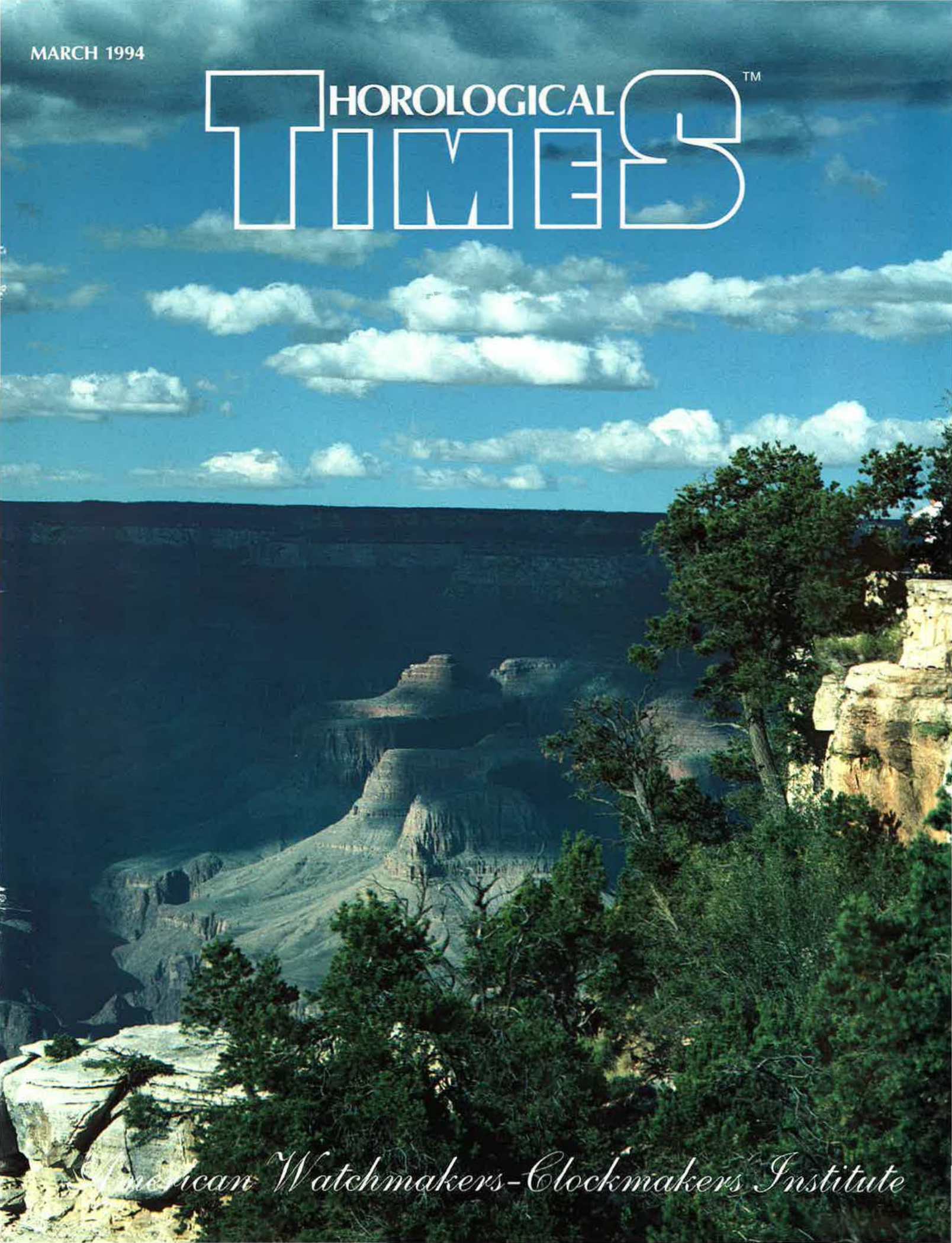
MARCH 1994

HOROLOGICAL TIMES™

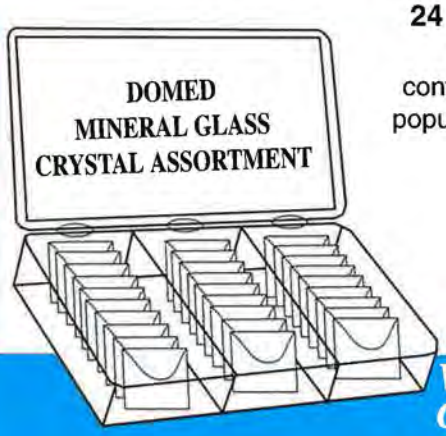


American Watchmakers-Clockmakers Institute

DOMED MINERAL GLASS CRYSTALS

FIRST QUALITY - BEAUTIFULLY FINISHED

OUR LOW PRICES MEAN MORE PROFITS FOR YOU!



24 Piece Assortment $59
Clear styrene storage box contains 1 each of the 24 most popular sizes from 19.0 to 31.0.

48 Piece Assortment $119
Clear styrene storage box contains 2 each of the 24 most popular sizes from 19.0 to 31.0.

Refills Available:
1 Piece . . $3.50
3 Pieces . . $3.00
Compare at $4.50

72 Pc. Master Assortment $179
Clear styrene storage box contains 1 each of 72 numbers covering a broad range of your everyday needs.

WE CARRY A FULL LINE OF WATCH MATERIALS:
CRYSTALS • BATTERIES • QUARTZ MOVEMENTS
YOU CAN HAVE IT ALL WITH ONE CALL!

FREE Special Offer
With Any Above Assortment

Ultraviolet Glass Adhesive In Needle Point Tube
Perfect for Mineral Glass Crystals - Cures in seconds in sun or ultraviolet light.



Same clarity as glass. **Regular $3.95**

ULTRAVIOLET LIGHT SOURCE/CURING LIGHT



- **Made for curing ultraviolet crystal cement.**
- **Takes up very little space on the bench measures only 7-1/2" x 4-1/2".**
- **Simply place watch under the light and in two minutes the UV cement cures hard, like an epoxy.**
- **Includes 6" UV bulb, 5-1/2" cord with 2-wire plug and on/off switch. 110V AC.**
- **Two minute curing time.**

Call Toll Free 1-800-328-0205 Toll Free Fax 1-800-548-9304 24-Hr. Fax Ordering 612-452-4298

Esslinger & Co.

1165 Medallion Drive, St. Paul, MN 55120
Serving The Trade Since 1923

FREE INFORMATION AVAILABLE
Quartz Movements • Crystals & Fittings
Resale Merchandise • Findings
Stones • Tools & Supplies

VOLUME 18, NUMBER 3 MARCH 1994

HOROLOGICAL TIMES™

Official Publication of the American Watchmakers-Clockmakers Institute

Wes Door **2** **PRESIDENT'S MESSAGE**

Henry B. Fried **4** **QUESTIONS & ANSWERS**
French 19th Century Comptoise Clock

Fred S. Burckhardt **6** **ROCK QUARRY**
Who needs money?

Archie B. Perkins **8** **TECHNICALLY WATCHES**
Antique Watch Restoration
Part LXXXXIX

Henry B. Fried **14** **WATERPROOF & WATER-RESISTANT WATCHES**
Part 5

Marshall F. Richmond **20** **PICKLE BARREL**
Jewelry Crafting and Repair
Buckles, Catches and Fasteners, Part I

John P. Kenyon **26** **THE APPRENTICE CLOCKMAKER**
Clock Movement Maintenance
Unit Repairs
Pivot Inspection & Repair, Part 3

Ron DeCorte **32** **THE WATCHMAKER'S LATHE**
Part IV
Making a Dead Center Drive Unit

Marvin E. Whitney **34** **MILITARY TIME**
Zig-Zag and Course Clocks, Part III

Wes Door **36** **SHOP TALK**
Mechanical Watch Repairs

Greg Hostetter **38** **AFFILIATE CHAPTER COLUMN**
Affiliate Chapter Meeting

Eugene T. Fuller, Henry B. Fried **40** **BOOK REVIEW**
The Museum of the American Watchmakers Institute
Patek Philippe

HOROLOGICAL TIMES (ISSNO145-9546) is published monthly and copyrighted by the American Watchmakers Institute, 3700 Harrison Avenue, Cincinnati, Ohio 45211, for $45.00 per year ($4.50 per copy in the United States and $50.00 per year, $5.50 per copy outside the U.S.) Second class postage paid at Cincinnati, Ohio. POSTMASTER: Send address changes to *HOROLOGICAL TIMES*, P.O. Box 11011, Cincinnati, Ohio 45211.

OFFICE HOURS: Monday through Friday 8:00 AM to 4:00 PM (Eastern Standard Time). Closed on all national holidays. PHONE (513) 661-3838, AWI HOTLINE: (513) 661-4636 (24-hour recording), FAX (513) 661-3131.

Club Toothed Escape Wheels 8

All About Buckles, Catches, and Fasteners 20

Two New Books for Your Library 40

DEPARTMENTS

Bulletin Board/**24**
AWI Material Search/**25**
New Members/**29**
Ask Huck/**30**
Association News/**39**
News in the Trade/**42**
Classified Ads/**44**
Dates to Remember/**48**
Advertisers' Index/**48**

HOROLOGICAL TIMES

EXECUTIVE AND EDITORIAL OFFICES

AWI Central
P.O. Box 11011
3700 Harrison Avenue
Cincinnati, OH 45211
Telephone: (513) 661-3838
Fax: (513) 661-3131
AWI Technical Hotline: (513) 661-4636

Milton C. Stevens: *Editor*
Regina Stenger: *Associate Editor*
Donna Baas: *Production Director*

Margie M. Brater: *Circulation Manager*
Nancy Wellmann: *Business Manager*
Mary Sansalone: *Seminar Coordinator*

TECHNICAL EDITORS

Robert F. Bishop
James H. Broughton
Fred S. Burckhardt
David A. Christianson
Charles Cleves
Joe Crooks
Wes Door
Henry B. Fried
J.M. Huckabee
John P. Kenyon
John A. Nagle
Archie B. Perkins
Robert D. Porter
Marshall F. Richmond
Marvin E. Whitney

AWI OFFICERS

Wes Door, CMW: *President*
Joseph L. Cerullo, CMW, CMC: *First Vice President*
Charles Cleves: *Second Vice President*
Fred S. Burckhardt: *Secretary*
Marvin E. Whitney, CMW, CMC, FAWI: *Treasurer*

AWI DIRECTORS

Robert F. Bishop, CMEW, FAWI
James H. Broughton, CMEW, FAWI
Alice B. Carpenter, CMW, CMEW
Gerhard Hutter, CMW
Gerald G. Jaeger, CMW, CMEW, FAWI
Benjamin Matz, CMW
John A. Nagle
Robert A. Nelson, CMW, CMEW, FAWI
Marshall F. Richmond, CMW
James E. Williams, CC

Greg Hostetter, CC: *Affiliate Chapter Director*
Tony Knorr: *Research & Education Council Director*
Alice B. Carpenter, CMW, CMEW: *Immediate Past President*

Milton C. Stevens, FAWI: *Executive Director*
James Lubic: *Associate Executive Director*
David LaFleche: *Administrative Director*
Henry B. Fried, CMW, CMC, FAWI: *Technical Director*

Reprinting and reproduction is prohibited without written permission from the American Watchmakers-Clockmakers Institute. Copyright©1994 by the American Watchmakers-Clockmakers Institute.

★ FELLOWS ★
OF THE AMERICAN WATCHMAKERS INSTITUTE

Robert F. Bishop
James H. Broughton
George Daniels
Henry B. Fried
Josephine F. Hagans
· Orville R. Hagans
Ewell D. Hartman
Harold J. Herman
Gerald G. Jaeger
Robert A. Nelson
· Hamilton E. Pease
Milton C. Stevens
Marvin E. Whitney

· Deceased

President's Message



Many times our inspiration for writing comes from our members, and today's article is no exception. A former member wrote to us after dropping his AWI membership. It seems he was unhappy with most of our encouraging things that we say to entice new people to consider making our trade their career. I would like to review some of the points of his letter without mentioning his name. There is an old saying that there are two sides to every story. Probably both sides of any issue deserves recognition, although in this case I believe his views would certainly be among the minority.

So much for the introduction. The person whose letter we are answering (let's call him "Joe") has a negative outlook on our business. Joe has been repairing watches and clocks for over 20 years, and needs to work many extra hours to make a living. He also must do both watches and clocks to have enough work to do. He cannot charge enough or the customers will not leave the jobs. Parts are too high. We can buy a complete watch for a little more than what just one part costs, especially crystals. AWI should handle parts so our members could buy them at a reasonable price. (Remember, I am still quoting from Joe's letter.) He says it's not our fault at AWI that so many cheap throwaway watches are on the market. It *IS* our fault for not explaining this to our members as this is one of the main reasons Joe cannot get enough work, thereby forcing him to do both watches and clocks and working extra hours to make a living. So much for Joe's letter.

From a more positive viewpoint, we do better and faster work if we have more education in our field. This reminds me of a recent article in the Gemological Institute of America's *Loupe* magazine, written by their president, William E. Boyajian. In his "Message from the President" column he says (in part): "People need training and motivation, now more than ever. I have seen jewelers cut back in these important areas during difficult times and I believe it is a serious mistake." I appreciate the GIA allowing me to quote them, especially since this permission was gained just after their big earthquake.

This brings me to my theme this year. My theme was to help bring all facets of our industry together--the clockmakers, watchmakers, jewelers, jewelry repair persons, and the gemologists. I did not really bring them together, but I tried to let these other facets of our industry know what we are doing at AWI and what *OUR* needs are and how we can continue to work together.

Yes, like the above GIA quotation says, we at AWI must also have training and motivation.

Wes Door

ON THE FRONT: The Grand Canyon. Slide by Jack Goldstein of Cranford, NJ.



SHAILESH SHAH
Designer
Eveready Technology Laboratory
Westlake, Ohio

Screen Test

Before joining Eveready® in 1975, Shailesh Shah worked for an engineering company located next door to Eveready's Edgewater facility. His job change didn't involve a big move geographically but it was a giant step in terms of his career. He has taken advantage of opportunities for experience and training that have prepared him well for the responsible position he holds today. Shailesh has a Bachelor's Degree in Mechanical Engineering. His spare time interests include computers, video photography, and building model railroads.



Shailesh Shah's design skills and understanding of computer technology make him a valuable member of the Computer Assisted Design (CAD) Team. He and his associates are responsible for the design of watch batteries, battery components and the tooling to make those components. The scope of their work includes original designs for new products and improvements on existing designs. The design function, one that a few short years ago was accomplished totally by hand, is today very much a part of the computer age. In the skilled hands of Shailesh and his fellow CAD team members, computers make major contributions to the excellent quality and dependability of Eveready® watch batteries.



the Powerful Difference

EVEREADY®

EVEREADY® WATCH BATTERIES
Exceptional quality and dependability, the result of a sophisticated manufacturing process, a high degree of technical expertise and *people* dedicated to making the difference.

©1991 Eveready Battery Company, Inc.

Questions & Answers



HENRY B. FRIED
CMW, CMC, FAWI,
FBHI, ★FNAWCC

French 19th Century Comptoise Clock

Q I am enclosing a few photographs of an old clock that I recently repaired for a customer. I would appreciate any information that you could give me concerning this clock.

Some of the features include a repeating mechanism that allows the hour strike to repeat approximately two minutes after the hour. There is also an alarm mechanism that is operated by two separate weights. This is governed by a 12-hour brass dial behind the hour hand.

On the dial are the names ROUSSOT-MOREL and below is a CHALON S/S.

My own research would suggest that it is a French Provincial Comptoise Clock from the Jura district.

I hope the above information and photographs will be of assistance.

W. Murray
Port Alberni, B.C., Canada







A I am quite familiar with these clocks, having had a number in my time and still have one. Very few seem to be exact duplicates of another. As you can see, these are typical French of the 19th century and still made on that general pattern in France. Names seldom mean much; sometimes they were those of the rural buyer.

The purpose of the repeat was that the farmer (most often the buyer) when awakened would start to doze off and before he fell asleep again, the repeat strike would tell him the hour.

The pressed brass crest atop the dial represents, at times, patriotic scenes. For those made during the French revolution, pastoral or religious scenes were used. Yours appears to be the manger scene of the birth of Christ.

Henry B. Fried
❑





Send your questions to:
"Questions & Answers"
c/o AWI, P.O. Box 11011
Cincinnati, OH 45211
Please enclose an SASE

METALS FOR THE HOROLOGIST
BLUE RIDGE MACHINERY AND TOOLS, INC.
Steel • Aluminum • Bronze • Brass • Copper Tube • Wire...Hex, Square, Round, Rectangle, Flat, much more!!
Catalog $1.00
800-872-6500
BOX 536-HT • HURRICANE, WV • 25526-0536

DANGER! Don't over oil!

Use Borel's new, exclusive capillary oilers.



Two sizes in a set: .004 and .005 inch holes, specially packaged. Ask for #OL-375B.
Only $16.00

This is the ideal instrument to oil train wheel pivots in today's quartz watches. Other oilers put on too much. Borel's capillary oilers are just one of more than 100,000 specialized watchmaker and jewelry items in the Borel inventory. We work hard to be your best one-stop source for tools, equipment, batteries, watch movements, horological products, findings and supplies. That's why, for three generations, no one beats Borel in inventory, service or price.

Borel

Suppliers to Watchmakers and Jewelers

1110 Grand Avenue, Kansas City, MO 64106

Order desk — 800-776-6858

ROCK QUARRY et tu

Who needs money?



Fred S. Burckhardt

Whenever watchmakers and clockmakers get together, the subject of pricing always enters into the conversation. We must remember, proper pricing only means that you'll make money doing your work. Beings I haven't made any so far, I can see no reason for starting now. But, for those of you who are aspiring to become wealthy, I would like to offer some advice--DON'T! Money only brings with it more problems. Wealthy people aren't happy people. Their wealth can only buy them everything they always wanted.

Years ago there was a watchmaker I knew who worked for years at a store that had a profit-sharing program. He always put in the maximum amount each payday. When he reached retirement age, he had quite a bundle saved up. He bought a new home in the country, a new fishing boat, motor home, and an unlimited supply of Budweiser. All he does now is fish, travel whenever he feels like it, and never thinks about watches or clocks. In fact, he got rid of all the timepieces in his house. Now let me ask you, what kind of life is that? He's not eligible for food stamps, welfare, free hospitalization at the county hospital, or any of the other good things available to the rest of us. It's a sad way to end up. Personally, I enjoy the CARE packages I receive from Europe.



Gem City College

Where Time Can Equal Money

- Watchmaking
- Engraving
- Clock Repair
- Jewelry
- Jewelry Store Management

700 State Street

Quincy IL 62301

(217) 222-0391

There was a time when I thought I would like that kind of life, so I figured the only way I could obtain it was to raise my prices. It didn't last for long. The first day a woman came into the shop and asked for an estimate to repair her watch. While I was checking it, a young man came in. He was acting kind of funny and I sensed there was something wrong. When I got up and told the woman how much it would cost for the repair, the man pulled a gun. The woman let out a loud scream, scaring the fellow, and he ran out the door, right into the arms of a policeman. When I came back in I thanked the woman for screaming and told her the scream saved me from being robbed. She said, "I wasn't screaming at the man with the gun. I screamed when you told me how much it would cost to fix my watch." For some uncanny reason, call it a fifth sense if you will, I had the feeling I set my prices too high. To show my appreciation to the woman, I gave her a two percent discount.

While we're on the subject of making money, did you ever notice the ones in our craft who are always bragging about how much money they make yet they never have a buck in their pocket? Why is that?

Well, it's almost time to file the old income tax return. Last year I claimed 14 dependents. Me, my wife, the dog, two squirrels, and nine rats that live in the shop. I figured if I feed and board them I should get something in return. I don't even know why I bother to file a return. It was really embarrassing last year when I took my return to the accountant. After looking it over, he reached into his pocket and gave me a few dollars. I did get a nice sympathy card from Bill and Hillary.

By the way, if you need any help with your tax return let me know and I'll put you in touch with my accountant, Big Bucks Bransom. He's saved me a lot of money over the years. He should be due for parole in a couple of weeks, at least I hope so. We need good people like him!

❑

MAJOR PRICE *BREAKTHROUGH!*



When you work on the BEST . . . you need the right tools.

Bergeon® Case Opener for Rolex® oyster watch cases

Made in Switzerland. Sturdy construction of die cast alloy. Includes vise, set of 6 rings with intermediate holder. Opener measures 300mm high with a 160mm diameter wheel. Will safely open case without marring.
The Quality of Bergeon at work!

Bergeon Case Opener
CO5700T . . . only $245.00

1/3 OFF!



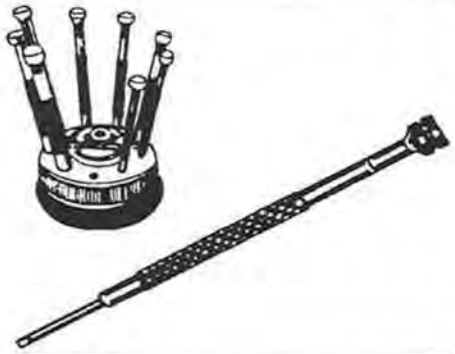
Bergeon® Screwdriver Set

9 Screwdrivers and Blades on a Rotating Stand

Sizes (mm):

0.50	1.00	1.60
0.60	1.20	2.00
0.80	1.40	2.50

SD5970 ..... Reg. $64.50 ..... ***only$44.95***



Of course we STILL Have Genuine **ROLEX PARTS**
including Crowns, Crystals, Tubes and Gaskets. *Larger inventory than ever!*

Special prices good while supplies last.

TC SI TWINCO

TWIN CITY SUPPLY

6150 Wayzata Blvd., Minneapolis, MN 55416-1239
(612) 545-2725
USA: 800-328-6009 FAX: 800-328-6001

© 1994

Technically
WATCHES

Antique Watch Restoration © 1994
Part LXXXXIX

Making Club Toothed Escape Wheels



ARCHIE B. PERKINS
CMW, FNAWCC, MBHI
(All rights reserved by the author)

Unlike the English ratchet tooth escape wheel which can be cut with one cutter, the club tooth escape wheel requires three cutters. Most of the early club tooth escape wheels were made from hard brass. In order for the teeth to have sufficient strength, the wheels had to be made thick and heavy. It is very important to make the escape wheel as light as possible without weakening the teeth too much. The more modern escape wheels are made from steel which is later hardened and tempered to blue. When using steel for escape wheels, they can be made thinner and lighter than brass wheels and still have adequate strength.

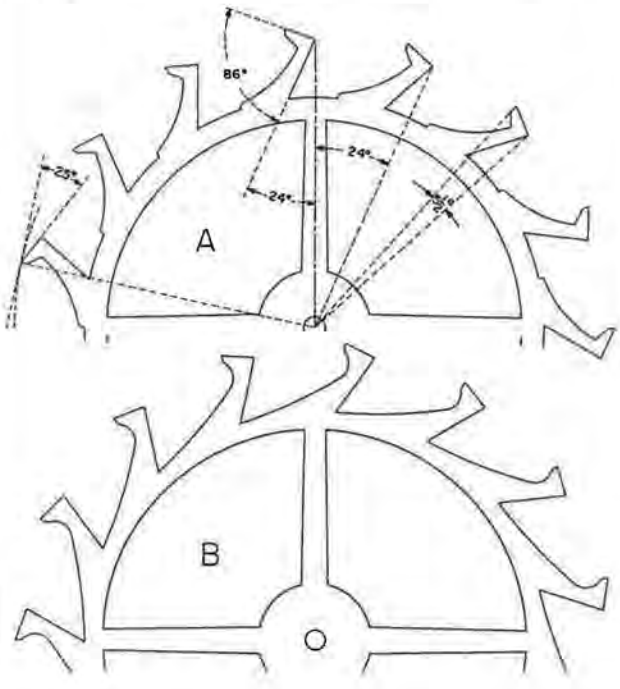
Styles of Club Toothed Escape Wheels
Figure 1 shows the club toothed escape wheel and its specifications. The illustration shows the two main styles of club toothed escape wheels. Club toothed escape wheels can be one of the two styles or they can deviate slightly from one or the other of the styles. The style of escape wheel shown in View A, Figure 1 is one used in early American watch production. The space between the teeth was cut with a concave cutter which cut the fronts of the teeth and the curve of the rim. Then a convex cutter was used to cut the backs of the teeth. This left a step in the wheel rim between the two cuts of the cutters.

The style of the escape wheel shown in View B, Figure 1 is used in most European watches. The bottom of the space between the teeth is shaped with two cutters which form a continuous double curve.

Specifications of Club Toothed Escape Wheels
Figure 1, View A shows the different specifications of the club toothed escape wheel. This wheel has 15 teeth. This makes the pitch of the wheel 24°. The width of the tooth equals 5-1/2°. Note: The width of the teeth can vary from maker to maker. When the tooth is made more narrow, the pallet stone must be made wider and vise versa. A good example of this is displayed in the English ratchet tooth escapement. The teeth of the wheel are pointed and the pallet stones are wide. An opposite example is shown in the pin lever escapement. The pallet pins are narrow which require the teeth of the escape wheel to be wide. The locking faces of the teeth should be undercut 24°. The angle between the locking face of a tooth and the impulse face is 86°. The angle of the impulse face of a tooth is 25° measured from a line which is tangent to the outside circle of the wheel at the tip of a tooth to a line running along the impulse face of the tooth.

