OCTOBER 1995

HOROLOGICAL TIMES

American Watchmakers-Clockmakers Institute

Center Catch Spring Bar Kit

All stainless steel assortment contains 12 sizes, 84 piece kit.

#84

$12.95

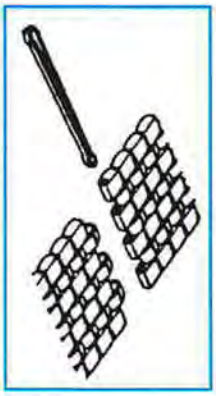
Bracelet Parts Kit

This 48-piece service kit contains safety chains, chain hooks, screw eyes, and spring bars.

No. 1015

$18.50

Friction Band Pin Assortment



These friction pins are used instead of screws to attach links and bands. 0.9 thickness to fit most hole diameters, 28 sizes from 6.5mm to 20mm - by 0.5 increments. Contains 84 pieces. ***Refills Available!***

No. 1028

$17.95

NEW Genuine SEIKO-PULSAR Stem Assortment

#ST-60

$44.00

12-Bottle kit contains stems for the most popular Seiko and Pulsar movements. With a total 60 pcs, cost per stem is only .73 each. A fraction of the regular refill cost.

Receive this Economy Spring Bar Remover FREE with each assortment shown on this page.

Solid steel tip with plastic coated handle.

WATERPROOF Crown Assortment

Popular Sizes/Taps for Quartz & Mechanical Models

No. 5610

$32.50

This kit combines crowns from 3.0mm through 4.5mm diameters, in a variety of taps and tube openings. Contains 36 pcs; nine sizes in steel. Swiss made.

Esslinger & Co.

1165 Medallion Drive • Saint Paul, MN 55120 • Toll-Free Nationwide: 1-800-328-0205
Local/Metro Area: 612-452-7180 • Fax: 1-800-548-9304 • Local Fax: 612-452-4298

VOLUME 19, NUMBER 10 OCTOBER 1995

HOROLOGICAL TIMES™

Official Publication of the American Watchmakers-Clockmakers Institute

Henry B. Fried	4	**Questions & Answers**
Fred S. Burckhardt	7	**Management** Part 16 (Final)
J.M. Huckabee	8	**As A Clockmaker Turns** Adapting a Tool Slide Rest to the Watchmakers Lathe, Part 2
Fred S. Burckhardt	11	**Rock Quarry**
Marshall F. Richmond	12	**Pickle Barrel** Course in Jewelry Repair, Part 12
Henry B. Fried	22	**The Hanging (Suspended) Barrel** Part 1
Henry B. Fried	24	**Repairing Mechanical Watches & Clocks** A Complete Series of Bench Practices, Part VIII
Henry B. Fried	27	**Book Review** *Painted Dial Clocks*
J.P. Kenyon	28	**A Practical Course in Clock Repair** Safety in Clock Repair, Unit 1
David A. Christianson	32	**The Novice Watchmaker** Specialized Tools
Jack Kurdzionak	35	**Affiliate Chapter Column** Affiliate Chapter Annual Meeting
Archie B. Perkins	38	**Technically Watches** Antique Watch Restoration, Part CXVIII

Sagacious Advice From Dave Grossman
2

How To Make A Fusee Ratchet Click
16

An Angelus Clock
18

Seeking Prospective Candidates
56

HOROLOGICAL TIMES (ISSNO 145-9546) is published monthly and copyrighted by the American Watchmakers Institute, 701 Enterprise Drive, Harrison, Ohio 45030, 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*, 701 Enterprise Drive, Harrison, Ohio 45030

OFFICE HOURS: Monday through Friday 8:00 AM to 4:00 PM (Eastern Standard Time). Closed on all national holidays. PHONE: (513) 367-9800, AWI HOTLINE: (513) 367-7799 (24-hour recording), FAX: (513) 367-1414.

DEPARTMENTS

Ask Huck	6
Association News	37
News of the Trade	42
Education Update	46
Bulletin Board	48
New Members	50
Classified Ads	52
Advertisers' Index	56

HOROLOGICAL TIMES™

Executive and Editorial Offices
AWI Central
701 Enterprise Drive
Harrison, OH 45030
Telephone: (513) 367-9800
Fax: (513) 367-1414
AWI Technical Hotline: (513) 367-7799

Milton C. Stevens: Editor-In-Chief/Publishing Director
Donna Baas: Editor/Advertising Manager
Katherine J. Ortt: Associate Editor
Diane M. DeVillez: Art & Production Director

Nancy Wellmann: Office Manager
Mary Sansalone: Seminar Coordinator
Sharon McManus: Circulation Manager

Technical Editors
Robert F. Bishop
James H. Broughton
Fred S. Burckhardt
David A. Christianson
Joe Crooks
Henry B. Fried
J.M. Huckabee
John P. Kenyon
Archie B. Perkins
Robert D. Porter
Marshall R. Richmond

AWI Officers
Joseph L. Cerullo, CMW, CMC: President
Charles Cleves: First Vice President
Roland R. Iverson, CMC: Second Vice President
Greg Hostetter, CC: Secretary
James H. Broughton, CMEW, FAWI: Treasurer

AWI Directors
Robert F. Bishop, CMEW, FAWI
Alice B. Carpenter, CMW, CMEW
M.R. Carpenter, CMC, CMEW
Wes Door, CMW
Henry Frystak, CMW
Ewell D. Hartman, CMW, FAWI
Gerhard M. Hutter, CMW
Robert A. Nelson, CMW, CMEW, FAWI
Robert D. Porter, CMW
Marshall F. Richmond, CMW

Jack Kurdzionak: Affiliate Chapter Director
Toby Witherspoon: Research & Education Council Director
Wes Door, CMW: Immediate Past President

Milton C. Stevens, FAWI: Executive Secretary
James Lubic: Education & Technical Director
David LaFleche: Communication & Finance Director
Henry B. Fried, CMW, CMC, FAWI: Technical Director

Sagacious Advice From Dave Grossman

Reprinted with permission from the Newsletter of the Massachusetts Watchmakers Association, Jack Kurdzionak, Editor.

Dave Grossman is a retired pharmacist who has been studying clock repair for the past three years.

The ground rules for operating a clock and watch company and a drug store are about the same.

1. Keep the customers happy. Sometimes an owner may make a mistake in quoting a price to the customer's advantage. The owner must stay with that quoted price, even if it is a loss. If the error in the price quote is to the owner's advantage, he must reduce the price charged to the customer. It is easier to reduce a price than to raise it.
2. Give the customer what he wants. You may not agree with him, but it is the customer's money being spent. You can state that there will be absolutely no guarantee if he doesn't follow your recommendations as to repairs or applications of a product. If that is what he wants, grab his money and give it to him his way. If you are a perfectionist, it may be difficult to do business with him. I am happy to do business his way.

