, and daily maid service. The dining facility provides four meals per day. The facility also has a gift shop, bar/lounge, and athletic facilities including saunas, game and exercise rooms and a 50-foot indoor swimming pool. The room rate for students and guests is $109 per night for a single and $159 for double occupancy. This includes all meals and full access to the residential facilities.



The MITAGS dining room serves four daily meals to students and guests.

Mid Atlantic Horological Symposium Schedule of Events

Saturday, October 3, 1998

Registration: 7:30 A.M. to 4:00 P.M.

Vendors' Exhibits and Displays:
All Day

Professional Programs:
Beginning at 9:00 A.M.

Horological Solvents and the EPA

Avoiding Comebacks
Roy Hovey

Business Management
Fred Burckhardt

Turns and Jacot
Ron DeCorte

Adjusting Lever Escapements
Jim Lubic

Problem Clocks
David Christianson

Graver Preparation and Use
W. R. Smith

21st Century Watchmaking
W. O. Smith

Pocket Watch Repair
Alice Carpenter

Atmos Clocks
Gerald Jaeger

Balance Spring Fitting & Adjusting
Joe Cerullo

Servicing Modern Chronographs
Tamara Houk

Adjusting Clock Escapements
Jerry Faier

Problems in Recasing Watches
Jack Kurdzionak

Saturday Night Round Table Repair, Restoration & Conservation
with:

Antoine Simonin	W. R. Smith
George Thomas	W. O. Smith
John Losch	Roy Hovey

Sunday, October 4,1998

Speakers' Breakfast
with:

Fred Burckhardt

AWI President David Christianson

AWI Executive Director William Ewbank

How to Register for the Mid Atlantic Horological Symposium

Sponsored by the Maryland, Pennsylvania, & Virginia Chapters of The American Watchmakers-Clockmakers Institute

Advance Registration - $30.00

Registration at the Door - $35.00

Sunday Speakers' Breakfast - $4.00

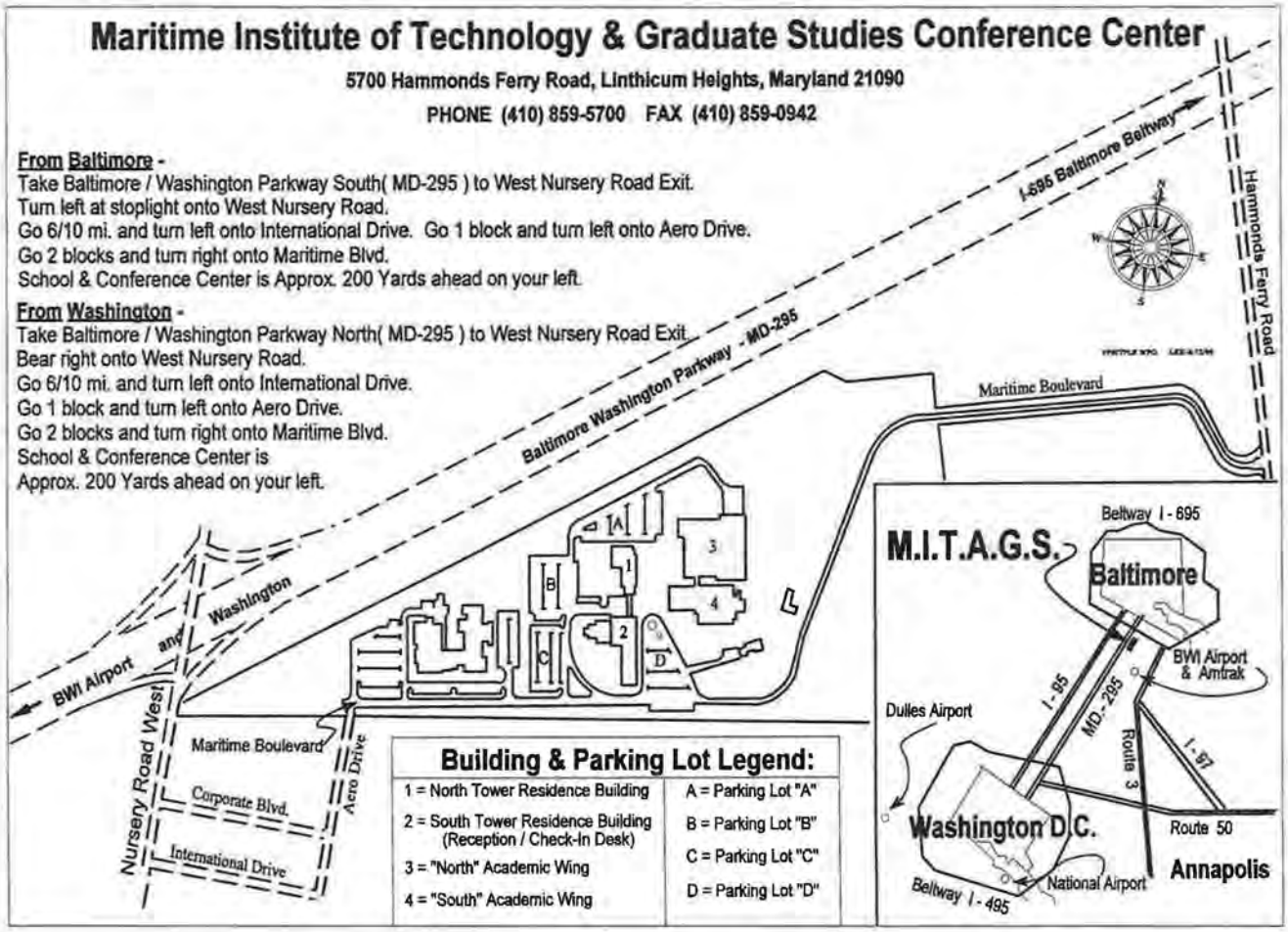
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Send your registration by mail to:
Mid Atlantic Horological Symposium, Inc.
c/o Treasurer Stan Palen
8283 Oakwood Dr.
King George, VA 22845

On October 3 and 4, scores of horologists will descend on this splendid facility for the first annual Mid Atlantic Horological Symposium. In the days preceding the symposium, up to fifteen bench courses and seminars will be offered to AWI members. The speakers program, scheduled for all day on Saturday, October 3rd, will include many of the leading experts in American horology today, including William O. Smith, William R. Smith, Roy Hovey, Ron DeCorte, Jim Lubic, Fred Burckhardt, Gerald Jaeger, Joe Cerullo, Jack Kurdzionak, Jerry Faier, and Tamara Houk. The highlight of the symposium will be a seminar on Saturday evening on the issues related to the restoration of vintage timepieces. The all-star panel will include George Thomas, Antoine Simonin, W.R. Smith, W. O. Smith, Roy Hovey, and John Losch.

The program will include a vendors' exhibit by leading manufacturers and distributors of horological supplies and a Sunday morning speakers' breakfast that includes AWI President David Christianson and AWI Executive Director William Ewbank.

Never in the history have so many of the leading experts in the craft of horology been gathered together for such a program. The AWI Affiliate Chapters in the states of Maryland, Pennsylvania, and Virginia have done an outstanding job in assembling this program for the benefit of AWI members and all other persons interested in the art and science of horology. The American Watchmakers-Clockmakers Institute is proud to be a supporter and sponsor of this program.



Book Review

Reviewed by
Robert D. Porter, CMW

ACCURATE TOOL WORK

By C. L. Goodrich & F. A. Stanley

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C. L. Goodrich was a department foreman in the Pratt & Whitney Co., a manufacturer of high-precision machine tools and gages. Frank A. Stanley was editor of the *American Machinist* magazine. Both men had considerable practical machine shop experience before becoming authors.

This 217-page book presents the tribal knowledge and precision machining methods first used by toolmakers in American watch companies, and then in machine shops, early in this century. Chapter VIII, "Master Plates Used In Making Watch Tools," is of particular interest to watch and clockmakers because it pictures the master plates with holes corresponding to the train wheel positions and locations of various screws, etc. for a Howard watch. Drawings illustrating the "Section and Train Development of Howard 12-Size, Extra Thin Model Watch" and "Plan of Howard Watch Movement" are also shown. Other subjects covered in this chapter include: face-plate devices, handy tools and appliances, clamping and other devices, and accurate indicators.

Although most of the precision tooling methods and instruments depicted in this book have been superseded by modern computer-aided design and manufacturing in large companies, many small machine shops still use many of the methods shown in this book to calculate and construct jigs, dies, and fixtures. All 19 chapters of "Accurate Tool Work" present an informative and fascinating look back in time at the techniques, tools, and gages being used to manufacture and inspect master tooling and high-precision products in the early 1900s.

This book is recommended reading for anyone interested in knowing how those early craftsmen achieved the incredible precision we see in the machine tools, watches, and clocks from that era. If you like tools, you will like this book.

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AWI Board of Directors Annual Meeting

June 20-21, 1998 • Holiday Inn-Cincinnati Airport Conference Center

President Charles Cleves called the 1998 annual meeting of the AWI Board of Directors to order at 10:00 Saturday morning.

Motions brought before the Board of Directors for a vote included:

Motion 1: Approval of the Nominating Committee for Officers. The committee appointed by President Cleves included Ron DeCorte, Ewell Hartman and Wes Door. *Motion carried: 16 Yes, 0 No.*

Motion 2: Dispense with the reading of the minutes. *Motion carried: 16 Yes, 0 No.*

Motion 3: Adopt the proposed budget for fiscal year 1998-1999. *Motion carried: 16 Yes, 0 No.*

Motion 4: When a class has been scheduled and it fails to meet the minimum number of participants, AWI will determine the prorated additional cost to conduct the seminar with less students and offer them the option of paying the additional cost. If the minimum number of students is then reached before the class date, the additional cost would be refunded. *Motion carried: 16 Yes, 0 No.*

Motion 5: Approval of Dennis Warner as Affiliate Chapter Director. *Motion carried: 15 Yes, 1 Abstain.*

Motion 6: Approval of Ken Pell as Research & Education Council Director. *Motion carried: 15 Yes, 1 Abstain.*

Motion 7: Send the Executive Director's proposal for a 40th Anniversary Celebration and a change of annual meeting date to the Finance Committee and the Constitution & Bylaws Committee for study and recommendations to the Board. *Motion carried: 16 Yes, 0 No.*

Motion 8: Send the Executive Director's request to extend the current



William Ewbank, AWI Executive Director, giving the State of the Association address.



Newly-elected members of the Board of Directors (L to R): Dennis Warner; William O. Smith, Jr.; Milton C. Stevens; Ken Pell; Robert D. Porter; Tamara Houk; and Jack Kurdzionak.

watch course to two years or 3,000 hours to conform with WOSTEP to the Education Committee for further study. *Motion carried: 16 Yes, 0 No.*

Motion 9: Send the proposal to amend Section 5E and Article 3, Section 2B to be revised to delete references to Allied Watch Material Dealers. *Motion carried: 16 Yes, 0 No.*

Motion 10: Recommend that the Project Extend Committee be discontinued. *Motion carried: 16 Yes, 0 No.*

On Sunday, June 21st the meeting was called to order by President Cleves.

Wes Door, Chairman of the Nominating Committee for Officers, presented their slate of officers and nominations were received from the floor. Officers elected for 1998-99 were: David A. Christianson, President; Ron DeCorte, First Vice President; Robert D. Porter, Second Vice President; Fred Burckhardt, Secretary; and Gerald G. Jaeger, Treasurer. The officers were sworn in by Ewell Hartman.

President David Christianson called for New Business.

Motion 1: AWI allow each Affiliate Chapter up to $400 reimbursement to delegates attending the annual meetings regardless of the percentage of AWI members to nonmembers within the Chapter. *Motion carried: 9 Yes, 7 No.*

Motion 2: Allow AWI to use the following financial institutions in its course of business: Centennial Savings Bank, PNC Bank and Fifth Third Bank. *Motion carried: 16 Yes, 0 No.*

Motion 3: The Bylaws be amended to delete references to Allied Watch Distributors as follows: Article 1, Section 1B - delete Allied Watch Distributors; Article 1, Section 5E - delete and reletter the remaining sections; Article 3, Section 2B - delete the title and dues for Allied Watch Distributor. *Motion carried: 16 Yes, 0 No.*



AWI Officers for 1998-99 (L to R): Fred Burckhardt, Secretary; Robert D. Porter, Second Vice President; Ron DeCorte, First Vice President; David A. Christianson, President; and Gerald G. Jaeger, Treasurer.

Motion 4: The President needs to do whatever it takes to address the spare parts issue and that contact be made to Peter Laetsch to begin negotiations. *Motion carried: 15 Yes, 0 No.*

Motion 5: The AWI Board of Directors endorses negotiations with the Bulova Watchmaking School in regards to AWI Press reprinting the Bulova Training Manual. *Motion carried: 16 Yes, 0 No.*

AWI Board of Directors 1999 Meeting Schedule

Mid-Year Board Meeting January 23-24, 1999

Annual Board Meeting June 24-27, 1999



David Christianson takes over as AWI President Sunday morning.

AWI Fellow - Archie B. Perkins



Daphene and Archie Perkins with Ewell Hartman as he presents Mr. Perkins with the AWI Fellow Award.



Charles Cleves receives a plaque commemorating his term as AWI President.



William O. Overturf accepts the Henry C. Frystak - Donald J. DeWolfe Award from Henry Frystak. Mr. Overturf attained the highest score on the Certified Master Electronic Watchmaker exam. James K. Zimmerman, York, PA, was the recipient of the Dick Lang Award for achieving the highest score on the Certified Master Watchmaker exam. Mr. Zimmerman was unable to accept his award in person.

The AWI-ELM Trust Battery Recycling Program

The AWI-ELM Trust Battery Recycling Program once again wrapped up a very successful year. The rivalry in the Annual Battery Collection Contest heated up just a bit this year, with the Grand Champion ribbon going to North Carolina for their donation of 253 pounds of batteries. A grand total of 1,007 pounds were received from 31 participating states.

States are divided into four divisions according to population. The top three winners in each division were as follows: Division 1: First - Pennsylvania; Second - Ohio; Third - Illinois. Division 2: First - North Carolina; Second - New Jersey; Third - Wisconsin. Division 3: First - West Virginia; Second - Utah; Third - Kansas. Division 4: First - Idaho; Second - Canada; Third - Rhode Island.



Scott Lemons accepts the Grand Champion Ribbon for North Carolina.

Vendor Display



Early shoppers at the Saturday evening Vendor Display.



Ashley Womble visits with Tony Voight of Witschi Electronics USA, Ltd.



Will Overturf stops by the Wm. S. McCaw Co. table and talks with Gerald Wilson.



Tim Carpenter demonstrates the features of the Vision Engineering Mantis® for Mark Baker.



Wayne Leach, representative from the S. LaRose Co., Greensboro, NC, talks with Jim Door.



Patrick Cassedy, President of the Cas-Ker Co., Cincinnati, OH, Tracy Combs, and Scott Schwartz. Not pictured Joel Deming.



Dennis Warner

Affiliate Chapter Report

The Affiliate Chapters held their yearly meeting on June 19, 1998 prior to the Annual Meeting of the American Watchmakers-Clockmakers Institute. There were 23 chapters represented this year. On Thursday evening, June 18, at 7:00 P.M. an informal meeting and social were held to introduce members to each other and explain the procedures to be followed at the Friday meeting. A large turnout added to the success of the meeting. Everyone had an opportunity to participate, ask questions, and make suggestions. At 9:00 P.M. Stanley McMahan presented a round table discussion on preparing and publishing "Effective Newsletters."

The Affiliate Chapter Annual Meeting started at 10:00 A.M. and lasted into the late afternoon. All chapters gave a report about the status of their organizations and the successful programs that they are running. After the reports each chapter had a chance to make proposals that would be presented to the AWI Board of Directors for their consideration to become policy and procedures of our organization.

After much discussion the following two proposals were agreed upon:

1. That the AWI allow each affiliate chapter up to $400 reimbursement to delegates attending the annual convention regardless (sic) of percentage of AWI members to non-members within the chapter.

2. When less than the minimum number of students have been scheduled for a course, let a contact person know and give the registered students the opportunity to pay he difference to have the course without the minimum number of students.

(Both of these proposals were motioned and passed by the Board of Directors at their meeting on Sunday.)



Affiliate Chapter Chairman, Dennis Warner, welcomes everyone to the 1998 Affiliate Chapter Meeting.



Dan Fenwick's presentation provided an informative and amusing break from Affiliate Chapter business.

Elections were held for officers of the Affiliate Chapters for 1998-99. Dennis Warner was elected chairman and Stanley McMahan was elected vice-chair.

The Affiliate Chapter group is a place where new members have a chance to see the board in action and can participate in planning for the future of AWI. Many of the AWI Officers and Directors have progressed through this group to where they are today.