Cutter for the Locking Faces of the Teeth
The cutters used to cut a club toothed escape wheel should be of the fine tooth circular type. The escape wheel teeth are too delicate and fragile to cut with fly cutters. The cutters need to be made up for the specific escape wheel. These can be made up by using the

Figure 1



THE BEST SOLUTION FOR CLEANING QUARTZ WATCHES



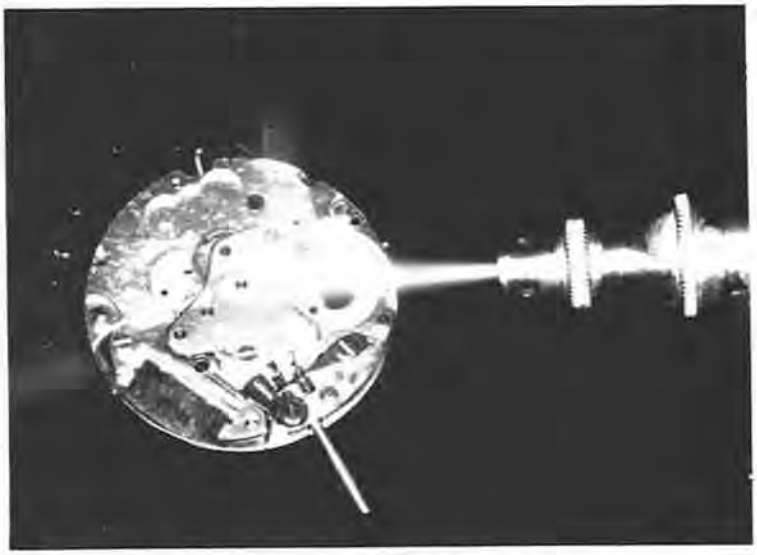


- TIME SAVING -

Complete Kit Includes:
Dual-Action Airbrush
Quiet Compressor
AC foot switch
Quartz Clean Solvent (1 qt.)
2 oz. Jar with cover
3/4 oz. Jar with cover
Movement Grippers
Airbrush Holder
Compressor Air-Hose
In-Line Moisture Filter
1/4" Female Pipe Thread Fitting
QC-650C.....$359.95
Quartz Clean & Plasticlean refills available

-EASY- *-EFFICIENT-* *-PROFITABLE-*

Get the maximum efficiency out of Quartz Clean and Plasticlean products by using our unique compressor system. The sensitive dual trigger action of the airbrush makes the perfect combination for maximum cleaning power. The airbrush can blow filtered air as well as solvent so there is no need for expensive cans of dry air. It costs about 10 cents to clean a movement with Quartz Clean and about 20 cents to clean with Plasticlean . Quiet enough for retail store environment.



- SAFE - *- POWERFUL -*

ZANTECH® INC 77 SHADY LANE • TRENTON, NEW JERSEY 08619

ORDERS ONLY (800) 441-7569
TECHNICAL HOT LINE (609) 586-5088

Prices and availability subject to change without notice. Minimum order $15.00. Fax # (609) 586-8221

Figure 2

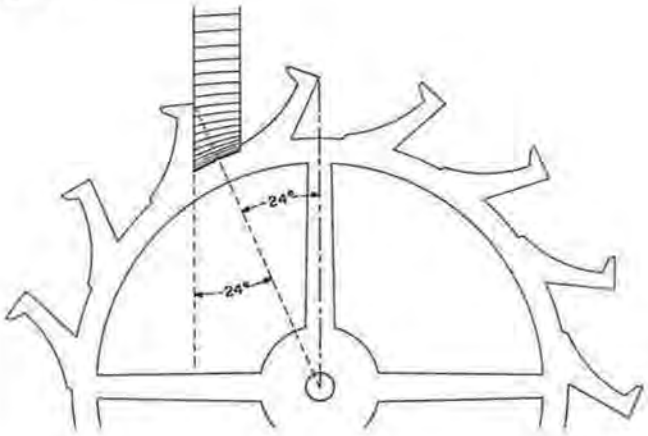
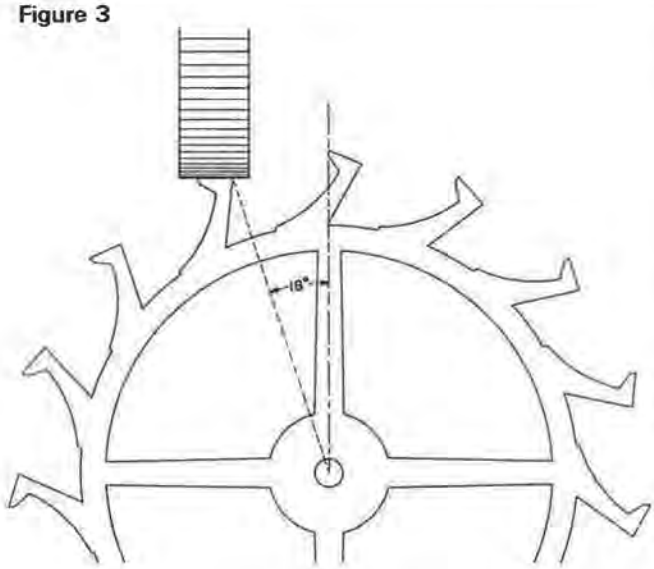


Figure 3



pantograph method described in the December 1989 issue of *Horological Times* "Technically Watches" column, pp. 30-34.

Figure 2 shows the cutter used to cut the locking face of the escape wheel teeth. This illustration shows the cutter in relationship to the sample escape wheel and it also shows the position of the wheel teeth in relation to the center line when the cutter is used. The cutter is set 24° off center for cutting the locking faces of the teeth.

Cutter for Cutting the Impulse Faces of the Teeth

Figure 3 shows the cutter used to cut the impulse faces of the teeth. The cutting face of this cutter is square or a 90° angle to the sides of the cutter. A pantograph device is not needed to make this cutter, but it may be used to make it. This cutter can be made with the use of a milling attachment attached to the slide rest. A 60° milling cutter can be used to cut the teeth on this cutter. This cutter may be obtained from cutter makers as a standard cutter. When this cutter is used, the wheel blank is set so the locking corner of a tooth is set 18° off center as shown. This places the blank in position so the correct impulse is cut on the end of the wheel teeth.

Cutter for Cutting the Toe of the Teeth

Figure 4 shows the cutter for cutting the toe of the teeth. This is the same cutter used to cut the impulse face of the tooth. The correct width of the tooth is gotten when this cutter is used. The wheel is kept in the same position for cutting the toe of the teeth as when the impulse angle was cut. This is 18° off center as shown. The cutter is moved over so the edge of the cutter is on the center line as shown.

Figure 4

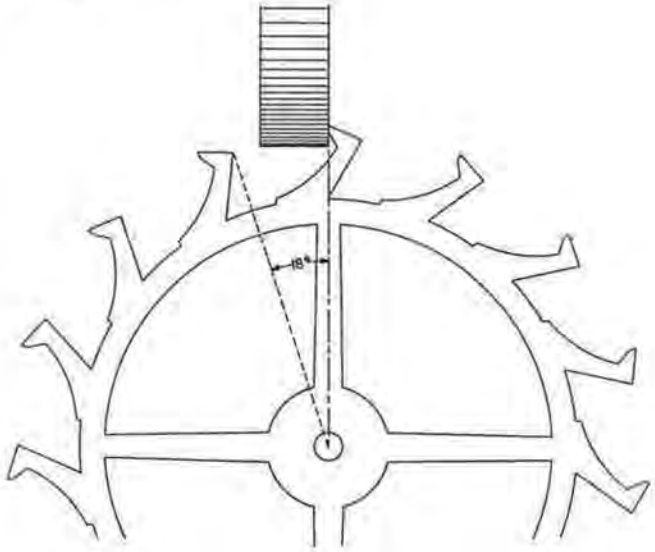
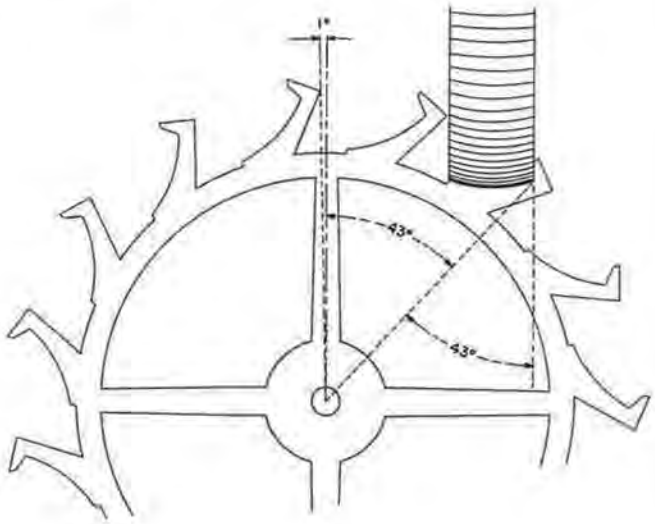


Figure 5



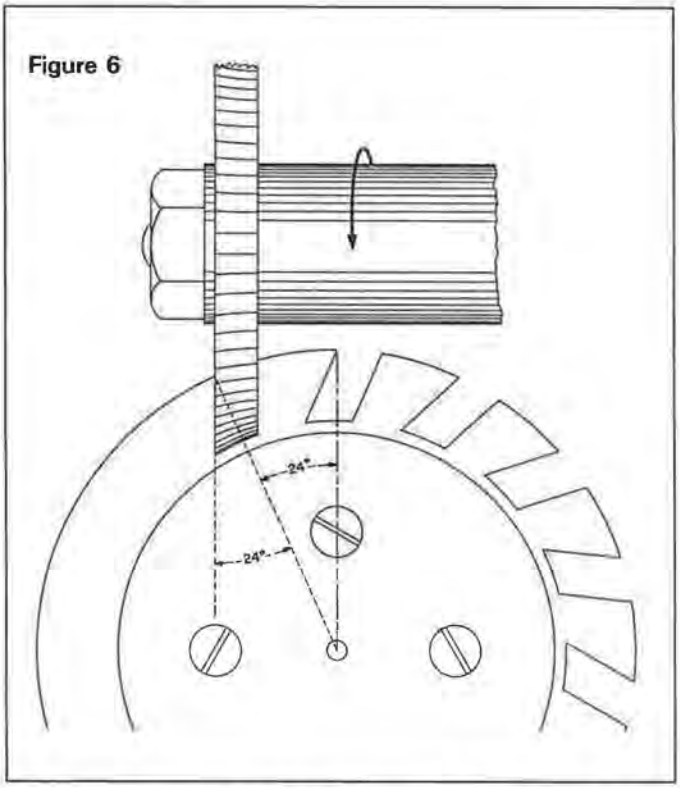
Cutter for Cutting the Back of the Teeth

Figure 5 shows the cutter used to cut the back of the teeth. This cutter would need to be made up with the use of a pantograph device. The correct position of the wheel when the back of the tooth is cut is when the locking corner of a tooth is set 1° back of the center line. The right side of the cutter is set 43° off center with the wheel as shown. Note: This cutter must not be so wide that it touches the adjacent tooth as the back of the teeth are cut.

Setting up the Equipment To Cut the Escape Wheel

The arbor holding the cutter is held in the spindle of the milling attachment. The wheel blank is held on an arbor chuck which has a center pin to center the blank. The end of the pin is pointed to be used for centering the different cutters. The wheel blanks are held tightly on the arbor chuck with an end cap which is held in place by two or more screws. The steel escape wheels for high-grade watches are sometimes recessed on one or both sides to reduce the weight of the wheel. When making this type of wheel, one should do the recessing on the blank before the teeth are cut. The index used should have 360 divisions so one can index any number of degrees. When one needs to index 1/2°, in the case of a 5-1/2° tooth width, the only way to do this is to use an index plate with 720 divisions or use a universal dividing attachment with a 40:1 ratio. By using an 18-hole plate on the attachment, each hole indexed would equal 1/2°. To index for 5-1/2°, one would move the index pin 11 holes.

Figure 6



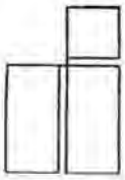
"LEVIN IS ALIVE!!"

FOR ALL YOUR WATCH & CLOCKMAKERS LATHE NEEDS!

CALL

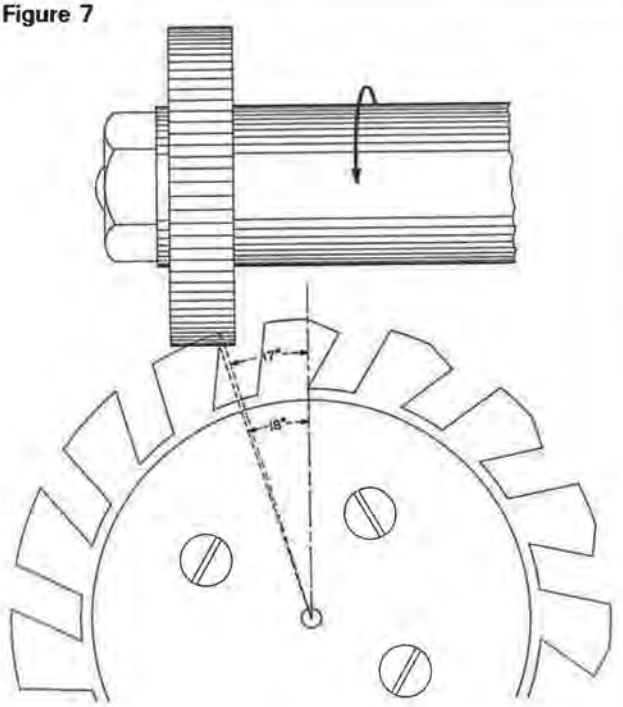
LOUIS LEVIN & SON, INC.

15120 DESMAN ROAD
LA MIRADA, CA 90638
(714) 521-9191
FAX (714) 521-0206



LEVIN®

Figure 7



Cutting the Locking Face of the Teeth

Figure 6 shows the locking face of the teeth being cut. The pointed edge of the cutter is set 24° off center as shown. To do this, one would first center up the point of the cutter with the lathe center. Then the pointed edge of the cutter is brought over the edge of the wheel blank so a small mark can be made on the edge of the blank by the edge of the cutter. Next the lathe spindle is indexed 24° (24 marks on a 360 index). Then the cutter is moved off center so its pointed edge once again lines up with the mark made previously on the edge of the blank. This places the cutter in position to cut the spaces to form the locking faces of the teeth. One would index 24 divisions (360 plate) each time a space is cut. The milling attachment spindle holding the cutter should turn in the direction of the arrow.

The speed of the cutter is very important. When cutting a steel escape wheel, the cutter should turn at between 600 and 800 R.P.M. The actual speed of the cutter would depend on the diameter of the cutter, the number of teeth in the cutter, the rate of the feed of the cutter, and the type of material from which the cutter is made, as well as its hardness. When cutting brass escape wheels, the cutter can turn between 1500 and 2000 R.P.M.

Cutting the Impulse Angle on the Teeth

Figure 7 shows the impulse angle being cut on the teeth. To set the cutter in the proper position for cutting the correct angle on the impulse faces of the teeth, one would do the following. First the index is set so the corner of a slot which forms a locking face of a tooth is on center with the lathe center. Then index the blank counterclockwise 17°. Next the cutter is moved offcenter so it is in position to cut the impulse faces. The locking corner of a tooth will be 18° from the center line after the angle has been cut. After all of the impulse faces have been cut, one would prepare to cut the length of the impulse faces.

Cutting the Length of Impulse Faces

Figure 8 shows the length of the impulse faces being cut. To make this cut, the wheel is left in the same index position as it was in when the impulse faces were cut. The right side of the cutter is centered with the lathe

Figure 8

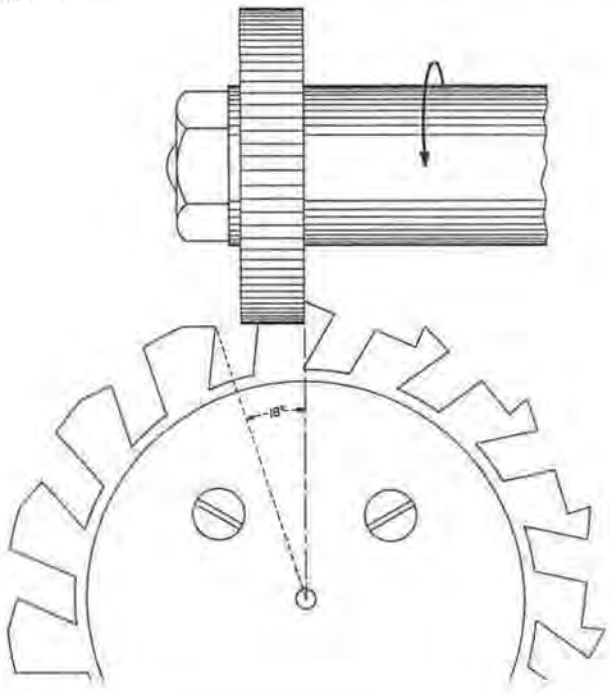


Figure 9

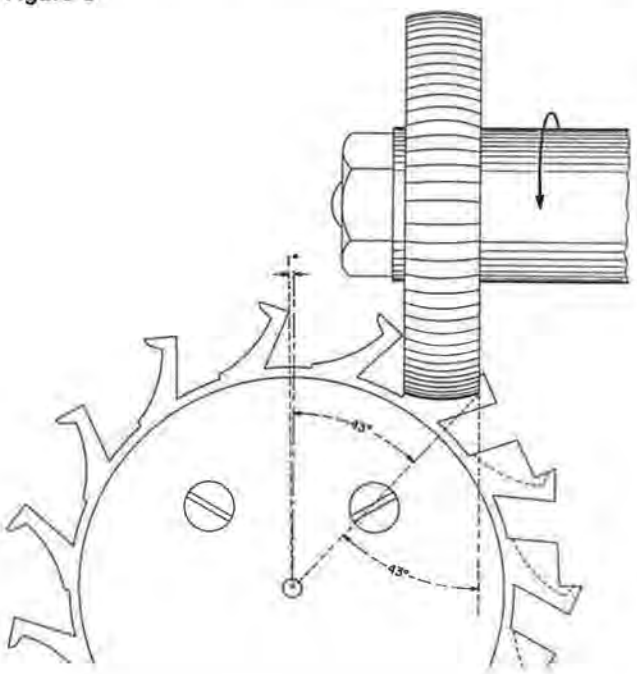
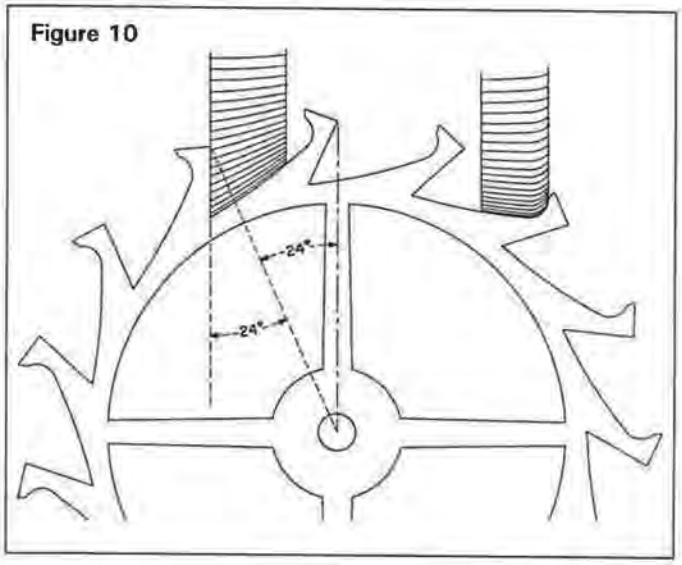


Figure 10



center. This leaves a tooth width of 6°. This allows some extra width for finishing the teeth. If we need a tooth width of 5°, we would index the blank 1° counterclockwise before cutting the length of the impulse faces. One can index the blank for 1/2° by using a universal dividing attachment to do the indexing.

Cutting the Back of the Teeth

Figure 9 shows the backs of the teeth being cut. To set the wheel blank in the proper position, we would set the index so the heel of a tooth is on center. Then we would index the blank 1° counterclockwise. Next the cutter is moved off center into position to cut the back of the teeth as shown. This position is on the second tooth from the center line. The correct position of the cutter is when the right-hand corner of the cutter is 43° off center from the center line. One must not make this cut too deep as this would weaken the teeth unnecessarily. Note: When cutting the back of the teeth, one must use care so the cutter will not touch the locking corner of the adjacent tooth. When one is cutting an escape wheel with very delicate teeth, it would be safer to cut the locking face as a last cut, especially on brass wheels.

Cutters for Cutting Modern Style Escape Wheels

Figure 10 shows the two cutters used to cut the locking face and to cut the back of the teeth when making a modern style escape wheel. The cutter for cutting the impulse face and the length of the impulse faces is the same style as for other escape wheels.

The finishing of escape wheels will be presented next month.

Bibliography

Daniels, George. *Watchmaking*. London, Sotheby's Publications, 1985, pp. 143-144.

DeLong, Charles E. *Design and Construction of an Escapement*. Horology, July issue, 1938, pp. 24-29.

Gazeley, W.J. *Watch and Clockmaking and Repairing*. London, D. Van Nostrand Co., Inc., 1959, pp. 168-169.

Samelius, W.H. *Making an Escape Wheel*. The American Horologist, Denver, CO, Jan. 1941, pp. 44-45.

Saunier, C. *Treatise on Modern Horology*. London, W. and G. Foyle Ltd. 1952, pp. 440-453 and Plate VIII. ❑

288 CRYSTALS ONLY $29.50 PER ASSORTMENT!



CRYSTAL BONANZA

Why pay more? Here are three assortments of round, high dome, straight wall crystals you can't afford not to have. Each assortment contains 288 (12 each of 24 different sizes). All are individually wrapped, marked, and stored in separate compartments in a cardboard box. **Regularly these type of crystals sell for up to $30.00 per dozen, buy now and save big! Buy all three for only $79.95!**

099041 - 19.0 - 23.6mm $29.50
099042 - 23.0 - 27.6mm $29.50
099043 - 27.8 - 32.4mm $29.50
099044 - 1 of each $79.95



EXPERT CRYSTAL FITTING

NOW AVAILABLE - Accurate cutting and fitting of any shape flat mineral crystals for modern style quartz watches. **FAST SERVICE** - Our experienced personnel have a two-day turnaround commitment [in some cases - one day turnaround is possible]. **PLEASE SEND bezel only** - no movements or complete watches. Since all bezels will be returned insured mail ($100.00 minimum), we recommend you send them adequately insured at your estimated value. WE CAN also duplicate flat glass crystals to unbroken samples. Take advantage of this custom service today!

S. LaRose, Inc.

Worldwide Distributors to Horologists

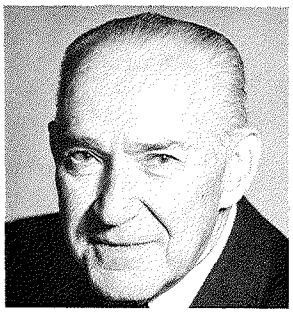
3223 Yanceyville St., P.O. Box 21208
Greensboro, N.C., 27420,USA
Phone: (910) 621-1936
Fax Number: 1-800-537-4513

March 1994/Horological Times 13

Waterproof & Water-Resistant Watches

PART 5

In previous articles Mr. Fried covered the general principles governing air and water pressure and examined the devices originally used to test watch cases. We will discuss the newer generation of testing devices later in this series. Mr. Fried begins this month's discussion with an analysis of methods and materials used to protect watches from moisture.



HENRY B. FRIED
CMW, CMC, FAWI,
FBHI, ★FNAWCC

Methods of Water-Protecting Watches

The term "methods of water-protecting watches" refers to the means used to seal casebacks, crowns, and crystals. Most commonly used for sealing casebacks and crowns is a ring of some material which, when compressed, will assume the contour of the surrounding surfaces and form a barrier against vapor and moisture. These rings are called gaskets. Gaskets are made of a number of materials: lead, vinyl, rubber, and a neoprene and rubber composition.

Lead gaskets were used in the earliest waterproof watches. They are still used in some watches and were preferred by a few watchmakers because they had sufficient body to be seated easily and were soft enough to adapt their own surface to the micro-contours of the case and caseback. They were fairly strong and water would not decompose or oxidize them. Some cases were expressly designed to take a lead gasket; the gasket was seated in a deep groove in the caseback. Special tools often were used to properly fit it so that it would lie perfectly flat and not become crimped.

The disadvantage of a lead gasket, or any other soft metal gasket, is that it sheds metallic dust when compression or perspiration crystallizes it. In addition, it can be stretched beyond its elastic return point. Also, if the watchmaker closes the case too tightly, a lead gasket will become compressed and a new one will be needed every time the case is opened. Should a lead gasket be used where the contacting flange of a caseback is scratched, burred, or rough, the caseback would act as a file and dust particles and shreds from the gasket would be deposited into the watch. The gasket, in such a case, would be useless as a moisture barrier.

In watch cases where lead gaskets were specifically prescribed, it was necessary to make certain that the gasket was fully seated in its "U" channel and free from dents, burrs, or bends. The contact flange of the caseback also had to be smooth and without scratches or burrs. A light coating of silicon grease was placed on the gasket top before closing the case. This allowed the caseback to glide over the gasket rather than damage it.

Do not tighten the caseback too much, regardless of the type of gasket used. Be especially careful if using a lead gasket since it can be easily compressed, crystallized, and scratched. Compressing the gasket makes it thinner and, if the movement enclosed is automatic, the caseback may go down too far and contact the winding rotor, preventing it from storing power in the mainspring. If you receive an automatic watch that doesn't wind, check to see if the caseback is contacting the rotor by placing a light smear of oil on the rotor, closing the case, and shaking the watch to activate the rotor. Then remove the caseback. If the inside of the caseback has oil on it, you can be sure it touched the rotor. A thicker gasket will prevent this trouble.