In the drug business, with prescriptions, you must be a perfectionist. Each prescription must be filled accurately with the correct drug, strength, and amount in each bottle. Also you must be sure there is no incompatibility between drugs, if there is more than one prescription, or with other drugs he may be taking. Now for the rest of the drugstore (out of the prescription department), give the customer what he wants. I couldn't care less what he bought, just give me his money. Dollars make the world go round.

When you unlock the door to a business, you do not know who is likely to walk in. Customers are pretty much the same in all businesses. The difficult ones are miserable in any retail business, whether it is a watch repair shop, grocery store, stationery store, drugstore, or whatever. The relaxed customer is the same in any establishment. I have been asked many times what kind of business I operate. Upon asking why, I am always told that I am very easy to deal with (that is until I become unhappy). I become quite vocal when I have something to complain about.

After my wife spent about six months trying to get an item straightened out, she asked me to do it. When I was told that it would be done shortly, my reply was, "How about right now? If you can't do it right now, I will sit in that chair over there until it is done, even if I have to sit there while the store is closed. I will not move." Everything was taken care of in less than one minute. Of course, this person did not own the business and I am very reluctant to trade in that establishment.

Continued on page 36.

ON THE FRONT: This beautiful Autumn scene was taken at the Nomohegin Park in Cranford, NJ by Jack Goldstein from Cranford, NJ.

IF IT RUNS ON BATTERIES, IT RUNS ON **maxell**

FOR DECADES MAXELL HAS STOOD FOR QUALITY RELIABILITY AND INNOVATION

As you know, Maxell is a world leader in the manufacturing of superior quality coin cell batteries. But here's something you probably don't know: Buy 200 SR and CR batteries and we'll give you a free Maxell screwdriver set. Think of it as further proof that one name is the clear indicator of superior quality: Maxell.

NOW ADD GENEROSITY TO THE LIST

FREE MAXELL SCREWDRIVER SET WITH THE PURCHASE OF 200 SR AND CR BATTERIES

To order, call your Maxell distributor today. Offer subject to availability. Maxell Corporation of America. 22-08 Route 208, Fair Lawn NJ 07410. Call 1-800-533-2836 (in NJ: 201-794-5900).

Questions & Answers

By Henry B. Fried, CMW, CMC, FAWI, FBHI, ★FNAWCC

Q. A customer brought to me a nineteen-jewel Ryrie Bros. of Toronto watch. The serial number of the watch is 251559. It is pendant wind/set and has a bar movement. The top plate is about 14 American size. The dial face is about 16 American size. The case is A.W.C. Co., 18K yellow gold. We are unable to identify this watch in any of our reference books. It would be very much appreciated if you could help us in dating and giving us any useful information about the watch. There is a casemark that looks like a Maltese cross.

Ted Moore, Ehrenberg, Arizona

Photo 1.

Photo 3.

Photo 2.

Photo 4.

A. Your watch case was made by the American Watch Case Company of Brooklyn, New York, about the first decade of this century.

The movement appears to be made by the LeCoultre Watch Company who supplied such ebauches to many makers (including Patek Philippe). Evidently the watch was cased in this country. I cannot make out anything on the dial from your photos, nor do you supply the legend that appears faintly and out of focus on the dial.

LeCoultre is still in business and does supply such basic movements to those who finished and placed their own names on them.

Henry B. Fried

Q. I have been a hobbyist/collector for over thirty years. Except for a few problems, I can usually get my clocks and watches to function, but I remain a hobbyist/collector and not a professional.

I have a small problem that concerns shortening expandable wristwatch bracelets. I can't do it. When friends ask me to make this adjustment, I have to turn them away. I can fix an overbanked Hamilton 992B, but I can't adjust a Timex expandable watchband.

I know your expertise is beyond this, but if you could give some information I'd appreciate it. Maybe you could steer me to a previous article in *Horological Times*.

Thank you.

Robert G. Farricy, Syracuse, New York

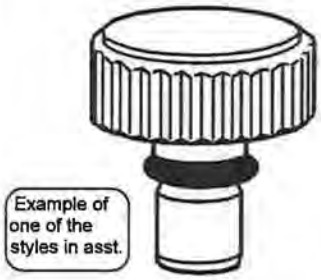
Q. I can well understand your problems with metal and expansion bracelets. There are so many different types that it would be difficult to list or try to explain the workings or adjustments to each.

The Seiko Time Corporation, which uses the whole gamut of bracelets in their large variety of watch attachments, commissioned Louis Zanoni of Zantech to create a video which shows these in an unusual and very clear manner.

This video can be purchased for $49 from Zantech Corp., 77 Shady Lane, Trenton, New Jersey 08619.

Henry B. Fried

Borel



Japanese Style Crown Assortment # 951

Borel has put together this unique assortment of crowns made to replace crowns on Seiko, Pulsar, Lorus, & Citizen watches. Includes 5 new numbers (*) for a total of 53 popular numbers, from 2.5mm to 6.5mm diameter. Put up in a 60 bottle cabinet with tap chart and a case number to crown number booklet. Saves money, as these crowns are a fraction of the cost of the genuine. Refills available in both yellow and white. Swiss made.

#951/2 Asst. of 106 total crowns, 1 each yel. & white of 53 #'s **$ 139.-**

#951/1Y Asst. of 53 total crowns, 1 each yellow of 53 #'s **$ 79.-**

Both assortments available with Quartz crown gauge for an additional $ 15.

Crowns for Seiko - Pulsar - Lorus - Citizen

Stock #	Diameter	Stock #	Diameter	Stock #	Diameter
J-25M04	2.50 mm	J-35M98	3.50 mm	J-40MH1	4.00 mm
J-25N02	2.50	J-35ME9 *	3.50	J-40MJ3	4.00
		J-35MR8 *	3.50	J-40N51	4.00
J-30E02	3.00	J-35N18	3.50		
J-30M22 *	3.00	J-35N20	3.50	J-45D01	4.50
J-30M98 *	3.00	J-35N57	3.50	J-45M04	4.50
J-32M29	3.25	J-35NA1	3.50	J-45M10	4.50
J-32N23 *	3.25	J-35NH9	3.50	J-45M30	4.50
		J-35R34	3.50	J-45W29	4.50
J-35D03	3.50				
J-35D15	3.50	J-39M04	3.90	J-50D05	5.00
J-35E09	3.50	J-40M16	4.00	J-50M04	5.00
J-35M03	3.50	J-40M17	4.00		
J-35M06	3.50	J-40M24	4.00	J-55M06	5.50
J-35M10	3.50	J-40M32	4.00	J-65M02	6.50
J-35M34	3.50	J-40M35	4.00		
J-35M68	3.50	J-40M69	4.00	J-506-2254	3.50
J-35M82	3.50	J-40M71	4.00	J-506-2614	3.50
J-35M86	3.50	J-40M81	4.00	J-506-2874	3.50
J-35M94	3.50	J-40M97	4.00	J-506-4494	3.50

Suppliers of Quality Products to Watchmakers and Jewelers Since 1920

Jules Borel & Co.
1110 Grand Avenue
Kansas City, MO 64106-2348

Order Desk **800-776-6858**
Order FAX 800-776-6862
Local 816-421-6110

Ask Huck

Clockmaking Bits About...