Alice Carpenter congratulates Dennis Warner, Chairman, and Stanley McMahan, Vice Chairman, after administering the Oath of Office.



Brent Glommen, President of the Minnesota Clockmakers Guild, accepts the "Affiliate Chapter of the Year" award from Ewell Hartman.

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James E. Lubic, CMW

Education Update

In April we were honored by having Alessandro Betti, ETA Instructor from Grenchen, Switzerland conduct a course on ETA Products for our members and Academy students. Immediately following this program, Mr. Betti conducted a course on the Auto-Quartz for AWI's REC Instructors. Both courses were well attended and all participants were impressed with Mr. Betti's knowledge. AWI also received a large contribution of movements from ETA in Grenchen. These movements will be used to modernize our certification programs. Thank you ETA for supporting the educational programs at AWI.

The following week Advanced Quartz Watch Repair was taught by Chip Lim. Chip is a 1997 graduate of our Academy of Watchmaking. He has an extensive background in electronics. He also presented an excellent course. Industry came though once again for this course. Citizen donated their latest solar watch, Seiko donated their Messaging watch, and Wittnauer loaned us a Junghans Mega.



ETA Products Course held in conjunction with AWI's Academy of Watchmaking (L to R): Dan Biery, Adrian Hendry, Russ Charlier, Ken Price, ETA Instructor Alessandro Betti, John Shorts, Gary McKee, and Stewart Lesemann.



Alessandro Betti, ETA Instructor, lectures during the annual Research & Education Council (REC) training course held at the AWI Training Center in April.

Next up we had Rhonda and David Christianson presenting AWI's new Introduction to Jewelry Repair Course. Six enthusiastic students worked hard and learned a lot.

On June 12, the 1998 Academy of Watchmaking class graduated. We had another great year. We still need to find a job for one of the graduates in the vicinity of College Corner, Indiana or Oxford, Ohio.

The third Academy of Watchmaking 45-week class started July 13. We are looking forward to another successful year. The students have already been here five weeks and are very enthusiastic.

The latest good news took place July 25 and 26 in Columbus, Ohio at the Ohio Watchmakers-Clockmakers Association's Annual Convention. AWI President, David Christianson, and Executive Director, William Ewbank, were presented with ten new Seiko Kinetic watches for the AWI Certification Program by Scott Chou, Director of Service and Production Planning, on behalf of Seiko Corporation of America. Also, a check for $7,000 earmarked for Academy Scholarships was presented by Scott Chou on behalf of Seiko's Service Division of Coserv. Thank you Seiko for all your support.

Recently Tamara Houk presented a Modern Chronograph Course in Seattle. The movements used were ETA 7751, ETA 2892-2 and ETA 555.232 that were equipped with the Dupois-Depraz 2000 chronograph module. Thanks to ETA, Tag Heuer, and the Swiss Watch Technical Center for supporting this course with the necessary watches.



REC participants (L to R): Front row: Chip Lim, AWI Instructor; Stephen Lange, Bishop State Community College; Tamara Houk, AWI Instructor; Second row: Chuck McKinney, Ohio Valley Watchmaking Institute; Arnold Van Tiem, Career Preparation Center; Wit Jaroshowski, Oklahoma State University/Okmulgee; Third row: Ken Pell, Winter Park Tech; Toby Witherspoon, Kilgore College; and Tony Knorr, North Seattle Community College.



Introduction to Jewelry Repair class: (standing) Craig Pappin, Neil Hanneken, Brad Benton, Tony Dixon, Chris Christopherson, Guy Padhaisky; (kneeling) Rhonda and David Christianson, Instructors.



The first Introduction to Jewelry Repair class gathers around David Christianson, Instructor, as he demonstrates some of the techniques which will be used during this phase of instruction.



John Shorts receives his AWI Academy of Watchmaking diploma from Jim Lubic, Instructor.



AWI's Academy of Watchmaking Class of 1998 (L to R): Russ Charlier, Dan Biery, John Shorts, Stewart Lesemann, Instructor Jim Lubic, Adrian Hendry, and Ken Price.



AWI President David Christianson accepts ten Seiko Kinetic wristwatches from Scott Chou on behalf of Seiko Corporation of America. The watches will be used in AWI's updated Certified Master Electronic Watchmaker exam. Mr. Chou also presented President Christianson with a $7,000 donation to the scholarship fund of the AWI Academy of Watchmaking. This is the third consecutive year Seiko's Service Division of Coserv has donated $7,000 for Academy scholarships.



David Christianson, Instructor for AWI's Seiko Kinetic Watch Repair course, addresses a class held in Columbus, Ohio on July 26.



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

Technically Watches

Pocket Watches and Their Maintenance
Part 4
Mainsprings

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The efficiency of a mainspring is affected by the following conditions:

1. The force of a mainspring.

2. The elasticity of a mainspring varies with:
   A. The composition of the material.
   B. The working of the material in making the spring.
   C. The heat treatment of the material.
   D. The number of windings and unwindings.

3. The type of hook used on the end of the mainspring.

4. The trueness of the mainspring in the flat.

5. If the mainspring is deformed or set.

6. Variation in temperature and dampness of the air.

7. The finish on the mainspring.

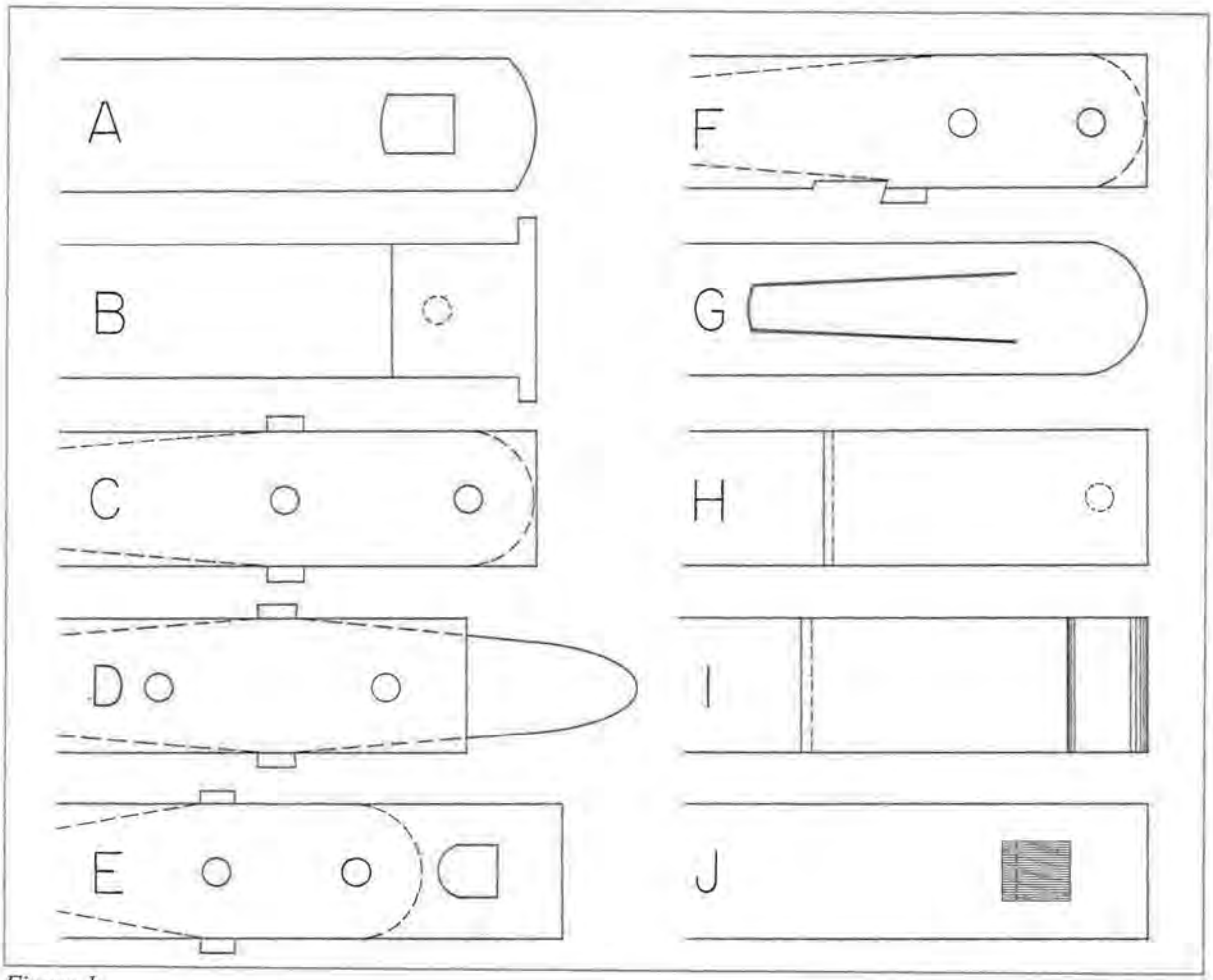


Figure 1.

8. The type of lubrication and how it is applied to the mainspring.

9. The finish on the inside surface of the barrel and the underside of the cover.

10. Width of mainspring for the barrel.

11. Fit of the barrel arbor.

These conditions will be discussed in the order that they are listed.

The Force of a Mainspring

The force of a mainspring varies with the amount it is wound. The more we wind a mainspring, the more force it will have. The more we let down a wound mainspring, the less force it will have.

Elasticity of a Mainspring

The elasticity of a mainspring varies with the following conditions:

A. The composition of a mainspring material has much to do with the spring's elasticity. The elastic qualities of a mainspring vary with the composition of its material. The steel from which mainsprings are made must be as pure as possible. If impurities such as sulphur and phosphorous are present, they induce weak spots in the spring which will cause the spring to become fatigued sooner and, as a result, the spring will set or break sooner.

The new alloy mainspring developed in the 1940s and 1950s has much better elastic qualities than carbon steel mainsprings. In making this new mainspring, manufacturers have added to the iron and carbon such elements as cobalt, chromium, nickel, molybdenum, manganese, and beryllium. The addition of these elements gives the alloy spring some great advantages over the steel spring. Some of these advantages are this material has a higher modulus of elasticity, higher limit of elasticity (does not break or set as quickly), higher tensile strength (takes more pressure to pull it apart), higher yield strength, and is harder and tougher.

This spring material has a higher torque output than carbon steel spring material. That is, for the same length, width, and thickness, the alloy spring will deliver more torque (power) than a carbon steel spring.

B. The working of the material causes the elasticity to vary. The rolling, working, and shaping of the mainspring material during its making can vary the elastic force of the material. For example, if the coils of a mainspring are formed with a cross-curved shape, its power output can be increased somewhat over one of the same

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dimensions that is not cross-curved. The power output of a mainspring is also increased if the end of the spring has a permanent reverse curve.

C. The heat treatment of the material. The elastic qualities of a mainspring vary with the hardening and tempering of the material. If the spring material has been overheated during the hardening process, it will become burned, and the grain in the metal will become coarse. As a result, the material will be weakened no matter how well it is tempered afterwards. This will greatly affect the elastic qualities of the material. A mainspring made of this material is more likely to break than to become set.

On the other hand, if the material is not heated enough to obtain maximum hardness, any tempering afterwards will not correct the problem. The material will not be hard enough; therefore, a mainspring made of this material will be too soft and will take a set the first time it is wound up. In both cases, the limit of elasticity will be reached prematurely.

If the spring material is correctly hardened and is not tempered enough, then it is likely to break in usage prematurely. If the material is correctly hardened but tempered too much, then a mainspring made from the material is likely to be too soft and it will become set the first time it is wound up.

D. Number of windings and unwindings. The elasticity of a mainspring varies with the amount of usage a mainspring receives. The more a mainspring is used, the more likely the material will become fatigued and deformed which will greatly affect the elastic abilities of the mainspring.

Types of End Pieces Used on Mainsprings

Figure 1 shows the most common types of end pieces used on watch mainsprings. View A shows a hole end mainspring. The hole end has been used by Waltham, Howard, New York Standard, and a few other American watch companies. The hole fits onto a hook in the barrel wall.

View B shows a T-end mainspring. This type of end piece has been used by the Waltham Watch Company as well as by Hamilton, Illinois, South Bend, Hampden, Rockford, and New York Standard. The two ends of the "T" fit into a hole in the bottom of the barrel and the cover.

View C shows a T-brace end piece used mainly by the Illinois Watch Company in the U.S.A. The ends of the "T" fit into slots in the barrel and its cover.

View D shows another T-brace end piece used by the Hamilton Watch Company in their watches with motor barrels. The outside end of the brace extends beyond the end of the mainspring for extra support for the end of the mainspring.

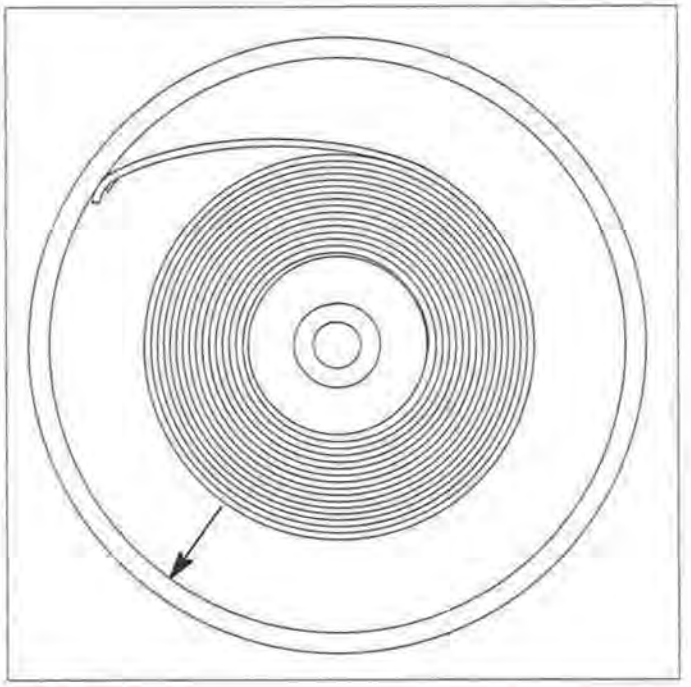


Figure 2.

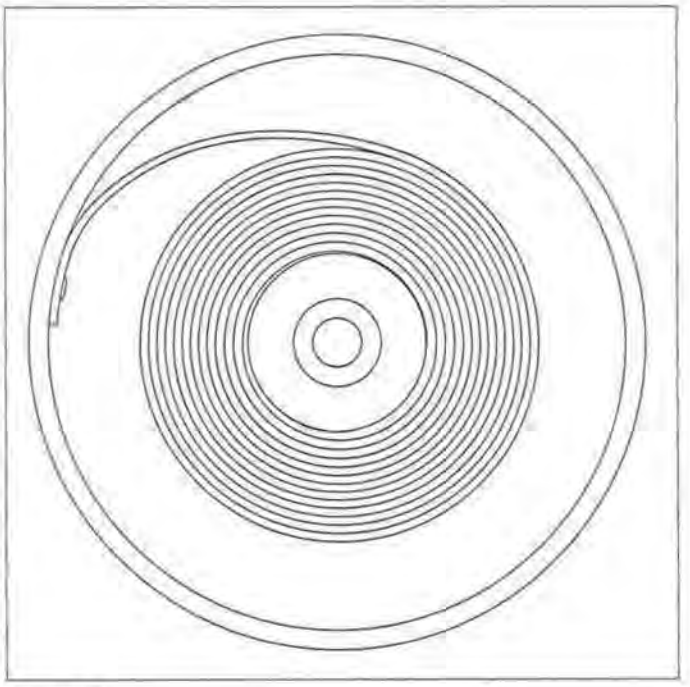


Figure 3.

View E shows an Elgin mainspring which has an end piece called a double brace and hole. The brace is a T-brace riveted to the mainspring and a hole is made in the mainspring between the end of the brace and the end of the mainspring. The hole fits onto a hook in the wall of the barrel while the hooks on the brace fit into slots in the barrel bottom and the cover.