The watchmaker should develop a "feel" when tightening the back on any water-protected watch. Just enough pressure should be applied to render a snug fit; however, too much pressure on the caseback of quartz watches risks damage to the coil, circuit board, step motor, or other components.

Where a lead gasket was used, learn to tighten the caseback with just enough force to seal the watch so that the gasket is not over-compressed. Doing so will permit a good sealing action and allow the case to be opened and closed a number of times without the need of replacing gaskets.

When a watch had a caseback whose gasket could be seen after tightening, like the inside of a sandwich, a lead gasket was not recommended. Body acids and perspiration caused lead oxide to form, spoiling the gasket and making it difficult to open the case without shedding lead crystals into the movement. (These lead crystals, by the way, are not unlike those seen on car batteries.)

Plastic gaskets have decided advantages over lead: They do not shred, oxidize, crystallize, tear easily, or lose their elastic qualities readily. If good judgment is used in opening and closing the case, plastic gaskets will provide water protection for a long time.

Vinyl and neoprene are types of plastic gaskets. Rubber and silicon gaskets are not pure rubber (contains sulphur, a tarnishing agent), but a silicon-treated rubber compound. They can be identified by their black color. Efforts to produce other colors of the same compound have resulted in poorer quality gaskets.

An efficient type of gasket using the silicon-treated rubber compound is the O-ring type (Figure 17). This type is used both for casebacks and for crowns. The O-ring gasket has a very durable elastic life and will shed moisture. A cross section of this gasket has the shape of an "O". When the caseback is threaded down, the gasket is compressed and spread in all directions. It thus seals all crevices and edges it contacts. Tests have shown that it can be compressed to a great degree without losing any of its qualities. Of course, like other gaskets, it can be damaged if care is not taken when tightening the case.

When inserting an O-ring gasket, a light amount of silicon grease (available from your material jobber) should be applied to the bottom of the gasket and to the cover so that the caseback, when turned

it easy to operate.

down and tightened, will glide over the gasket. The grease will check crimping and stretching and will also prevent any metallic dust or metal shavings, which might come off as a result of careless tightening, from falling into the movement. In addition, the silicon grease acts as an extra sealing agent. The K-22 O-ring Lubricant for watch casebacks (Zantech) eases replacement of casebacks and guards against moisture and dust. There are other useful products on the market as well.



A polyethylene-based gasket has an elliptically-shaped cross section (Figure 18). Its chief virtue lies in its toughness and resistance to tearing. Its surface is smooth, dry-lubricant in appearance and touch, and, as a matter of fact, does not require a lubricant. It is used mainly in thin waterproof watches where the thickness of the O-ring would require an additional thread for the caseback.

The watchmaker should always stock a complete assortment of watch gaskets and carry an extra quantity of those numbers which prove most popular. The temptation of using an old gasket when a replacement is not readily available generally leads to costly comebacks and complaints. Use the gasket recommended by the case manufacturer. Follow the procedures outlined by the maker if the case or gasketing is unusual, otherwise follow the general procedures outlined above.

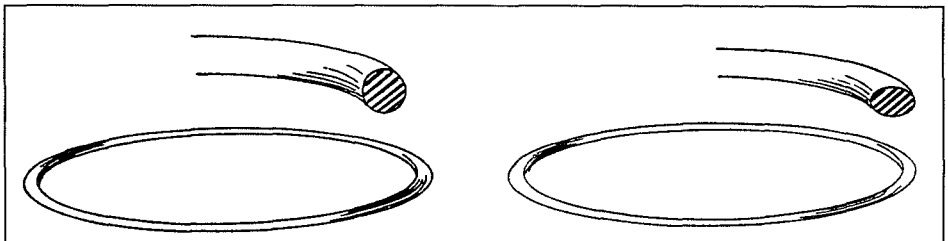


Figure 17. The O-ring case gasket is made of a silicon-treated rubber compound.

Figure 18. The polyethylene gasket has an elliptical shape.

One of the most neglected parts of the waterproof case is the crown and crown pipe. Water entering through the crown immediately attacks the winding and setting mechanism of mechanical watches as well as the battery, circuitry, and other components of quartz watches. While the crystal and caseback, once inserted, remain stationary and, if sealed properly, require little attention (unless the case is opened), the crown is constantly being turned, pulled out into the setting position, and pushed back into the winding position. Thus the crown and its gasketing must incorporate an excellent seal against the entry of moisture. Another vulnerable feature on quartz watches and chronographs is the push button. They too must be protected. We will deal with the methods used in another article.

One method of protecting the winding section of the watch is by gasketing the crown pipe of the waterproof case (Figure 19). Here the gasket is a plastic, rubber, or cork sleeve lining the inside of the case pipe and held by a metal retaining ring. The crown has a long neck so that even during the setting position a seal

Vibrograf Introduces Two State-of-the-Art Watch Repair Instruments To Save You Time & Money...

Advanced Watch Servicing Technology For The Professional Watchmaker...



NEW UPG-2000
State-of-the-art watch rate recorder for all mechanical, quartz and tuning fork watches. Dot Matrix display with features not available in any other instrument. Computer print-out capability. Oscillogram of beat noise. Easy to operate.

TIMODUL 2000
Newest quartz timer and quartz analyzing system. Quickly locates faulty parts. Color coded push button controls and large window readouts make it easy to operate.

* THREE PAYMENT PLAN WITH APPROVED CREDIT

**** Now is the time to trade-in your out-dated equipment!***

For more information, or the name of your local distributor contact:

VIBROGRAF U.S.A. CORP.
504 Cherry Lane, Floral Park, NY 11001
Tel: (516) 437-8700 Fax: (516) 437-8708

Serving The Watchmaker For Over 50 Years

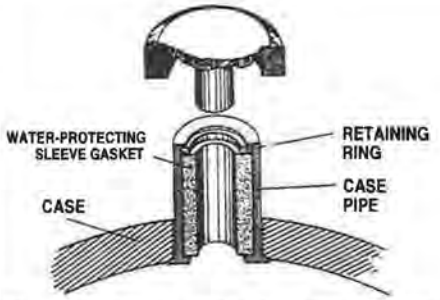


Figure 19. Some watches have their winding sections water-protected with a gasket in the form of a sleeve lining the case pipe.

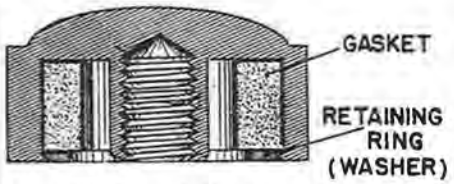


Figure 20. The gasket is held in the crown by a retaining washer which, in turn, is kept in place by friction or by some of the crown's metal burnished over its edge.

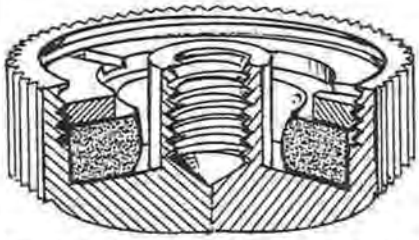


Figure 21. In some cases the retaining ring is threaded into the crown in order to compress the gasket and have it present a curved surface to the case pipe.

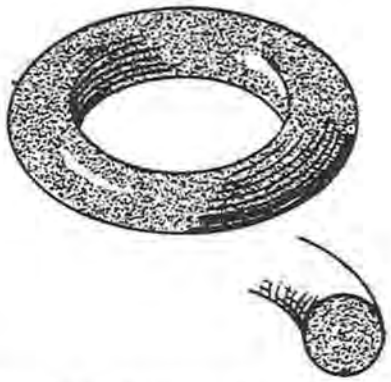


Figure 22. The O-ring type of crown gasket is both durable and pliable.

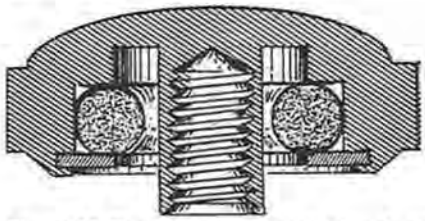


Figure 23. The O-ring crown gasket is not under pressure until the crown is attached to the case.

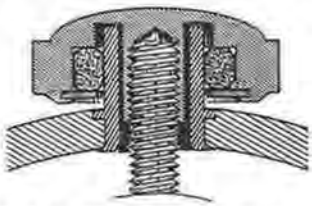


Figure 24. When the crown is on the case, the case pipe contacts the O-ring gasket and forms a moisture block.

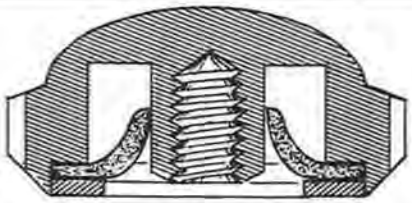


Figure 25. Cross section of a crown with a bell-shaped gasket.

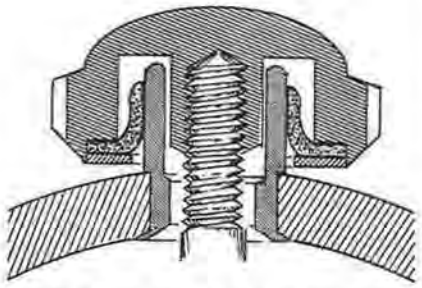


Figure 26. A seal is formed when the case pipe contacts the gasket.

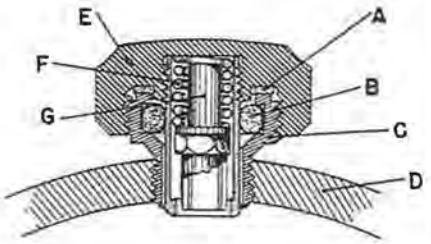


Figure 27. The Rolex "Twin-Lock" crown. Both the crown and case pipe are gasketed.

against moisture is maintained.

In a typical water-protective crown, the gasket is a tubular rubber, cork, or plastic material which surrounds the crown neck. The gasket is contained in the crown by a ring washer which is held in place by burnishing some of the crown metal over its edge (Figure 20). In some cases the retaining washer is threaded into the crown in order to compress the gasket slightly and have it present a tangent (or curved) surface to the case pipe (Figure 21). Thus, should the gasket wear a little bit, tightening the washer would cause it to bulge out enough to compensate for any wear that might have occurred. However, in practice, the washer becomes loose on mechanical watches due to the constant winding and setting of the crown.

Many watch companies use the O-ring type of gasket for the crown (Figure 22). The O-ring is held into the crown by a retaining washer. When the crown is not in the watch, the O-ring is not compressed (Figure 23). When the crown is fitted into the case pipe, the pipe compresses the gasket so that it seals off every moisture avenue (Figure 24). The O-ring is made of a black rubber compound, silicon treated to aid in its water-repellent duties.

Bell-Shaped Crown Gasket

Another type of water-protective crown features a gasket in the form of a bell-shaped tube (Figure 25). The brim of the "bell" is gripped between a shoulder of the crown and a retaining washer. When the crown is fitted over the case tube, the washer is wedged between the case tube and the crown neck forming a waterproof seal (Figure 26).

Another type of crown, quite different from the others, is used in Rolex waterproof watches (Figure 27). The "Twin-Lock," as it is called, has gaskets both in the crown and in the case pipe. The crown is screwed onto the case pipe after the winding and setting operations. This causes the flat gasket (A) at the base of the crown to be compressed, sealing off a possible water or moisture channel. Should water somehow pass this gasket, it would still have to contend with the O-ring (B) in the case pipe (C). The case pipe itself is threaded into the case (D). When the watch has to be wound or set manually, the crown (E) is unscrewed. The spiral spring (F) pushes up the sleeved crown tube (G) and the winding operation can take place. If the hands have to be set, the crown is pulled further outward. After winding or setting, the crown is depressed as far as it will go and then threaded securely on the case pipe. It is claimed that the unit will still be waterproof if the crown is inadvertently left in the unscrewed position. The patented Rolex "Oyster" features this type of crown and gasketing.

In replacing crowns, it is important to observe some common sense rules to obtain and maintain water-protection. First, the crown must be threaded onto the stem so that it is at right angles to the axis of the stem, or else a clear avenue for moisture will exist (Figure 28). Secondly, the crown must be just clear of the case when it is in the winding position. If it is too far above the edge of the case, moisture

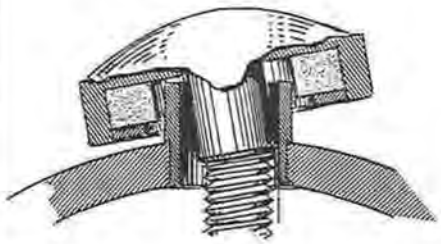


Figure 28. If the crown is not threaded at right angles to the stem, the gasket will not envelope the case pipe.

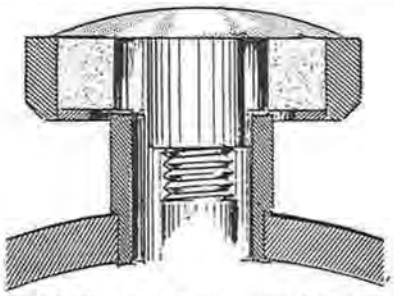


Figure 29. The crown must be seated properly on this case pipe. If not down far enough, moisture may enter the movement.

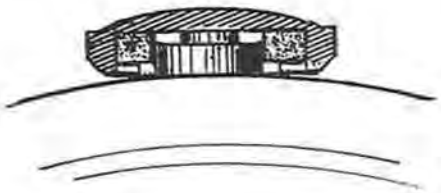


Figure 30. If the case pipe, in order to fit a low type crown, is filed too far, the gasket may not make effective contact.

will have a pathway (Figure 29).

When, in replacing a crown and stem, you find that the crown will not go down far enough because of the length of the case pipe or because of a new stem, change the crown for one that fits all the way or adjust the new stem's length. A good method is to place the crown on the case pipe before fitting it to the stem. See whether it seats far enough to almost touch the case edge. Some watchmakers cause themselves a great deal of trouble by filing the case pipe short to accommodate a new crown. This results in an otherwise good waterproof case becoming damaged and admitting moisture (Figure 30).

Choose the Proper Crown

Select the crown to fit the stem and case pipe. If the case pipe is high, pick a crown with enough height to be fully seated. If the case pipe is thin, select a crown with a gasket that will make proper waterproofing contact.

When replacing a movement into a water-protected case, some watchmakers make the error of aligning the movement with the case pipe by inserting the stem into the case pipe and then into the movement. By using the stem as a miniature crowbar, they shift the movement over into alignment.

This is a poor and damaging practice because: It causes the case pipe to become distended or ovalized and renders it unfit for waterproofing. It causes burrs and scratches on surfaces that must be smooth. It does not allow a smooth winding and setting action since the movement is not aligned properly. It causes compression on one side of the crown gasket and leaves the other side with little or no tension to seal off moisture. It also causes the stem to slant in the case pipe and the crown to be at an improper angle to the case pipe axis. It does not take much effort to place the movement into the case so that its stem hole is perfectly aligned before replacing the stem and crown. (Figure 31



TIME FOR ACCURACY

WITSCHI's waterproof tester — the ALC 2000

Tested in Europe and found to be the most accurate!

- user-friendly — *fully automatic measurement programs*
- flexible – tests **vacuum** and **pressure** — ***vacuum** (up to -0.8 bar) and **pressure** (up to 10 bar), separately or combined*
- programmable — *10 customer specific test programs*
- multi-lingual — *9 language choices: Eng., Fr., Ger., It., Sp., and the 4 Scandinavian languages*
- practical — *automatic locking and release of the pressure chamber*
- fast — *automatic or manual from 10 to 300 sec.*
- future-orientated — *assured by a 16-bit processor*
- able to **print** results — **WITSCHI** *printer (Citizen) or printer with serial interface*

WITSCHI
A SWISS BASED FIRM

WITSCHI ELECTRONICS USA Ltd.
34 E. Henry St., P.O. Box 2, Palmyra, NJ 08065-0002
Tel.: 1-800-882-7977 Fax: 1-609-829-2266

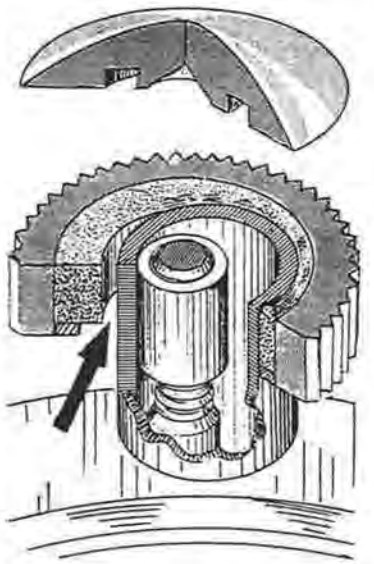
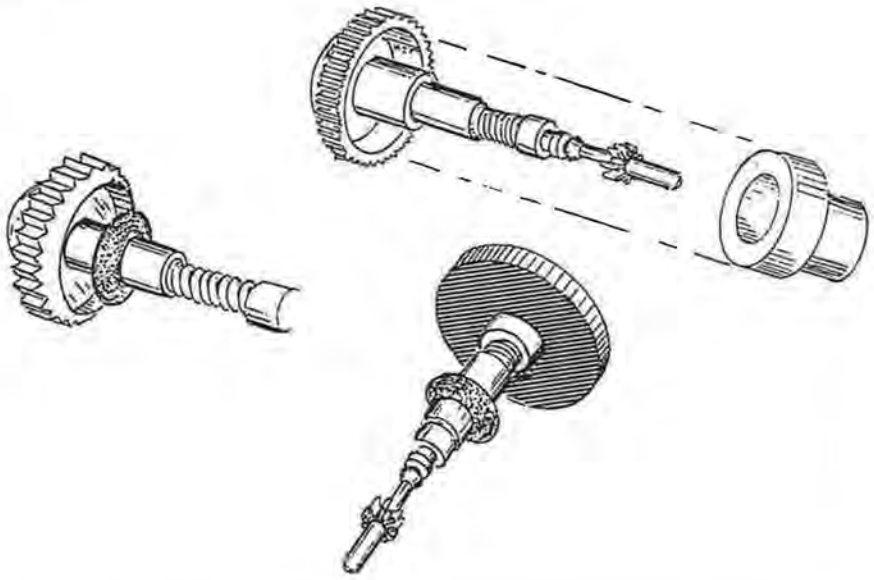
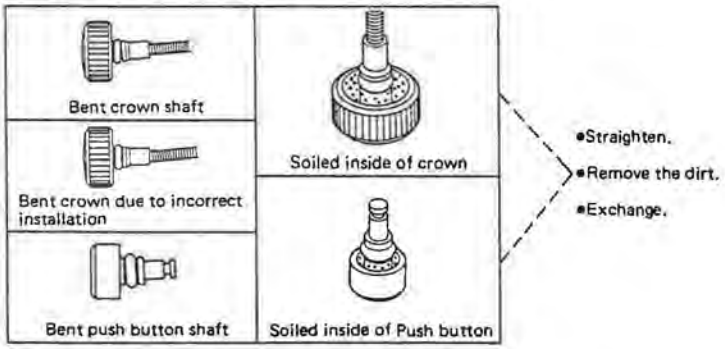


Figure 31. In placing the movement in the case, make certain that the stem is concentrically aligned with the case pipe and the case pipe aligned with the crown.

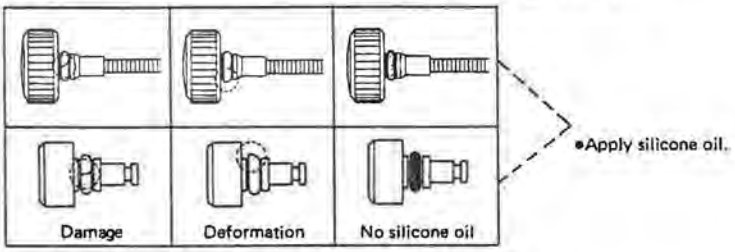
Types of Japanese quartz watch gasketing



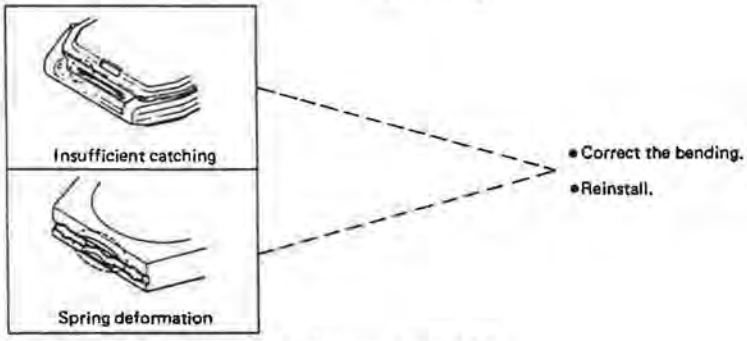
Are there any defects for crown and push buttons?



Are there any defects for crown and push button gaskets?



Are there any defects for the case body springs?



Illustrations and headings courtesy of Citizen Watch Co.

shows an example of a case pipe not concentrically aligned with the crown.)

Putting silicon grease on the case pipe before replacing the crown will make winding and setting easier, preserve and lengthen the life of the gasket, and aid in preventing the entrance of moisture.

Crowns and Gasketing for Quartz Watches and Quartz Chronographs

On quartz watches, the crown and its gasketing are not subjected to the frequent use as are wind-up watches. Therefore, the gasketing on quartz watch stems and crown pipes are positioned differently. For the most part, the gaskets are positioned in a niche or groove on the crown's threading extension. This is sufficient to provide protection in the well-fitting case tube. O-rings are the type found on most quartz watches.

Shown here are the types of crowns and their gaskets used in quartz watches. Additional illustrations and captions were taken from Citizen's manual. The citizen Watch Company, through their Service Manager Gene Kelton, has generously permitted use of these special illustrations and captions. The various figures shown can also be applied to the servicing of many other types of quartz watches.

Case tubing such as used for the crown and command, push button on chronographs can be replaced and adjusted with precision with use of the Fried-Zantech case pipe tool.

Next month we will continue with Part 6. ❑

LATHE PIN MADE BY GEM CITY COLLEGE

Written by Janice Marshall-Miller
Photos by David Carmany & Roy Hovey

The American Watchmakers-Clockmakers Institute is promoting a Watch/Clockmakers Lathe Course. To recognize those who have completed this course, the instructor, Roy A. Hovey, wanted something special. He had an idea, but needed someone to implement it. He called Gem City College School of Horology in Quincy, Illinois. His idea was to craft a miniature likeness of a watchmakers lathe, cast it in silver, and produce a unique tie tac/lapel pin to offer to the graduates.

Jim Phillips, Gem City College's Instructor of Hand Engraving and Jewelry Designing, accepted the challenge and produced the tie tac/lapel pin for Mr. Hovey.



Lathe pin produced by Gem City College.



Jim Phillips, Instructor of Hand Engraving & Jewelry Designing.



Gem City College student working on a lathe.

Gem City College is one of the earliest schools of watchmaking in the United States. It was founded in 1886 in LaPorte, Indiana before it constituted the beginning of Bradley University in Peoria, Illinois. In 1961 it was moved to Quincy, Illinois to become part of Gem City College.

The college now offers courses in Watch Repairing, Clock Repairing, Hand Engraving and Jewelry Repairing, and Designing and Stone Setting. At times the enrollment of the School of Horology has been over 200 students coming from all 50 states and from many foreign countries. ❑

Livesay's Inc.
Wholesale Jeweler & Watchmaker Supplies
456 West Columbus Drive
Tampa, Florida 33602-1200

WATCH STRAP NOTCHING PLIERS

Great for notching Gucci style watch bands. Helps reduce inventory by converting ordinary leather bands into Gucci style bands. Made of high quality steel. 3mm width.

#461.330 NEW! $8.95

HOLE PUNCHING PLIERS

Punch holes in leather or plastic watch bands. Great for sizing bands!

NEW!

#461.350 $8.95

SCREWDRIVER SET

A 9 piece European quality screwdriver set in a rotating stand. Color coded identifier bands allow for easy selection of blade size. Included in the set are one each .60mm, .080mm, 1.00mm, 1.20mm, 1.40mm, 1.60mm, 2.00mm, 2.50mm, and 3.00mm. All have hexagonal, swivel heads to prevent rolling and knurled handles for a firm grip. The kit also contains 19 extra blades and 2 extra set screws.

#52.540 $39.95

Your Headquarters For Batteries, Watch Material, Tools, Findings, Bands, Jewelry Boxes, Casting Supplies, Watch Movements, and Much, Much More. Catalogs Available.

Phone Orders
(800) 476-2715
Toll Free 24 Hour FAX Orders
(800) 476-8016
394
Tampa (813) 229-2715 Local Fax (813) 221-8016

Pickle Barrel

Jewelry Crafting and Repair

Buckles, Catches and Fasteners, Part I



Marshall F. Richmond
CMW

Although there are many different types, shapes, and styles of catches, it would not be possible to write about all of them. Based on experience, I will try and relate descriptions, construction, problems found in them, and, where possible, how to correct these problems.

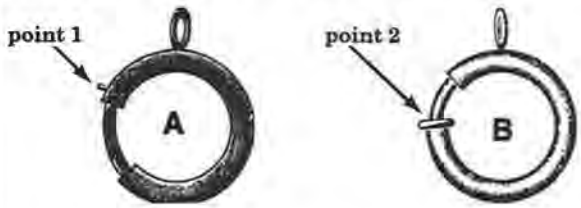
There are many replacement catches available and catalogued. They can be ordered by the piece, in quantity, and even by assortments of different styles and sizes. There probably are replacements for most catches. A source cannot be found for many that come in for repair. When some have to be ordered from a watch company through a material distributor, the cost is prohibitive. Some buckles or bands cost me $35-$45 wholesale. To turn a keystone profit, the cost to the customer would be $70-$90. This, in most cases, is prohibitive. In many cases that is more than was paid for the entire watch and band when new.