Correct Time
Motive Force for Tower Clocks

By J.M. Huckabee, CMC, FBHI

Question: What could I use for a shop regulator? How important is the correct time?

Answer: This is a good question. Most anything is a suitable regulator for checking Mantle Blacks, kitchen clocks, and other old American clocks. However, you do need a good time standard. Not all clocks are capable of high accuracy, but some are, and you need the best you can afford. I built my regulator about twenty-five years ago. It was a big chore but I have never regretted the work.

A friend of mine who is a watchmaker used his regulator to promote foot traffic into his jewelry store. He placed his regulator in the front area of the store, and a window sign read, "Come in and set your watch to the National Bureau of Standards Time." A card on the regulator posted the error as compared to Bureau time. This was corrected each morning and showed some number of seconds error. Next to the clock was a push button that would turn on a small radio speaker tuned to the Bureau's time station. The radio was hidden. This required a little daily attention, but brought a stream of foot traffic into his store each day.

The National Bureau of Standards transmits time signals on 2.5, 5.0, 10.0, 15.0, and 20.0 megahertz. One or more of these stations can be heard most any place in the United States at any time of day. An inexpensive radio with short-wave coverage is suitable in most areas.

Yes, we need a regulator for several purposes, and building store name and traffic is an important one.

Question: What is the power source for tower clocks? Were these weight-driven in years past? How much weight is required?

Answer: The IBM tower clocks built after World War II were all electrically driven with various methods of automatic recovery from power failure. Some built in the 1920-1940 era had small weights of a hundred pounds or so and were electrically wound at intervals of a few hours. These were mostly supported on an endless roller chain.

Most of the older clocks made by other companies had steel wire cables or roller chain and were hand wound. Many of these had weights up to two to three thousand pounds, with a weight fall of fifty or more feet.

Weights were usually twelve to fifteen inches in diameter and a few inches thick, weighing about fifty pounds. These looked like a giant version of the multiplying weights on a beam-type scale—a disc with a slot that nested with other discs. Weights were supported by a platform disc and steel rod. The weights were then stacked for suitable total weight.

The classic courthouse clock with four seventy-two-inch dials might use one thousand pounds for the time movement and two thousand pounds for striking. This would lift a fifteen- to twenty-pound hammer to strike a bell of three to four feet in diameter. A weight fall of fifty feet was not unusual.

Be warned, those weights were a "time bomb" just waiting to go off. The weight shaft usually spanned several floors of the building, and had a pit at the ground floor in case of a broken cable. Others used large timbers as a means of stopping fallings weights. To climb the tower and wind the weights was a major chore each week.

The following is an example of a "time bomb." In the mid-1950s, I went into the Lownds County, Mississippi, courthouse and there lay a pile of weights in the ground floor. There was about a ton of cable and cast iron. By looking upward, I could see all the way to the clock tower through the overhead hole. The cable had broken a few nights before. I've since had a great appreciation for electrically-driven tower clocks. ❐

If you have any questions, please write:
"Ask Huck", c/o *Horological Times*,
701 Enterprise Drive, Harrison, Ohio 45030

Management

Part 16 (Final part in the series)

By Fred S. Burckhardt

This is the last article of this series on management, so it's just going to be about a few things that haven't been mentioned in this series plus a few that I would like to reiterate upon.

I'm sure you've noticed that nothing has been said about inventory or insurance. These are two areas which should be handled by experts. In the case of inventory records, some insurance companies require certain types of records be kept in order to qualify for their particular type of insurance. It would be better to consult your accountant for his/her opinion. Some people still use the physical method of inventory, others use their computer to keep records, and others use a combination of both. It would be a little presumptuous of me to recommend any particular type.

As far as insurance is concerned, here again, let the expert handle it. Some may require a certain type of safe or alarm system in order to protect you with their policy. These are things you should check and then consult someone who is familiar with such facets of the business.

I know there are some who are thinking about having their own business someday. Don't get into the habit of "I should'a, I would'a, or I could'a, *but*." The faster you get off of that *but*, the faster you will attain your goal.

Set yourself a goal. Write it down on a card. Put it on your bench where you'll see it every day. Get it etched on your brain so you won't forget it. The more you visualize your goal, the easier it will be to attain it.

You don't have to have a lot of money to start a small business. You don't have to have the fanciest equipment or fixtures or the most lavish surroundings to start. Take your time. Start small and build from there. Pay your bills on time and get a good credit rating. Remember, keep whatever money you have working for *you*. Don't let somebody else use your money and you get nothing out of it.

Become more competent. Attend guild meetings and bench courses, take home-study courses. Learn all you can about your chosen profession and even though you may be good at a lot of things, be great at one.

One important thing to remember is that in any business there is a certain amount of risk. If you aren't willing to take risks, you will be better off working for someone else. Risks are part of business. Robert Goizeuta of Coca-Cola says, "Remember, if you take risks, you may still fail, but if you do not take risks, you will surely fail. The greatest risk of all is to do nothing." Lee Iococca has this to say about risks, "I have to take risks every day. I'd rather not, but the world doesn't give me that option." Before making any risky decision, gather whatever information is available. This will help to make it a calculated risk. As one fellow said, "If you have to take a risk and you have the feeling it will be good, go ahead and take it. If you should fail, make it a spectacular failure."

Don't listen to doomsayers. Usually they are the ones who have never accomplished anything themselves but they can tell others how not to do it. One of my favorite verses is by Edgar A. Guest:

It Couldn't Be Done
Somebody said that it couldn't be done,
But he with a chuckle replied
That "maybe it couldn't," but he would be one
Who wouldn't say so till he tried.
So he buckled right in with a trace of a grin
On his face. If he worried he hid it.
He started to sing as he tackled the thing
That couldn't be done, and he did it.

Somebody scoffed: "Oh, you'll never do that:
At least no one has ever done it";
But he took off his coat and he took off his hat,
And the first thing we knew he'd begun it.
With a lift of his chin and a bit of a grin,
Without any doubting or quiddit,
He started to sing as he tackled the thing
That couldn't be done and he did it.

There are thousands to tell you it cannot be done,
There are thousands to prophesy failure:
There are thousands to point out to you one by one,
The dangers that wait to assail you.
But just buckle in with a bit of a grin,
Just take off your coat and go to it,
Just start in to sing as you tackle the thing
That "cannot be done," and you'll do it.

Continued on page 36.