View F shows a braced mainspring which has a side hook on the brace to fit into a slot in the bottom of a steel motor barrel. This type of end piece is used mainly by Elgin and Hamilton Watch Companies in their high-

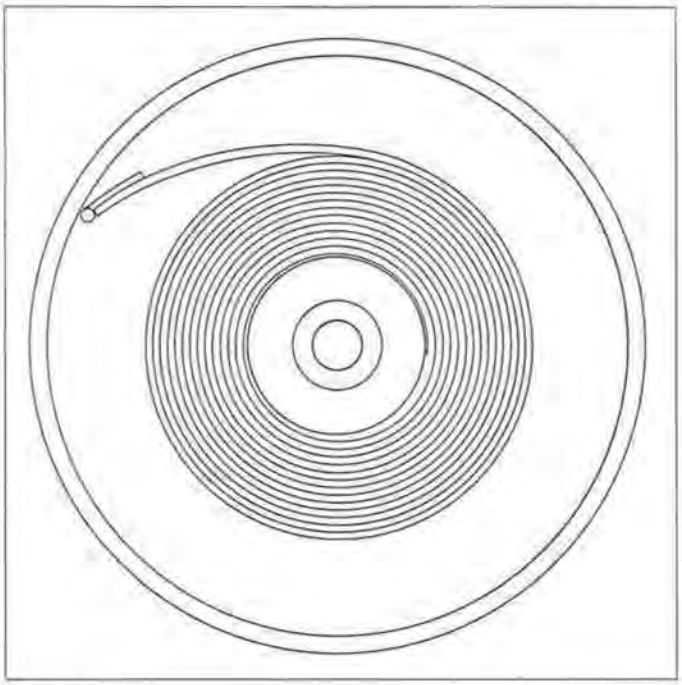


Figure 4.

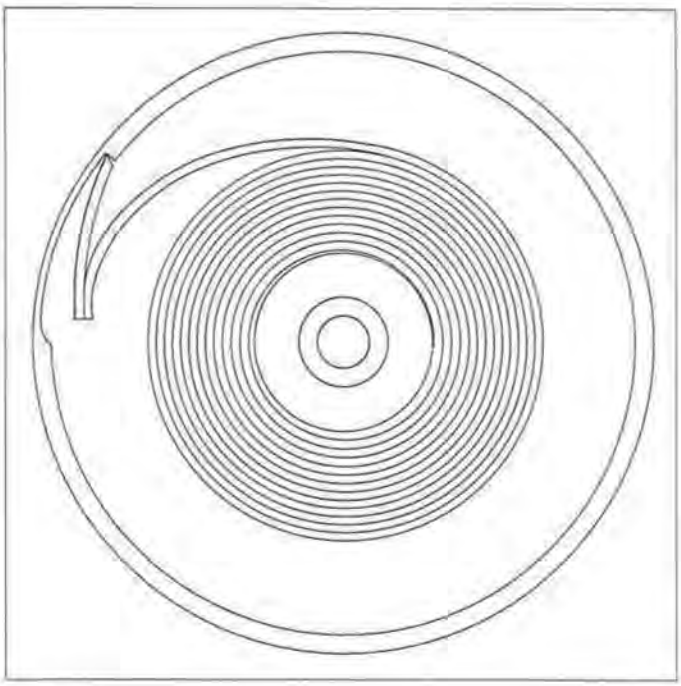


Figure 5.

grade watches with motor barrels.

View G shows a stamped tongue end mainspring. The loose end of the tongue fits into a slot in the wall of the barrel. This end piece is used on lower grade watches.

View H shows a regular riveted tongue end. This style of end piece is mainly used in Swiss or European watches. The loose end of the tongue fits into a step milled into the inside wall of the barrel.

View I shows a two-piece tongue end. This style of tongue end is made by forming a small loop in the end of the mainspring. The end of the spring is heated to a red heat and the end is bent outward with the pliers to form a tight loop for the loose tongue to fit into.

View J shows the hook end mainspring. This style of hook is used on fusee watch barrels. The hook is riveted to the mainspring and fits into a hole in the wall of the barrel.

A Comparison of the Different Mainspring End Pieces

Figure 2 shows a hole end mainspring in the barrel in a wound up state. The action of the hole end on its barrel hook is a pivoting action. This loose action of the spring on its hook causes the outside coil of the mainspring to pull away from the barrel wall as the spring becomes wound fully. This type of action leaves very little tension on the last part of the outside coil of the mainspring to drive the watch. This can sometimes cause the watch to stop when it is wound tightly, especially if the watch does not have a recoil click working in the ratchet wheel. It is best if the last part of the outside coil still lies against the barrel wall when the spring is fully wound. Another reason for the coil to stay against the wall of the barrel is so

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the mainspring will remain more centered in the barrel as the spring runs down. If the end of the mainspring pivots away from the barrel wall, as in Figure 2, the mainspring will go against the wall of the barrel in the direction of the arrow and increase the coil friction on the mainspring as it runs down.

Figure 3 shows another hole end mainspring that is hooked onto a hook which is undercut to cause the spring to wedge against the hook so the end of the spring is held against the wall of the barrel at all times. This allows power to be built up in the outside coil of the mainspring when the spring is wound fully. Also, the spring will stay more centrally located in the barrel during the run-down period.

Figure 4 shows a T-end mainspring and its action in the barrel as the spring is being wound fully. The T-end pivots in its holes in the barrel and cover which allows the outside coil of the mainspring to swing away from the barrel wall similar to the hole end mainspring that is shown in Figure 2. This is an undesirable action for the outside coil.

Figure 5 shows the action of the riveted tongue end mainspring. This type of hook allows the outside coil to pull away from the barrel wall causing an eccentric action of the mainspring coils during the running-down period of the mainspring although the outside coil is tensioned enough to drive the watch when fully wound.

Figure 6 shows the action of a mainspring which has a double brace and hole type end piece. This type of end piece and the T-brace type are considered to be superior to the hole end and the T-end types of end pieces. The double brace and hole and the T-brace allow the coils of the mainspring to remain more centered in the barrel during the run-down period of the mainspring which reduces coil friction.

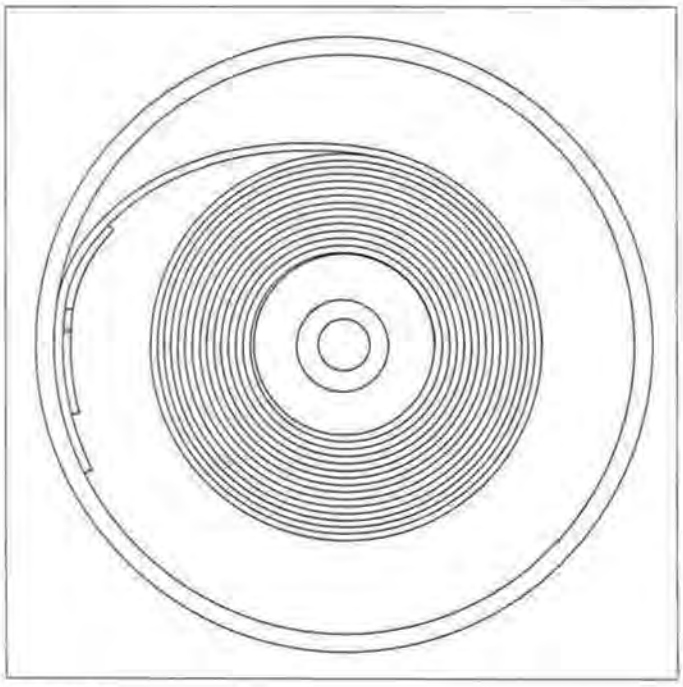


Figure 6.

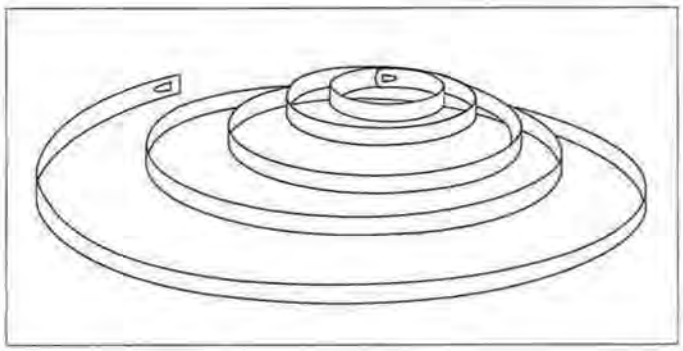


Figure 7.

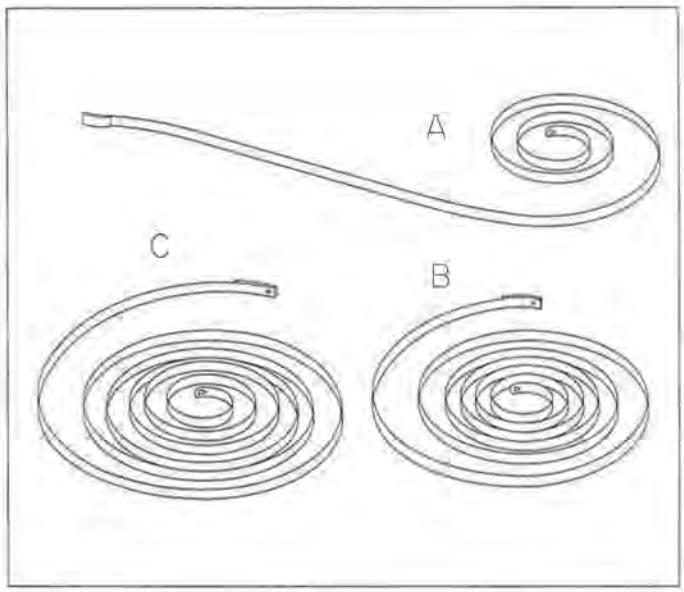


Figure 8.

The Trueness of the Mainspring in the Flat

It is very important that the mainspring be true in the flat. Figure 7 shows a mainspring that is cupped out of flat. This condition can be caused when improperly removing or replacing the mainspring in the barrel. When the mainspring is being removed from the barrel, care must be used to avoid stretching the mainspring as it is carefully worked up and out of the barrel. This cupped condition can also be caused by winding the mainspring into the barrel by hand. The proper mainspring winder should be used to replace a mainspring in the barrel.

A mainspring that is out of flat will exert more pressure on the bottom of the barrel or the cover. This will increase the friction between the spring and the barrel or cover and cause irregular power flow from the mainspring.

A Set or Deformed Mainspring

Figure 8, View A shows a well-shaped mainspring, especially if it has this shape after being used in the watch for some time. View B shows a set mainspring. When a mainspring is set, the coils remain clustered in a small area as shown in View B, Figure 8. A mainspring will become set if it is too soft which is a fault of poor material or being incorrectly heat treated.

A set mainspring does not deliver enough power to drive the watch normally for a 24-hour period. The power of a mainspring is in proportion to the angle that the coils go through during winding. A set mainspring is already mostly wound due to its small diameter in its set state.

View C, Figure 8 shows a distorted mainspring. Some of the coils are touching other coils. The coils are not uniformly spaced. This causes more coil friction because extra pressure will be applied by the close coils on one another when the mainspring is wound and running down. This causes an uneven power release which affects the isochronal rate of the watch. If the coils are badly kinked, the uneven power will be more magnified. A kink in a mainspring can cause the mainspring to fail prematurely. Also, a nick in the edge of a mainspring is a potential break in the mainspring.

The new alloy mainsprings furnish more power than do carbon steel mainsprings with the same dimensions. The alloy mainspring resists becoming set and distorted.

Figure 9 shows the reverse curve formed on the end of the alloy mainspring. This reverse curve adds to the power delivered by the mainspring. View B, Figure 9 shows the same mainspring after being used in the watch for some time. The end of the spring still has some

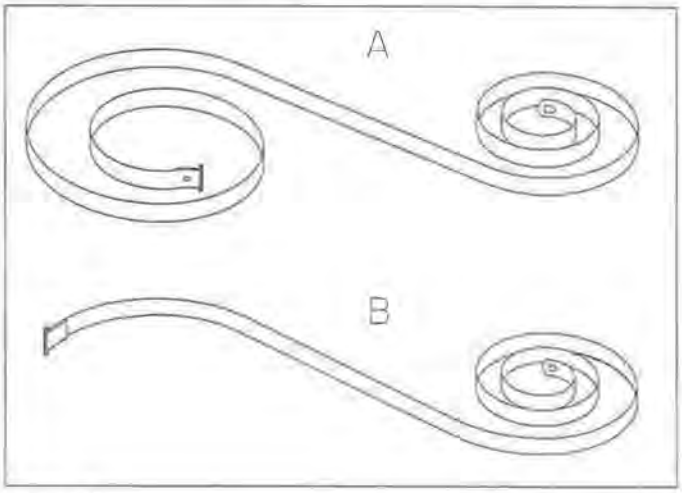


Figure 9.

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reverse curve. It is nearly impossible to find a carbon steel mainspring that will perform this well. The best alloy mainsprings do not loose the reverse curve even after years of service.

Temperature and Dampness of the Air

The changes in temperature and dampness of the air have an effect on the elasticity of a mainspring. Damp air, especially salty air, can cause a steel mainspring to rust. The rust in any defect on the spring can weaken the spring and even cause the spring to break. The mainspring is more elastic in heat and less elastic in cold.

The Finish in a Mainspring

The smoothness and polish on the mainspring is of utmost importance for the best performance of a mainspring. The edges of a mainspring should be rounded, smooth, and polished to reduce the friction of the coils against the barrel bottom and its cover. In order to reduce coil friction to a minimum, the coils should be smooth and well polished where they slide against each other.

Lubrication

The mainspring should be correctly lubricated with the proper type and weight of lubricant. The lubricant should be of a type that has a high oiliness factor that will keep the coils separated. In other words, the oil should stay between the coils and resist being pushed out from between the coils for best results. The oil must not be so heavy that it causes the coils to stick together and resist their movement on each other.

Special mainspring oil and grease can be purchased from watch supply houses. The oil or grease should be applied uniformly to all of the mainspring. One way to do this is to place some of the lubricant on a piece of watch tissue and move the paper along the coils of the mainspring with a pair of tweezers before the mainspring is inserted into the barrel.

The Finish Inside the Barrel

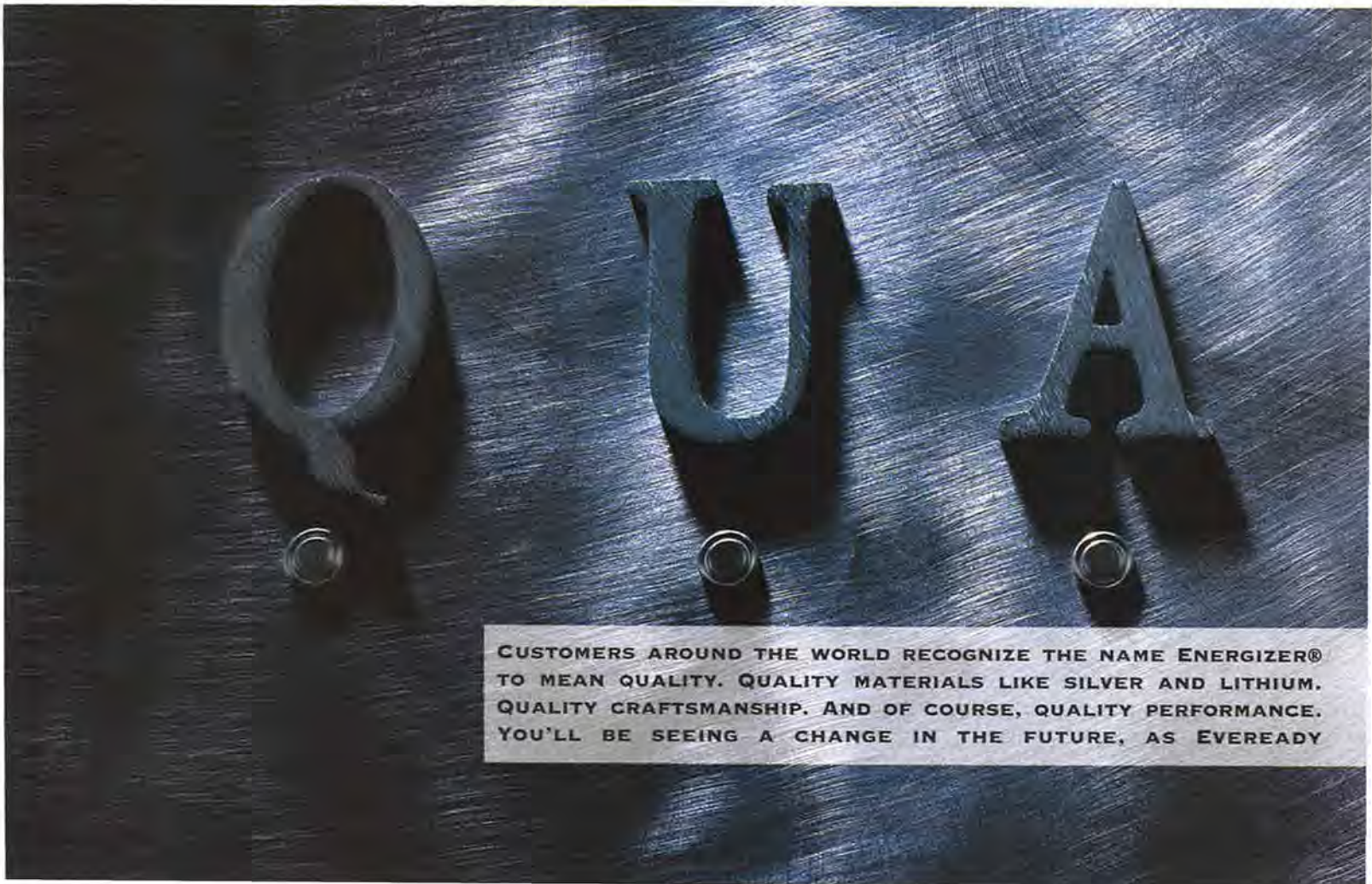
The inside bottom of the barrel and the under side of the cover should be very smooth to reduce the friction of the coils of the mainspring on these surfaces.