I have found it possible in many cases to make durable repairs on these, resulting in a profit for me and a satisfactory repair for the customer. Many times this requires making a piece by sawing, filing, bending, drilling, and hard soldering. The material used would be determined by the quality and color of the band. I have used karat gold, brass, nickel silver, sterling, coin silver, and in some cases stainless steel. All these metals can be gold or silver soldered using regular flux, except stainless steel. Any hard soldering requires Aircosil® flux to make silver or gold solder flow on it.

This article will be a discussion on the old common catches, buckles, or fasteners. The newer ones will probably be carried over to another article. We will deal with: spring rings, pearl and bead fishhook catches, pearl and bead box and tongue catches, sister hook catches, lobster claw catches, click clack bead catches, round and square tubular catches, box catches, and figure eight safety catches used in box and tubular catches. We will also discuss watch and bracelet catches, point out some problems that I have encountered, and offer solutions that I may have used.

Spring rings are the most used and one of the oldest catches used for necklaces, bracelets, anklets, and safety chains. They are made of tubing fashioned in a circle which has a spring inside the tubing that works a tongue. This tongue is in an opening where the ends lack about one-eighth of the circumference of meeting. Spring rings have a small jump ring hard soldered to the outside for fastening it to the piece of jewelry. This ring is like most jump rings, it can be bent open and shut for attaching. Some are solid and must be attached with a jump ring.

Figure 1. Two kinds of Spring Rings



The spring rings are attached crosswise and lengthwise. Figure 1 shows two spring rings, each with the jump ring attached crosswise. There are two types of tongues: one with a peg that slides toward the fastening ring (Figure 1a, point 1), and the other with a flange with the tongue protruding through the flange to lock in the tube opening (Figure 1b, point 2). The b type can be disassembled by bending the tube while holding the tongue open, so when released it will miss aligning with the tube. This will allow it to be removed and the spring can also be removed. If any soldering needs to be done on the tube body, it can be done. Then the spring and tongue are reassembled, and the body bent back in shape to align the tongue end and flange. Solder work cannot be performed on 1a because the tongue cannot be removed to remove the spring. In reality, I prefer the 1a type with the sliding peg even though it cannot be repaired except by bending and straightening for alignment. Spring rings, even karat gold rings, can be replaced for less than the cost to repair them. The only reason that I have ever repaired a spring ring is to further develop my skill as a jewelry craftsman.

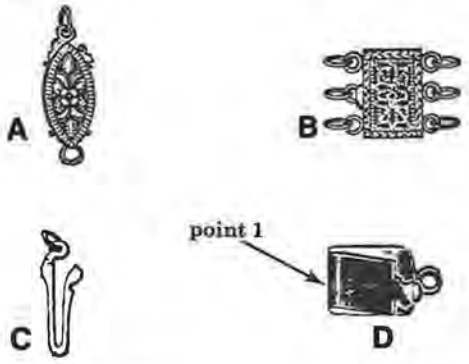
Sport rings are nothing but oversize spring rings used on one end of a key chain or watch chain.

Spring rings are usually available in 5, 5-1/2, 6, 7, and 8mm in diameter while sport rings are made in 9mm to 18mm; however, not all sizes are readily available, usually in gold-filled and sterling.

Sport rings are made with the sliding peg type opener and the flange type. Most listings I find in catalogs feature the sliding peg type. In a recent catalog the price for one 18mm sport ring in 14K gold (jewelers cost) was $31.87 and in gold-filled $5.30. Gold-filled and sterling spring rings also cost three to six times less than karat gold. Repairs on sport rings should be judged by the cost of replacement. If you can make a quality repair that is durable and good in appearance, and make a profit, do it.

Fishhook catches (Figures 2A and 2C) make a secure catch for pearls or beads. The hook first hooks into the body of the clasp, then when pushed in, it snaps making for a secure fastening. If for any reason it comes unsnapped, it will still be hooked and the beads or pearls will not be lost. The only repairs that I have found necessary besides bending the hook for tightening is replacement when broken. These hooks are available in assortments, and one can usually be found to replace any broken one. Hooks are available in karat gold, gold-filled, gold plate, or sterling silver. Usually the gold plate, gold-filled, or sterling silver are found in simulated pearls or less expensive beads. White or yellow 14K gold is usually used on natural or cultured pearls and more expensive beads. The hooks are usually made of a base metal that will harden, so even in the karat gold body the fishhook may be plated base metal.

Figure 2.



Box and tongue catches (Figures 2, 2B, and 2D) can be used on single strand as well as multi strand pearls and beads. The one shown is for a three-strand necklace. By removing the center loop, it can be used for two strands, or if the two end loops are removed leaving the center loops it will make a catch for a one-strand necklace. Although I have seen these catches for more than three strands, I cannot find any listing for them in any of my current catalogs.

Figure 2D shows a tongue replacement for a box and tongue catch. These replacement tongues are available in assortments of various sizes. Some are plain,

QUARTZ MOVEMENTS

CRYSTAL CUTTING

Lowest prices on 6 popular calibers



All movements come with free hands set

CALIBER	REG.	SPECIAL
ETA 578.004	$ 8.75	$6.90
MIYOTA 2035	$ 7.75	$5.90
VX 10A	$ 8.25	$6.50
VX 11A	$ 8.75	$6.90
VX 51A	$ 8.25	$6.75
VX 22A	$10.75	$9.90

HERE ARE 5 REASONS WHY YOU SHOULD TRY

SMEA

1) Accurate replacement of the original
2) High tempered crystal with different thickness
3) 15 years expert cutters
4) Low, low prices
5) 24-hour delivery



Flat glass crystal regardless of shape or thickness

FOR ONLY $6.00

One free crystal cutting for new customers
NOTE: $2.00 additional charge for crystal w/gasket

SMEA

5962 Broadway Blvd. Garland, TX 75043

NWT: 1-800-536-7632
FAX: 1-800-536-7631

the one shown has just one hole, others come in different widths and numbers of holes for different numbers of strands. Tongues can be altered in size by starting with one a little wider than the box and reducing the size to match the one being replaced. If plain, it can be drilled for the correct number of strands. For reducing tongues in size, I use dental separating discs (small thin grinding wheels) in the flex-shaft tool, or a hand-rotating motor-driven grinding tool. If much metal is to be removed, a jewelers saw can be used.

Usually the necessity for replacing the tongue is that is breaks where bent (Figure 2D, point 1). If your customer has both pieces, it is possible to repair the old tongue by gold or silver hard soldering it at the break. To do this, put the pieces together and hold with small work tweezers (locking if possible), then force a small piece of wire or a needle between the two pieces opposite where the break is. This will leave the ends to be soldered together. Be sure to leave a crack where the two pieces come together to the other end. The ends to be soldered can be fluxed carefully and two or three small chips of solder placed on the fluxed end while they are held in a vertical position. Apply heat until the solder flows. Enough solder should flow to cover the end and be pulled back between just a little. Cool and remove from the tweezers, use a knife to spread to an opening of about 1mm, then remove any excess solder on the end to make it smooth. Try it in the catch and, when adjusted to work freely, reattach the strand(s) and the repair is complete. This type of repair is not usually practical in repairing inexpensive catches. Don't attempt a repair unless it is for sentimental reasons and no repair parts are available. Making such repairs, however, will broaden your skills.

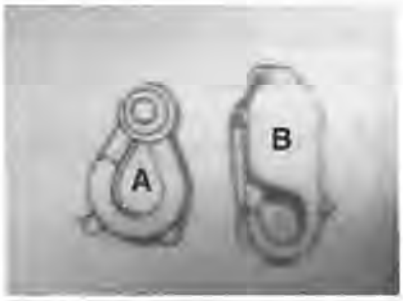
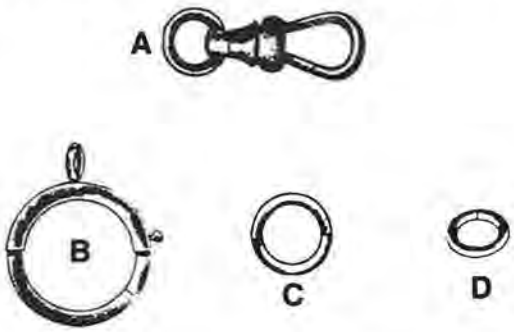


Figure 3.
A - Sister Hook Catch, B - Lobster Claw Catch

Sister hook catches (Figure 3A) are made in karat gold, gold-filled, and sterling silver. They are found in the shape shown, perfectly round and long narrow shape. Sister hook catches are one of the most secure catches you can use. They are made in several sizes but are mostly used for heavy chain necklaces or bracelets. They usually are strong enough that the chain will break before the sister hook will. The only repair that I have found necessary to make on a sister hook catch is to tighten the tubular rivet holding the two pieces together. This rivet serves as an axle for opening and closing the catch. In a few cases adjustments have been needed in bending to make them fit tighter.

Lobster claw catches (Figure 3B) have become popular in recent years because they are stronger,

Figure 4. A - Swivel Catch, B - Spring Ring, C - Round Jump Ring, D - Oval Jump Ring.



more secure, and easier to fasten and unfasten. This is especially true when used on necklaces that are at tached by feel, using both hands behind the neck. Lobster claw catches are available in several sizes in karat gold, gold-filled, and sterling silver. There are several styles but basically they operate as the one shown. A little lever opposite of the opening is moved with the fingernail. It opens and can be hooked in the ring in the other end of the necklace or bracelet. Some of the more streamlined styles have reduced the size of the hook which weakens the strength of the catch. So far I have not found a need to repair or adjust a lobster claw catch. The only possibility of repairs or adjustments being needed would be if the spring working the lever that opens could break, or the hook could be bent from some kind of extreme pressure. In this case it could easily be adjusted back in shape by bending.

Swivel catch (Figure 4A) is called a swivel because the fastening ring swivels a complete 360 degrees which keeps any chain it is attached to from tangling. Swivels were used for pocket watch waldemar, vest, or sport chains. They snap into the watch bow. Key chains and ladies' lapel watch chains also used them. Such catches are still available in gold-filled, sterling silver, gold plate, or nickel plate. Today there is very little demand for them. Figure 4B shows a spring ring which was used on the other end of a waldemar watch chain, Figure 1C shows a round jump ring, and Figure 4D shows an oval jump ring. These are the attachments used with the swivel for watch and key chains.

Box clasps (Figure 5) are generally used on flat type bracelet or necklace chains. Some are even used on

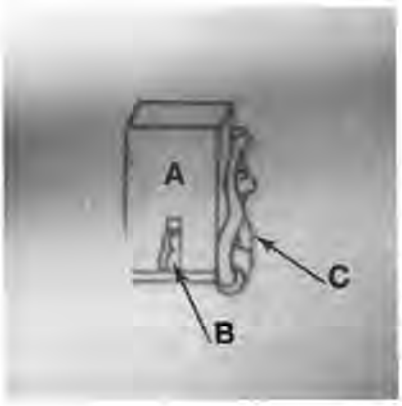


Figure 5.
Box Clasp, B - Tripping Post, C - Figure Eight Safety

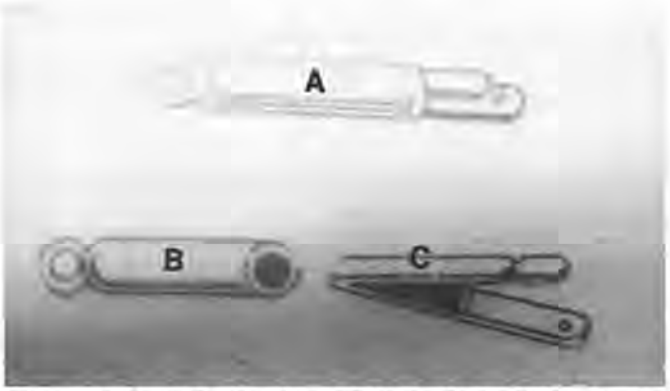


Figure 6. A - Tube Catch or Click Clack Catch, B - Catch Body, C - Tongue.

watch bands. Although mechanically it works the same as the box and tongue bead clasp, the bracelet box clasp is more sturdily constructed and has a figure eight safety catch mounted on the catch (Figure 5C). Figure 5B shows the tripping post that protrudes through a groove in the catch body. When pressed it will release the tongue thus opening the catch after the figure eight safety is opened. These are usually hard soldered to the piece at both the body and tongue. Replacements of either require hard soldering. If the tongue breaks where it is folded over, the repair is the same as was explained previously in the box and tongue repair.

Click-clack or tube catches (Figure 6) are becoming more popular with the popularity of neck and wrist chains. This simple tube clasp is catalogued as a click-clack catch, but can have a figure eight safety installed. There are many tube catches available with both round and square tubing, with or without the figure eight safety device. I can find them listed only in 14K yellow gold or 14K white gold. I have had only a few occasions to make repairs. One such repair was to make and install a figure eight safety to replace a defective one. Other than that, there has been one or two with the tongue broken in the fold which was repaired as was previously explained.

The next article will be a continuation of buckles, catches, and fasteners. ❑

HENRY FRIED'S 21st HOROLOGICAL TOUR

(for Members of AWI and NAWCC and Friends)

to Switzerland, Germany, & Denmark

Basel Fair, Rhine and Baltic Sea Cruises, Technical Visits,
Spring Festival in Stuttgart, Strasbourg,
Horological Museums in Furtwangen & Wuppertal,
Meetings with Horologists in Stuttgart & Copenhagen

Contact:

ADVANTAGE TOURS INTERNATIONAL

P.O. Box 1222, Fort Lee, NJ 07024; (800) 262-4284

Tour Dates:

APRIL 15 - MAY 1, 1994

CASIO WATCH PARTS

No Minimum Order Required

Kaben Enterprises

Official Casio Distributor

- We carry ALL the parts for ALL Casio Products!
- Prompt, Courteous Service
- We accept MasterCard, Visa, and American Express
- Overnight Shipping Available

CALL TODAY TOLL FREE

(800) 418-2345

ROLEX WATCH MATERIAL

FOR GREAT SERVICE ON ALL CROWNS, SAPPHIRE & PLASTIC CRYSTALS, TUBES, GASKETS, MOVEMENT PARTS, ETC.

CALL: S&G INDUSTRIES
TOLL FREE 1-800-942-0047
FAX: 1-800-423-4256

"WE STOCK WHAT WE SELL"

MasterCard VISA

WE GIVE QUICK AND EFFICIENT SERVICE 24 HOURS A DAY! 7 DAYS A WEEK!

NJ: 1-908-469-7200

BULLETIN BOARD

A. NEW REQUESTS

KING ARTHUR CLOCK COMPANY
Ron Boyajian, St. Joseph, MO, is seeking the manufacturer or distributor of King Arthur clocks.

CLOCK CHAINS CUSTOM MADE
Del Littlefield, Pensacola, FL, is seeking someone who makes chains to order for an English grandfather (floor) clock.

CASE TOP FOR GUSTAV BECKER CLOCK





Wallace Morse, Duluthe, MN, would like to know what the missing top of this Gustav Becker clock looks like. He also needs to know the approximate age.

These markings appear on the rear of the back plate.



B. RESPONSES

We continue to receive copies of Waltham and Marshall material assortments. While some are the same, additional notes on some of them prove to be interesting.

TERRY MODEL 5 WOOD MOVEMENT STRIKING LEVERS
Jack Wallace, Oneida, NY, provided a detailed drawing and instructions for setup of the Terry Model 5 wooden clock. He also suggests an individual who might supply missing levers for Dick Marco, Yarnell, AZ.

LADDER CHAIN, WEIGHT-DRIVEN
Jack Wallace, Oneida, NY, suggests that the ladder chain, weight-driven clock of Samuel Tipton may be a Waterbury.

LE CLIP
As a follow-up to last month's responses, Mark Pleszczynski, Queensland, Australia, writes:

On the back of the "watch" there is a screw. Once removed, one can then get access to a pushpiece on the set lever so the stem can be removed. Next, put the access screw back in. Using the Bergeon Pump No. 5011 (shown below), the glass can be popped out and the movement can then be worked on.

To reassemble, put the movement back in the case, fit the stem and crown, then the dial-glass spacer, glass gasket, and finally press the glass back in using a conventional glass press.



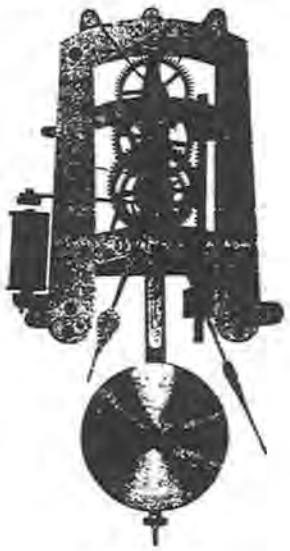
C. ITEMS STILL NEEDED

FAVORITE STAKING/RIVETING TOOL
Richard Bocock, Austin, TX writes: "I am in need of the circular die plate and spindle for the base of a Favorite staking set referred to on its label as a riveting set. Any parts or information on how to contact the company would be appreciated.

DAEWOO KOREAN-MADE CLOCK
Keith Ballard, Drexel, NC needs a governor for a Korean clock made by Daewoo Precision Industries. A source for new or used parts will be apprerciated.

SETH THOMAS
Clayton Herbert, Littleton, NH seeks wiring/battery and operational information for the Seth Thomas clock shown here:

1924 SETH THOMAS CLOCK MOVEMENT



SELF WINDING MOVEMENT

HERSCHEDE KIN?



4006

The above logo appears similar to the Herschede logo except it has a hammer incorporated with it. Samuel Tipton, Maryville, TN, seeks information about the maker and possible age of the clock. The family history reveals that the clock case and other matching furniture hand carved in Italy. Below are three views of the clock in question.







SCHEMATIC FOR BRANSON ULTRASONIC CLEANER MODEL A300 AND TANK #LT 126-6

Alton DuBois, Jr., Queensbury, NY is seeking a schematic for a Branson ultrasonic cleaner, model A300 (Sonogen) and tank #LT126-6.

TUBULAR BELL CHIME - HERSCHEDE TYPE CROWN TRADEMARK

Todd Aschenbach, Sheboygan, WI, has an 8 tubular bell chime and strike clock which will strike Westminster or Wittington chimes. This 3-weight German-made movement has a 5 stamped on nearly all its parts and the number 229 is stamped on the front plate. Both the chime and strike have silencing levers which operate at the front of the dial. Both plates are 5.1mm thick, 9-1/2" wide at the bottom, and 13" wide at the top. The height is 8-5/8".

Do you have information regarding this month's requests? Do you need information about one of this month's responses? If so, send a self-addressed, stamped business-size envelope and your request to: "Bulletin Board," c/o AWI Central, 3700 Harrison Avenue, Cincinnati, OH 45211.

❑

AWI MATERIAL SEARCH NETWORK

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

SS2 Seiko 0139 movement complete

SS5 Rolex 19 ligne minute recorder, serial #219138, balance staff

If you can supply any of these items, please contact:
AWI Material Search Network
AWI Central
P.O. Box 11011, Cincinnati, OH 45211

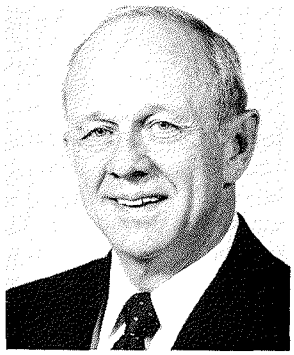
GENUINE WATCH MATERIALS

TOOLS - FINDINGS - JEWELRY
COMPLETE CRYSTAL DEPT.
SEIKO - PULSAR - LORUS
ROLEX - BULOVA
AMERICAN & SWISS MATERIAL
SERVING THE INDUSTRY SINCE 1913
NO MINIMUM ORDER
EVEREADY & RAY-O-VAC CELLS

WM. S. McCAW CO.
1722 MADISON AVE.
TOLEDO, OHIO 43624
TEL 419-243-3720
OHIO WATTS 800-472-0200
NAT WATTS 800-537-0343

The Apprentice Clockmaker

Clock Movement Maintenance
Unit Repairs



JOHN P. KENYON
CMC

Pivot Inspection and Repair - Part 3
Repivoting

If a pivot on a clock movement arbor is severely scored and cannot be feasibly repaired, or if it has been broken off, it must be replaced. This procedure requires lathe skill, patience, and close attention to detail. With a little practice, the apprentice can become quite proficient in this technique.

In this procedure, careful preparation is essential to achieve success in the final repair. Repivoting includes the following steps: checking for hardness and annealing, if necessary; setting up; removing the remnants of the old pivot; locating the center of the arbor end; drilling the arbor; preparing and fitting the "plug"; and finishing the pivot. Each of these steps will be discussed in detail.

Pivot work should always be completed prior to bushing work. Then, if necessary, the bushing can be made to accommodate the pivot. This is more practical than adjusting the pivot to fit the bushing.

Checking for Hardness

In our model 30-hour time-only movement, the arbors are probably made from steel that is soft enough to repivot without annealing. In high-grade clocks or French clocks, as a rule, the arbors are made from tempered steel and will need to be annealed prior to machining. To check for hardness, run a file over the surface of the arbor. If metal is removed, the material is soft. If the file glides over the surface without removing any metal, the arbor has been hardened and tempered and must be annealed. For this project we will assume that the material is soft and that annealing is not necessary.

Setting Up

When the broken pivot is on the short end of an arbor and the wheel and pinion are fixed as in Figure 1, the projecting arbor will run true in a lathe collet with no additional support. When the broken pivot is on an arbor end that will protrude a considerable distance from the collet, as in Figure 2, the arbor must be centered and supported at the outer end before it can be drilled. Otherwise, it will be necessary to remove the wheel and/or pinion so that it can be placed far enough into a collet to be accurately drilled.

Accessories are available to center and support the end of the arbor. One type is fitted to the tailstock, and drilling is done through the tailstock spindle. Another type is attached to the tool rest post and designed to support the end of the arbor in a tapered cone, while the tailstock is used for holding the drill. One of the most popular attachments for this work is the "steady rest". This device is made up of three adjustable radical spars within a circle to center and support different diameters of lengthy ends. Some type of attachment for this purpose is available for most watchmakers' lathes. The next column will be devoted to a detailed discussion of how to make your own "steady rest".

Figure 1. Broken pivot at short end

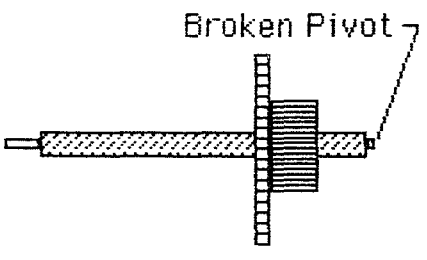


Figure 2. Broken pivot at long end

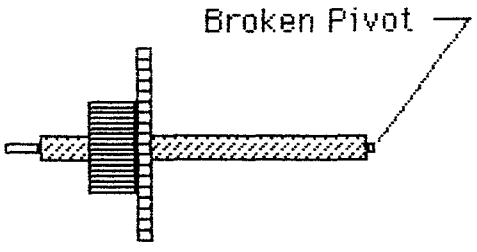
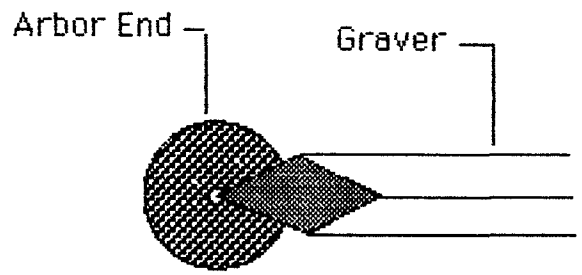


Figure 3. Striking center



Removing Remnants of the Old Pivot
This step involves preparing the end of the arbor for drilling. First, clip off the end of the old pivot with an "end cutting" nipper, being very careful not to apply pressure from an angle that will cause the arbor to bend. Next, file or grind off the stump, flush with the shoulder. Now you are ready to locate the center.

Locating the Center of the Arbor End
Locating or "striking" the center of the arbor end is the crucial step in the procedure. If it is not done perfectly, it will be impossible to drill the new pivot hole exactly in the center of the arbor end. Take a little extra time for this step, and proceed with extreme caution! If this is your first attempt, you should practice on an old arbor or a piece of scrap metal until you feel confident doing it.

Chuck up the arbor, using a support for the end, if necessary. With the lathe turning at slow speed, rest a sharp-pointed graver on the tool post and carefully touch the arbor end at the center of rotation as in Figure 3. Use a loupe to monitor the progress. The graver should appear motionless with no vibration. Apply slight pressure until a small cone or V-center is formed as illustrated in the cross section in Figure 4. Continue cutting until the cone is almost the size of the drill diameter. There can be no "pip" in the bottom of the cone, as illustrated in the cross section in Figure 5. If one does occur, you have not found true center and the drill bit will be pulled aside by the channel around the "pip", resulting in a hole that is off center.

Another method of locating the center is by using a very sturdy drill bit called a "center drill". In this method, a chuck-holding tailstock is used to hold the center drill as

HERMLE MOVEMENTS
from
Butterworth Clocks, Inc.
1715 Pearlview • Muscatine, IA 52761
Phone & FAX: (800) 258-5418
Technical info: (319) 263-6759

Largest selection in US — over 60 different models.
Guaranteed lowest prices.
Same day shipping, two year warranty.
Most models bronze bushed, milled ratchets.
Factory fresh stock.
I can custom match 21 different pendulum lengths.
Technical help from a practicing clockmaker — Life Member of AWI.
SASE free price list and info.