As A Clockmaker Turns

Adapting a Tool Slide Rest to the Watchmakers Lathe

Part 2

By J.M. Huckabee, CMC, FBHI

Overview

This is the second part of a four-part series on adaptation of a tool slide rest to a watchmakers lathe. Part 1 related a slide rest for a typical lathe, each piece foreign to the other, but similar to all American-style devices related to the familiar Moseley and WW tools.

As you study this material, you may modify your thoughts to apply to the equipment you own or plan to purchase. This material shows how the slide rest is modified to measure slide motion via a pair of dial gauges. The gauges each have a one-inch range, and are set to come into use as you approach the final work dimension. This is much superior to the crank dial calibration.

These gauges read slide motion of 0.001" per dimension. This approximates depth of cut: tool bit height above or below center, sharpness of tool and work deflection, and other factors will slightly alter the depth of cut being made.

The Gauge Brackets

Our cross slide gauge is shown in Figure 1, and longitude gauge in Figure 2. These brackets are made of 3/16" thick brass and held in place by screws and a dowel pin. Study your slide rest with great care. These are made of a fine-grained cast iron, most parts are thin in section, and will break like a soda cracker. Screws for mounting the brackets are numbers 6-32 and 8-32 with binder heads. The thumb nuts are #5-40 socket-head style, with a small thumb nut under each head. Other screw sizes may be more suitable for your application. Sizes #6 and #8 screws and taps are readily available. The #5 taps are not as easily found: a #4-40 size is readily available and equally suitable. Gauge portholes are 5/16" diameter (0.3125"), a standard for many gauge makers. A commercial 5/16" drill bit is available everywhere tools are sold.

Gauge bezel has a lock; can be released and turned. The dial then counts both up and down in increments of 0.001".

The longitude dial has the most simple bracket. It is a bar with gauge port, screw hole, and dowel pin (see Figure 3). Illustrations 4 and 5 show the holes that are drilled in the cross slide. The right-most hole in those photographs is the cross-slide feed screw. Some slide rest examples have an overhang on that feed screw for power feeding a screw-cutting attachment. In that case, our bracket would need a passageway for that shaft. My Levin slide has that feature: the gauge bracket on that slide differs slightly.

Turn your attention to Figures 6 and 7. This is the cross-slide bracket. It is held in place by two screws, but no dowel pin. The major problem here was finding space for screws, and avoiding closure of the T-bolt slot. Figures 7 and 8 are reproduced here at approximately full size. The #8 screw of Figure 8 has a diameter of 0.164". From that size you can see how thin the material section is on each side of the hole. The smaller hole in the same illustration is a #6, with a diameter of 0.138". The view in Figure 8 is upside down to position when mounted on the lathe bed.

Viewing Figure 9, again this is an upside down view, which shows the edge of our screw head was cut away for passage of the T-bolt that secures the slide to our lathe bed.

A couple of suggestions can be offered on assembly. The dowel hole was drilled with the bracket tightly secured in place (see Figure 3). This gave perfect alignment of the dowel holes. Hole size is 1/16", with a brass rod of the same size for the pin.

The screw head modification was marked after assembly, removed and cut to size, then reassembled (see Figure 9). Modification of a Levin slide was made at the same time. Although the brackets of the two slides look similar at a glance; they are slightly different in size and shape. I'm sure the same would be true with slides from another origin.

What May We Expect From This Work

These two slides were modified ten to fifteen years ago: I never dreamed how this would expedite most lathe work. Not only for the dial gauge value, but these brackets also will hold micrometer stops, and even solid (brass rod) stops that prevent feed over-run. It will provide stops to prevent feeding into collet, chuck, grinding wheels, etc., as well as making repeated cuts to a given position.

Forward

Part 3 to follow will show some ideas on mounting the slide rest onto our lathe bed, how the dials are fitted to their brackets, and other considerations for slide rest work. Part 4 will relate some methods of slide rest safety stops when the lathe is used in wheel work. ❐

Illustrations continue on page 10.

Figure 1. Cross-slide rear end showing lock nut and bracket for dial gauge.

Figure 2. Tip of dial gauge to read longitude motion. Wing nut and bracket holds dial gauge in place.

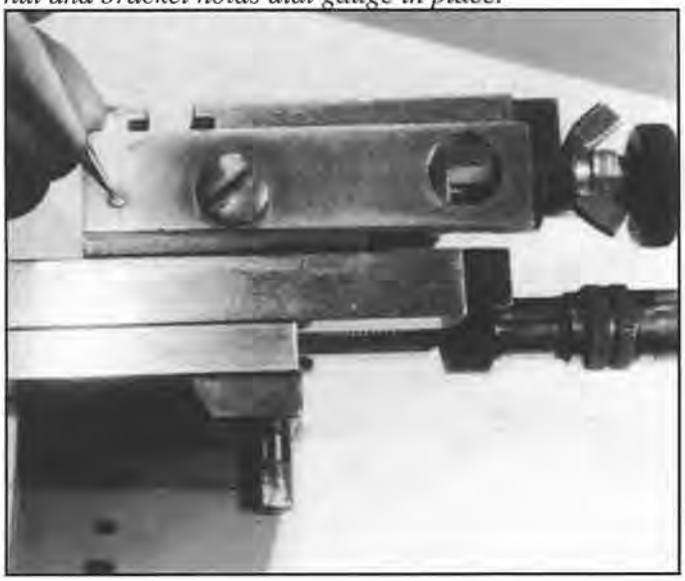


Figure 3. Dowel pin for longitude gauge bracket. A single #8 screw holds the bracket.

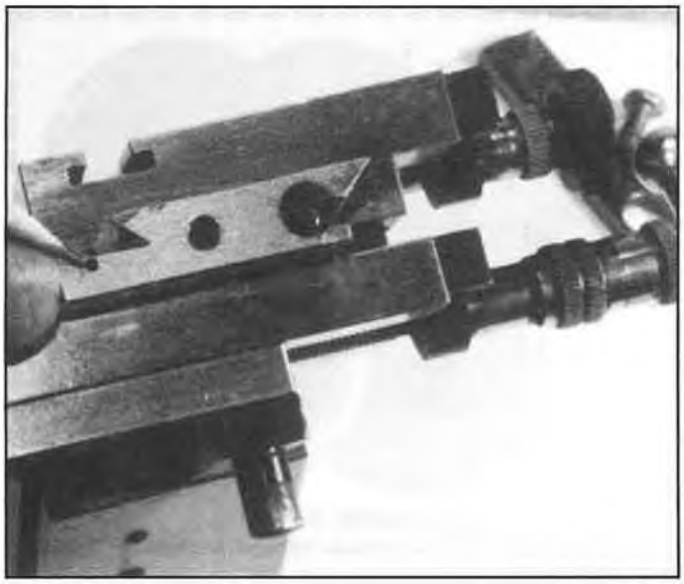


Figure 4. Dowel pin hole for longitude bracket. Large hole is for screw. Larger hole is the crank feed-screw.