Width of Mainspring

The mainspring must not be too wide for the barrel. If it is too wide, the spring will bind in the barrel and reduce the power delivered by the mainspring and may cause the watch to stop. The mainspring should have a freedom of .1 mm between the barrel bottom and cover.

The Fit of the Barrel Arbor

The barrel arbor should fit the holes in the barrel and cover closely but it must not bind. The side shake



should be .015 mm and the end shake .02 mm for railroad-grade watches. The arbor pivots must be correctly oiled.

"Pocket Watches and Their Maintenance" will continue.

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AUCTION

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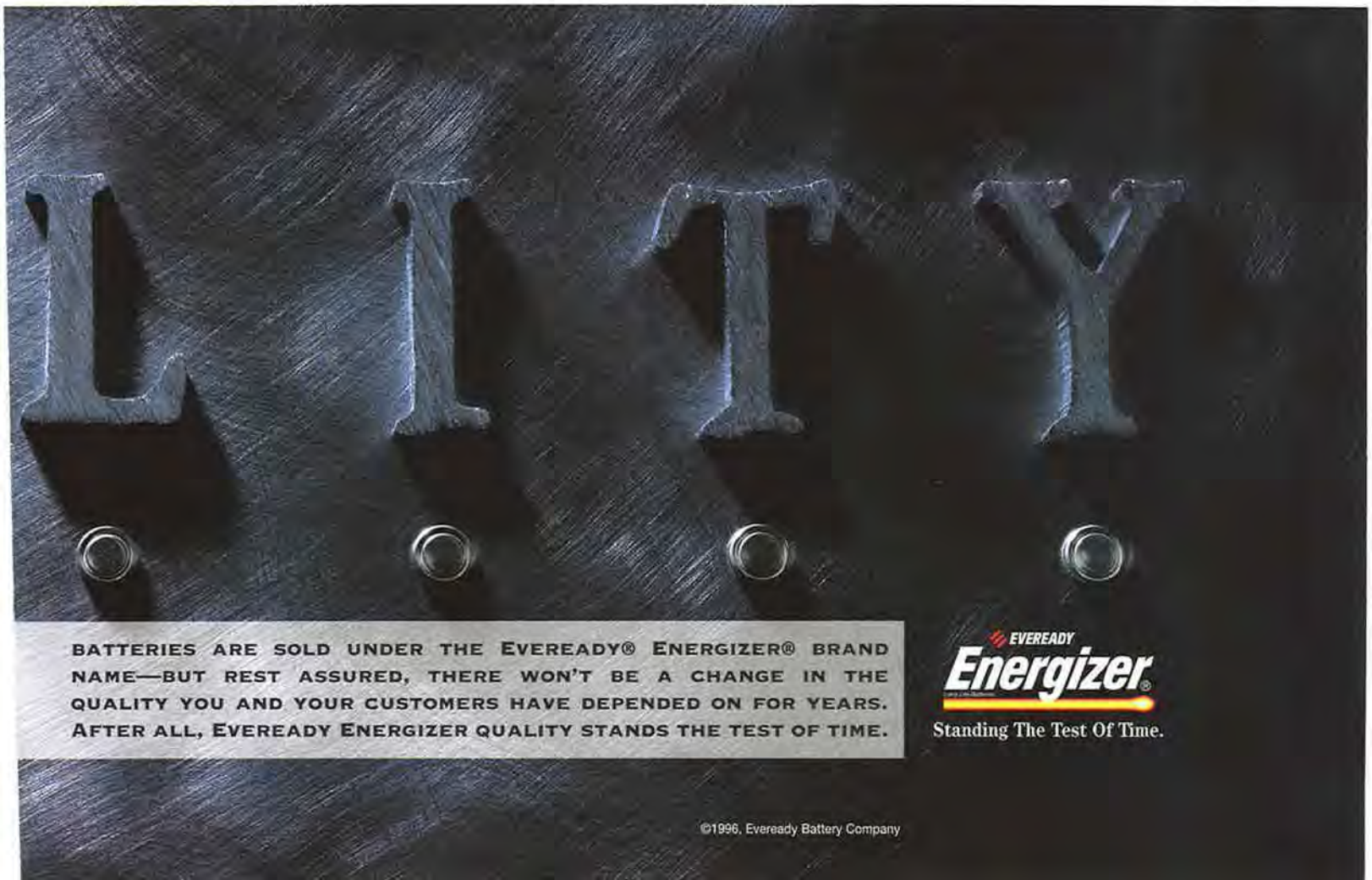
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As a Clockmaker Turns

Your Third Day with the Clockmakers Lathe

J.M. Huckabee,
CMC, FAWI, FBHI

Simple Tools to Restore Bent Arbors and Worn Pivots as "Old Huck" Does It

This is the third in a series of four lathe work examples that the newcomer can learn and practice almost immediately. The work is broken down into a group of simple and logical steps. You can practice these examples with a high confidence of excellent results in a time-efficient job.

Forward

Old American clocks are by no means a "prize antique." However, they are loved by all Americans, and the service trade is filled with the need of high-quality restoration work. Arbor and pivot work often sends one of "Grandma's wedding presents" to the scrap pile, when it should be restored.

Pivots and arbors of these specimens were made from mild steel wire. Therefore, the pieces can be straightened and worked with very little danger of breakage. The practices in this article can be modified and used on movements of higher grade. Test those pieces with a fine-cut file. If hard, they must be annealed first to prevent breakage.

The Tools

We will use some of the most simple tools to do our job. The little faceplate can be used to drive your arbor. I use this if a wheel is very near the arbor-driven end. Otherwise, the tape coupling is preferred. In fact, the tape coupling can be used on almost all jobs.

Study Figures 1 and 2. This is a combination faceplate, driver, and holder for "wheel-in-a-box" work in my shop. Its application is illustrated in Figure 10. Otherwise, I will use the tape coupling throughout the work.

Chuck a brass rod in the lathe. Cut a cup center in a piece about 3/4" long. Now hold this in your lathe tailstock. Cut a similar piece and leave it in the lathe collet. Place your wheel and arbor between these centers and give it a spin. You can immediately detect pivot or arbor bend, or runout in the wheel or pinion.

Look over Figures 3 and 4. This tailstock runner has a cylindrical pocket 1/8" in diameter and 1/2" deep. A lever screw holds the cup center in place. A tailstock collet is also suitable. If you have a lathe without those features, turn a wooden plug that fits finger-tight into the tailstock. Drill the wooden plug such that your brass center will fit finger-tight into the drilled hole. Working stress is low, and the wooden plug technique is totally satisfactory. As you spin the arbor, mark where you have a bend, and on the wheel where there is run-out.

Study Figures 5, 6, and 7. Two small wooden blocks, a small hammer, and a soft flat-faced punch will be used. I use a punch made from a 1/4" brazing rod; brass or mild steel may be used. A hard punch may leave scars on the arbor.

In the event of multiple bends, work on the largest one first. Once the arbor runs true between centers, then work on the wheel. Run-out in the wheel flat can usually be corrected with a bit of finger pressure here and there.

Usually the arbor must be over-formed slightly to remain straight. The merit of these pine blocks is that the arbor may be driven into the wood to achieve that objective. As you study the respective photos, you will see that I made at least five strikes to complete the job. Actually, one of the earlier strikes was just a bit too much.

Drive the Piece Between Centers

In Figures 3, 4, and 8 we prepare to drive the piece between centers. The tape coupling works nicely. It is masking tape and the pieces must be oil free. This gives a test of how the piece will run in your clock movement. The piece will run perfectly true if your straightening work was well done.

The tape coupling is not easy to remove. Beware of sticky residue that may be left in the



Figure 1. Every clockmaker needs a few small faceplates. This one doubles as a driver for work held between centers. It is shop-built.

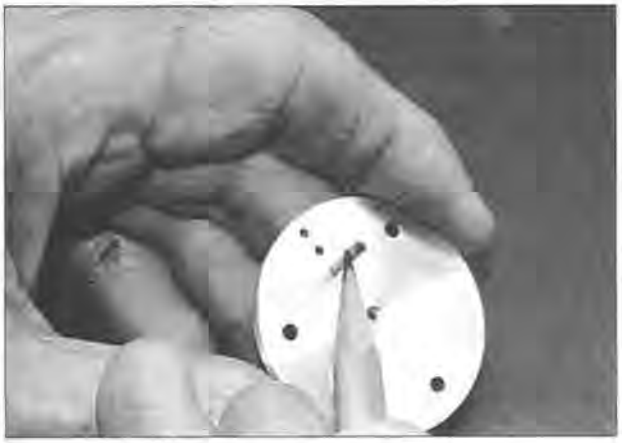


Figure 2. Front view of the Figure 1 faceplate. It is held in a #64 collet. Nice for this project, but it is not required. The drive pin is pegwood.

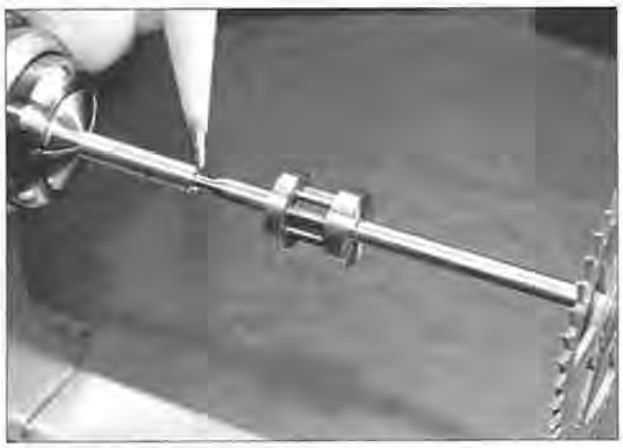


Figure 3. Cut a cup center for your headstock and another for the tailstock. These are 1/8" brass rod stock.

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55-100	5.0-3.0	QH-56Y
55-100	7.0-5.0	QH-57Y
55-100	8.0-5.5	QH-58Y
55-100	11.0-8.0	QH-59Y
60-110	5.0-3.0	QH-60Y
60-110	7.0-5.0	QH-61Y
60-110	8.0-5.5	QH-62Y
60-110	11.0-8.0	QH-63Y
65-100	5.0-3.0	QH-64Y
65-100	7.0-5.0	QH-65Y
65-110	5.0-3.0	QH-66Y
65-110	7.0-5.0	QH-67Y
65-110	8.0-5.5	QH-68Y
65-110	11.0-8.0	QH-69Y
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Figure 4. Spin this escape wheel assembly between the two centers. Run-out at the pinion is bad. The arbor is bent in this region.



Figure 5. Two wooden blocks, a brass or bronze flat-faced punch, and a hammer will do the job. Observe these marks. They were made by the straightening process.

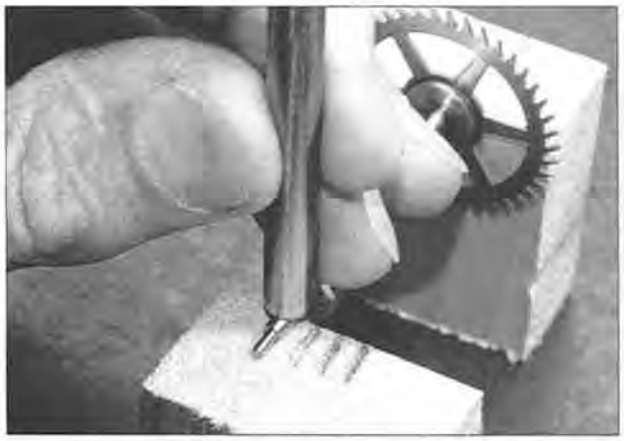


Figure 6. Turn the arbor for high side up. Strike the punch and recheck for error. The arbor is driven into the wood, which permits slight over-forming, so the piece remains straight.



Figure 7. Another view of the process. The blocks are the end-grain of pine wood. The time was two or three minutes.



Figure 8. Place the job between centers as in Figure 3. Couple the drive with a fold of masking tape. Run at slow speed and check your work.

pivot area. I run the point of a hobby knife along the arbor, cutting one side of the tape. Hold the tape tab and roll the lathe knob to peel away the tape. My working practice is to make repairs, clean the pieces and assemble the movement. That takes care of the tape residue.

Rework the Pivots

Figures 9 through 12 show the process of reworking a worn pivot. The assembly is driven by the faceplate carrier technique in Figure 10. If the pivot shows rings of wear, I use a #8 cut, safe-edge file to remove the rings (Figure 10) and finish the surface with a steel burnisher as in Figure 12.

On pivots that are very hard, you may need to use a stone or a bell-metal burnisher with some type of polishing compound. The method illustrated is excellent for the American clocks.

The Pivot Bed

The pivot bed of Figure 9, and others, is made of wood. A hardwood dowel of 1/8" diameter is the raw



Figure 9. Make up a pivot working bed. This is a 1/8" wood dowel. Drill to pivot size and cut away the surface with a knife or sanding disc in a hand-held motor tool.

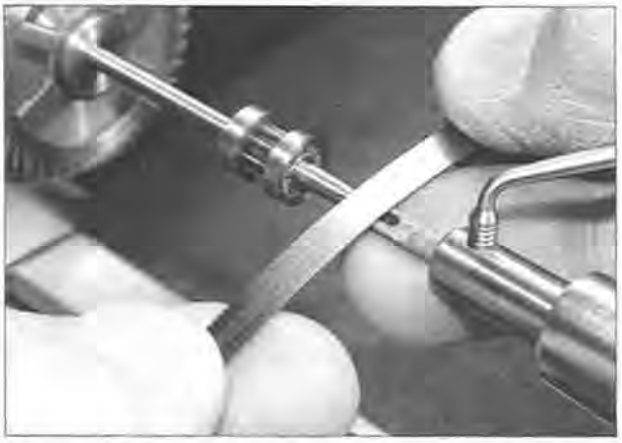


Figure 12. Finish off the job with a flexible burnisher. This one is made from a piece of mainspring with its edges squared up.

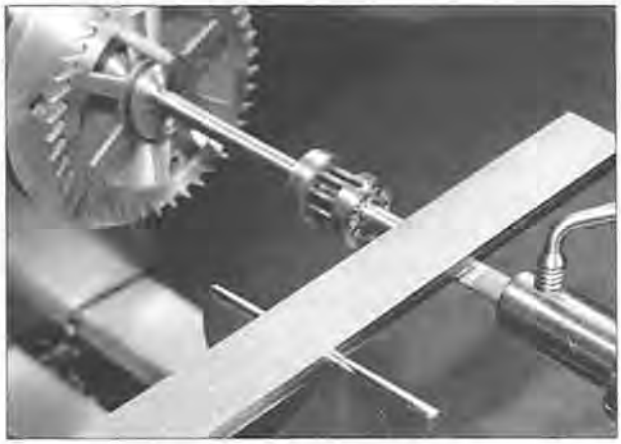


Figure 10. Use a #8 cut safe-edge file for pivots with extensive wear. A burnisher is used on lesser worn pieces. The lathe tool rest is used here as a file rest.



Figure 11. Here, and in Figure 10, the drive method is via the faceplate. In this application it has no real merit over the tape coupling of Figures 3 and 8. Keep the pivot bed flooded with oil.

material. Place a couple of inches of dowel in your lathe, locate center, and drill with a pivot-sized bit to about 5/16" deep. Now touch this down on a sanding disc and cut into the drilled hole. Figures 9 and 11 give the idea. Your arbor pivot should stand about 30% of its diameter above the pivot bed. This is called a half-open center. Really about 1/3 open. Flood the pivot with oil during your work.

Several options are available for holding the pivot bed. One is a collet-holding tailstock, another is the pocketed tail runner used in these illustrations. A wooden plug, with a suitable hole in your lathe tailstock, is also good. There is no great merit of one of these methods over the others. Save your pivot beds. As they wear, use them on larger pivot jobs.

Conclusion

Straightening arbors and wheels, and refinishing pivots can be so easy and results are so good that it is a routine in many clock service centers.

Note that only two lathe collets were used. Had I not shown the faceplate, only a single collet would be needed. Working between centers is simple, fast, and yields a perfect result.