KEY TEST FOR QUARTZ WATCHES

The "KEY TEST FOR QUARTZ WATCHES" by Ewell Hartman, CMW is a quick and simple method of locating the problem in a quartz analog movement. The only tool required is a meter.

Material and instructions for learning this test are supplied by the AWI-ELM Trust as part of their educational work. There is no charge to any group wishing to learn this test. There are great benefits to learning this in a group setting. However, for individuals who may not be able to participate in a group, it is available to them also.

For more information call or write the AWI office for an information sheet and application form.

P CC Precision Crystal Cutting Co.

"For All Your Watch Crystal Needs"

SAME DAY SERVICE

SATISFACTION GUARANTEED ON ALL WORK

Suppliers of All Major Crystals

Expert Crystal Cutter With 10 Years Experience

LOWEST Prices in the Country

SHIP TO:
Precision Crystal Cutting
23940 Eureka
Taylor, MI 48180

Reference & Price List On Request

(313) 287-3480
FAX (313) 287-9210 (24 hrs.)

Figure 4.
Correct center strike

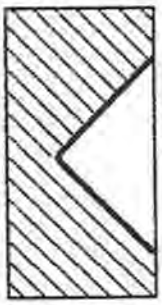


Figure 5.
Incorrect Center Strike

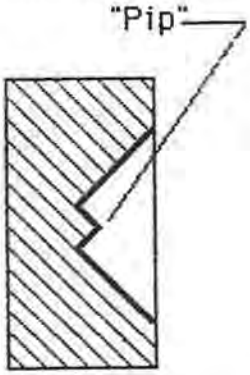
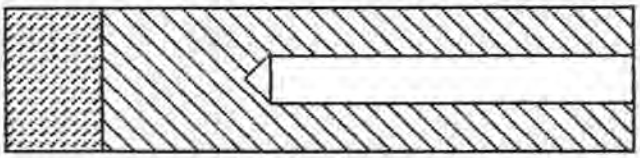


Figure 6. Drilled arbor



it is applied to the arbor end with a lever feed attachment. To use this procedure the tailstock must be truly aligned with the headstock, and the arbor must be set up so that it is precisely centered or the pivot hole will be drilled oversize in the arbor.

Drilling the Arbor

Now that the center has been precisely located and scored, the drilling mode can commence. Drill bits used for pivoting are carbon steel flat drills and can be purchased in assortments or made in your workshop.

Select a pivot drill bit slightly smaller in size than the diameter of the pivot wire to be used and place it in the chuck of the pin vise. Holding the pin vise freehand, with the lathe operating at slow speed, carefully place the drill to the "spot" at the center of the arbor. Keep it aligned with the arbor and employ light pressure to begin the cut. A little oil should be applied to the drill bit, and the drill bit should be removed from the hole regularly to clear the chips and to check the progress of drilling. The hole should be drilled one and one-half to two times the length of the pivot as shown in the cross section in Figure 6. Drilling freehand with no support may result in a "bell mouth" hole. To overcome this, some clockmakers use a guide attached to the lathe bed or to the tool post to support the pin vise and keep it parallel with the center height of the lathe. Such a tool can be made in your shop with a little ingenuity.

If the drill becomes dull as indicated by slow cutting, stop and resharpen it; otherwise, the inner surface of the hole will become burnished and even more difficult to cut. Be sure that the drill bit is sharpened correctly or it might produce an oversized hole.

If the tailstock is to be used for drilling, be sure it lines up perfectly with the headstock and place the pivot drill in a collet or other holding device. Run the lathe at slow speed and use a lever feed attachment to guide the drill into the work slowly. Remove the drill bit frequently to clear away chips, to apply oil, and to check the depth of the hole.

Preparing and Fitting the "Plug" (Figures 7 & 8)

In our 30-hour single train movement we decided that the arbors and pivots are made from soft steel, so they should be replaced with the same material. Most pivot wire in the catalogs is blue-tempered steel, but unhardened steel wire is also available in assortments of 6" lengths. For our purpose here, the latter will be satisfactory.

Select a piece of wire slightly larger in diameter than the hole. Place it in a lathe collet and grind the end in a very slight taper until it fits into the drilled arbor about 2/3 of the depth of the hole, as illustrated in Figure 8.

Use "end cutting" nippers to cut off the wire at a point slightly longer than the finished pivot, then rechuck the arbor in the lathe. Using a pin vise to grip the extra material on the pivot end, twist the wire into the pivot hole until it is tight, then carefully tap the end of the wire once or twice with a light hammer. Start the lathe, and the plug should run true. The pivot can be brought to its correct diameter and length with a pivot file. If the pivot does not run true it must be turned down. Filing and/or grinding will not make it run true.

Be especially careful with the degree of taper on the plug. If too steep, the walls of the arbor may split when tapping it in, and/or the plug may work itself loose later.

Finishing

Grind the new pivot to the correct diameter and length. Be sure to keep it parallel. Undercut the shoulder and round off the end. Now polish and burnish the pivot surface. A decent repivoting job should be impossible to distinguish from the original.

Next time we will discuss repairing worn pinion holes, the right way.

❑

Figure 7. Finished plug

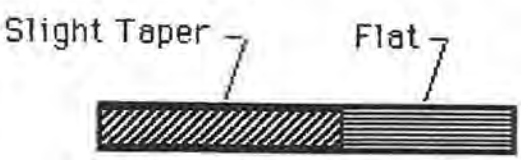
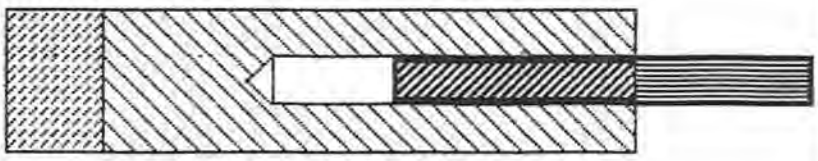


Figure 8. Plug in pivot hole



New Members

ALABAMA
CROUCH, Paul--Auburn, AL
Sponsor: William C. Rogers--Lanett, AL
KLOOCK, Carl--Madison, AL
RAYBURN, Cecil--Birmingham, AL

ARIZONA
BURIAN, Rudolph--Scottsdale, AZ
HAY, Robert M.--Sun City, AZ★
MORENO, Rocky--Phoenix, AZ
SEAVER, Eric--Phoenix, AZ

ARKANSAS
FIELDER, James--Guy, AR
HINDMAN, Jim--West Memphis, AR

CALIFORNIA
BOWSER, Richard--Temecula, CA★
BRIGHTWELL, John D.--Carmel, CA
DAVIS, Frank J.--Grand Terrace, CA
DI MINO, Angelo V.--Costa Mesa, CA★
JOZEFOV, Abraham--Palo Alto, CA★
GRIGGS, James--Saratoga, CA
HOLBORN, Harry--Cupertino, CA
NASH, Mike--Lakeside, CA★
OSTEN, Gene--Santa Ana, CA
WAITE, Dale A.--LaMirada, CA
WATSON, Ray--San Diego, CA

COLORADO
AMMANN, Bruno--Boulder, CO★
COX, Oscar--Loveland, CO
EVANS, G.M.--Boulder, CO
YANG, Kenny S.--Colorado Springs, CO

CONNECTICUT
AUSTIN, Gilbert--Wallingford, CT
GROSSO, Peter--Waterbury, CT
PETERSON, Jim--Monroe, CT★
ROMERO, Douglas W.--East Hampton, CT

DISTRICT OF COLUMBIA
COSBY, Clarence C.--Washington, DC★

FLORIDA
BARD, Sam--Royal Palm Beach, FL★
CAPRARO, George--Keystone Heights, FL
COLON, Salvatore--Orlando, FL
D'SOUZA, Harold--Altamonte Springs, FL
FERNANDES, Jorge A.--Hialeah, FL
GONZALEZ, Gonzalo J.--Spring Hill, FL★
LONDON, William R., Jr.--Winter Park, FL
MARR, Steven--Largo, FL
MEREL, Melquiades--Miami, FL
MIRO, Carlos R.--Miami, FL★
PETERS, Kamal--Ft. Lauderdale, FL
POLIAKOFF, Manny--Miramar, FL
RAMSEY, Roy B.--Odessa, FL★
SAVILLE, David--Miramar, FL
SCHOONOVER, Jerry--Winter Park, FL
STANCAMPIANO, John--Deltona, FL
STEHLI, Daniel--Tampa, FL★
STICE, Cecil--Daytona Beach Shores, FL
TONNESEN, Russell Wayne--Clearwater, FL
WESTON, Don--Margate, FL
Sponsor: Jack Napp--Hallandale, FL

GEORGIA
GOOD, James O.--Kennesaw, GA

IDAHO
PARIS, Linda Ann--Pocatello, ID★

ILLINOIS
DECKER, Paul D.--Liberty, IL
HORNE, Everett D.--Peoria, IL
KOZLOWSKI, Leo G.--Norridge, IL
VAN RYN, Paul--Tinley Park, IL

INDIANA
HESS, Thomas I.--Kokomo, IN
Sponsor: William E. Givens--Kokomo, IN
KERLIN, Ron--Syracuse, IN

KANSAS
WRAY, Samuel--Junction City, KS

KENTUCKY
COSHNITZKE, James E.--Florence, KY
DWIGHT, Tim--Covington, KY★
KAELIN, Alvin T.--Park Hills, KY
SHIFRIN, Isaac--Louisville, KY

LOUISIANA
DUNCAN, Richard--Bush, LA

MAINE
THERIAULT, Thomas E.J.--Gorham, ME

MARYLAND
SABEL, Robert E.--Baltimore, MD
SHAW, Richard--Mt. Airy, MD

MASSACHUSETTS
BUCHAN, Walter--Norton, MA★
DE FAZIO, Thomas--Watertown, MA
Sponsor: Leo A. Jaroslaw--Acton, MA
DEMERS, Gaetan L.--Lawrence, MA
REINOLD, Richard J.--Winthrop, MA

MICHIGAN
ANDRUS, Paul--Bay City, MI
DAHL, Michael--Midland, MI
HURWITZ, Samuel A.--Flint, MI
YANKEE, David Al--Auburn Hills, MI

MINNESOTA
BLOTKAMP, Paul J.--Worthington, MN
GILLEN, Robert F.--White Bear Lake, MN
GUNDERSHAUG, Robert B.--New Hope, MN
GUSTAFSON, Larry--Bloomington, MN
HORST, Donald--Plymouth, MN
SALAS, Jeffrey--St. Paul, MN

MISSOURI
CURREN, Roger--O'Fallon, MO
OWEN, Charles--Kansas City, MO
Sponsor: Don M. Robinson--Kansas City, MO

NEVADA
BULLARD, Brian--Reno, NV

NEW HAMPSHIRE
STONE, Peter--Nashua, NH

NEW JERSEY
DUTY, Robert--Randolph, NJ
HERMANCE, Brett--Madison, NJ
O'BIERNE, Dennis--West Caldwell, NJ

NEW YORK
CHIMENTO, Joseph M.--Akron, NY★
COOPER, Fred F.--Groveland, NY
DESGORCES, Alain--New York, NY
Sponsor: Damian DeBlis--Millburn, NJ
FLORIE, Walter--Massapequa Park, NY
GRANTIER, Terry--Elbridge, NY
GROSSMAN, Joseph--Brooklyn, NY
KOWALSKI, Stephen--Brooklyn, NY
LA GRAVINESE, Tom--Pelham, NY
MARSCHHAUSER, J.--Brooklyn, NY★
MCGEARY, Stuart A.--Waterford, NY★
OLDFIELD, W.T.--Wappingers Falls, NY
PALMER, Ronald--Orchard Park, NY
PRESTON, Robert A.--APO, NY
RIPLEY, Karen--New York, NY
SMITH, Charles W.--New Berlin, NY
STEVENS, Daniel--Brooklyn, NY
VAN DEMARK, Paul H.--Delmar, NY
WALKER, Charles E.--Hopewell Jct., NY
Sponsor: Leo A. Jaroslaw--Acton, MA

NORTH CAROLINA
TISDALE, William M.--Waynesville, NC

OHIO
DAVIS, Arthur L.--Niles, OH★
KAUCK, John R.--Cincinnati, OH
LAY, Gary--Cincinnati, OH
MILLER, Gary--Canton, OH
Sponsor: Mark A. Baker--Damascus, OH
MITCHELL, Wayne M.--Cincinnati, OH

OKLAHOMA
CAVENAH, Dennis--Sapulpa, OK
HOMESLEY, Jerry--Tulsa, OK
LUELLEN, Randy--Henryetta, OK

OREGON
OLFSON, Mark R.--Medford, OR

PENNSYLVANIA
BAISDEN, Keith--Lake Ariel, PA
CRYSTAL, Jay--Pittsburgh, PA
Sponsor: John C. Paige--Pittsburgh, PA
DAVIS, John R.--Shillington, PA
KATCAVAGE, Charles--Bearcreek, PA
WEYER, Geoffrey--State College, PA

RHODE ISLAND
CHERICO, Vincent V.--Lincoln, RI★

TENNESSEE
CHAPMAN, Robert H.--Knoxville, TN
Sponsor: Richard Grose--Gastonia, NC
ROZEN, Doron--Memphis, TN

TEXAS
GOSS, Kenneth--Ft. Worth, TX★
HAYNES, Grady L.--Ft. Worth, TX
JACKSON, Charles N.--Grapevine, TX
Sponsor: Larry L. Bower--Grapevine, TX
MANNING, Ronald L.--San Antonio, TX
WIMBERLEY, John--San Angelo, TX

VIRGINIA
ABDALLAH, Ali--Centreville, VA★
FRENCH, Janet--Springfield, VA
Sponsor: Marvin E. Whitney--Alexandria, VA
HORNICK, John F.--Front Royal, VA
VOIGTSBERGER, Richard--Virginia Beach, VA★
WESCOTT, William C.--Midlothian, VA

WASHINGTON
SHARPE, George A., Jr.--Preston, WA
VICKERY, Eric--Snohomish, WA
Sponsor: Gail I. Sherman--Seattle, WA

WEST VIRGINIA
CRACRAFT, William A.--South Charleston, WV

★ AWI welcomes back these individuals who have chosen to reinstate their membership.

Ask Huck

CLOCKMAKING BITS

By J.M. Huckabee
CMC, FBHI

About . . .



SPRING BARREL BEARINGS

MAINTAINING POWER

Q. What do you do about spring barrel bearings? Many are loose, wobble, and have excess end play.

A. I find three general types of barrels: The older ones have the barrel and great wheel cast in one piece. These may have the hub as a part of the main casting. Another type has the wheel, hub, and barrel as a three-piece assembly. A third type is made of steel, of one piece, and is brass plated. This third type is a recent-era technique--touch one with a magnet to determine if it is steel.

Let's talk about the first type. These may be found with a barrel that never ran true and had a marked cover location. The great wheel ran essentially true when assembled according to the cover marking. We often find these which have a bad wobble and a depthing problem with the following pinion. We may have a problem with a conflict with other movement features due to excessive runout and endshake. Should the great wheel slip mesh with its pinion, the result may be of vast damage to the movement.

I've never liked the idea of a barrel bushing. The hub has numerous features that need to be preserved, and a bushing error makes a large contribution to wheel runout. I make a new hub for the barrel when this problem is encountered.

My first step is to remove the old hub and true the great wheel bore. This is done by holding the wheel in the lathe and then going through the barrel open-end to true the wheel bore.

The next step is to turn a new hub from a brass billet cut from rod stock. We now have the option of adjusting arbor endshake within the barrel and adjustment of endshake or feature conflicts external to the barrel.

I begin the bushing job by polishing the arbor surface that the new hub journals onto. The hub bore is machined to size and never reamed. We usually broach train pivot holes to an hourglass shape, but on the barrel journals I prefer as much contact area as feasible. This journal gets "double wear", once when winding and again as the clock operates.

The new hub is staked in place and results in a very nice professional job. That's why I like the new hub. It fits perfectly, corrects any wheel runout that may have been present, and permits compensation for some other problems.

The arbor pivots and plate bushings may also need some attention at this time. Commercial bushings work out quite well in plate journals and may well be a more time-effective way to do the job.

Assemble the barrel and arbor without the mainspring. Now spin the barrel and observe great wheel wobble. Try several positions of the barrel cover for the least wheel wobble. Barrel markings may be obscured or not original. Don't be alarmed if the barrel is not absolutely round, many of them never were. Of course, the error must not inhibit functional operation.

Q. How important is maintaining power? Do you consider it necessary? How is it best achieved?

A. These questions all have conditional answers, so let's discuss the subject from several viewpoints.

Probably no other clock has been more successful than our old American clocks. Yet it is not a fine timekeeper, neither does it have maintaining power. It has a robust escapement that is not seriously affected by backlash during winding. Its overall accuracy would not be materially improved by saving the error accrued during winding. Adding maintaining power to this one would be like guilding an orchid to improve its beauty.

A highly accurate clock with a delicate escapement surely should be maintained during winding. Some methods of stored power are easily achieved, for instance a watch. We enter the spring storage via the barrel arbor and exit via the barrel. We have main-

tained power without even giving thought to the mechanism.

Most clocks with barreled mainsprings have maintained power just as does the watch. Although this is a simple system, it has a potential problem. It requires great caution because of full wind; excess winding force is transferred to the train and escapement.

Over 300 years ago Christiaan Huygens developed an endless rope winding system for maintaining power. This is frequently found today in chain form. Many tower clocks use this system with a roller chain and motorized winding mechanism.

The fine IBM Master Time Control Regulators all had some form of maintenance power. The models 15, 17, 25, 37, and 90 group all had springs with winding via one end and power delivery from the other end. These clocks all had spring torque sensors to maintain a constant power to the train. The model 35 used weights which were wound via a differential gear cluster and a motor. All of these clocks, except the 90 group, used a very delicate deadbeat escapement. The 90 group used a balance wheel escapement with automatic regulation. These clocks were all champions of accuracy in their era.

Some tower clocks have a gear sector attached to a weighted arm that is engaged during winding for maintenance power.

I've built a number of clocks, all were maintained. In the large regulators several used dual weight drive to achieve the objective. One used a complex dual coil spring energy storage mechanism. But regardless of the method used, the end objective is the same.

Many fine clocks of the past used a maintaining power system built into the great wheel. This same scheme is found in many fine regulators.

Is maintaining power necessary? No, but in fine clocks it certainly is desirable, and some forms can be had with very little manufacturing effort. ❑

If you have any questions, please write:
"Ask Huck," c/o Horological Times,
P.O. Box 11011, Cincinnati, OH 45211.

TRAINING UPDATE

Update Your Training

By Jim Lubic

Project Extend

The Project Extend Courses scheduled for April 1994 still have plenty of openings. I will be the instructor for both the Watch II and Watch III Project Extend courses.

In Watch II the student can expect to receive instruction in servicing the Swiss modern wind-up watch. Staffing, poising, and truing of the same, as well as the proper method for setting up the Swiss lever escapement, are the main topics of this course. The dates are April 18-22.

Hairspring vibrating and timing adjustments are the main topics covered in the Watch III course. The students will vibrate a flat hairspring, form overcoils, and adjust an overcoil for isochronism. Dynamic poising will be covered and practiced in depth. The dates are April 25-29.

Bench Courses

All of the Bench Courses scheduled for the month of March and April are still lacking enrollment, with the exception of the "Repair of the Atmos Clock" course to be held in Orlando, FL on March 12 & 13 and the "Cuckoo Clock Repair" course in Baltimore on April 9 & 10. These two courses are full.

Phase III of the Lathe course, scheduled for April 22-25 in Secaucus, NJ, is drastically lacking enrollment. In Phase III the student can expect to learn how to operate the Jacot tool and the Swiss turns, as well as become more proficient with his/her WW style lathe. Roy Hovey has designed a curriculum for watchmakers and clockmakers, so if you are interested be sure to specify which curriculum you want to follow.

AWI has Bench Courses scheduled in all sections of the country in the next two months, so there should be something for almost everyone. Remember, if there are less than 8 members enrolled in any scheduled Bench Course 14 days before the course is to be held, the course will be cancelled. Sign up and support the Bench Courses to be held in your area. Contact AWI Central for course descriptions and hotel locations for any Bench Course you are interested in.

❑

YOU HAVE TRIED THEM ALL . . . NOW TRY

PLYMOUTH

WE ARE A FULL SERVICE MATERIAL SUPPLIER.
WE SPECIALIZE IN **ROLEX** PARTS,
MATERIALS FOR QUARTZ WATCHES
AND HARD-TO-FIND MATERIALS FOR
AMERICAN BRACELET & POCKET WATCHES,
CLOCK MATERIALS, & TOOLS.
SEND FOR A FREE SET OF CIRCULARS.

PLYMOUTH WATCH MATERIAL CO., INC.
87 Nassau St., Room 909
New York, NY 10038 Telephone (212) 267-4441



WEST DEAN COLLEGE

The Edward James Foundation
ADVANCED DIPLOMA COURSE
IN THE RESTORATION
OF ANTIQUE CLOCKS

Run in conjunction with The British Antique Dealers' Association and commencing September each year. Candidates with appropriate skills are invited to apply for selection and practical test. Grants may be available.

Further information from:
The Administrator, West Dean College
West Dean, Near Chichester, W. Sussex
PO18 0QZ England. Tel: 0243 811301
International: +44 243 811301 Fax: +44 243 811343

The Watchmaker's Lathe

Part IV

Making a Dead Center Drive Unit



Ron DeCorte, CMW

My last article, "The Watchmaker's Lathe, Part III," dealt with repivoting wheels between centers. You may have noticed that a special drive unit was used in the headstock in order to drive the workpiece. The dead center drive unit shown in that article was made in my shop and has many applications such as repivoting, turning, and polishing.

This brief article will give the basic information required for the reader to construct a similar unit.

Photo 1 shows the drive unit mounted in a collet and Figure D shows the basic construction of the unit.

It should be noted that the drive pulley E and idler pulley H shown in Figure D are made of brass. All other parts are made from oil-hardening drill rod, hardened and tempered to a dark blue color.

Making a Dead Center Drive Unit

Figure D is a detailed drawing of a dead center drive unit. The dimensions are not that critical so I have placed a general scale in the lower left corner. Some notes are in order:

Diameter "A" should fit nicely in a large collet.

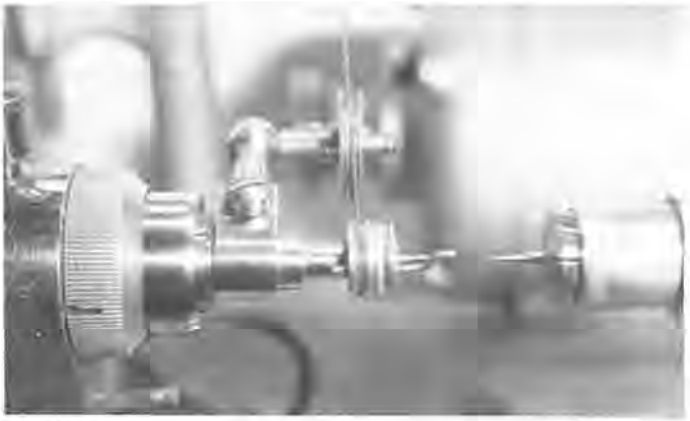


Photo 1

Diameter "C" should fit tightly into diameter "B" but be removable (a slight taper in diameter "C" would help).

Diameter "D" should be slightly longer than the length of the driver pulley "E" and allow the pulley to rotate freely.

The shank of the center(s) "F" should be 2° included angle. (Make several centers while you are at it.)

Driving pin "G" should fit through the driver pulley with just enough friction to hold it in place.

Idler pulley "H" should be free to rotate and move along diameter (shaft) "J".

Diameter (shaft) "J" is pressed tightly into unit "K".

Diameter (hole) "L" should fit freely over diameter "A" but hold securely when screw "M" is tightened.

Note the V- and U-shaped grooves in the driver pulley "E". (The V is for motor drive and the U is for bow drive.)

I think that the rest of the details needed to make this unit are simple enough to figure out from the drawing. If you need additional details, please write to AWI.

HAVING TECHNICAL PROBLEMS?