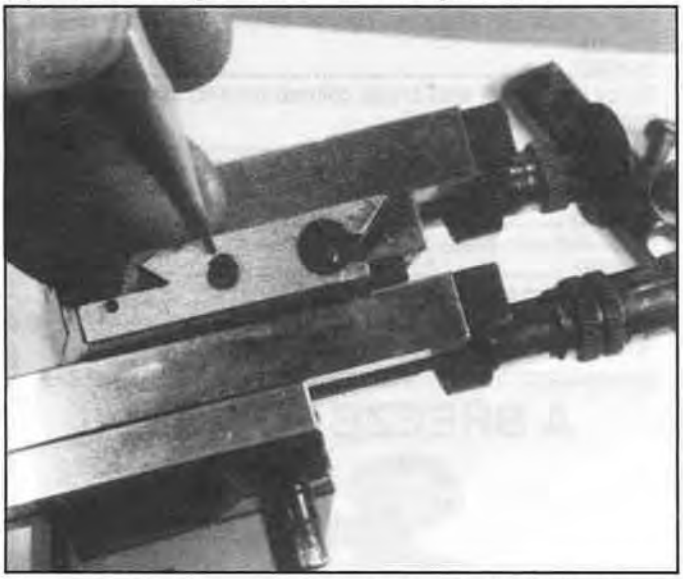


Figure 5. Bracket screw hole is threaded for #8-32 machine screw with a binder head.

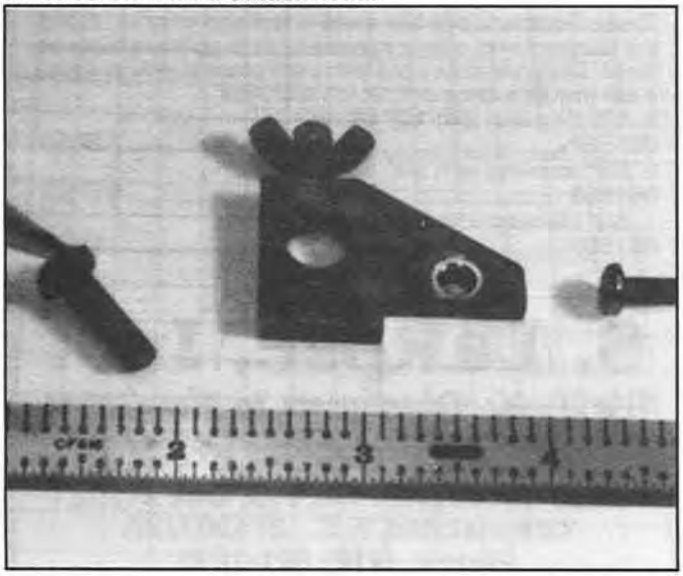


Figure 6. Gauge bracket for cross-slide. Screw indicated is #8-32 for the far right hole. Small screw is a #6-32.

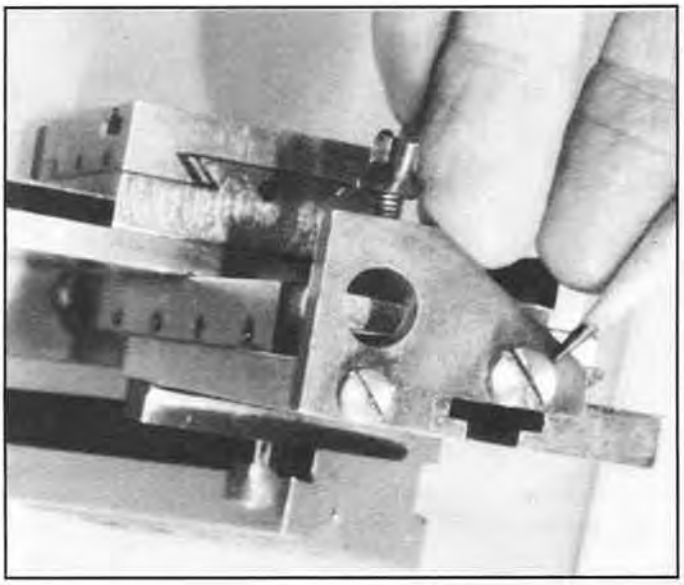


Figure 7. Cross-slide gauge bracket in place. Note the screw head conflicts with the T-slot; the head was modified.

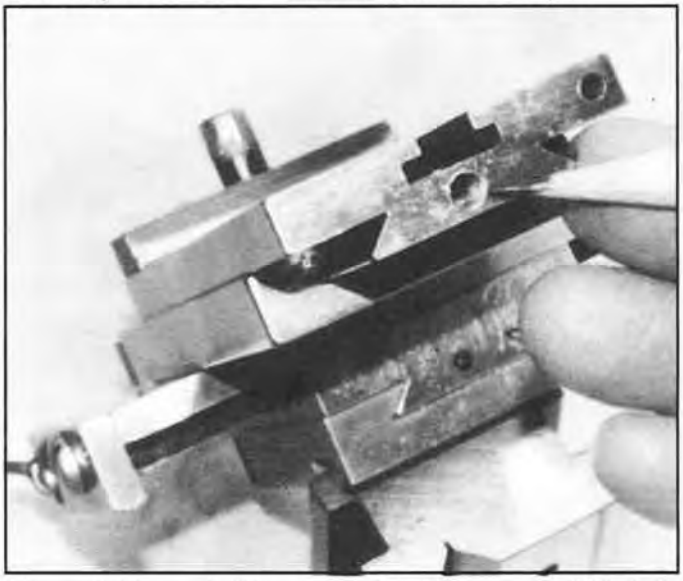


Figure 8. Far end of the cross-slide (bottom up). This hole threaded #8-32. The smaller hole was threaded #6-32.

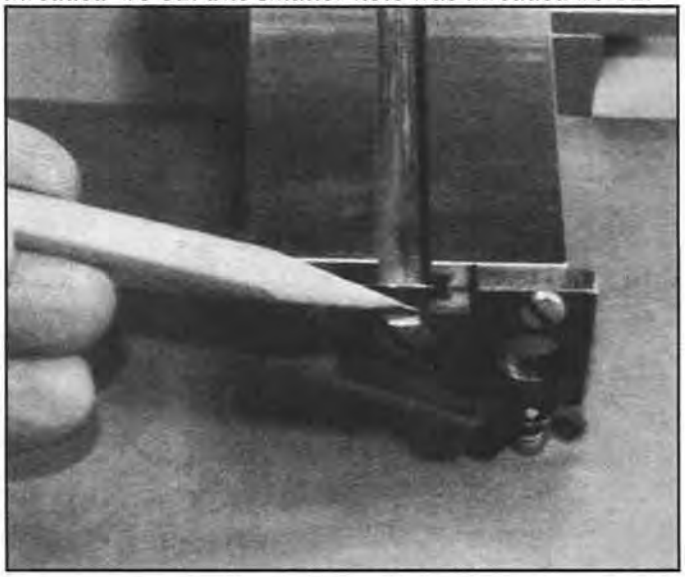


Figure 9. The finished bracket. Note that there is now no conflict with the T-slot and bolt (underview, far end).