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How to Make a Winding Pinion and Clutch

Part 7
Winding Pinion

Robert D. Porter
CMW

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We completed our cutter for the winding pinion in Part 6. We have just made the pinion blank from drill rod in Figure 37, and it is now ready to have the pinion and clutch teeth cut. Figure 38 shows that we are using a small toolmaker's square against a large cement brass that has been turned and lapped perfectly flat and square to its axis. Thus insuring the milling spindle is square to the work in the vertical plane. The base of the square was then placed against the lathe spindle nose with the edge of the blade against the cement brass and parallel to the lathe bed to check the squareness of the milling spindle in the horizontal plane.

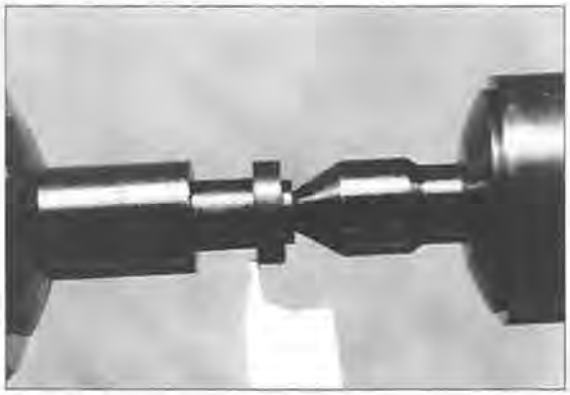


Figure 37.



Figure 38.

Figures 39 and 40 picture a dial indicator being used to check the pinion cutter to make sure it is running true. The cutter is also being set to the vertical centerline of the lathe. The pinion blank was then chucked and indicated in. The lathe attachment we described in the May, 1995 issue of *Horological Times* is being used to support the front of the blank. The tooling arrangement for cutting the pinion teeth is shown in Figure 41. The torsion drive to the milling spindle is a piece of screen door spring with 1/4-28 threaded inserts in both ends that screw into the motor pulley and milling attachment draw bar. Mounting the slide rest as shown gives us a clear view of the work.

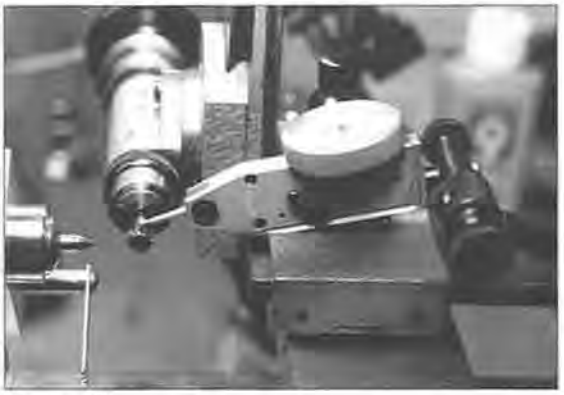


Figure 39.

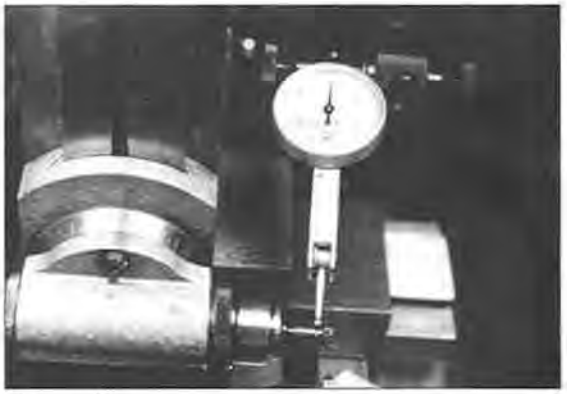


Figure 40.

My home-built indexing attachment is illustrated in Figure 42. It uses a 32-pitch, 120-tooth bronze worm wheel, driven by a hardened and ground single start steel worm. The worm (stock no. W-32HG) and wheel (W-113) were purchased from the Chicago Gear Works, 1805 S. 55th Avenue, Cicero, Illinois 60650 and are still available should you want to make an attachment for your lathe.



Figure 41.

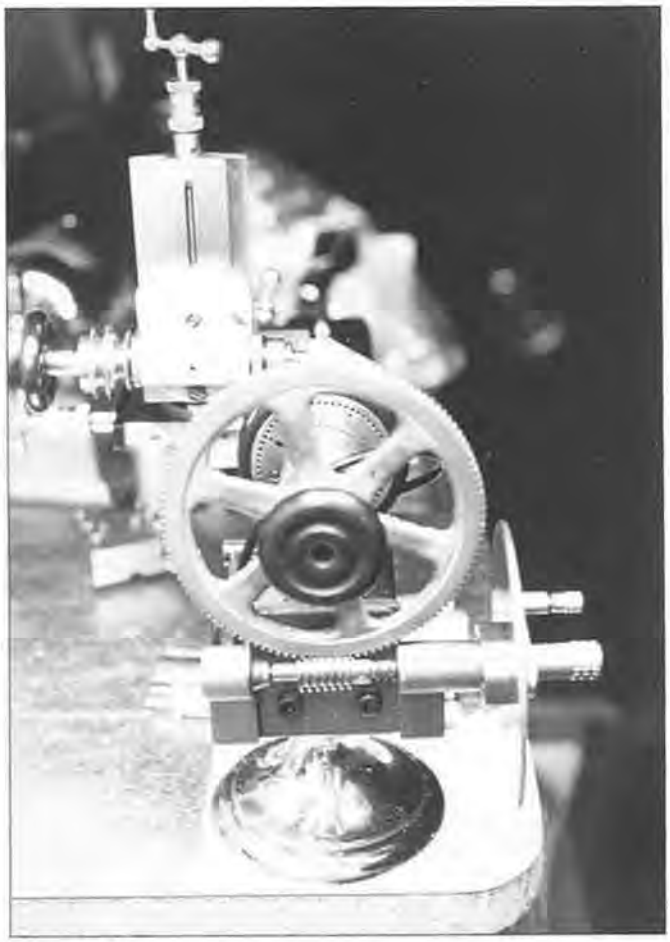


Figure 42.

The book, *The Watchmaker's Lathe*, by Ward Goodrich describes a similar attachment and also has a chart giving the hole circle and number of turns to be used for nearly any indexing division a watch or clockmaker will need. This book can be borrowed from the AWI library.

The pinion teeth are being cut in Figures 43 and 44. Subtracting the 4.38 mm minor diameter of the pinion from the 5.88 mm major diameter gives us 1.5 mm, and then dividing by 2 gives us the .75 mm (.0295") working depth of the cutter. A dial indicator was used to monitor how far the cutter was lowered from "touch-off" at the top of the pinion blank to the working depth. As you can see, cutting gears is messy work as the cutter and the part must be kept flooded with oil during the process. Since our cutter is not backed off like the (expensive, when you can get them) factory cutters, we must use a sharp cutter and fine feed to accomplish the task. It's fun to see the complex geometry of a gear emerge from a piece of steel or brass, especially when you have made your own cutter. We'll cut the clutch face in Part 8.



Figure 43.



Figure 44.



A Practical Course in Clock Repair

Pin Lever Escapement

John P. Kenyon, CMC

The same basic mechanical principles are used in the construction of all escapements. The pin lever escapement is no exception. The basic layout of the train is essentially the same as that of a pendulum movement with a balance wheel substituted for the pendulum. This escapement was designed for use in portable clocks, such as alarm and desk clocks. It is also found in inexpensive mechanical watches.

Design

In Figure 1, the pin lever escapement is shown in conjunction with a balance wheel and balance spring, commonly called a hairspring. The balance wheel is illustrated at (A) and the balance staff at (B). The hairspring (C) is attached to the balance staff with hairspring collet (D). The outer end of the hairspring is fastened to hairspring stud (E) with hairspring pin (F). A balance staff bearing is located at (G). The impulse pin is fitted to the balance wheel at (H). The escape wheel is illustrated at (I) and the pallet pins (J) are fitted to the pallet frame or lever (K), which is attached to arbor (L). The fork is shown at (M).

Operation

When impulse is supplied by the escape wheel (I) to lever (K), thrust is transmitted by fork (M) through impulse pin (H) to the balance

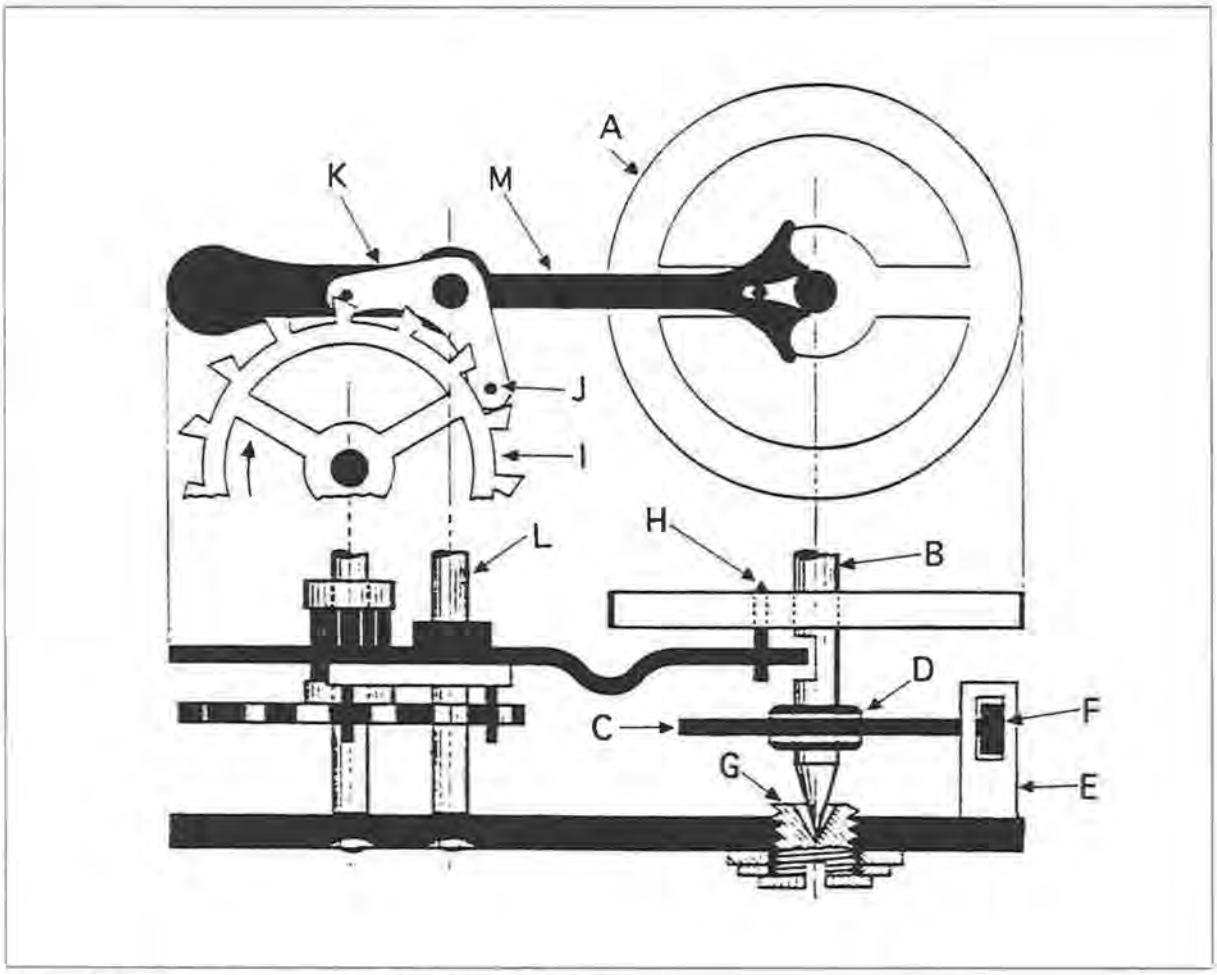


Figure 1. Pin Lever Escapement With Balance Wheel

wheel (A), causing it to turn 1/2 - 3/4 of a turn under the tension of hairspring (C) until the impulse pin arrives at the position shown in Figure 2. After the balance wheel comes to a stop, the motion is immediately reversed. The escape wheel unlocks and gives impulse to the balance wheel in the opposite direction, returning the balance wheel and impulse pin to the position illustrated in Figure 1. As each impulse is completed, the escape wheel drops and locks on the opposite pallet pin. The hairspring controls the motion and number of vibrations made by the balance wheel in a given time. This action continues until the power of the mainspring is insufficient to cause an impulse.

During impulse, the fork is allowed to pass the balance arbor through a notch cut in the arbor (see Figure 1). After impulse, a solid section in the arbor prevents the fork from passing the balance arbor. The fork is designed to prevent the escape wheel from unlocking when the impulse pin is completely out of the notch of the fork, and to insure safe clearance between the horn of the fork and the balance wheel arbor.

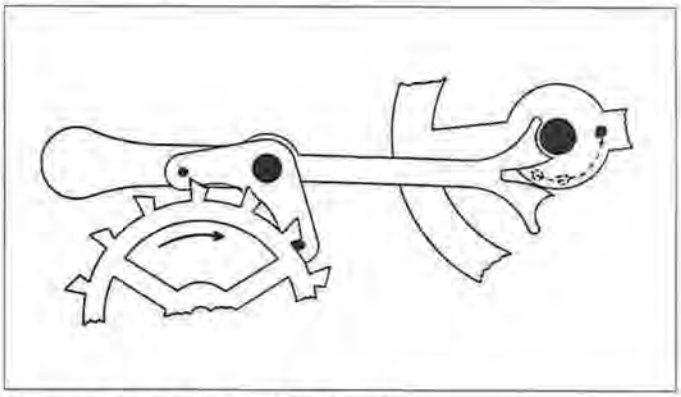


Figure 2. Fork Position After Impulse

Cleaning and Oiling

With an overhaul, the balance assembly should be cleaned and oiled. Note the precise point at which the hairspring is pinned and remove the pin that holds the hairspring to the stud block. Remove the top bearing cap or bridge and then remove the balance wheel. String the parts on a dip wire and immerse them into any good ultrasonic or hand clock cleaning and rinsing solutions. Dry them thoroughly over gently blown warm air. When all surfaces are completely dry, reverse the procedure to reassemble. The hairspring must be repinned at the same spot. The top and bottom bearings are lubricated with clock oil. Be very careful not to get oil onto the hairspring.

Adjustment and Repair

A clock movement operating with a hairspring balance unit must be in excellent overall repair to be a good timekeeper. Often, attempts to repair sluggish motion are directed to the balance assembly when the trouble is

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actually caused by friction in the movement itself. Generally, the balance unit will not need repair unless it has been dropped or mishandled. Some problem areas are discussed in the following sections.

Pivots

Usually the pivots of the balance arbor are tapered to a sharp point and run in tapered center bearings that are threaded into holes in the clock plate (see Figure 1). End shake of the balance arbor is adjusted by turning one of the end bearings in or out until the ends of the pivots rest on the incline of the cone of the bearing (not in the apex). This will reduce the friction. Figure 3 illustrates the situation when the ends of the pivots are worn. The additional surface in contact with the bearing at the end of the pivot creates additional friction and causes increased end shake of the balance arbor which could allow the escape wheel to unlock at the wrong time, permitting the fork to overbank. To correct this condition, the pivot must be set up in a lathe and ground with a sharp hand stone to the original shape, then polished and slightly rounded.

Very hard pivots may cause pits to wear in the bearings and create high friction. This can be corrected by turning the position of the bearing (slightly) to introduce a new surface of contact to the ends.

Figure 3. Worn Pivot



Pallet Pins

When an impulse is completed and the escape wheel drops, the locking corner of the tooth should drop safely over the center of the pallet pin; otherwise, immediate impulse will be given by the tooth in the opposite direction. This occurs when the pivots or pivot holes on the pallet and/or escape wheel arbors are worn.

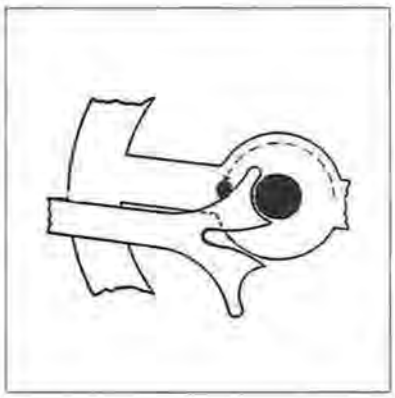
Adjusting the Beat

In the balance wheel movement, the escapement is designed to automatically start as soon as sufficient power is applied to the escape wheel. The beat or impulse position of the escapement is illustrated in Figure 1. With little or no power on the escape wheel, the pallets, fork, and balance wheel should assume a position where the impulse pin is in the notch of the fork and on the line of centers of the pallet and balance arbors, while one of the pallet pins is resting on the impulse face of a tooth of the escape wheel. The hairspring collet can be adjusted so that there is no tension on the hairspring when the balance wheel is at rest in this position. The escape wheel will supply an impulse to the balance as soon as the mainspring is wound enough to supply sufficient power.