CALL THE AWI HOTLINE

513-661-4636

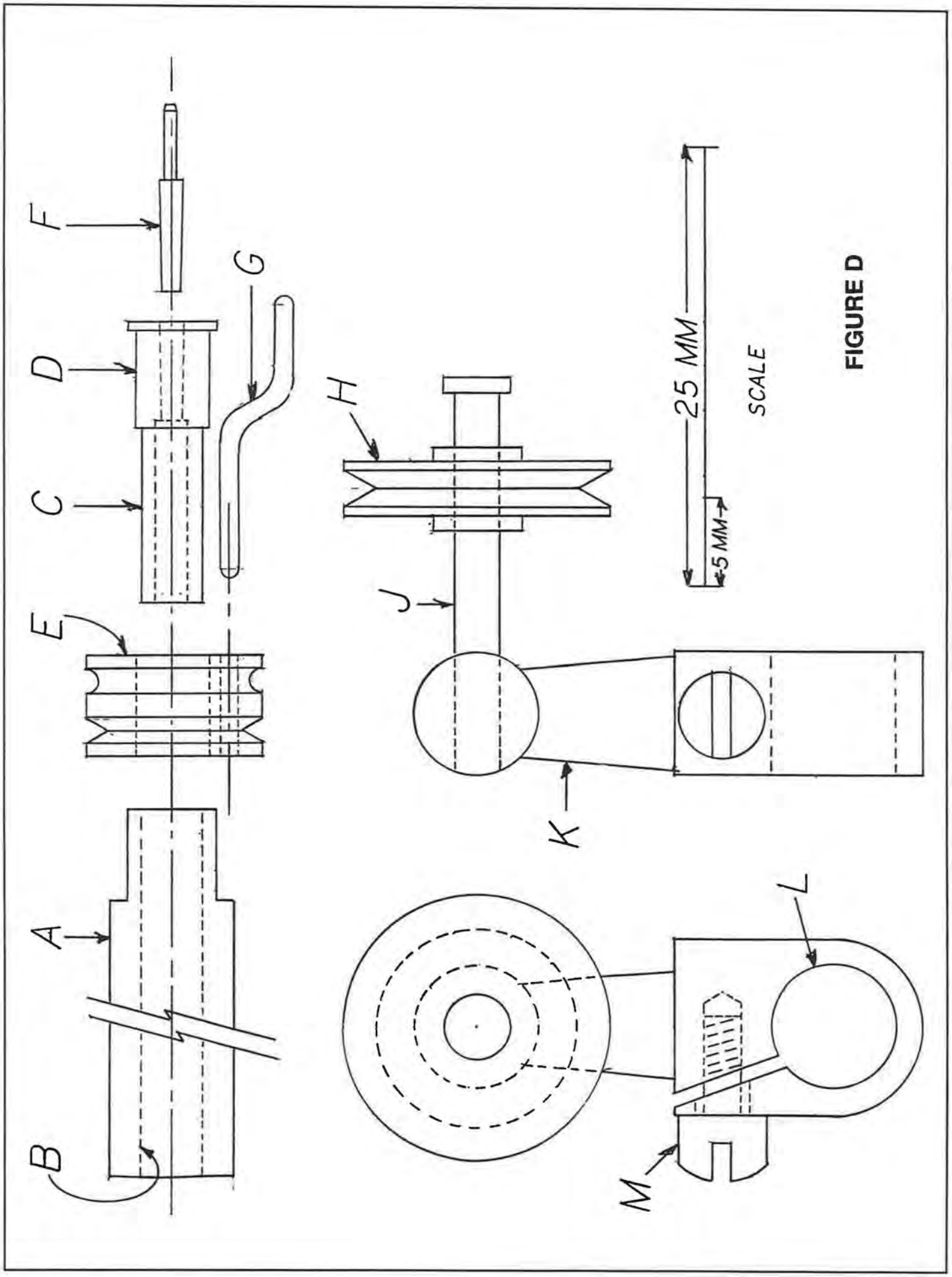


FIGURE D

MILITARY TIME

ZIG-ZAG AND COURSE CLOCKS, *Part III*

Sinuous Course Clock Instruction Book, Mk. 3 Mod. 0, Seth Thomas Clocks, Thomaston, Conn.



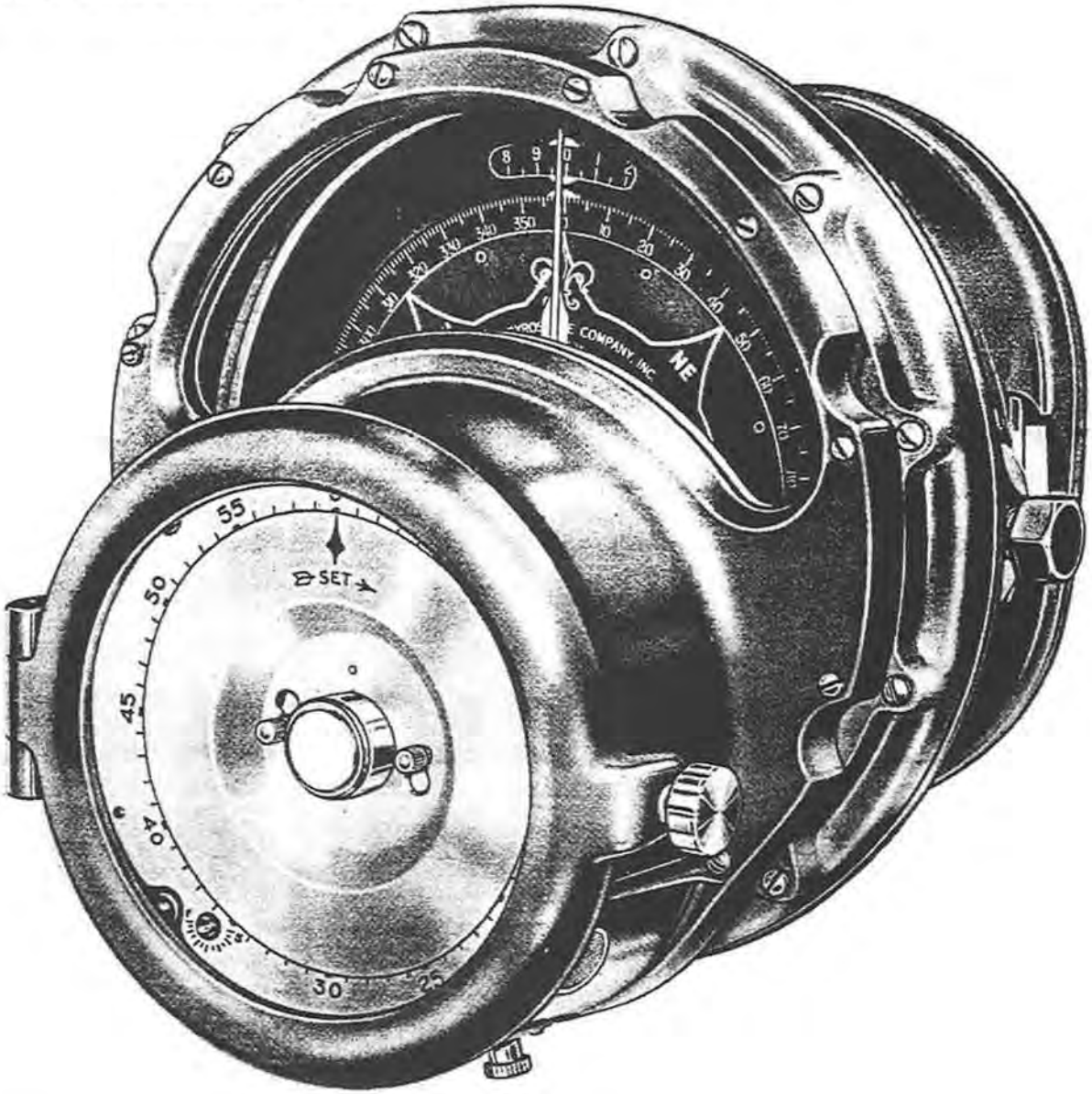
Marvin E. Whitney
CMW, CMC, FAWI

SECTION 1 - INTRODUCTION

The Sinuous Course Clock Mk. 3 Mod. 0 is a self-contained auxiliary instrument to be mounted on either (1) Arma Mark 6 Mod. 0, (2) Sperry Mark 24 Mod. 0, or (3) Sperry Mark 15 Mod. 0 gyro compass steering repeaters. The provision for mounting on these three classes of gyro compass repeaters is in the form of adaptor rings.

The purpose of the Sinuous Course Clock is to enable

Figure 1. Sinuous course clock mounted on repeater.



the helmsman to steer a predetermined, constantly curving track along a base course as a means of protection from submarine or air torpedo attack.

SECTION 2 - DESCRIPTION

1. General Description

The Sinuous Course Clock Mk. 3 Mod. 0 is composed of four major assembles: the clock assembly, the cam mechanism assembly, the front case assembly, and the adaptor ring assembly (Figure 2).

The clock consists of an eight-day double spring barreled movement and is geared to rotate the cam spindle once in one hour. The cam operates a pointer which swings over the compass card through a maximum arc of 140°.

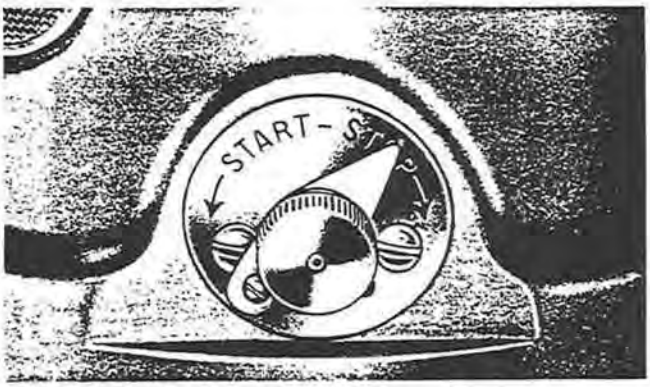
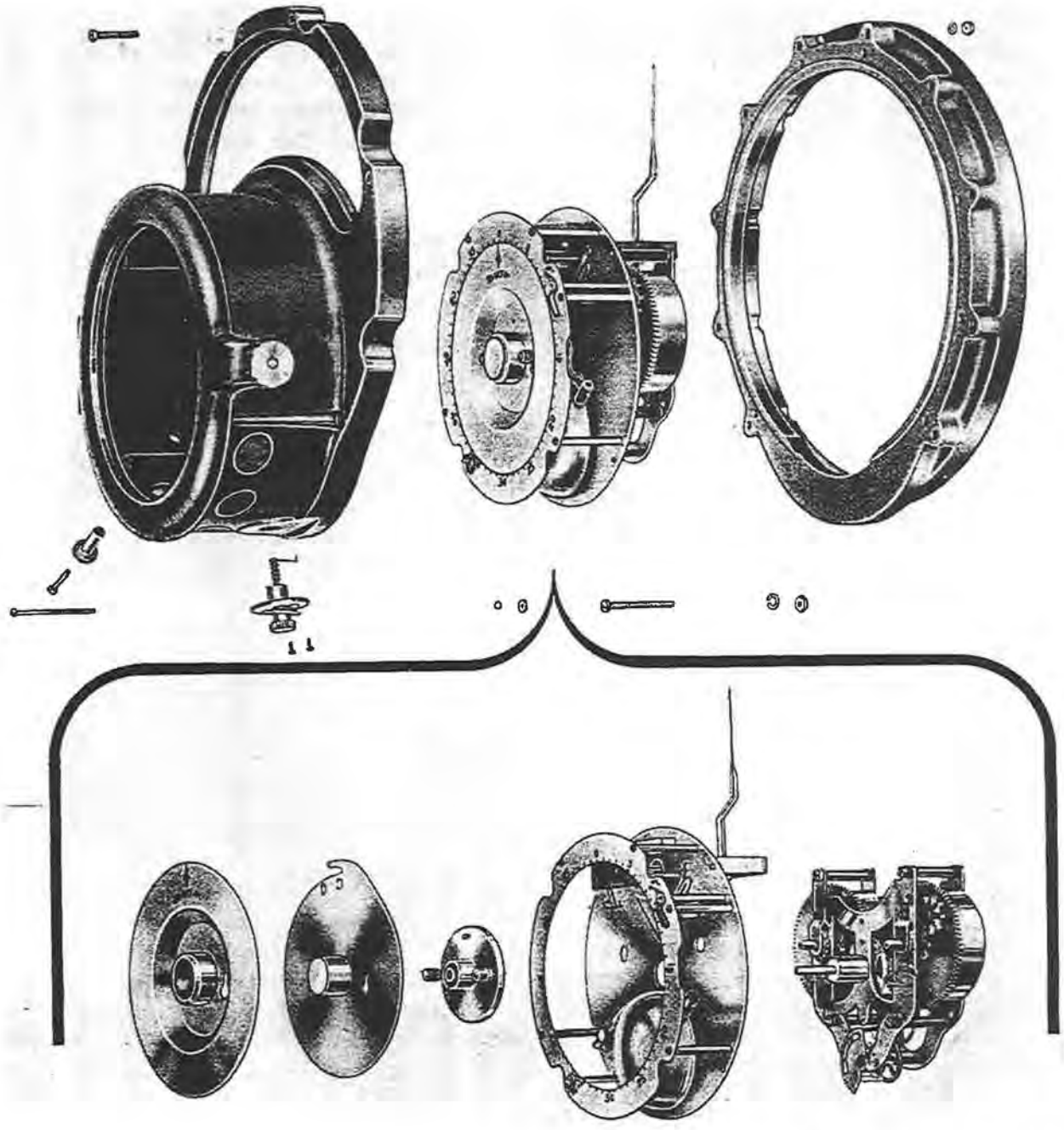


Figure 3. Stop position of start and stop knob.

(Please turn to page 37)

Figure 2. Exploded view of major assemblies.



Shop Talk

Mechanical Watch Repairs

Examination & Staff Work



Wes Door, CMW

Although much has been written about mechanical watch repairs, there is a continual influx of new horologists entering our profession. In view of this, it has been suggested that a need for this type of article does exist, so here goes.

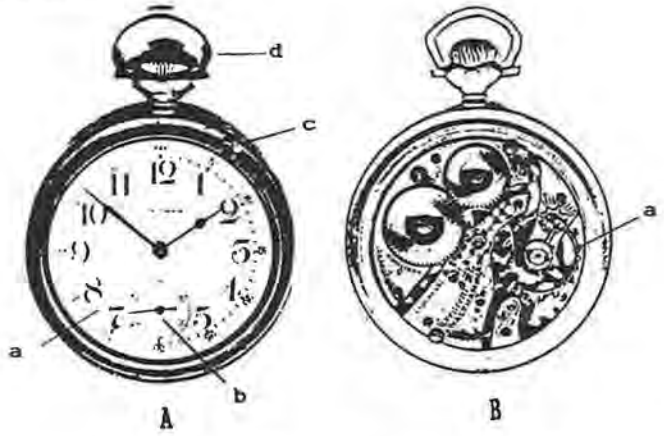
This article will not attempt to teach lathe work, although it is very necessary to have one and know how to use it. There are available good sources for this knowledge so we will only touch on the subject here.

Most older watches were not shockproof; that is, the balance staff was not protected by jewels set in a flexible manner which allowed them to move and absorb shock.

These older watches, especially pocket watches, were prone to staff breakage. Figure 1 shows a pocket watch with a broken balance staff and thus we know we need a new balance staff and maybe more.

Like any job, this one starts with talking to our customer. We can learn a lot and maybe save time by just listening to our customer. If our customer says that their watch was running great until yesterday when the watch was dropped, except for the staff, we probably will not have any serious additional repairs to do except maybe a jewel or two. If the customer says their watch was passed down to them and it hasn't run for several years, or that it was repaired by a friend who fooled around with watches a little and it hasn't run right since, then we possibly have some other work to do in addition to cleaning and a staff. Another scenario would be if the watch was just purchased at a flea market, then we can be quite sure several hours of additional work will be necessary.

FIGURE 1



VISUAL APPEARANCE

To make a proper estimate of charges, we need to make an examination. However, before removing the movement from the case, we can make a few visual checks. Figure 1-A shows the dial side of the watch. The dial (a) is checked for cracks. The hands seem OK. The fourth wheel post (b), that holds the second hand, seems straight. The dial seems tight. If the dial was loose, it would be caused by loose dial screws or broken dial feet. By pulling out the set lever (c) we can check the hand setting of the watch. While the set lever is pulled out, it should stay without holding by hand. If it slips back in, then repairs are necessary. Also, we can check the bow (d) for tightness or if the pendant post is worn. Possibly some soldering will be needed.

Now let's turn the watch over and observe the train side. See Figure 1-B. With tweezers we noticed the balance staff is broken. What other observations can we make before disassembling the watch? We could check the balance screws making sure they are in matching pairs (across from each other). We can check the upper balance jewels for cracks, although they are much easier to see when the movement is removed from the case.

Sometimes the position of the regulator is a guide. If the regulator is pushed completely to one side and the regulator pins are spread, maybe someone else had problems of regulation. We might find that the hairspring is bent in the flat or in the round, or the hairspring is rubbing on the balance bridge or on the balance arms.

Up to now we have just looked at this watch movement while still in its case. Sometimes these few seconds are enough to give a rough estimate to our customer. We need to tell the customer that there are several jewels and other parts that we cannot see that may be damaged and need repairs. These may show up

later. Also, even though the mainspring is not broken, it may be weak and thereby need replacing.

For a better examination, we should remove the movement from the case and then remove the balance bridge from the movement. Now we can observe the balance jewels, the escapement, etc. We should also remove the dial for a better inspection of the jewels.

ESTIMATE REPAIR COST

By now we should have taken ample time to examine this pocket watch and to make an estimate to our customer. This estimate should have enough leeway for the things that we cannot anticipate. If anything, we should give a high estimate. We can always lower the price later. Most old watches need a good cleaning and overhaul, parts, and lots of adjusting and regulating.

I like to look up the year that the watch was made and give this information to our customer. I charge more for the very old watches as there is generally more work to do on these that we don't see at first. Maybe it's a loose barrel lid or a worn sleeve that we missed or could not see during our examination.

Our next article will cover different types of balance staffs and preparing to replace them.

❑

MILITARY TIME

(Continued from page 35)

A bell sounding device is actuated by pins protruding from the cam. An external knob is provided for regulating the intensity of the bell sound. The dial ring indicates a complete hour cycle.

An external start-stop knob is provided for starting and stopping the clock movement to synchronize the cam pointer when set to the proper position on the dial ring (Figure 3).

A dial pointer disk is provided to indicate minute intervals of the one hour cycle. The disk is so designed that the cam is completely covered.

2. Detailed Description

(a) Course clock mechanism complete in case equipped with protective cover. (Cover is for storage and shipment only.)

(b) Adaptor kits. (This can be any one of three kits provided for the three repeaters.) The adaptor kit consists of the following basic units: adaptor ring with gaskets, mounting screws, lock washers, and nuts. Note: All screws, nuts, and lock washers are furnished in a small cotton bag, marked with the respective adaptor ring assembly.

(c) A storage case is provided for the various parts of the adaptor kit. This case is also used for storing of the parts removed from the repeater.

(d) Overall dimensions and weight of the course clock mechanism, complete with protective cover: diameter - 10-1/2", height - 4-1/2", weight without packing - approximately 8-1/2 pounds. Overall dimensions and weight of adaptor kit: size - 12"x12"x4", weight - approximately 8 pounds.

❑

BOOKS FROM AWI

THE MUSEUM OF THE AMERICAN WATCHMAKERS INSTITUTE--Henry B. Fried. An exposé of the unique collection of the American Watchmakers Institute. **$125.00**

QUESTIONS & ANSWERS IN QUARTZ WATCH REPAIRING- Alice B. Carpenter and Buddy Carpenter. A basic understanding of quartz technology. **$12.95**

GRUEN WATCHES: A SPECIAL COLLECTION--Robert D. Gruen. A collection of Gruen watches with photos and descriptions. **$6.95**

MILITARY TIMEPIECES--Marvin E. Whitney. Probably the most complete compilation on military timepieces to date. **$75.00**

HOW TO BUILD A REGULATOR CLOCK--J.M. Huckabee. Shop drawings with critical drawing notes, 82 fully illustrated pages. **$18.00**

TIMING MANIPULATIONS--James L. Hamilton. 63 pages plus three large charts for the serious student of timing mechanical watches. **$4.50**

THE BEST OF J.E. COLEMAN-CLOCKMAKER--Orville R. Hagans. An aid to solving everyday problems in clock repairing. **$30.00**

QUESTIONS & ANSWERS FOR THE CLOCKMAKING PROFESSION--AWI. Experts answer everyday questions about clockmaking. **$14.95**

QUESTIONS & ANSWERS FOR THE WATCHMAKING PROFESSION--AWI. Helpful information on repairing watches. **$5.95**

REPAIRING QUARTZ WATCHES--Henry B. Fried. Includes a basic course in electricity & electronic horology. **$26.00**

THE SHIP'S CHRONOMETER--Marvin E. Whitney. A concise treatise on the fascinating nautical timepiece, for the collector as well as the horologist. **$75.00**

WATCH & CLOCK INFORMATION, PLEASE--W.H. Samelius. The writing of Samelius edited by O.R. Hagans. **$30.00**

THE WATCH REPAIRER'S MANUAL--Henry B. Fried. The newly expanded and updated fourth edition of this popular textbook on watch repair. **$30.00**

If you are interested in any of the above books, please send your order along with a check or money order made payable to AWI Press. (U.S. Funds only.) Include your name, address, zip code, and phone number and send to: AWI Central, P.O. Box 11011, Cincinnati, OH 45211.

ALL BOOKS SHIPPED POSTPAID

Affiliate Chapter Column

Affiliate Chapter Meeting

By Greg Hostetter, CC

The time of year has come for each of us as affiliate chapters to start preparing for the annual affiliate chapter meeting coming up in June. Each affiliate chapter can select a delegate to attend the meeting. Each chapter should also give serious thought to any proposals that they would like to have brought up before the other delegates at the meeting.

It is a true privilege to represent a chapter as a delegate at the affiliate meeting. The delegate's job includes updating the other delegates of the happenings of your chapter, bringing up proposals from your chapter, and collecting ideas from other delegates to bring back to your association.

Your delegate should also make plans to attend the AWI Board of Directors meeting on Saturday and Sunday. This is an important meeting that affects all of the members of AWI. Your delegate should attend this meeting so that he/she can report back to your chapter on the important news and changes in AWI. In addition, it is at this meeting that the proposals from the affiliate chapter meeting are brought up for action.

The better your delegate does his/her job, the more your chapter will benefit. One of the key benefits of being an affiliate chapter of AWI is that you have the right to join with other delegates from the other affiliate chapters and have input on the running of AWI.

How do the affiliate chapters have input in the running of AWI? Several of the recent changes at AWI are the direct result of proposals brought to the affiliate chapter meeting. Changing the name of the American Watchmakers Institute to the American Watchmakers-Clockmakers Institute and the development of more one-day bench courses are just two examples of how the affiliate chapters have impacted the operation of AWI.

Through their delegates, the affiliates can also make changes in how the affiliate chapter committee conducts their business. In order for the chapters to get more out of the affiliate chapter meeting, two important proposals were passed last year. In the future, the minutes from the affiliate meeting will be in the hands of the chapters within two months instead of waiting till the following year. This will allow chapters to receive this important information 10 months sooner. Also the affiliate chapter meeting will be preceded by a social to give all delegates a better chance to informally discuss improvements to our organizations. This is so that each of the delegates will have an opportunity to share ideas and get answers to problems that come up in a chapter.

From these examples, you can see that the individual chapters can make a difference. What if your chapter has a proposal and they really want to see it pass? Why not contact the other chapters before the meeting, explain your proposal, and ask for their support?

An information packet on the affiliate chapter meeting will be arriving at your chapter soon. Please take time to share this information with your membership. If you have any questions, you can contact me or the AWI office.

Every year we have a large percentage of the affiliates represented at the meeting. Please encourage your chapter to send a delegate to the meeting. It is one of your greatest rights as an AWI affiliate. To allow as many affiliates as possible to send delegates to the meeting, AWI generously offers each chapter up to $200 to send a delegate to the meeting. I cannot encourage you enough to send a delegate to this meeting. I also invite all members of AWI to attend these meetings. They are open to all members and your input is invited.

❑

Association News

CALIFORNIA



Jay Foreman, founder and president of the House of Clocks, Inc. in Los Angeles, has received the highest degree from the British Horological Institute--Fellow, British Horological Institute (FBHI).

Jay Foreman, watchmaker/clockmaker, has been a Craft Member of the BHI since the mid-1950s; however, his dream has always been to receive the degree of Fellow. Finally, after giving nearly 55 years of his life to the horological profession, his dream has become reality.

Mr. Foreman began his watchmaking apprenticeship in 1941 under the tutorship of his father. He then mastered his clockmaking skills under the instruction of T.H. Martin.

Upon Jay's return from Korea after serving in the U.S. Army, he founded the House of Clocks in Los Angeles. What began as a one-man watch and clock repair shop, eventually grew to 50 employees providing factory warranty service for such manufacturers as Citizen, Bulova, Longines, and Omega.

Mr. Foreman served as President of the Horological Association of California from 1972-1978 and is a past director of the American Watchmakers-Clockmakers Institute.

ILLINOIS

The Central Illinois Watchmakers Association's Board of Directors met on Sunday, January 9, 1994 to make an agenda for 1994 and elect officers.

The association is making plans for their state convention to be held at the Keller Convention Center in Effingham, IL on October 14, 15, & 16, 1994.

Officers for 1994 are: Chuck Ramsey, president; Larry Blanchard, vice president; Deb Charlier-Carr, secretary; and Werner Theobald, treasurer.

NEW JERSEY

The Watchmakers Association of New Jersey began its 55th year by drawing on talent within the organization. Bernard Stoeber, vice president in charge of technical services for North American Watch Corp., who is a member and technical advisor of the WANJ, spoke at the January meeting. His topic was the history of the Movado watch. He brought along with him a number of examples of Movado's notable timepieces for all to see.

1994 CONVENTIONS

Horological Association of Virginia
April 29-May 1, 1994
Holiday Inn -- Richmond, VA

North Carolina Watchmakers Association
June 3-5, 1994
Holiday Inn-North -- Raleigh, NC

Illinois State Watchmakers Association
October 14-16, 1994
Keller Convention Center -- Effingham, IL

TEXAS

On November 13-14, 1993 members of the Texas Watchmakers Association took part in the AWI Bench Course "Hairspring Vibrating". This course was taught by Joseph Cerullo, CMW, CMC.



Pictured (left to right): Robert Fesler, Charles Hahn, Chip Naleski, Bill Zukauckas, Richard Bocock, Hans Roozbakhshian, Thom Van Anders, Bob Dodd, and Instructor Joseph Cerullo (sitting).

SUPPORT

THE AWI-ELM TRUST SCHOLARSHIP PROGRAM

SEND YOUR OLD WATCH BATTERIES TO:

AWI Central
3700 Harrison Avenue
Cincinnati, OH 45211

Book Review

THE MUSEUM OF THE AMERICAN WATCHMAKERS INSTITUTE by Henry B. Fried, CMW, CMC, FAWI, FBHI, ★FNAWCC. 8-1/2 x 11", hard covers, 185 pages, 56 color and 212 b/w illustrations. AWI Press, Cincinnati, OH 45211. Priced at $125, published late in 1993.