Rock Quarry *et tu*

By Fred S. Burckhardt

Every once in a while, someone will ask me if I'm telling the truth about some of the places I used to work. The answer is *yes*.

I'll never forget one place that was really bad. This was in a tough neighborhood. One day, one of the kids made it all the way down the street to school. This may not sound like a big deal, but this was the first time it happened all year. I have to tell you, even the school was tough. The school was Our Lady of the Emergency Ward. A woman worked there who wore black motorcycle boots, a black leather jacket, a large heart tattooed on her upper shoulder with an arrow running through it. I'm talking about Sister Mary.

Anyway, this shop where I worked was right in the middle of the block and the subway entrance was on the corner. Every day after work, we made bets as to who would be able to make it to the subway without any injuries.

Our boss was a nice old lady watchmaker who spent most of her adult life in prison. She made us work in small cells with iron bars for doors. I guess she felt more at home in those surroundings. She was always doing nice things for the employees, like slipping us cigarettes and bars of candy. If you turned out your quota for the day, she would roll up the magazine cart and you could pick out which trade magazine you wanted to read. We held an Employee of the Month contest but as long as I worked there, nobody ever won.

The customers were also a little different. Most pulled up in front of the shop in long black cars and usually backed into the door instead of walking in the right way. They all had large heavy gold watches. In certain ways they would let you know that you had better take good care of them or it would be a while before you could work again. Why? Because it's hard to hold tweezers with broken fingers.

Needless to say, there was a lot of pressure working in this place. It just got to be too much for me so I told the boss I was going to leave. She looked at me and said, "Nobody quits on me." For some strange reason, I could tell she was giving me a warning not to quit. I tried to explain that I was a nervous wreck and couldn't take it anymore. She just looked at me expressionless and muttered, "Same old story, I've heard it a hundred times. All you people are the same, just looking for sympathy. Well you won't get any from me. You don't realize how good you have it here. Where else can you make the kind of money I pay you?"

I answered, "I know the money is good but it's hard getting the prison script exchanged for cash."

"You're nothing but a whine baby," she answered. "You better watch yourself in the yard during exercise time."

This was enough for me. I knew I had to make a break and get away from this place. I went back to the bench and shoved all the tools I could into my pockets. It would be either now or never. Break time came and we went out into the yard. The fence was about eight feet high but I talked a couple of the other guys into helping me when the time came. Fortunately, she went back inside to get something she forgot. This was it. I managed to get over the fence in time and made it to the subway stop. The train came in a minute and I jumped on.

In a few minutes, I started to feel like a new person. It was as if a load had been lifted from my shoulders. Thank goodness I never had to return to that place again. I thought for sure I would find a pair of broken tweezers on my pillow the next morning. I didn't. The break was clean. What a relief. Talk about tough places to work! ❐

Pickle Barrel

Course in Jewelry Repair, Part 12

Jewelry Crafting and Repair

By Marshall F. Richmond, CMW

Polishing and Cleaning

The polishing of jewelry can be a trade in itself, the same as watchmaking, jewelry repair, diamond or stone setting, or hand engraving. However, small one- or two-person shops need only to know how to polish jewelry so that it has the appearance of a new article. Being a small shop, we have to be an all around jewelry craftsman and most of us need to earn while we learn. When enough proficiency is attained to start doing customer repair we can expand our knowledge and skills as we produce work by continually experimenting and practicing with the articles on which we are working. If you always try and make the job you are working on better than the last, soon you can be doing excellent work.

Polishing can be done with a very small investment in equipment and polishing abrasives. First, we need a polishing motor with a dust collector. Although the dust collector is not absolutely essential, it serves a dual purpose. First, it keeps the dust created by polishing from getting into the air we breathe and settling over the furniture and fixtures in the room where we work. Secondly, it collects the metal particles so when the filter or dust bag is full, it can be sent to a refiner who will salvage any precious metal. In return they will send you a check for the value of any precious metal they recover. In a relatively short time, the salvage can pay for your polishing outfit.

Some polishing motors have a spindle on only one end, but most polishing motors have a spindle on each end of the motor. The two ends have an advantage as the coarser tripoli can be used on one spindle and fine rouge can be on the other which can save time in changing buff wheels. A two-speed polishing motor can also have an advantage because the high speed of 3,450 rpm is best for hard metals such as platinum or stainless steel and the slow speed of 1,750 rpm is advantageous for polishing soft metals. Most watchmakers have polishing equipment for polishing the cases and bands of the watches they have repaired. This equipment is adequate for jewelry polishing with the addition of more buffs. As a two-speed polishing motor is relatively new to the market, I do not have one. I have a factory-made high-speed motor with a dust bag collector, and a slow-speed motor that I purchased for $5 and an old furnace blower for the dust collector that draws

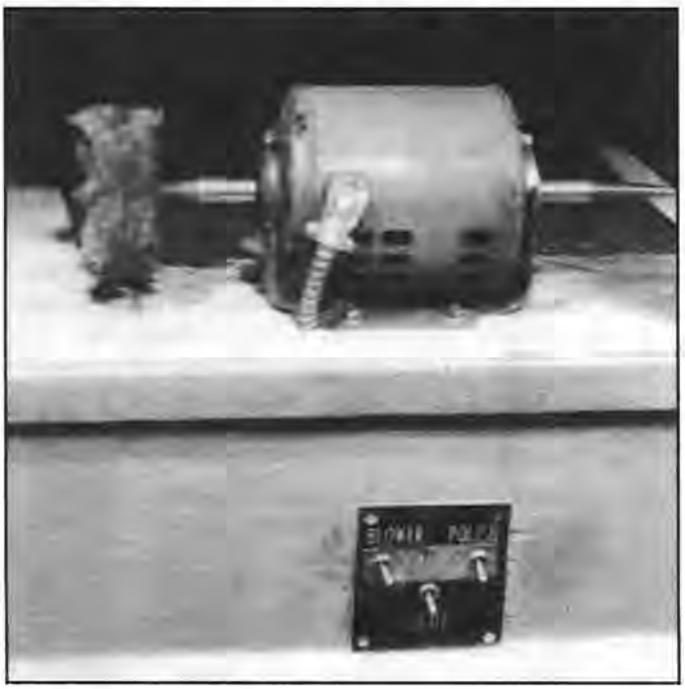


Figure 1.