Overbanking

Overbanking occurs when the fork passes the balance arbor while the impulse pin is out of the notch of the fork. The fork ends up on the wrong side of the line of center to receive the impulse pin in the notch when it returns. The impulse pin comes to rest against the outside of the fork as shown in Figure 4. This is caused when the pallet arbor pivots and/or balance arbor pivots or pivot holes are worn.

Figure 4. Overbank Position



Hairspring

a) Removing and Replacing

When removing a hairspring, make a slight bend close to the stud hole before taking out the pin, so that it can be repinned at exactly the same place. Turn the balance wheel to free the outer coil of the hairspring from the stud hole and the regulator pins. Hold the movement a short distance above the bench with the balance down and turn the balance arbor bearing enough to allow the balance to fall away from the movement. This technique will prevent tangling of the hairspring. When replacing the balance, the hairspring must be carefully placed between the regulator pins and through the stud hole. The impulse pin is placed in the notch of the fork on the line of centers. The balance arbor bearing is turned in to adjust the arbor for end shake, and the hairspring is pinned. The spring should remain flat and parallel to the balance wheel, and the collet must be in alignment with the stud hole when pinning the spring in the stud.

When selecting a new hairspring, be sure the diameter of the outer coil falls between the regulator pins

and the second coil is free of the inner pin, while the collet is centered over the balance arbor bearing (see Figure 5). Check the adjustments of the spring by shifting the regulator pins to the various positions and observing the clearance of the spring between the pins. It should be the same in all positions of the regulator.

Figure 5. Centered Collet

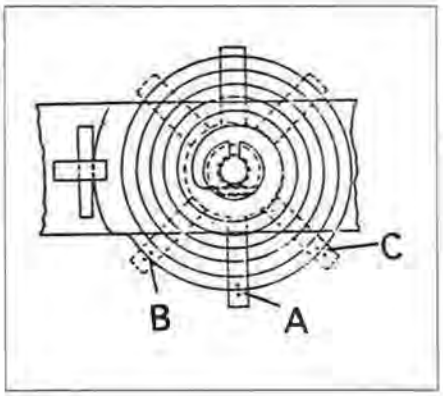


Figure 6. Distorted Hairspring

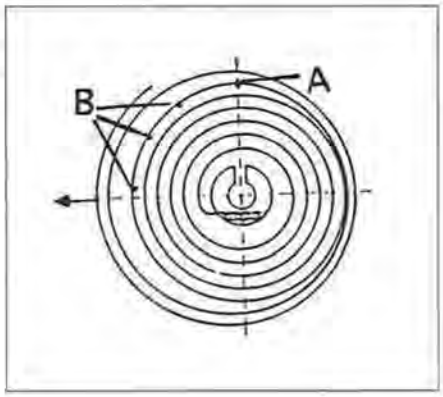
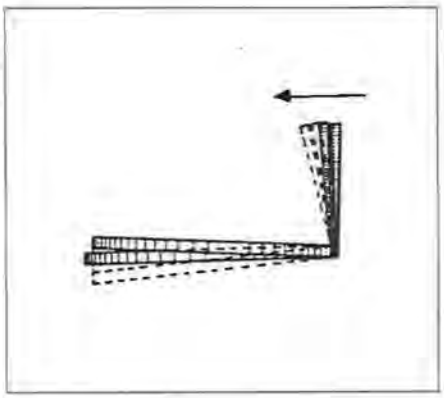


Figure 7. Hairspring That Is Not True In The Flat



b) Adjusting the Collet

Before the hairspring collet is removed from the balance wheel, mark the location of the outer end of the spring on the edge of the balance wheel with a small scratch to facilitate replacing it in the correct position. With little or no power on the escape wheel, the impulse pin and the fork should assume the impulse position described above. If not, remove the hairspring pin and shift the position of the spring in the stud. To adjust the collet on the balance arbor, place a thin-bladed screwdriver in the slot and turn it on the arbor, or hold the collet with small, smooth-jawed pliers and turn the balance.

c) Distortion

When a hairspring has become distorted, as shown in Figure 6, it can be corrected by holding the spring rigid between the points of a pair of tweezers at (A), and applying pressure to the spring at point (B) with another pair of tweezers (or a needle). Press in the direction of the arrow until the spaces between the coils of the spring are equal on opposite sides.

Hairsprings may be found that are not true in the flat (one or more of the coils that do not lie in the same plane as the others), as shown in Figure 7. The coil(s) may be aligned by holding the spring rigid at the bend with one pair of tweezers and twisting the coil with another pair of tweezers until it is back in alignment.

Vibrating a Hairspring

Since the hairspring is the timing element, a spring of sufficient thickness, breadth and length must be used. Strength is governed by thickness and breadth, while number of vibrations is controlled by length. A hairspring is selected by trial and error on a balance wheel by a process called vibrating. The spring is placed on the balance arbor and pinned to the stud and the lever is removed so that the balance can vibrate freely. The balance is then started in motion and the number of vibrations in one direction are counted for 60 seconds and multiplied by two. If the count is found to be higher than the number required, the length of the spring is too short and the clock will run fast. It can be corrected by "letting out the spring;" that is, making it longer by changing the pinning point. If the count is found to be lower than the number required, the length of the spring is too long and the clock will run slow. It can be corrected by making it shorter ("taking up the spring"). Balance wheels with hairsprings "ready vibrated" can be obtained from some material houses.

Regulation

A movement with a sluggish balance assembly cannot be properly regulated. Any problem in the movement or balance wheel assembly must first be corrected. Fine regulation is attained by adjusting the regulator arm. Regulating information is marked on the plate or bridge near the regulator. Coarse regulation can be accomplished by shortening or lengthening the hairspring at the stud. After regulating, reset the beat if necessary; then, test-run the clock for a week. The rate can be checked with an electronic timer.

Why Didn't This Unusual Watch Catch On?

By Kathleen H. Pritchard

Trevor Power of Annandale, Virginia, found an unusual watch among his collection. He didn't remember when or where he had acquired it, but it piqued his curiosity. He called on fellow member of the Horological Association of Virginia, Skee Jenssen. Skee has been a leading watchmaker in the Washington area for many years, but he too had never seen a watch like this. Skee was excited enough to photograph the watch and to call AWI headquarters to describe it. He also called me and sent a set of photographs. I was able to tell him about the watch's maker and further research has turned up more of its story.

The watch is a 9 x 13 ligne Swiss wrist watch (see Figure 1). The dial is marked 8 days and LEKTROCHRON (see Figure 2). The movement shows the name OCTO, and gives the information that it is Swiss, 15 jewels, two adjustments, and patented (see Figure 3). It has a split balance, two mainsprings, and a Breguet hairspring. The main wheel is between the two barrels. It has an intermediate



Figure 1. Trevor Power's Eight-Day Watch (Photograph by Skee Jenssen.)



Figure 2. Dial of the Watch (Photograph by Skee Jenssen.)

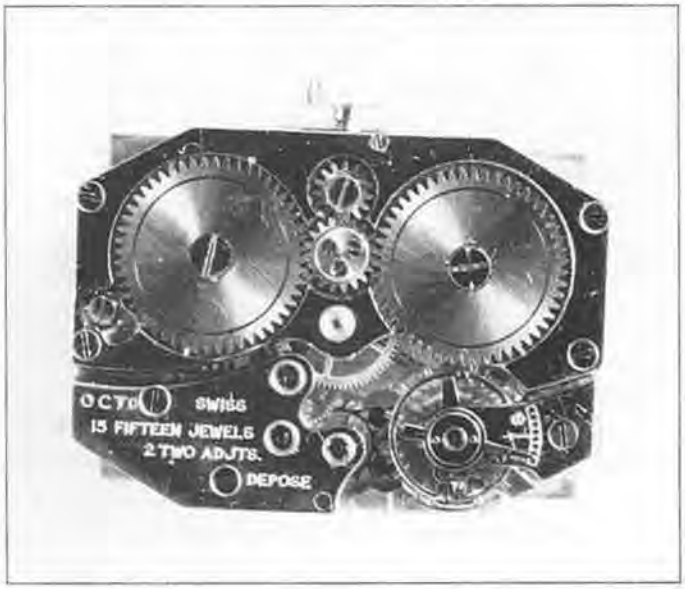


Figure 3. The Watch Movement (Photograph by Skee Jenssen.)

winding wheel and one pusher. The setting mechanism is shown in Figure 4. The appearance of the movement, case, hands, and dial indicate a date in the 1930s.

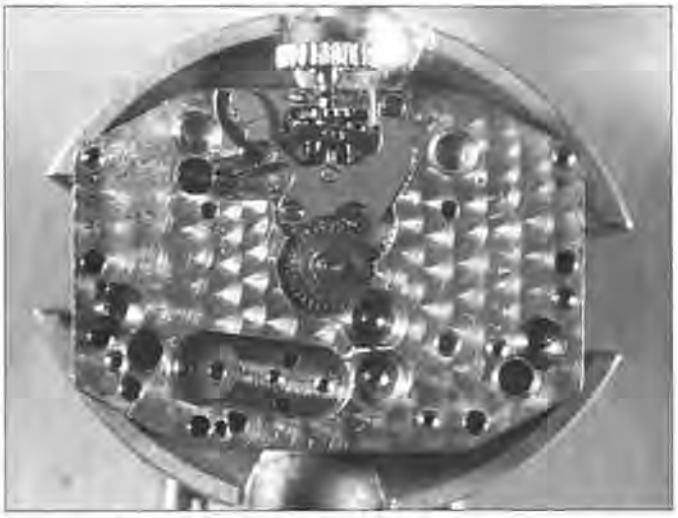


Figure 4. Dial Side of the Watch Movement (Photograph by Skee Jenssen.)

Who was OCTO? The full name of the company was Ernest Tolck, Montres Octo SA or Ernest Tolck, Fabrique Octo. It was located in La Chaux de Fonds, Switzerland. From the time of World War I it was advertising 8-day lever watches for automobiles, carriages, airplanes, and motor bikes under the brand names "Logic" and "Octo." From 1920 on they also produced wrist watches.

In 1930 Ernest Tolck, Fabrique Octo was granted Swiss Patent No. 141602 for an eight-day wrist watch. In 1932 the company also registered "Octo" as a trade mark for use on eight-day wrist watches. I found many ads throughout the 1930s for a watch with a movement the same as Trevor's. I selected some illustrations from the *Indicateur Davoine*, a horological directory, to show you the progress of this eight-day wrist watch. In 1932 the advertised movement is the same as Trevor's but on each mainspring barrel is the patent number, 141602 (see Figure 5). The surface of the dial and the case are both engraved with triangles, unlike Trevor's watch which is plain. The 1933 ad shows the same movement and patent number (see Figure 6). One wrist watch in the ad is plain as is



Figure 5. 1932 Ad Showing Swiss Patent No. 141602

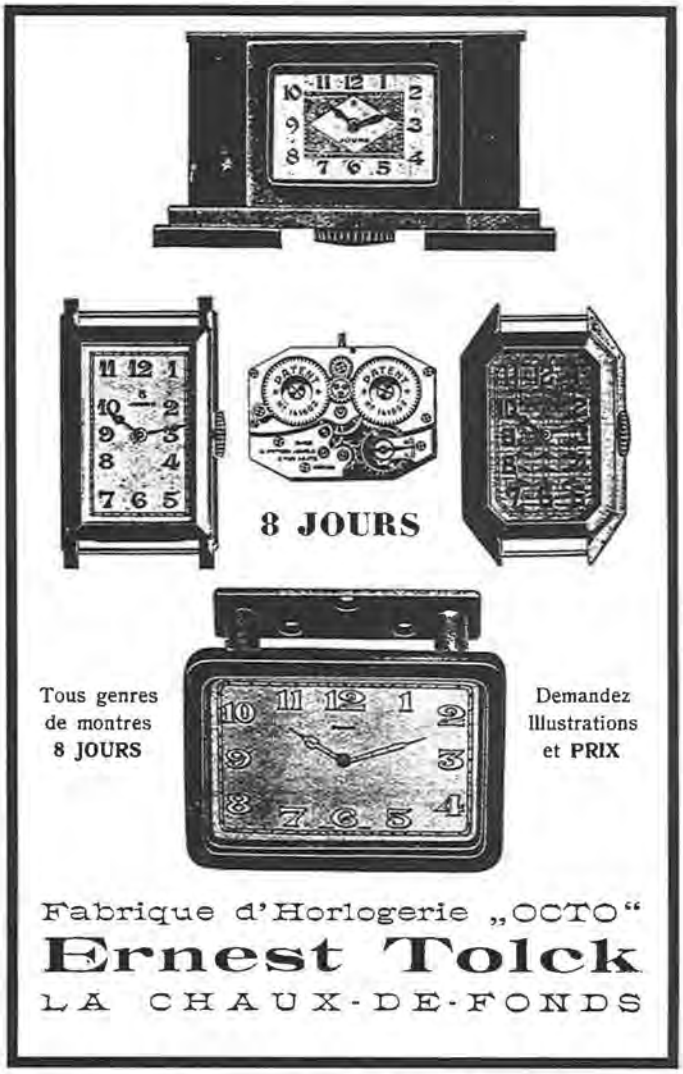


Figure 6. 1933 Ad Showing Two Styles of Wrist Watch

Trevor's, another has cut-off corners. In 1934 an ad again showed the movement but did not show a whole watch (see Figure 7). The ad offers all kinds of 8-day watches, of guaranteed quality, for use on automobiles, airplanes, small clocks, easel clocks, pocket watches, and wrist watches. A 1936 ad showed the movement again, with the same wrist watch as in the 1932 ad, and an automobile clock (see Figure 8). A 1937 ad was the same as 1936, except that the automobile or airplane clock was shown face on (see Figure 9).

After this spate of advertising in the 1930s the patent wrist watch did not appear again. In the early 1950s the company moved to Bienne. It took out another patent in the 1960s for a watch compass, "a totally magnetic watch." The company seems to have disappeared shortly after that.

The one item I have not been able to trace is the name on the dial of Trevor's watch, LEKTROCHRON. I found no such name in listings of Swiss brand names, nor in American import names. Perhaps some reader has other documents that will reveal the source of the name, and that may lead to more information.

So what happened to the eight-day wrist watch? Apparently after the vigorous five-year advertising campaign it still had not achieved its hoped for popularity. I suppose buyers did not mind winding a watch every morning before putting it on. Some of the eight-day watches were certainly sold outside of Switzerland, hence the example we are looking at. The watch remains as an interesting wrinkle in the history of watchmaking.

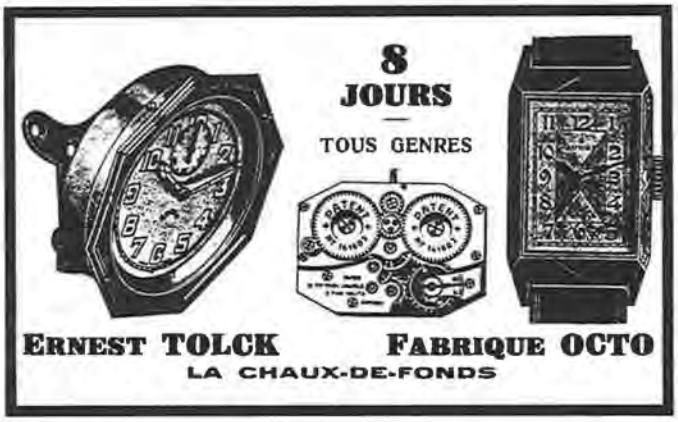


Figure 8. 1936 Ad

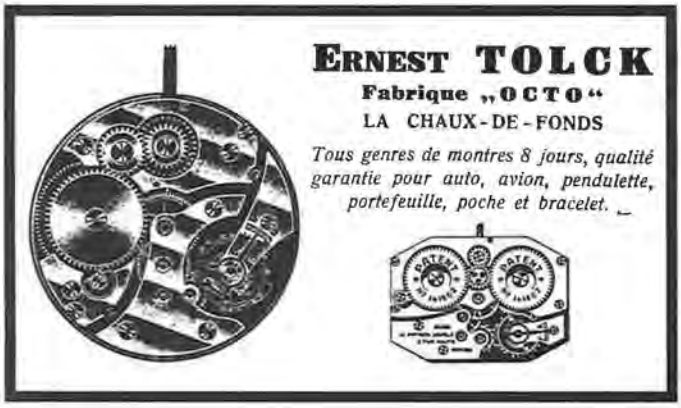


Figure 7. 1934 Ad Listing Types of 8-Day Watches Offered



Figure 9. 1937 Ad

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1M2 Univeral Chronograph 281 balance complete (#721/?).