This superb catalogueue takes its reader on a pictorial and descriptive journey through many of the fascinating watches and clocks in the AWI Museum collection. The pride and basis of the Museum's collection is that group of some 30 watches donated in 1928 by James Ward Packard, the automobile pioneer. Mr. Packard, a mechanical engineer, was fascinated by the complexities of timepieces. During the early 1900s he commissioned the finest watchmakers of his time to produce extraordinary timepieces to his exacting specifications. It is interesting to note that back in 1959, Henry Fried authored a 44-page, soft cover booklet with black and white illustrations and brief descriptions of the Packard collection. This publication has long been out of print.

So, the current publication is certainly appropriate. It celebrates the 30th year of AWI's birth, the successor organization to the Horological Institute of America, and fills a significant void in documenting the Museum's entire collection. About one-third of the current effort, some 62 pages, is devoted to comprehensive coverage of outstanding examples of the Packard watches using 56 color plates and 32 black and white illustrations. Thirteen of the Packard specimens are complicated products of the well-known Swiss firm of Patek Philippe & Co. There is also one beautiful, skeletonized watch from the Geneva firm of Vacheron & Constantin. The English firms of Dent, Smith and Son, and Benson are also represented. A significant highlight of the Packard section are the 15 pages by the late Dr. Joseph G. Baier with a detailed photographic essay and explanation of his restoration procedures on two of the most complicated Patek Philippe timepieces in the group. One of these is the "gem" of this watch grouping, a magnificent astronomical, 3-gong minute repeater with a variety of unique, customized features. When this watch was delivered in 1916, it was the most complicated ever made by the company and one of the most complicated in the world. The Packard section concludes with an excellent technical explanation with drawings by the author of complex features found in some of the various timepieces.

This book is much more than a catalogue of the Packard timepieces in the AWI Collection. This publication is divided into 11 major sections and includes a comprehensive index as a concluding 12th section. Some idea of the diversity in the collection is shown by the breakdown of major sections: Watches, Marine Chronometers, Military & Sport Watches, Pioneer & Experimental Timepieces, Packard Collection, Gruen Watches, Early Attempts at Timekeeping, Swiss Fakes of American Watches, Clocks, Old Tools, and Escapement & Teaching Models. It is fitting that the donor is given credit for the majority of items included in the publication. I also liked the fact that each item's description concludes with suggestions for further reading.

In addition to the unique Packard watches, the reader will find a variety of American, Swiss, English, and French timepieces ranging in quality from a marvelous quarter repeater made by the house of Breguet to a modest lady's watch made by the U.S. Watch Co. at Waltham. American watch enthusiasts will be especially interested in an Illinois 12 size, grade 525 made with aluminum plates. It is believed this example is one of 50 made on special order for the Aluminum Co. of America during the early 1920s. Readers should be aware of a typo in the serial number range cited as starting at 3866251; it should be 3869251. Another American pocket watch of historical significance is a 16 size Waltham presented to President (Theodore) Roosevelt "as a demonstration of the methods of the American Watch Trust" from Charles A. Keene, a New York city jeweler and president of the Independent Watch Dealers Association. The case covers are fully engraved with the presentation plus a contrast between home and foreign prices for American watches, showing they were sold abroad for less than at home. The watch was "refused" by President Roosevelt but "accepted" by Hon. Henry T. Rainey, a House of Representatives member, according to engraving on the inside top cover. Then there is a New York Standard worm-drive watch with star-shaped cutout to observe the worm action, plus an unexplained additional cutout which completely removes the watch company's name from the upper plate. This added cutout would appear to be of after-factory origin.

Marine chronometer enthusiasts will find beautiful examples by Arnold, Wempe, plus an interesting surveying chronometer by Mercer. The pioneer timepieces include several examples of noteworthy wristwatches such as Hamilton and Lip electrics, an early Pulsar, and a fascinating Seiko TV wristwatch, one of only 10,000 sold in the U.S. during the early 1980s. There's a section devoted entirely to a collection of Gruen pocket and wristwatches donated by Robert D. Gruen, grandson of Deitrich Gruen, founder of the company. The first example shown is their 50th Anniversary commemorative pocket watch produced in a limited edition during 1924. Only a dial view is shown, and there is no mention of the beautifully engraved, solid gold (12K) plates. It is regrettable a color movement view was not included, as the movement is the real beauty of this watch. But, in fairness, I had this same

comment on the 50th Anniversary watch in the 1991 *American Pocket Watches* catalogueue published by the Rockford Time Museum.

The section on Swiss Fakes illustrates a wide variety of these Swiss-made, American-named watch movements intended to deceive the casual observer. Most of these are cheaply made and easily identified, like the "P.G. Barzlet of Waldham, Mass.". Occasionally an example surfaces that challenges even the expert observer, such as the first example shown in this section simply engraved "Springfield". The author was not positive of his identification, stating "it was probably a good Swiss product," but chose it as the lead item to assure further input. In my opinion, this watch movement is an example of the 18 size, 3/4 plate, Model 1 made by the New York Watch Co. of Springfield, MA; the serial number appears to be No. 1010 (last digit not clear) which would date it circa 1871. The American watch companies of this period hired many skilled craftsmen from Switzerland. This fact, plus the relative scarcity of this particular grade of the New York Watch Co., make it understandable how the movement could have been identified as probably Swiss.

The book concludes with some fascinating sections on foreign and American clocks, old tools, and escapement and teaching models. Clock examples include a unique late 17th century Japanese temple clock, and Austrian gravity clock, a beautiful Seth Thomas pillar and scroll, a Howard & Davis banjo, a 30-day Vienna Regulator, a collection of E. Howard vault time clocks, a slot machine gambling clock, plus several other interesting examples. Old tools include examples like a Faure rounding-up machine, a benchtop milling and wheel cutting lathe, a circa 1900 watch demagnetizer, several early watch timing machines, and others. Escapement models as early as 1844 illustrate pivoted and spring detent chronometers, cylinder, duplex, and lever examples; teaching models of various watch components are finely executed examples of the watchmaker's skills.

This publication will serve as a valuable addition to one's reference library. It is skillfully written with excellent photography, providing an elegant record of the most interesting watches and clocks comprising the AWI Museum Collection.

Eugene T. Fuller, ★FNAWCC
Chairman, NAWCC
Editorial Committee

PATEK PHILIPPE by Roy Ehrhardt and Joe Demesy. Hard covers, 6 x 9", 432 pages, 2219 watch illustrations. Published by Heart of America Press, 1993 @ $50.00.

The format of this book is of the usual high calibre maintained by the Ehrhardts. Two pages are devoted to methods of ascertaining values. This is followed by an excellent glossary of general terms used in collecting, repairing technical areas and definitions of antique watch terms used in the trade and in the descriptions of antique watches. One page contains a table of Watch Sizes and Measurements.

The famed Calibre 89 is featured since it is the Patek Philippe watch that brought the record price of 4,950,000 SF ($3,100,680) at auction.

The range of Patek Philippe watches is quite large with World Time watches with tourbillon (est. $140,000-150,000). There are tourbillons in pocket chronometers, carillon clock watches, others with grande complications (est. $500,000), split second chronographs, some with moonphase indicators. Diamond pavé watches with complications, two-train minute repeaters, and others with "montre a tact" (timetelling by touch). Many others are shown, some with simple 46mm and smaller in size. Still others are "giant" watches. Half-quarter and five-minute repeaters are included. There are watches with offset dials, "astronomical" dials, time zone dials, 24-hour dials (chronometro Gondolfo). Watches with spring detent (chronometer escapements) are pictured.

The watches with complications require 114 pages of this book. Other sections are devoted to regular and older watches from this 150-year-old, prestigious company. There are square, elliptical, offset dial, platinum, skeletonized watches with repousse cases, enamel watches, and convertible types.

A section on ladies' pendant form watches, coins with ultra-thin movements enclosed are shown in a 30-page section. Also shown are enamel and highly decorated watches, some with portraits. One, modern 20th century watch described as a gold-painted enamel open face with horseman appears to be a very close copy of a David painting of Count Potocki, an early 19th century nobleman and military hero. Other watches contain enamel portraits of other famed people.

Clocks are not omitted. There are 30 highly decorated clocks. Bird-boxes with watches are found here, too. 196 pages of wristwatches contain a great variety of these vintage and modern timepieces. Other pages contain tables of determining a watch's age by its serialized production number. There are 33 movements pictured among the final pages, six pages of reprints from catalogueues of Schreve and Company (San Francisco) and Brock (Hollywood). A good index is 4 pages long, and there are 8 pages of advertisements.

Except for the covers, all photos are in black and white, most of good quality, a few a bit dull. However, this book of 689 pocket watches, 1685 wristwatches, 812 ladies' wristwatches, 33 clocks, among a few others, have been compiled from the contributions of 64 collectors, dealers, and auction galleries. Thus, it must be expected that a few would vary in clarity. Therefore, some minor compromises for the sake of comprehensiveness might be allowed.

Despite these minor observations, this book provides a very acceptable reference of watches and current estimates from the shops of a world-reknowned watchmaker.

Henry B. Fried
❑

News in the Trade

GEORGE DANIELS TO EXHIBIT MASTERPIECES AT BASEL '94

"Truly one of the greatest watchmakers alive" is invariably how qualified watch-industry observers describe George Daniels, the world's leading expert on the life and work of horologist A.L. Breguet. The 68-year-old Englishman will be on hand at the 1994 European Watch, Clock and Jewellery Fair, Basel '94, accompanied by some of his most notable accomplishments. The presence in Basel of a man recognized as one of the most gifted devisers of any number of horological masterpieces and author of highly regarded reference works can be expected to prove one of the principal attractions of the upcoming Fair.



George Daniels

The most suitable venue for a presentation of George Daniels' creation is booth 481 in hall 106 at the Fair. This is where the Académie Horlogère des Créateurs Indépendants shows off its members' latest creations. Dedicated to "perpetuating the inventive spirit of watchmakers and to inspiring them to design either classic or totally original timepieces to the best of their ability," this association of horological inventors and craftsmen will play host to George Daniels for the duration of the Fair, providing visitors and exhibitors alike with a rare opportunity to meet this wizard of time.

George Daniels is really worth meeting, too. At the age of five he had already taken his father's alarm clock apart to see how it worked. By the time he was 10, he was repairing his friends and even his teachers' watches to earn a little pocket money. At 14 he was forced to leave school and earn his keep as a factory worker. He lasted only a week, choosing instead to work as a delivery boy for a green grocer. Pedaling his bicycle all day gave him such a feeling of freedom that he swore never again to work at something he hated.

Over the years, he read every book on watchmaking he could lay his hands on, earning a living repairing all sorts of timepieces, a trade he even carried on while in uniform. At the age of 22, he purchased a set of basic tools and set up shop as a watch repairer and restorer. He was lucky to work on an exceptional number of Breguet originals, acquiring what might be called an insider's knowledge of the art of Breguet. Many years later, he published an impressively knowledgeable reference work on the master's life, work, and timepieces.

George Daniels gradually tired of simply bringing old masterpieces back to life. So in 1967, with the rather rudimentary means at his disposal, he designed and built his first watch---no mean venture at a time when electronic technology was promising consumers unheard-of precision. That didn't stop George Daniels who, to this day, refers a bit disdainfully to "self-destructing batteries" while proclaiming the superiority of traditional watchmaking.

In his eyes, a mechanical watch movement will keep practically as good time as its electronic counterparts and last far longer; providing its regulating mechanism can be made to run without lubrication. Rising to his own challenge, George Daniels set about designing and testing a new type of non-lubricated escapement that has given his own watches a precision of one second a month!

Perhaps George Daniels' shrewdest insight was his prediction, some decades ago, that mechanical time still had a great future. Ignored at the time by conventional wisdom, his words have proved more than prophetic.

Every watch collector and trade visitor headed for Basel this spring now has a further reason to visit the European Watch, Clock and Jewellery Fair, the opportunity to admire some of George Daniels' finest designs and to meet the man who made them.

Basel '94, the 22nd European Watch, Clock and Jewellery Fair, is scheduled for April 14-21, 1994.

BENRUS MILITARY WATCH TO COMMEMORATE 50TH ANNIVERSARY OF D-DAY

Benrus Watch Company is re-issuing the Benrus Military Watch, supplied to millions of troops during World War II, Korea, and Vietnam, to commemorate the 50th anniversary of D-Day and the end of World War II. The Benrus Military Watch wholesale cost is $55.00, with an expected retail of approximately $125.00. The watch comes in a military green canvas field pouch and carries an unlimited one-year warranty.

Like the original, the Benrus Military Watch has a stainless steel water-resistant case, Swiss mechanical movement with full 17-jewel mechanism, and luminous dial and hands. The 50th anniversary issue replicates the special feature enabling persons to synchronize their watches with one another. This crucial military "hack" function has been immortalized in countless movies with the words "gentleman, synchronize your watches."

Benrus Watch Company has reproduced this battle-proven wristwatch with the same exacting standards as the original, and rugged enough to conform to the rigors of battle. Many were preserved as heirlooms, passed on from generation to generation.

The Benrus Military Watch is a living testament to some of the greatest moments in the history of our country. Assembled in the USA, the watch is a rare and special conversation piece to be cherished by anyone living through or interested in that chapter of this country's history.

For more information call Benrus Watch Company at 1-800-621-4445.



Benrus Military Watch

J.M. HUCKABEE'S
"Random Clock Talks"

The series of 37 "Random Clock Talks" videotapes listed below are available for loan to AWI members from the AWI Audio Visual Library. The tapes vary in viewing time from 1.25 to 2.00 hours and are available in the VHS format. A service charge of $5.00 each is to accompany requests to borrow a tape; only one tape is loaned at a time. The service charge covers AWI's production and shipping costs. Tapes should be returned to AWI within 7 days after receipt, insured for $30.00. Please order tape by number along with your name, address, and $5.00 service charge. Send to: **AWI Audio Visual Library, 3700 Harrison Ave., Cincinnati, OH 45211.**

TAPE 1: Approximately 2 hours
SUBJECT MATTER: A brief view and discussion of a variety of clocks and tools used in the Huckabee shop.

TAPE 2: Approximately 2 hours
SUBJECT MATTER: Demonstration and discussion on using various tools and lathes to make and fit a clock bushing.

TAPE 3: Approximately 2 hours
SUBJECT MATTER: Discussion and demonstration on lathe operation using the Boley watchmakers lathe and the C&E Marshall watchmakers lathe.

TAPE 4: Approximately 1.50 hours
SUBJECT MATTER: An analysis and work with the Urgos 21/42 8-day trapezoid time only clock.

TAPE 5: Approximately 2 hours
SUBJECT MATTER: A demonstration and discussion about drilling the arbor using Huck's "turning in a box" method and making a pivot.

TAPE 6: Approximately 1.75 hours
SUBJECT MATTER: A demonstration of wheel cutting using clear plastic and a Mosley watchmakers lathe. Huckabee cuts four gears such as those required in the AWI certification examination.

TAPE 7: Approximately 1.75 hours
SUBJECT MATTER: The Birge & Mallory Striker Clock—a complete study and analysis of the Birge & Mallory Striker and the clock with its strap plates and roller pinions, circa 1841.

TAPE 8: Approximately 2 hours
SUBJECT MATTER: Making a great wheel and mounting the great wheel on its arbor.

TAPE 9: Approximately 1.75 hours
SUBJECT MATTER: Making and fitting a replacement pinion for a clock wheel.

TAPE 10: Approximately 1.50 hours
SUBJECT MATTER: Correcting problems caused by an elongated pivot hole by bushing with a solid bushing and the use of a "preacher" to relocate center distance.

TAPE 11: Approximately 2 hours
SUBJECT MATTER: Huckabee discusses the IBM #37 Master Clock Movement and IBM 90 Series Clock Movement.

TAPE 12: Approximately 2 hours
SUBJECT MATTER: Using a custom-made attachment to make wheels and index plates on the Unimat lathe. The custom-made attachments can be made from drawing available from AWI upon request (cost to cover printing and postage is $2.00).

TAPE 13: Approximately 2 hours
SUBJECT MATTER: Cutting clock wheels—a demonstration of cutting the wheels used in the AWI CMC examination.

TAPE 14: Approximately 2 hours
SUBJECT MATTER: Using an inexpensive quartz analog clock movement, Huckabee disassembles the movement and provides an in-depth explanation of each component and their function in the operation of the timepiece.

TAPE 15: Approximately 2 hours
SUBJECT MATTER: Huckabee presents an in-depth discussion on the design of cutting tool bits, both hand-held and those held in the tool post rest. Also a discussion of steel—its composition and characteristics.

TAPE 16: Approximately 1.50 hours
SUBJECT MATTER: Huckabee presents an in-depth discussion about hairsprings. He also demonstrates how to vibrate a clock hairspring.

TAPE 17: Approximately 1.75 hours
SUBJECT MATTER: Huckabee goes through the process of making a knurled nut, one like those used as hand nuts in Early American kitchen clocks. He demonstrates a simple way to knurl the nut.

TAPE 18: Approximately 1.75 hours
SUBJECT MATTER: Huckabee demonstrates the process of inserting a tooth into a clock wheel to replace a broken or damaged tooth.

TAPE 19: Approximately 2 hours
SUBJECT MATTER: Pivot work in the American antique Sessions, count wheel, and clock movement.

TAPE 20: Approximately 2 hours
SUBJECT MATTER: Continuation of work with the Sessions clock used in Tape 19. Complete restoration work on the movement and treating a worn great wheel.

TAPE 21: Approximately 2 hours
SUBJECT MATTER: Making an American clock verge. Huckabee demonstrates how to select and work raw materials into a verge for an Ingraham miniature kitchen clock—time only.

TAPE 22: Approximately 2 hours
SUBJECT MATTER: Completion of making a verge for an Ingraham kitchen clock from Tape 21. Also random tips and cutting a 32-tooth recoil escape wheel for an Ansonia kitchen clock.

TAPE 23: Approximately 2 hours
SUBJECT MATTER: Pivot and bushing problems and their repair.

TAPE 24: Approximately 2 hours
Not available at this time.

TAPE 25: Approximately 2 hours
SUBJECT MATTER: Clock mainspring and barrel work.

TAPE 26: Approximately 2 hours
SUBJECT MATTER: Clock mainspring ends and barrel teeth. Huckabee demonstrates how to replace teeth in the barrel of an Urgos 8-day modern clock. Huckabee also fashions a new hole end for the mainspring.

TAPE 27: Approximately 2 hours
SUBJECT MATTER: Understanding the antique American clock time train and repairs to it and using the Unimat lathe to polish pivots.

TAPES 28 & 29
Not available at this time.

TAPES 30-34: Approximately 2 hours each
SUBJECT MATTER: A series of five tapes designed as a teaching exercise which encompasses every facet of lathe work encountered in the clock shop. Produced in conjunction with a series of drawings which are provided by AWI when you borrow the first tape in the series. Upon completion of the work you have a set of excellent useable lathe accessories for use in your shop.

TAPES 35 & 36: Approximately 2 hours each
SUBJECT MATTER: Two tapes which demonstrate the use of the lathe accessories produced in the Series 30-34. This encompasses all facets of pivot work encountered in the clock shop.

TAPE 37: Approximately 2 hours
SUBJECT MATTER: A companion tape to the Huckabee book "How to Build a Regulator Clock." All components and details for their construction are discussed in detail. It is recommended that the viewer have the book at hand when viewing this tape.

CLASSIFIED ADS

REGULATIONS AND RATES

Ads are payable in advance $.70 per word, $.80 per word in **bold type.** Classified display ads are $30.00 per column inch, 2-1/4" wide. Ads are not commissionable or discountable. The publisher reserves the right to edit all copy. Price lists of services will not be accepted. Confidential ads are $4.00 additional for postage and handling. The first of the month is issue date. Copy must be received 30 days in advance (e.g. May issue closes for copy on April 1st).

HOROLOGICAL TIMES, P.O. Box 11011, Cincinnati, OH 45211
Phone (513) 661-3838 Fax (513) 661-3131

TRADESMAN

REPAIR & RESTORATION of repeaters, fusee, all pocket watches, chronometers, complications, balance staffs made, repivoting, parts made. Free estimates. Fast dependable service. All work guaranteed. Tascione, 555 Saturn Blvd #123A, San Diego, CA 92154; (619) 491-3893.

ENGLISH CLOCKMAKER. I have 39 years experience in restoring and making parts for **platform escapements,** staffs, cylinders, pinions, repivoting, hairsprings, jewels, etc. **JOHN BARRS**, 3924 S.W. Holden St., Seattle, WA 98136; (206) 935-0596.

THE ACCUTRON MAN

A **"Cracker Jack"** when it comes to repairing Accutron Watches!

Let me **"Spaceview It"** according to **Bulova Factory Standards!**

Not anxious to spend money??.....then trade in your model 214 & 218 **junker watches for cash credit** against your repair bill!

Why not give me a call and.....
LET'S TALK ACCUTRONS!

George Fruge'
251 Greenwich Avenue
Greenwich, Ct. 06830
Tel: 203-661-0056
Fax: 203-661-0703

CUTTERS cycloidal for clock wheels and pinions. Module 0.2 to 1.0. Constant profile producing traditional square bottomed teeth, 104 sizes. Escape cutters: recoil (set of seven sizes), dead beat (set of four sizes). Ratchets 60° and 70°. All cutters made in 8% cobalt M42 High Speed Steel and heat treated under vacuum. Also cutter grinding wheels, Grit and CBN. Send for Information Sheet, prices, and order forms to: P.P. Thornton (Successors), Ltd., Horological Cutter Makers, The Old Bakehouse, Upper Tysoe, Warwickshire, CV35 0TR, England; Telephone 0295-680454, Fax 0295-688176.

CLOCK and **MUSIC BOX** parts, mainsprings, material and tools. Custom made to order or repair of gears, pinions, and parts. Catalog $2.00. TANI ENGINEERING, Box 338, Atwater, OH 44201; (216) 947-2268.

ARE YOU SPENDING TOO MUCH FOR CRYSTALS?? We will make any flat mineral or heavy plastic crystal. One-day turnaround. Call or write for price list. D & H Crystal Co., 708-D Westchester Dr., High Point, NC 27262; phone/fax (910) 889-0148.

DIAL REFINISHING CO. FAST SERVICE, FINEST QUALITY, quantity works welcome. Specialize on changing dial feet positions to fit the quartz movement. Send your works to: **KIRK DIAL OF SEATTLE,** 4th & Pike Bldg., Suite 625, Seattle, WA 98101; (206) 623-2452.

CLOCK WHEEL AND PINION CUTTING
Fast service -- Write for free Brochure and price list. Fendleys, 2535 Himes St., Irving, TX 75060. (214) 986-7698.

ELECTRONIC INSTRUMENT SERVICE
We are Factory Authorized Service for:
*** VIBROGRAF & PORTESCAP**
*** TICK-O-PRINT & L&R**
We service all makes of ultrasonics, all makes of watch rate recorders, and related equipment. 25 years experience.
JACK PHILLIPS
ELECTRONIC INSTRUMENT SERVICE
757 Lincoln Ave., #26 San Rafael, CA 94901
For Information Call (415) 453-9266

THE MORTICIAN
NO COMEBACKS
We correct past mistakes and bury them. Specializing in wheel work, repivoting, making of parts, antique pocket watches, **Atmos clock service** (10-year warranty) for over 50 years & factory-recommended service for 35 years. Repeaters, Audemars Piguet, Piaget, Rolex, and Quartz Conversions. All other work guaranteed 2 years and done by Joseph Small II, CMW & Associates; (713) 561-5147.

CLOCK REPAIR
Quality repair or restoration of mechanical clocks. Fast, friendly service. All work guaranteed. Call or send SASE for free price list, (904) 386-5498. Fax available. Jeff Hamilton, 2656 Byron Circle, Tallahassee, FL 32308.

MURPHY'S CRYSTAL SERVICE
FAST -- QUALITY WORK
* **24-hour** turnaround on most jobs.
* Complete crystal fitting service for new and old wrist and pocket watches.
CALL OR WRITE FOR PRICE LIST
FAX or PHONE (209) 576-8865
2324 WESTMINSTER DR.
MODESTO, CA 95355

CLASSIFIED ADS

ATMOS BY JAEGER-LECOULTRE
Overhauled with a
three-year (3) warranty on all labor
MIKE'S CLOCK CLINIC
1326 Stanford Street
Santa Monica, CA 90404-2502
Established in 1982 & AWI Trained
Please Call **(310) 828-6707**

POCKET WATCH CASE REPAIR -- Bezels, hinges, springs, dents, etc. HARRY MAZAR, Tick-Tock Specialties, 308 N. McLeansboro St., Benton, IL 62812. Phone (618) 439-6995.

CUSTOM BALANCE STAFFS cut and fitted for pocket watches and platforms. TASCIONE, 555 Saturn Blvd #123A, San Diego, CA 92154; (619) 491-3893.

FACTORY-CERTIFIED ROLEX SERVICE
Master Watchmaker, 44 years experience. Certified Rolex specialist. Only genuine materials used. Service includes case & bracelet refinishing & waterproofing of case. High-grade watches & clocks are our specialty. Ask for Alvin or Marcus; (203) 792-4539.

TIMING MACHINES -- NEW AND REFURBISHED. Quality Service and Repair. DON HOLDEN, Box 56, Penna. Furnace, PA 16865. Call (814) 692-2285.