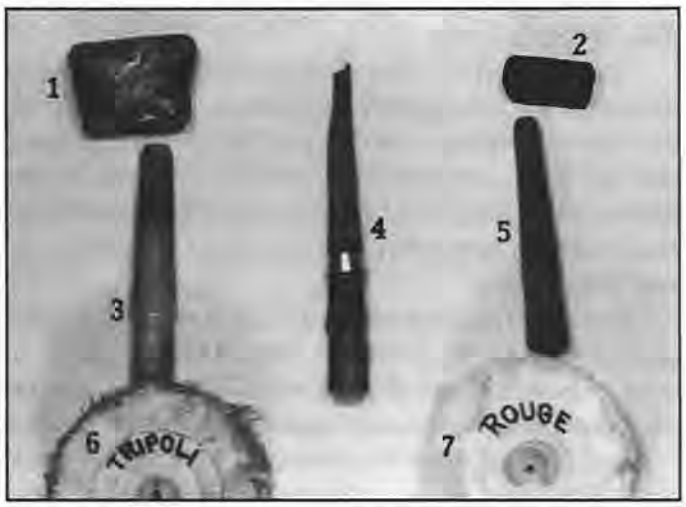


Figure 2. (1) Tripoli polishing abrasive, (2) rouge polishing abrasive, (3) inside ring buff for tripoli, (4) emery cone on inside ring buff, (5) inside ring buff for rouge, (6) cotton buff for tripoli, (7) cotton buff for rouge.

the air through two furnace filters. I designed and made this outfit probably at a total cost of no more than $25, including a left-hand and a right-hand spindle that can be purchased from most any jewelry tool and material supplier. A complete unit sells for approximately $250 and up, so if you have ingenuity and can build one yourself it will save money (see Figure 1).

Buffing wheels are available in many sizes, shapes, and materials. I have always stayed with the basic cotton and felt buffing wheels, although wheels are available in muslin, chamois, and other materials (see Figure 2). Hard felt wheels are available in sizes from 1/2" to 6" in diameter. The knife-edge felt buff wheels are available in small sizes that can be mounted on a mandrel and used in the flex shaft tool in addition to the larger sizes to be used on the polishing motor. Flat felt buffs can be used to keep flat places flat as the softer cotton buffs may tend to round the edges. Bristle brushes are also of great value in polishing around heads, beads or prongs, and in grooves or ridges.

Many polishing abrasives have been introduced in the last few years, but rouge and tripoli, the old reliable abrasives, are still the most common abrasives and should be used until you gain enough knowledge and experience to experiment with others. Through experimentation you may find abrasives that are faster and work better for you, so use whatever works best for you. Tripoli is available in either brown or white. The brown is for general use and the white works better on harder metals like platinum or stainless steel or even for polishing glass edges. Tripoli is a fast-cutting abrasive that is suitable for removing file marks or emery dullness before a final polishing with rouge which will produce a mirror-bright finish. Rouge is available in red or green and removes very little metal; in fact, it almost burnishes the metal. Green rouge like white tripoli is used for polishing harder metals.

Before starting to polish with tripoli, a very rough surface can be polished with emery cones or a piece of emery cloth or paper wrapped around an inside ring finger buff which is tapered and can be held in place with a brass ring size twelve or larger (see Figure 2, View 4). Emery cloth comes in three common grits: coarse, medium, and fine. If the work is not too rough, the fine grit will prefinish it for the first polish with tripoli. Work that requires much metal to be removed can be done first with coarse grit, next medium and then fine. With this fine grit finish very little will be required of the tripoli, and after a good finish is obtained the completion can be done with rouge. The cotton or felt buff wheels can become shiny with metal that the abrasives remove from the polished article which will actually burnish the metal being polished and can produce a bright burnished finish. This, however, is a waste of time because the tripoli and rouge can produce the final finish faster and better. To remove this metal from the cotton buff wheel an old file can be used, with the wheel

rotating, making the buff wheel soft and fluffy which will produce a finer finish when charged with tripoli or rouge. A high speed of 3,450 rpm should be used. All buff wheels and inside ring buff fingers should be well marked so you will know with what kind of abrasives they are charged (see Figure 2, Views 6 and 7). Rouge buffs can be contaminated with tripoli even if kept in the same drawer or container with tripoli buffs. When rouge buffs are contaminated with tripoli, they will no longer produce the fine mirror-bright finish they should.

Polishing with buff wheels can produce enough heat from friction to burn fingers, but tools are available for holding rings and keeping heat from the fingers. Often when polishing rings where great pressure is necessary, a ring mandrel can be used for polishing the outside of the shank. The mandrel being massive will absorb the heat, keep the ring from getting hot, and keep the heat away from the fingers as well.

Polishing chain can be treacherous. If held in the hands, it can catch in the buffs. Fine chain can easily be destroyed and heavy chain can inflict injury to the hands or fingers. One way to polish chain is to wrap it around a ring mandrel, holding one end tight against the mandrel with the thumb of the right hand and the other end with the left hand. The ring mandrel, being tapered, will allow you to keep the chain tight by pressing toward the taper. By rotating the mandrel with the chain in contact with the rotating buff wheel, the exposed side of the chain can be polished then the chain rewound exposing the surface not polished which can then be polished by repeating the process.

Ornate surfaces such as florentine or filigree can best be polished by using bristle brush wheels charged with tripoli or rouge. Again it is important to have them marked as tripoli and rouge so the rouge wheel will not become contaminated with tripoli. For the final finish, use the soft cotton rouge wheel and polish lightly. Florentine finishes should always be buffed lightly as the abrasives, especially tripoli, can easily remove the florentine engraving.

Polishing around stones, between ridges, or in grooves can be done by using the knife-edge hard felt buff wheels using tripoli or rouge. These wheels are available in large to very small sizes and can be used with either the polishing motor or flex shaft tool. When the knife edges become flat or rounded they can, while rotating, be trimmed with a sharp knife making them knife-edged again. Small brushes and small rubber abrasive-charged lap wheels are available and are useful in polishing small places. Polishing can be made much easier and quicker if the article is properly prepared by removing high spots, rough places, or file marks with hand gravers or emery papers.

In cleaning jewelry there are many things to be considered, such as the stones involved, the foreign matter to be removed, and the type of solution that will do the job without damaging the stones. Diamonds, rubies, sapphires or most any natural or synthetic hard stones can be cleaned with the harshest of chemicals, while pearls, opals, emeralds or foil-back glass stones (rhinestones) must be cleaned with mild soap or detergent solutions. Even ammonia can be damaging to pearls or rhinestones. For removal of paints or lacquers from jewelry containing the tough stones soaking for a few minutes in lacquer thinner and brushing with a stiff bristle brush will remove them. Brushes with nylon or plastic bristles can be damaged with lacquer thinner so be sure to use a genuine bristle brush. Again never use this type of solution on opals, pearls, or fragile stones. Finger rings that are worn continuously will accumulate a build-up of soap, detergents and body oils under and around the stones. This is often quite difficult to remove. Sometimes even the strongest of chemicals are not successful, but if the piece is boiled in pickling solution or soaked in the pickling solution for a half hour, normal cleaning solutions will usually be sufficient to remove the debris.