1M4 Elgin 657 escape wheel with both cone pivots or complete movement. (#C/C657)

1M5 Bulova 10 CPACO one-piece cannon pinion for offset center wheel.

1M6 Hamilton 992B lower roller. (#644)

1M8 CH Meylan (Swiss) 12 size dial (Marcus & Co., New York).

1M9 Eveco SAV 7, 12-12½ ligne (skeletonized) balance staff, balance complete or movement complete.

1M10 LeCoultre 426/2 balance wheel or hairspring.

1M11 Hamilton 914 (serial #1773486) 4th wheel flat arm (old part #1294, new part #661071) and 4th wheel swedged arm (old part #1293, new part #661070).

1M12 Movado 395 movement or wheels and winding setting parts and barrel

1M13 LeCoultre 310-5321 Aircraft Clock hammer spring and pillar wheel jumper minute hand (#8350/1).

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George Graham Bracket Clock, Part 35

Leo A. Jarsolaw

Introduction

In Part 34 we completed the cabling and set-up of the fusees. We now will start to assemble the quarter strike (chime) mechanism.

36. Install chime hammer block. (See Figures 35.1-35.3.)

36.1. Place hammer block on the inside of the rear plate, just under the right upper pillar.

36.1.1. Thread and secure the two screws (105)

37. Install chime pin cylinder (26).

37.1. Check if quarter strike gathering pallet (69) is installed. (See Figure 35.4.)

Note: If not, install and pin it.

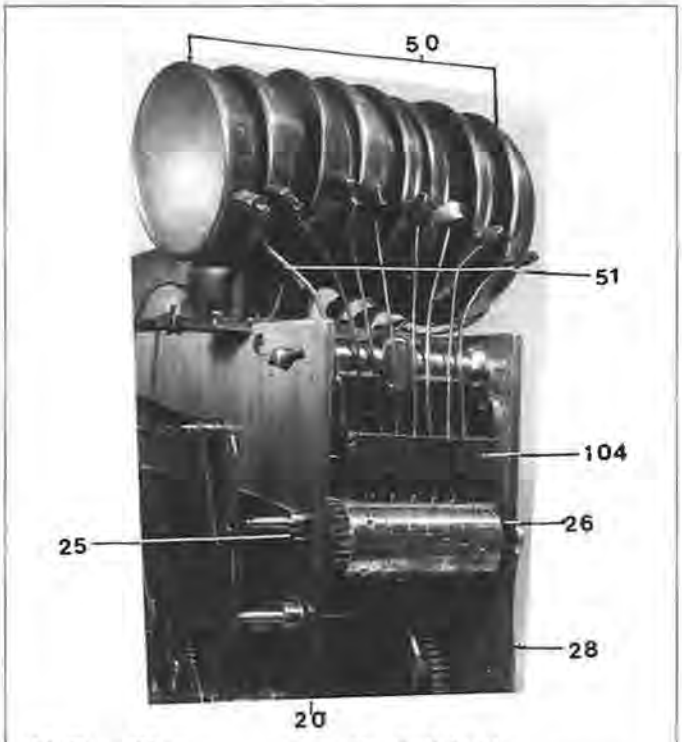
37.1.1. Place gathering pallet in the stop position against the stop (72).

37.2. Insert chime cylinder arbor (25) into its hole in the front plate. (See Figures 35.1 - 35.3)

37.2.1. Engage the pin cylinder drive wheel (shown but not numbered on the left side of the chime cylinder (26) in Figure 35.2), with the second wheel.

Note: The timing in this engagement should be with the first bell pin (30) about to be contacted by the #1 hammer tail. Some run to gather speed before contact is normally required. When properly timed there is a run before bell #1; and essentially, the #8 bell pin must have released its hammer tail.

In this clock the positioning of the pins were not perfect. There were slight differences in each of the rows. After several trials and adjustments, I was able to have all rows release the eighth hammer. However, some of the first pins did not have the free run. In



20 Front Plate
25 Chime Cylinder Arbor
26 Chime Cylinder
28 Rear Plate
50 Bell Stack
51 Chime Bell Hammers
104 Chime Hammer Block

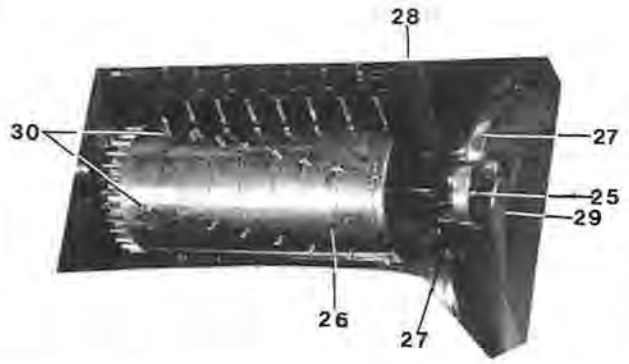
Figure 35.1. Quarter Strike Components

practice, there was enough power even with the fusees run down, to initiate the quarter strike.

37.2.2. Attach chime cylinder cock (27) to the back plate with the arbor (25) in its hole in the cock.

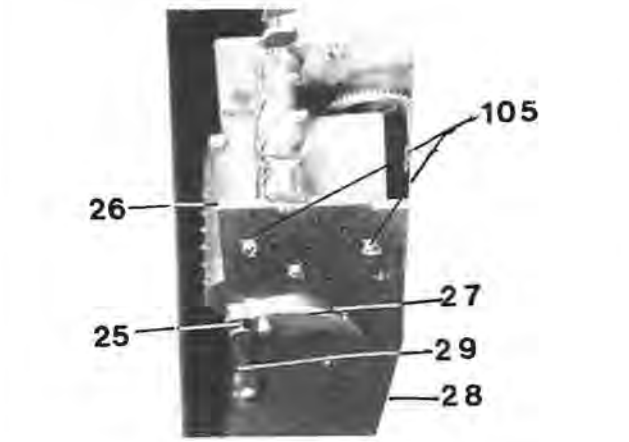
Note: The shift spring (29) is left off until the final timing is complete.

37.3. Check timing of the pin cylinder.



25 Chime Cylinder Arbor
26 Chime Cylinder
27 Chime Cylinder Cock
28 Rear Plate
29 Cylinder Shift Spring
30 Double First Bell Pin

Figure 35.2. Chime Cylinder



25 Chime Cylinder Arbor
26 Chime Cylinder
27 Chime Cylinder Cock
28 Rear Plate
29 Cylinder Shift Spring
105 Hammer Block Mount Screws

Figure 35.3. Chime Cylinder Back Plate Details

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MYN-Flat with Narrow Gold Trim	Limited sizes available
MBW-Flat with wide Black Trim	18.0mm to 34.0mm
MBN-Flat with Narrow Black Trim	18.0mm to 32.0mm
PSM-Prism with No Trim	18.0mm to 32.0mm
PSY-Prism with Gold Trim	18.0mm to 32.0mm
PSB Prism with Black	18.0mm to 32.0mm
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BMG/T-Flat, 1.2mm		15.0mm to 31.0mm
SMG-Flat, 1.5mm		16.0mm to 33.0mm
XB-Flat, 2.0mm		17.5mm to 36.0mm
SDB-Flat, 2.50mm		18.0mm to 32.0mm

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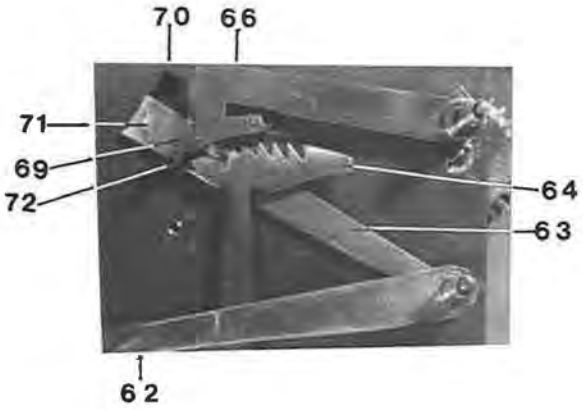
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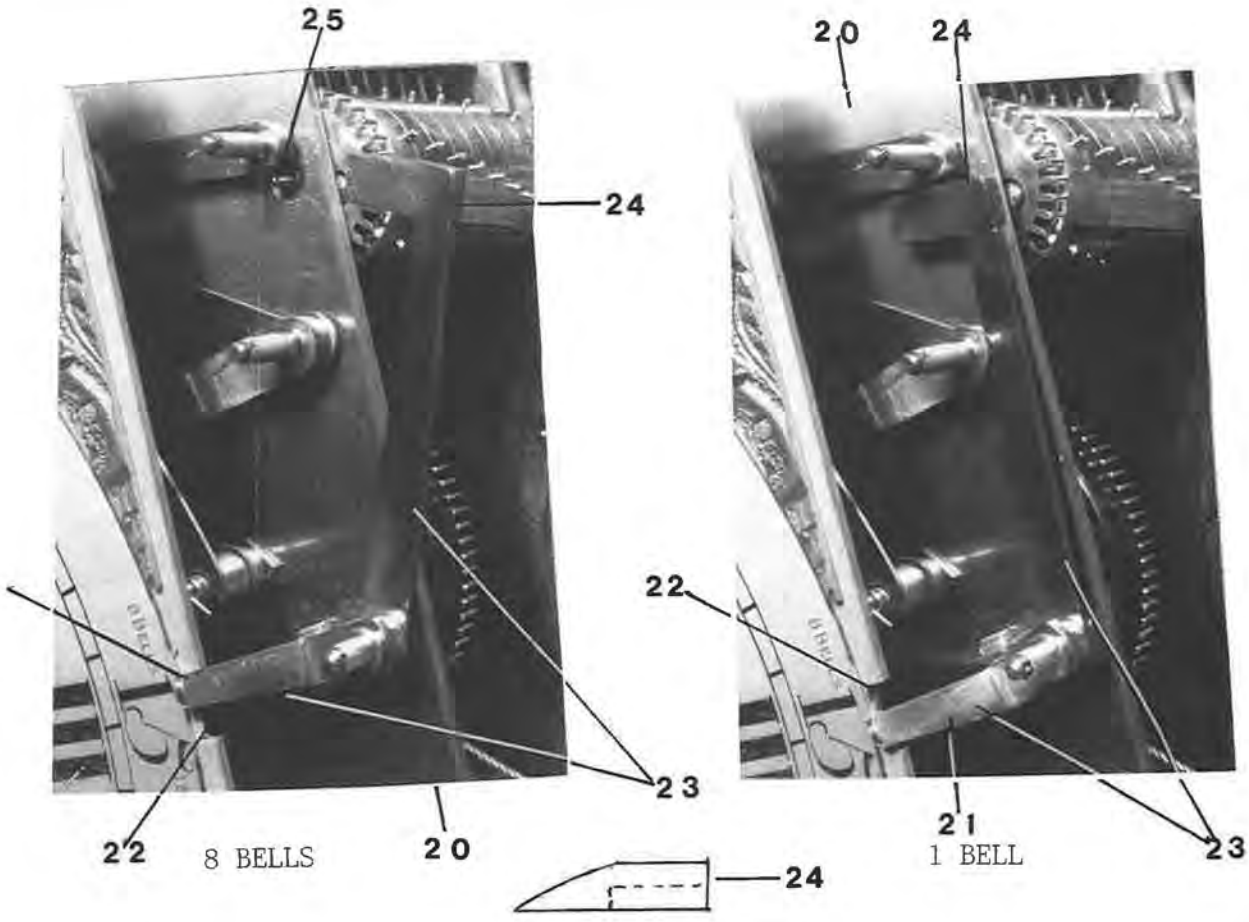
37.3.1. Release quarter rack hook (66). (See Figure 35.4.)

37.3.2. Manually rotate the quarter strike through a complete cycle.

37.3.3. Check that pin #8 has dropped the eighth hammer tail, and there is some space between the #1 hammer tail and the first pin. If not, correct.

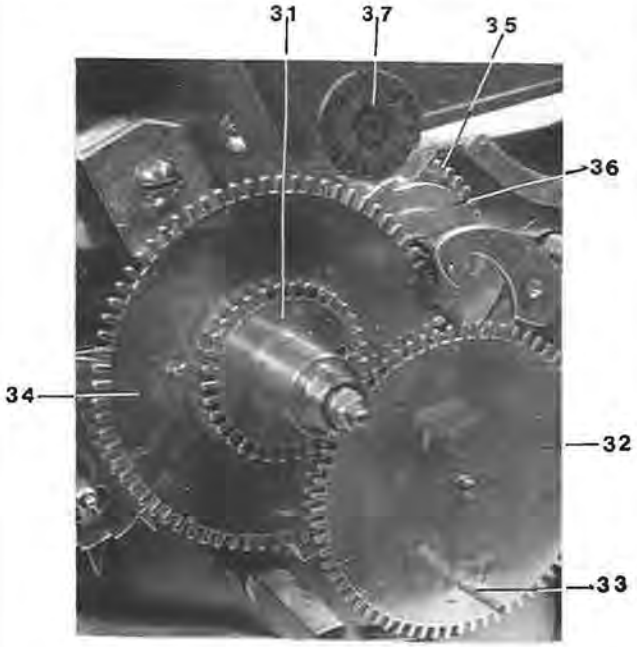
Note: To change timing of the pin cylinder (26). Loosen or remove the pin cylinder cock (27) on the backplate. Reposition the cylinder one or more teeth on the drive gear in the direction to correct. Replace cock, recheck and re-adjust as necessary.

Figure 35.4. Chime Control Details



20 Front Plate
21 Bell Control Lever
22 1-Bell/8-Bell Slot
23 Chime Control Assembly
24 Shift Cam
25 Chime Cylinder Arbor

Figure 35.5. Chime Bell Control



31 Calendar Pinion
32 Calendar Wheel
33 Calendar Acuator Pin
34 Hour Wheel
35 Minute Wheel
36 Quarter Snail
37 False Pendulum Bob

Figure 35.6. Calendar Gearing

37.4. Install pin cylinder shift spring (29), with a dab of grease on the arbor (25) contact point.

Note: This spring moves the cylinder from the "1 bell" to the "8 bell" position when the bell control lever (21) (Figure 35.5) is shifted The 8-bell position is normal. The shift cam (24) in the 1-bell position compresses the arbor against the spring (29) as the cylinder is shifted. (See Figures 35.2 and 35.3.)

37.5. Install the chime control assembly (23). (See Figure 35.5.)

Note: The chime control assembly consists of the bell control lever (21), the shift cam (24), and the connecting arm (not numbered).

37.5.1. Rub a dab of grease on the curved section of the shift cam.

37.6. Install the dial temporarily.

37.6.1. Check action of the 8- to l-bell shift lever within the slot (22).

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Note: The cylinder should shift completely from the 8- to the 1-bell position within the slot, and vice versa, without binding. If binding, correct as necessary. If correct, complete the following steps.

37.7. Remove dial to complete the motion work assembly.

37.7.1. Install minute hand temporarily. Check for hour position.

37.7.1.1. Rotate hour snail to the 12 o'clock position.

37.7.1.2. Remove minute hand.

37.7.2. Install hour wheel/pipe (34). (See Figure 35.7.)

Note: The timing mark on the hour wheel lines up with the exposed leaf of the minute wheel pinion. (See Figure 35.6.)

37.7.3. Install calendar wheel (32). (See Figure 35.6.)

Note: The calendar actuating pin (33) should be in the 3 o'clock position, with the hour snail at 12 o'clock (see Figure 35. 6). Pin is shown at 6 o'clock in this photo.

37.7.4. Install the false pendulum plate (81). (See Figure 35.8.)

Note: This plate goes behind the false pendulum (37).

37.7.5. Check operation of all systems.

Note: For the test, wind each train spring one turn. If all operations check okay, install the dial.

This concludes Part 35. In part 36 we will install the dial and continue with the reassembly of the movement.