•• *FREE ACCUTRON REPAIR* ••
Send 2 MENS Accutrons (no basket cases)
Will repair one free and keep the other
SPACE VIEWS — $150
George Hite, 246 Del Pond Drive,
Canton, MA 02021, (617) 821-5288
• *SPACE VIEW CONVERSIONS $45* •

DIAL REFINISHING



BEFORE AFTER

Quartz Conversions
Diamond Dial Conversions
Emblem & Name Personalization

Write for Brochures
INTERNATIONAL DIAL CO., INC.
58 W. SUGARTREE
P.O. BOX 970
WILMINGTON, OH 45177
(513) 382-4535

CLOCK WHEEL & PINION CUTTING. STARRETT COLLETS
QUICK SERVICE
SEND FOR PRICE LIST. MC & VISA
Jim DuBois 330 Rte 101
Amherst, NH 03031 (603)673-3645

CLOCKS: gearcutting, repivoting, jeweling, rebushing. REPAIRING: timers, aircraft clocks, pocket watches. ROY H. NIEGEL, CMC, CMW, N31552 Saint Joe Drive, Spirit Lake, Idaho 83869. SASE or CALL (208) 623-4330.

QUARTZ CONVERSIONS
WATCH RUSTED? DISCONTINUED?
NO PARTS? SENTIMENTAL? GOLD CASE?
SEND IT TO **AL ZAMORA**
FOR A NEW **SWISS** QUALITY MOVEMENT
AND FIRST QUALITY JOB CONVERSION.
90% SIZES POSSIBLE.
SAFE REGISTERED MAIL.
ALFONSO ZAMORA
280 PRESIDIO PLACE
BUFFALO, NY 14221
(716) 633-6138

ARTICLES FOR SALE

HAMILTON 950B with original boxes and receipt. Excellent condition. My own watch which I bought new in the '50s. $525.00. Ken M. Law, H.C. 30, Box 825, Prescott, AZ 86301.

1 Vibrograf Timing Machine B-200A, $500.00 and 1 Portescap Microscope, Model SM-1, $300.00. Excellent condition. Call (312) 685-9590.

EQUIPMENT: Vibrograf Mark V Ultrasonic Watch cleaner, $1295; Portescap VC-10 watch cleaner, $795; Vibrograf B-200, $895; Vibrograf MU-4500, $1795; Hermes Inside Ring Engraver, $595, Marshall 3-jar Cleaner, $149.95; Watchmaster WT Cleaner, $395; Watchmaster WT Mark II, $595; L&R Console Cleaner, $195; New Hermes Universal Engraver floor model, $1695, Bestfit 1986 microfiche systen with viewer, $395; Vibrograf Quick Checker 2, $275. **Other watchmaker's, jewelers and engraving equipment available!** Send **SASE** for our equipment and hand tool list. **Watches Etc.**, 5934 NW 39th, Oklahoma City, OK 73122; (405) 789-2824.

MINI QUARTZ MOVEMENTS. Guaranteed lowest prices--as low as $2.30. Two-year guarantee. Large selection of hands and numerals. Free delivery. SASE or call (704) 333-0221. HALL CLOCK SHOP, 1512 Central Ave., Charlotte, NC 28205.

ATTENTION COMPUTER USER
Easy Access Software keeps track of:
- Jobs & Shipping Information
- Estimates
- Customer + Address + Insurance Information
- Automatic Invoicing
- Plus many more features and a personal organizer free of charge

Easy Access Software is available for DOS and WINDOWS environment for only **$79.95**
Please leave name & phone number at
(203) 325-2877

Miscellaneous types mechanical aircraft clocks including replacement parts with repair service available. WMR, 66 Marlboro Rd., Shalimar, FL 32579; (904) 651-0942.

USED WATCH MOVEMENTS
H. HERB & SON, 908 Riva Ridge Drive, Great Falls, VA 22066; (703) 549-8045.

GLASS
POCKET WATCH CRYSTALS
For Price List, send SASE to:
THE CRYSTAL BOX
Box 682, Short Hills, NJ 07078

NOW AVAILABLE
An affordable machine that makes any shape mineral glass watch crystal in minutes in your own shop for approximately 75¢ each.



Traces the bezel shape directly onto the mineral glass material with a diamond cutting point. Break off and lightly sand or grind. 220 wet sandpaper, available at your local hardware store, works great. **NEW LEFT-HANDED CRYSTAL CUTTER NOW AVAILABLE.**

Schohl Crystal Cutting Machine
(616) 842-6025 or Fax (616) 842-2198
VISA & MASTERCARD ACCEPTED

CLASSIFIED ADS

ARTICLES FOR SALE

Custom Made Watch Bands
To Fit Your Vintage Watch

1950s Style (Not Tapered), Made in USA

GENUINE ALLIGATOR & CROCODILE



AFRICAN OSTRICH



Available in SHINE or DULL FINISH

9/16	5/8	21/32	11/16	3/4	13/16
14mm	16mm	17mm	18mm	19mm	20mm

BLACK BROWN PEANUT *ALWAYS IN STOCK*

Also on request: Red, Green, Blue, Burg., Gray

These Watch Bands Retail in Fine Stores for $75.00 ea.

FOX PRICE $15.00 EA.

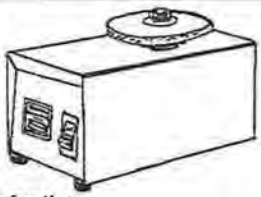
Send Check To: **Fox Enterprises**
4011 Daleview Ave., Seaford, New York 11783
OR CALL 516-781-5754

USED WATCHMAKERS TOOLS, EQUIPMENT, MATERIAL, SUPPLIES, WATCHES, MOVEMENTS, AND RELATED ITEMS. Write or call for our latest list. Tom Mister, Herr & Kline, Inc., 1914 Granby St., Norfolk, VA 23517; (804) 623-0714.

CUCKOO CLOCK AND BIRD CAGE BELLOWS MATERIAL

Save time, money, and work re-covering bellows. Easier than replacing. For information, send business-size SASE to:
JANDI GOGGIN
Box 175H, Huntington, NY 11743-0175

NEW!! Schohl Crystal Grinder



The ultimate mate for the Schohl Crystal Cutting Machine

5-inch diamond wheel grinds quickly without heat or buildup. A light spray of Windex is all that's needed.

Specs: 10" x 5-1/2" base, 7" height
Horizontal 5" diamond wheel, 600 gr
240 R.P.M.
Electrical: 115 volt, 60hz, 1.2 amp
hole to mount in grinder wheel
Weight: Approx. 30#

NOW $279.00 w/NEW splash pan

2-week trial offer, money back
D/A wheel available separately

(616) 842-6025 or Fax (616) 842-2198

VISA & MASTERCARD ACCEPTED

HAMILTON MILITARY MATERIAL. Many parts available for 992B, 4992B, M23, M22 deck watch, M21 marine chronometer, brass hardware for boxes. Robert Ravel Co., Box 32, Devon, PA 19333.

BUSINESSES FOR SALE

SHOP FOR SALE: Established 21 years. Watch, clock & jewelry repair shop, sales & service. Suncoast Florida. Retiring. Includes inventory, fixtures, tools, material. Serious, not curious, calls only (813) 789-6704, 2 pm - 5 pm EST.

BOOKS

W.R. Smith's ***Clockmaking/Modelmaking Tools & Techniques*** workshop manual will be extremely helpful when making the clock from his new serial, **"How to Make a Skeleton Wall Clock,"** starting in *The Home Shop Machinist* (800-447-7367), Nov./Dec. 1993. Thirty-five other Smith or Wilding clockmaking manuals available. Gateway Clocks, 7936 Camberley Drive, Powell, TN 37849. Phone (615) 947-9671.

AMERICAN REPRINTS CO.

CLOCK AND WATCH TRADEMARK INDEX
European Origin
Austria/England/France/Germany/Switzerland
By Karl Kochmann

Trademark Index, this 1993 edition is expanded to 967 pages and 17 tables with 18,000 trademarks as a result of Mr. Kochmann's continued research in Switzerland, Austria and England. The contents are of special interest to collectors, hobbyists, appraisers, and historians. First-ever published chapter on Electrical Clocks, data from the industrial revolution to present. Chronological essays of notable European watch and clock enterprises.

Retail Price $38.50

SCANLON/AMERICAN REPRINTS CO.
P.O. Box 379 Modesto, CA 95353
Or Your Book Dealer

SCHOOLS

City College of San Francisco Watch Repair Training since 1938. In order to speak with the Instructor and at the same time register for the class: Voice Mail (415) 731-0621. Open enrollment throughout the semester. 106 Bartlett St., Room 214, San Francisco, CA 94110. When writing for information: CCSF Watch Repair Instructor, 2425 Yorba St., San Francisco, CA 94116.

JOSEPH BULOVA SCHOOL
40-24 62nd St. Woodside, NY 11377
Phone (718) 424-2929

Quality Instruction Since 1945

WATCHMAKING
(17 months)
WATCH REPAIR
(9 and 13 months)
JEWELRY DESIGN & REPAIR

Ideal Housing, Dining, Recreation

HELP WANTED

CLOCK REPAIRMAN - Experience required. Competitive salary, paid vacation. Send resume to John Wyatt, 715 Pine St., Herndon, VA 22070 or call (703) 709 0234.

Our trade shop is looking for an experienced, independant watchmaker to work on premises. Must be able to work on quartz and mechanicals. Please phone (707) 425-0429 (Fairfield, CA).

SITUATIONS WANTED

WATCH REPAIRER - Mechanical/Quartz, 20 years experience, watchmaking school graduate. Prefer Boston, MA area but will consider moving. Sam Bhagadia (617) 899-3968.

European-trained watchmaker seeking employment. 14 years experience with mechanical, quartz, Accutron, and high-grade mechanisms. Will relacate for the right positioon. Contact Oscar Cox, 719 S.W. 21st St., Loveland, CO 80537; (303) 635-9738.

WANTED TO BUY

MICROFICHE SYSTEM - complete with interchangeability system. (508) 688-3395 leave message.

WANTED: Chronograph movements, especially Venus 150, 152, 175, 188 (paying $35-$75); Venus 178 (paying $125-$175); Valjoux 7733, 7334, 7736 (paying $30-$65). Interested in any related materials, case parts, dials. Responds to M. Heist, 917 Post Rd., Ste. 282, Fairfield, CT 06430. Phone (203) 338-0823. Fax (203) 336-8506.

CLASSIFIED ADS

American & European Pocket Watches Wanted. Railroads, Keywinds, Hi-Grade, Rare & Unusual Pocket & Wristwatches Wanted. Need not run. Professional, timely and confidential transactions assured. MAUNDY INTERNATIONAL, P.O. Box 13028-H, Overland Park, Kansas 66212 or call toll free 1-800-235-2866.

WANTED: Will pay up to $500 for Rolex Easy Opener. Also need Rolex crystal press and Rolex movements, cases, dials, etc. We also buy watchmakers tools and equipment, pocket watches, and wristwatches. Single items or complete collections. **Watches Etc.**, 5934 N.W. 39th, Oklahoma City, OK 73122; (405) 789-2824.

WANTED: High-grade electro-mechanical clocks, literature, and parts. Elliot Siegel, 930 Broadway, Wassapequis, NY 11758; (516) 541-2400.

WATCHMAKER'S ACCUMULATIONS WANTED: tools, materials, watches, etc. Will travel. Ken Waldhorn, (313) 399-3067.

RETIRING? I need to buy watchmakers tools and related items. **I will pay your price,** in most cases. Call collect, Tom Mister (800) 446-8094.

Watches Wanted



We desperately need for our retail customers fine watches by:

Rolex, Patek Phillippe, Audemars Piguet, Vacheron & Constantin, Movado, Gubelin, etc.

We are paying top prices for any high quality, unusual or complicated Wrist or Pocket Watches

When You're Ready to Sell a Fine Watch
Call us Toll Free 1-800-842-8625
In Texas 1-214-902-0664

Always prompt immediate payment!

Wingate's Quality Watches
P.O. Box 59760 • Dallas, TX 75229-1760

HAMILTON ELECTRIC REPAIRMAN seeks parts! Hamilton advertising and memorabilia also wanted. Rene Rondeau, P.O. Box 391, Corte Madera, CA 94976; (415) 924-6534. FAX (415) 924-8423.

WANTED: Comic/Character Promotion Watches. Any quantity. (212) 675-3213.

WATCHMAKER'S ACCUMULATIONS WANTED: tools, materials, watches, etc. Will travel. Ken Waldhorn, (313) 399-3067.

We pay 97% of market for karat gold scrap (any amount)! Also, buy filings, gold fill, sweeps, silver, platinum! Immediate 24-hour payment return mail! Ship insured/registered mail to: AMERICAN METALS COMPANY, 253 King St., Dept. HT, Charleston, SC 29401. Established 1960. Phone (803) 722-2073.

WANTED

- Watches: Rolex, Patek Philippe, Audemar Piguet, Vacheron, LeCoultre, IWC, Etc. Also Buying Low Grades--Gold-Filled & Gold (Hamilton, Bulova, Elgin, Gruen, Etc.)
- Sterling & Plated Trays, Dishes, Service Sets, Etc.
- Scrap--Gold-Filled, Gold, Silver, Platinum, Watch Batteries (Silver or Mixed)

CALL TOLL FREE **1-800-426-2344**



Ron Fried, President

SPECIALTY METALS REFINING COMPANY
10 Bay Street
Westport, CT 06880

Members: Better BusinessBureau
Jewelers Board of Trade

Our 107th Consecutive Ad

WE'RE INTERESTED IN YOUR COLOR SLIDES

The American Watchmakers-Clockmakers Institute knows that there is a wealth of talent in its membership and that this talent is not only in the field of horology. There is seldom a gathering of a group of watchmakers and clockmakers where a camera is not also there.

Those of you who pride yourself in the beauty of your camera work can possibly participate in having your own picture reproduced on the cover of *Horological Times*. The covers of *Horological Times* are reproduced from color transparencies or slides. Remember, the format is scenery or nature and what you submit must be a color slide. Color photos are not acceptable.

If your color slide is used, you will receive an 8-1/2 x 11 inch color photo. It will be framed and sent to you for your enjoyment. Mail your color slide with description to: **Horological Times, P.O. Box 11011, Dept. 31, Cincinnati, OH 45211. All slides become the property of the American Watchmakers-Clockmakers Institute.**

Dates to Remember

MARCH 1994

12-13--Management for Watchmakers & Jewelers (AWI); Fred Burckhardt, instructor; San Francisco, CA.*

12-13--Repair of the Atmos Clock Bench Course (AWI); Gerald Jaeger, instructor; Orlando, FL.*

12-13--400-Day Clock Repair Bench Course (AWI); John Nagle, instructor; Reno, NV.*

19-20--Advanced Quartz Watch Repair Bench Course (AWI); Robert Bishop, instructor; Birmingham, AL.*

20--Introduction to Quartz Watch Repair Bench Course (AWI); Buddy Carpenter, instructor; Meadowlands.*

20--Basic Pocket Watch Bench Course (AWI); Alice Carpenter, instructor; Sacramento, CA.*

APRIL 1994

8-10--Mechanical Watch Repair Bench Course (AWI); James Lubic, instructor; Sacramento, CA.*

9-10--Cuckoo Clock Repair Bench Course (AWI); James Williams, instructor; Baltimore, MD.*

9-10--Modern Mechanical Chronographs Bench Course (AWI); Remy Waelchli, instructor; Orlando, FL.*

22-25--Lathe Bench Course, Phase 3 (AWI); Roy Hovey, instructor; Meadowlands.*

29-May 1--Missouri Jewelers & Watchmakers Association 88th Annual Convention, Lodge of the Ozarks, Branson, MO. For more information: Sharon Blair, P.O. Box 70027, Shawnee Mission, KS 66207; (913) 661-0084.

29-May 1--Horological Association of Virginia Annual Convention, Holiday Inn, Richmond, VA. For more information contact C.E. Hardy, 15 West Church Ave., Roanoke, VA 24011; (703) 342-1419.

MAY 1994

15--Servicing ETA Quartz Chronographs Bench Course (AWI); James Broughton, instructor; Birmingham, AL.*

21-22--Advanced Quartz Watch Repair Bench Course (AWI); Robert Bishop, instructor; Meadowlands.*

21-22--Introduction to Clock Repair Bench Course (AWI); Buddy Carpenter, instructor; Boston, MA.*

JUNE 1994

3-5--North Carolina Watchmakers Association Annual Convention, Holiday Inn-North, Raleigh, NC. For more information contact Alice Carpenter (919) 823-2944.

4-5--Hairspring Vibrating Bench Course (AWI); Joseph Cerullo, instructor; Des Moines, IA.*

5--Servicing ETA Quartz Chronographs Bench Course (AWI); James Broughton, instructor; Orlando, FL.*

24--AWI Affiliate Chapter Meeting, Commonwealth Hilton, I-75 & Turfway Road, Florence, KY. Contact AWI Central for more information.

25-26--AWI Annual Board of Directors Meeting, Commonwealth Hilton, I-75 & Turfway Road, Florence, KY. Contact AWI Central for more information.

OCTOBER 1994

14-16--Illinois State Watchmakers Association Annual Convention; Keller Convention Center, Effingham, IL.

***For more information on AWI Bench Courses, Project Extend, and Regional Seminars, contact AWI Central, P.O. Box 11011, 3700 Harrison Avenue, Cincinnati, OH 45211; (513) 661-3838; Fax (513) 661-3131.**

Ad Index

Blue Ridge Machinery & Tools 4
Borel Co. 5
Butterworth Clocks, Inc. 27

Cas-Ker Co. ..... inside back cover

Esslinger & Co. ..... inside front cover
Eveready Watch Batteries 3

Gem City College 6

Kaben Enterprises 23

S. LaRose, Inc. 13
Levin, Louis Co 11
Livesay's, Inc. 19

McCaw Co., Wm. S. 25

Plymouth Watch Material 31
Precision Crystal Cutting Co. 27

S & G Industries 23
SMEA 21

Twin City Supply Co. 7

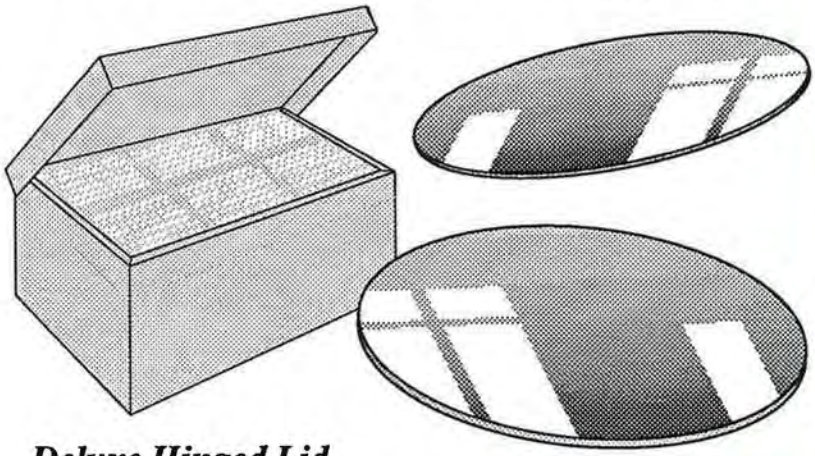
Vibrograf USA 15

West Dean College 31
Witschi Electronics 17

Zantech, Inc. 9

FREE Case Wrench & UV Adhesive!

Buy our CKX-100 assortment and we'll send you a case wrench and UV adhesive worth $17.90 absolutely Free!



Deluxe Hinged Lid Container Holds Up To 200 Crystals

100pc Mineral Glass Crystal Assortment

- **Asian Made**
- **Most Popular Sizes**

Assortment CKX-100 includes 100 Crystals in these sizes:

14.0	14.5	15.0	15.5	15.9	16.0	16.5	16.9	17.0	17.5
17.9	18.0	18.4	18.5	18.9	19.0	19.1	19.2	19.5	19.9
20.0	20.1	20.4	20.5	21.0	21.5	22.0	22.5	22.9	23.0
23.1	23.5	24.0	24.5	24.6	24.9	25.0	25.1	25.2	25.3
25.4	25.5	25.6	25.7	25.8	25.9	26.0	26.1	26.2	26.3
26.4	26.5	26.6	26.7	26.8	26.9	27.0	27.1	27.2	27.3
27.4	27.5	27.6	27.7	27.8	27.9	28.0	28.1	28.2	28.3
28.4	28.5	28.6	28.7	28.8	28.9	29.0	29.1	29.2	29.3
29.4	29.5	29.6	29.7	29.8	29.9	30.0	30.1	30.2	30.4
30.5	31.0								

Assortment CKX-100
100 Crystals..... **$65.95**



FREE!

Crystal Clear® UV Adhesive

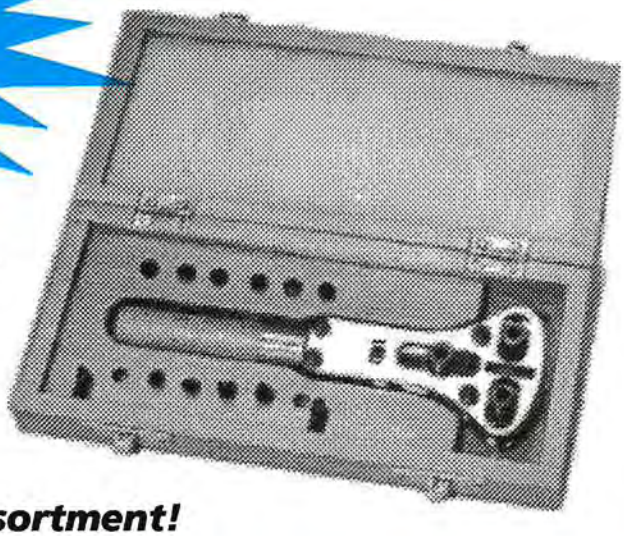
- Ideal for replacing glass crystals and glassware.
- Uses the power of the sun or our curing lamp to bond metal to glass instantly.
- Clear, non-yellowing bond.
- No-mess needle point applicator. .07 fl oz. No.120.CGA

$3.95 Value

Case Wrench for Waterproof Watches

Four sets of pins fit all waterproof watch cases. Fitted wooden case keeps pins ready for instant selection. India. No.591.090

$13.95 Value



Both Free with purchase of our CKX-100 assortment!

Cas-KerCo.

Call Today **1-800-487-0408**

FAX 1-800-487-5848

2121 SPRING GROVE AVENUE CINCINNATI OH 45250-0069 LOCAL PHONE 513/241-7073 FAX 513-241-5848

AWI BENCH COURSES -- 1994

To register for these courses, please send with your request a registration fee of **$35** per instruction day (for AWI members) to: **AWI Central, 3700 Harrison Ave., P.O. Box 11011, Cincinnati, OH 45211.**

PLEASE NOTE: Registrations are limited and will be selected by the *EARLIEST POSTMARKS.* You may register by fax if you wish; if so, please include your Visa or MasterCard number, card expiration date, and signature.
FAX: (513) 661-3131 -- INFORMATION: (513) 661-3838

MARCH 1994
12-13--Management for Watchmakers & Jewelers--San Francisco, CA
12-13--Repair of the Atmos Clock--Orlando, FL
12-13--400-Day Clock Repair--Reno, NV
19-20--Advanced Quartz Watch Repair--Birmingham, AL
20--Introduction to Quartz Watch Repair--Meadowlands
20--Basic Pocket Watch--Sacramento, CA

APRIL 1994
8-10--Mechanical Watch Repair--Sacramento, CA
9-10--Cuckoo Clock Repair--Baltimore, MD
9-10--Modern Mechanical Chronographs--Orlando, FL
22-25--Lathe Course (Phase 3)--Meadowlands

MAY 1994
15--Servicing ETA Quartz Chronographs--Birmingham, AL
21-22--Advanced Quartz Watch Repair--Meadowlands
21-22--Introduction to Clock Repair--Boston, MA

JUNE 1994
4-5--Hairspring Vibrating--Des Moines, IA
5--Servicing ETA Quartz Chronographs--Orlando, FL

COURSES & INSTRUCTORS

Advanced Quartz Watch Repair
Robert Bishop, CMEW

Basic Pocket Watch
Alice Carpenter, CMW, CMEW

Introduction to Clock Repair
Introduction to Quartz Watch Repair
Buddy Carpenter, CMC, CMEW

Advanced Clock Repair
Roland Iverson, CMC

Repair of the Atmos Clock
Gerald Jaeger, CMW, CMEW, FAWI

Mechanical Chronographs
Mechanical Watch Repair
James Lubic

Cuckoo Clock Repair
James Williams, CC

400-Day Clock Repair
Striking Clocks
John Nagle

Servicing ETA Quartz Chronographs
James Broughton, CMEW, FAWI

Hairspring Vibrating
Joseph Cerullo, CMW, CMC

Modern Mechanical Chronographs
Remy Waelchli

The Watch/Clockmakers Lathe Course
Roy Hovey
Phase I: Basic Lathe & Accessories
Phase II: Mounting Wheels, Arbors, & Staff Blanks
Phase III: Staffs, Repivoting, Jewel Setting; Bushings, Lantern Pinions, & the Jacot Tool
(Please contact AWI Central for more detailed course outline.)

PROJECT EXTEND CLASSES -- 1994

MARCH 1994
7-12--Clock Case Repair--Williams
14-26--Lathe Courses--Hovey

APRIL 1994
18-22--Watch II--Lubic
25-29--Watch III--Lubic

MAY 1994
9-13--Clock II--Nagle
16-20--Clock III--Nagle

JUNE 1994
13-17--Watch V--DeCorte

Contact AWI Central for the *General Information Brochure* for Project Extend and specific course brochures for classes that interest you.

See page 43 of the October 1993 issue for Project Extend's class re-alignment.