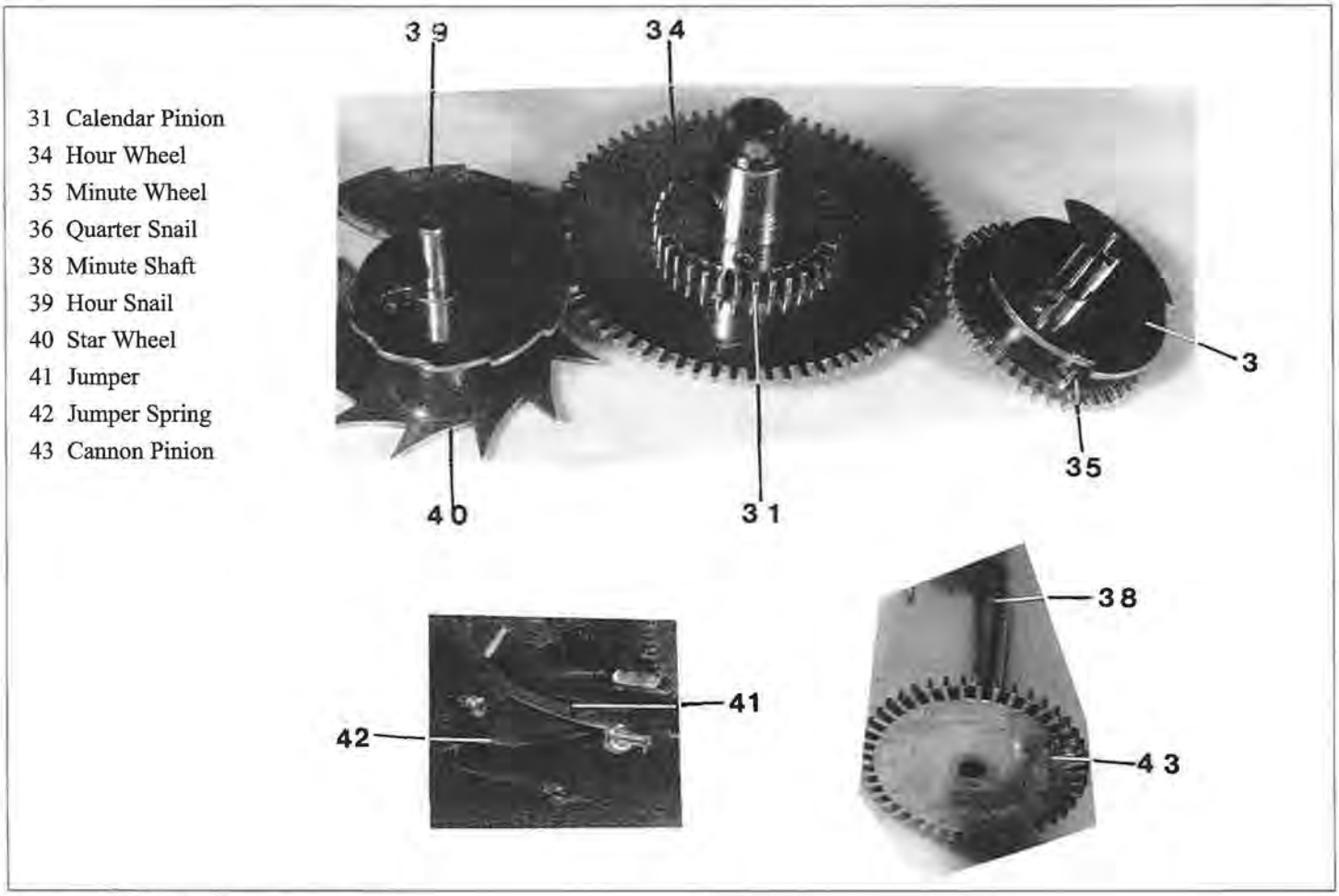


Figure 35.7. Motion Work Components

12 Chime/Silent Lock Lever
16 Strike/Silent Lock Lever
20 Front Plate
23 Chime Silent Assembly
31 Calendar Pinion
32 Calendar Wheel
34 Hour Wheel
37 False Pendulum
39 Hour Snail
40 Star Wheel
41 Jumper
42 Jumper Spring
76 Hour Warning Lever
79 Hour Warning Spring
81 False Pendulum Plate

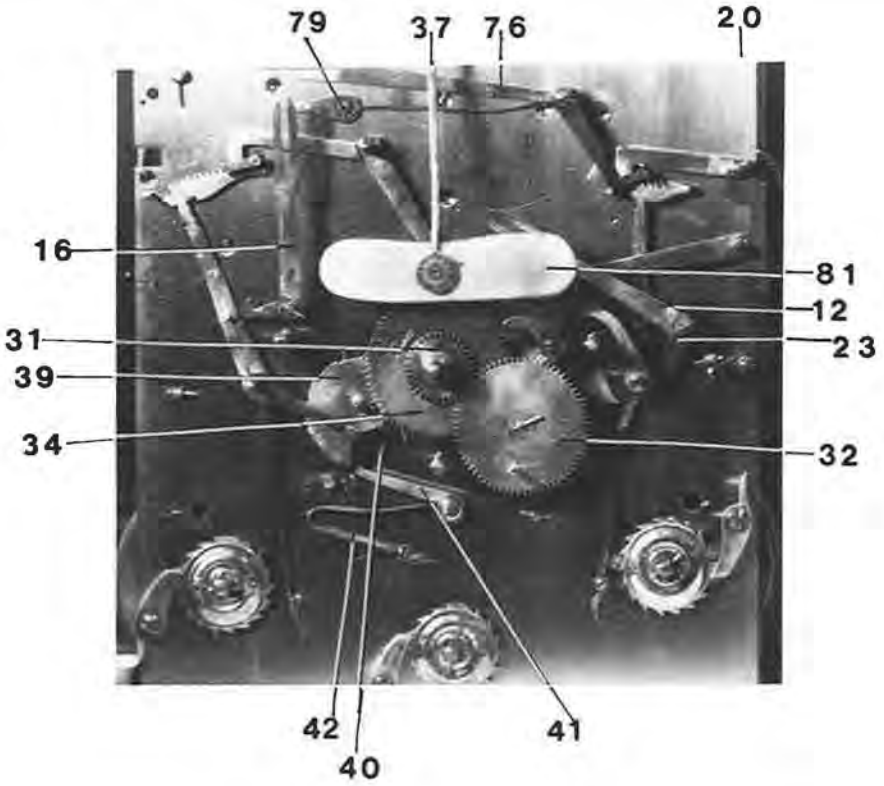


Figure 35.8. Front Plate Components

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From the Workshop

Be Careful of These Bogus Watches

Watchmakers have seen counterfeit watches ever since brand names became important in the nineteenth century. Swiss copies of Waltham watches bore names such as Waldham Watch Company and model names such as P.S. Barzlett. The plates and jewels were made to resemble an American-made watch. They were deliberately made and engraved to deceive the buyer. A close inspection would reveal they were copies of a well-recognized brand name and also style of movement. They must have been sold in fairly large numbers as many of these 100-plus-year-old watches are still around today.

The watch counterfeiters did not give up in this century. They changed their methods a bit. They often just changed a dial or a name on a dial so that a low-cost watch was made to bear the actual trademark of a higher priced watch. The cases were even stamped with a counterfeit trademark. These watches were always easy for the watchmaker to recognize because he knew what an Omega, a Patek Philippe, or a Rolex should look like. The experienced watchmaker was seldom fooled by these watches for more than a few seconds. The customers for these counterfeit watches generally understood they were buying bogus merchandise because the price paid for the watch was so low as to be unrealistic. The street price for the counterfeit Rolex, Tag Heuer, Omega, and Patek is often as low as $30.

I thought that was the end of the story until I examined a small box of watches brought to the annual AWI meeting by previous president Charles Cleves. In the box were several Rolexes which are bought on the street for $30. There was no problem in identifying these as counterfeits. They just did not look like a real Rolex. The hands, the dial, and the case were of the type we see on $30 fashion watches. These watches just bore the counterfeit trademark. Then he showed me what at first seemed to be an antique bubble back Rolex. I removed the back and saw the typical covered automatic mechanism with the weight rotating the full 360 degrees. The case was stainless and appeared appropriately worn considering its age. The dial and hands also appeared to be correct for the case. Then Charles asked me to remove the movement from the case and I was shocked. The movement was a new ETA 7-3/4 ligne automatic mounted beneath the phony Rolex backplate. The entire backplate was a polished casting made to look like a Rolex. This was a brand new counterfeit antique watch. This was not made to sell for $30 on a street corner but for hundreds of dollars to an unsuspecting buyer. Someone had worked very hard to produce this counterfeit. I thought I had seen it all until he then showed me a Presidential-style woman's watch featuring an 18K case, bracelet, and a genuine Rolex movement. Okay I thought, what could be wrong with this one? The movement was genuine and that was no problem. The stampings on the case and bracelet were good quality and all of the case numbers appeared to be legitimate. After telling me this case and bracelet were counterfeit he asked me to look closely with a powerful loupe paying close attention to the hallmarks on the case and back. Next he had me compare them to those on a completely genuine Rolex he had in the box. Sure enough, there were some subtle differences. The hallmarks were not stamped into the case as crisply as a genuine and there was one small difference in the picture in the hallmark. The counterfeit case was almost new and the outer edges were not as nicely finished as the genuine article. Overall, this was a difficult judgment to make. Those of us who service these fine watches must take extra care when taking these watches in for service to ascertain that they are the genuine article. It would be very good insurance to record all of

the numbers on the watch case and movement at the time of taking the watch in. This would give the owner of the watch the assurance that he is receiving the same piece back when repairs are completed. You may not be able to always recognize a counterfeit case and bracelet, but do not put yourself in a position that could lead you to be accused of substituting a counterfeit case and bracelet for a genuine one. By recording everything during the "take in" process you can demonstrate that the watch given back is the same one you took in. It's not the way we may want to do business but we must recognize that there are some watches that call for this special procedure.

Keep Your Eye on These "I"s

This past July's column mentioned "I" gaskets for crystals. At that time I confessed I did not know why they were called "I" gaskets.

Thanks to Wit Jarochowski, instructor of horology at Oklahoma State University, who called with a very reasonable explanation. The cross section of these gaskets looks a lot like the letter "I". He also told me that the larger crystal gaskets used in many divers style watches are called "L" gaskets as they have an L shaped cross section. So mind your Ps and Qs, keep your "I" and "L" gaskets in order.

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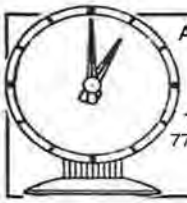
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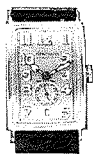
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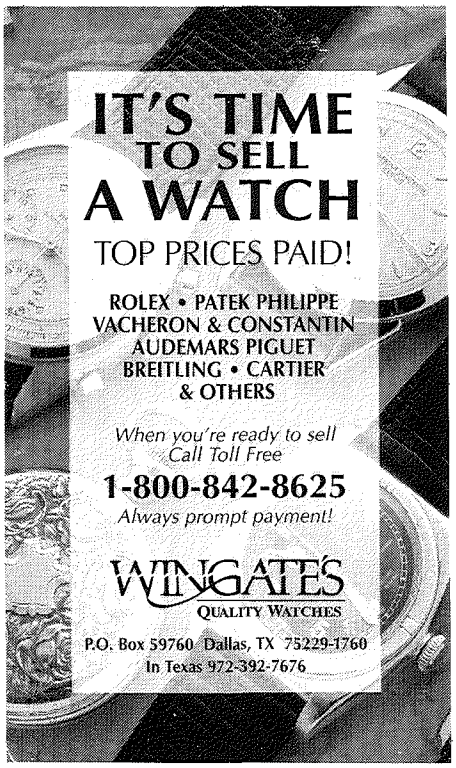


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K&D Clock Bushing Tool

William J. Stewart, Independence, KS, sent a copy of the operating instructions for a K&D Bushing Tool. A copy has been forwarded to Raymond Frazier, West Union, WV.

Mr. Stewart recommends not to press the bushings in too energetically with the tool. This could burr the slots in the spindle, making changing reamers difficult.

Marshall Stock Numbers

William (Bill) Tolbert, Millers Creek, NC, has supplied a list for stems, staffs, and mainsprings in numerical Marshall numbers with corresponding BestFit numbers. The list was produced by B. Jadow so watchmakers could convert their Marshall systems to BestFit cabinets. A copy has been sent to Martin Norman, Prescott Valley, AZ.

ITEMS STILL NEEDED

C & E Marshall Material Cabinet Charts

Michael Okagaki, San Francisco, CA, is looking for two material charts for a C & E Marshall Material Cabinet. The wooden cabinet has 10 drawers, circa 1920s. The Marco System Number is not known, but the rest of the system covers older Swiss material, 4 to 10½ ligne.

He needs a material chart for Setting Levers and Screws, Drawer #4, 160 clear top boxes in a wooden drawer. This drawer appears to contain an assortment of 160 types of setting levers and screws for Swiss watches, roughly 4 to 10½ ligne.

The other chart is for the Setting Bridges, Drawer #7, 160 clear top boxes in a wooden drawer. This drawer appears to contain an assortment of 160 types of setting bridges for Swiss watches, roughly 4 to 10½ ligne.

Vigor TC2000A Timing Machine

Sergio Lotenschtein, Honolulu, HI, is seeking an owner's manual for a Vigor TC2000A mechanical and quartz timing machine.

Portescap Ultrasonic Cleaner Rc-4

R.L. D'Avignon, Syracuse, NY, is seeking a schematic for a Portescap US Ultrasonic Cleaner, Model Rc-4. If anyone has this schematic, AWI will make a copy for Mr. D'Avignon, retain one for our technical files, and return the original.

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DATE	CLASS	INSTRUCTOR	LOCATION	FEE
SEPTEMBER 1998				
12-13	400-Day Clock Repair	Ron Iverson	Austin, TX	$130.00
• 19	Clock Wheel & Barrel Repair	Robert Ockenden	Fort Worth, TX	$ 65.00
OCTOBER 1998				
• 9	Clock Wheel & Barrel Repair	Ron Iverson	Eagan, MN	$ 65.00
• 11-12	Antique Clock Restoration	David Christianson	Eagan, MN	$130.00
17-18	Cuckoo Clock Repair	Jim Williams	Austin, TX	$130.00
24-25	Introduction to Watch/Clockmakers Lathe	Roy Hovey	St. Louis, MO	$142.00
NOVEMBER 1998				
14-17	Phase I-Watchmakers Lathe/Clockmakers Micro Lathe	Roy Hovey	Fairfax, VA	$350.00

AWI Project Extend

AWI's continuing Education Program offers one-week and two-week 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 Project Extend 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, fax or e-mail your registration and payment information to: **AWI Central, 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 your Visa or Mastercard number, card expiration date, signature and phone number. Registrations cannot be taken by phone. All registration fee checks and charges are processed immediately upon receipt.

PROJECT EXTEND CLOCK CLASSES

DATE	CLASS	INSTRUCTOR	FEE
SEPTEMBER 1998			
21-25	Clock Case Restoration	Jim Williams	$250.00
28-Oct. 1	Clock Escapements	Jerry Faier	$250.00
OCTOBER 1998			
5-9	Organize Your Work Habits for Success	Robert Ockenden	$250.00
12-16	Clock Repair Operations	David Carlson	$250.00
NOVEMBER 1998			
2-6	French Clock Repair	Ron Iverson	$250.00

AWI JEWELRY SCHOOL

DATE	CLASS	INSTRUCTOR	FEE
OCTOBER 1998			
19-23	Course I - Introduction to Jewelry Repair	David Christianson	$595.00

PROJECT EXTEND WATCH CLASSES

DATE	CLASS	INSTRUCTOR	FEE
SEPTEMBER 1998			
8-11	Drawing & Understand the Lever Escapement	Jim Lubic	$200.00
14-18	Adjusting & Repairing the Lever Escapement	Jim Lubic	$250.00
21-25	Staffing, Truing & Poising	Jim Lubic	$250.00
OCTOBER 1998			
5-9	American Pocket Watch Repair	Jim Lubic	$250.00
12-16	Hairspring Vibrating & Timing Adjustments	Jim Lubic/Hal Herman	$250.00
26-30	Automatic Winding Mechanisms	Jim Lubic	$250.00
NOVEMBER 1998			
2-6	Calendar Mechanisms	Jim Lubic	$250.00
30-Dec. 4	21st Century Watchmaking	Jim Lubic	$250.00
JANUARY 1999			
19-22	Cross Slide for Watchmakers	Roy Hovey	$240.00
25-Feb.6	Lathe Operations for Watchmakers (12-day)	Roy Hovey	$780.00
FEBRUARY 1999			
8-12	Advanced Turning Between Centers	Ron DeCorte	$250.00
22-26	Chronograph Repair	Jim Lubic/Tamara Houk	$250.00
MARCH 1999			
8-12	Basic Electronics & Meter Reading	TBA	$250.00
APRIL 1999			
7-9	ETA Products	Remy Waelchli	$150.00
12-16	Advanced Quartz Watch Repair	Chip Lim	$250.00
19-23	Repair of the Bulova Accutron	Henry Frystak	$250.00
MAY 1999			
3-8	Phase IV - Wheel Cutting Operations for Watchmakers	Roy Hovey	$480.00
12-14	Shop Management	Fred Burckhardt	$150.00
JUNE 1999			
1-4	CEWT & CMEW Examinations	Jim Lubic	Exam Fee
7-11	CW & CMW Examinations	Jim Lubic	Exam Fee