Ultrasonic cleaning is probably the greatest recent development to come along for the jeweler or watchmaker. The cavitation created by the ultrasonic sound waves will reach even the most remote crevices and scrub away the dirt or residues. For jewelry work, ultrasonic tanks are available in almost any size needed, ranging in capacity from one quart to several gallons. For the small jewelry repair shop, a size from one quart to one gallon would be sufficient. These machines are available from your tool and material supplier as well as are cleaning concentrates to take care of almost any need. I have access to many formulas for making your own solutions but the ingredients are too hard to obtain from our ready sources. However, I will pass along a formula that works for me and the ingredients can be purchased from your local supermarket and/or drug store.

One-half cup of Spic and Span®, one-half cup of Mr. Clean®, one-half cup of strong ammonia. 1)Put in one-gallon plastic jug (such as milk comes in). 2)Fill with tap water and shake well. 3)Let stand for twenty-four hours and use diluted half and half with water.

I find this solution works well in an ultrasonic tank, boiled in a pan, or just used to scrub with a washout or old toothbrush. One jeweler that I know uses this formula, only he substitutes Tide® for Spic and Span® and claims it works well for him.

The ultimate in final cleaning is the steam cleaner which blows live steam on the polished piece of jewelry and rinses it as well as heats it, which causes it to dry quickly without using a dryer or heat lamp. In many small shops the steam cleaning would not be practical unless doing production work (which many single-shop

jewelers do). An alternative is to rinse the cleaned jewelry with hot tap water and dry under a heat lamp or in a dryer. Another item of equipment that some jewelers use is a small sand blasting machine that blows sand with compressed air. This machine will remove scum and build-up of soaps or detergents and is excellent for precleaning before starting to work on jewelry or before polishing. However, as sand can remove metal as well as dirt and could damage soft stones, much care should be used with this process. Tumbling is also another way to polish. This has a rotating motor-driven drum in which the jewelry is placed inside with different fine abrasives and highly polished small steel balls. After tumbled for a given time, the jewelry is removed, cleaned and rinsed, then dried. It can have as high a luster as if polished with rouge. Manufacturers of jewelry findings use tumbling as a final finish and I have even found an occasional steel ball in a new spring ring that was wedged in the catch. This tumbling can be done with either wet or dry abrasives. The abrasives polish and the steel balls burnish.

Split-lap polishing is done on a special split-lap polishing machine that sets at a 45° instead of a 90° angle with the spindle facing the operator. The motor uses a buff that is tapered to a knife edge with four splits. While rotating you can see through the buff so the work is held under the buff which makes it possible to closely watch the piece of jewelry as it is being polished taking any guesswork out of critical polishing. These laps are available in 4", 6", 7", or 8" diameters and in hardnesses starting with medium going to rock-hard, flint-hard, and diamond-hard. These outfits are usually used by production manufacturing jewelers.

I am going to give a step-by-step way to polish a ring that has been sized larger starting with the first step after the soldering has been completed.

Step 1. Boil the ring in pickling solution for a few seconds or soak several minutes which will remove any borax or boric acid crystal that has formed from the shielding or flux, then rinse.

Step 2. On the ring mandrel, round it with the rawhide mallet or hammer the solder joint if it needs stretching a little.

Step 3. With a half-round inside ring file smooth the inside of the shank where pieced, then file the sides smooth and shape the outside of the shank with a fine-cut flat file.

Step 4. Place a polishing finger on the tapered spindle of the polishing motor. Wrap a piece of fine emery cloth or emery paper around the polishing spindle and secure it with a brass ring about size twelve. Looking at the motor from the spindle end, the wrap should be clockwise around it. This will allow it to rotate when the

article is sanded. A manufactured polishing cone is available that slips over the polishing finger. It is available in various grits from fine to coarse. The inside of the ring can then be smoothed to a satin finish by holding it over the rotating spindle which being tapered will accommodate most any size ring. The sides and the outside can be also satin-finished by holding and rotating the outside and sides of the shank.

Step 5. With the inside ring finger charged with tripoli, polish the inside of the shank, then with a cotton buff charged with tripoli polish the outside of the shank.

Step 6. If there are no places in the ring requiring special polishing with brush wheels or knife-edge lap wheels, Step 5 can be repeated with rouge.

Step 7. Inspect the ring and if there are no pits, scratches, or too lightly polished places that need going over, it is ready for cleaning. Assuming the ring was precleaned and any crud removed that the ultrasonic would not easily remove, the ring can be put in the ultrasonic tank for three to five minutes.

Step 8. Rinse in hot water, steam, or even rinse in cold water, and dry under a heat lamp or in a dryer. If live steam is used it will air dry without using the dryer or heat lamp as it will be hot enough from the steam.

Step 9. The final inspection should be made under magnification to see if all dirt has been removed and it is polished to your satisfaction, then put it on the ring mandrel and check to make sure the size is correct. The ring now should be ready for delivery to the customer

In many rings, especially stone rings, there are often some other steps needed in polishing them. You can use rotating brushes and knife-edge polishing wheels and even in some pierced places that need polishing, a piece of cotton cord charged with abrasive. The cord can be fastened to something solid on one end. Then with the string run through the pierced place and the other end of the string held in one hand pulling it tight, the ring can be slid back and forth on the charged cord and it will polish the inside of the pierced place.

As this is "Part 12," it concludes the basic course in jewelry repair. The next article will deal with more advanced repairs and will start with a request on repair and restoration of gold-filled watch cases.

❐

How to Make a Fusee Ratchet Click

By Robert D. Porter, CMW

A frequent challenge we face while restoring antique watches is the repair or replacement of worn or missing ratchet clicks or pawls. Figure 1 pictures a typical fusee ratchet wheel with its pair of spring-loaded clicks that engage the ratchet wheel inside the bottom of the conical fusee. These clicks have a pivot that extends through the wheel and is peened over just enough to hold it in place while allowing the click to function properly as the watch is wound with a key.

A keenly sharpened carbide graver is used to turn these parts from nail stock, which has just about the right combination of temper, toughness, and peenability for this work. Time is saved by eliminating the hardening and tempering operations.

A pivot and disk have been turned on the stock in Figure 2. The diameter of the disk is equal to twice the length of the click we want to make, measured from the centerline of the pivot. Figure 3 shows how the disk is filed away to form the beak of the click. Excess stock is being removed in Figures 4, 5, and 6 to form the click while the lathe pulley is manually rotated to position the work to the file.

The stock is being turned back far enough in Figure 7 to allow an escapement file to remove excess material down almost to the centerline of the part as pictured in Figure 8. This allows us to file the part axially as shown in Figures 9 and 10.

A jeweler's saw is parting the click from the stock in Figures 11 and 12. The click will be ready for installation in the ratchet wheel after some minor finishing.

❐

Illustrations Continue on Page 17.

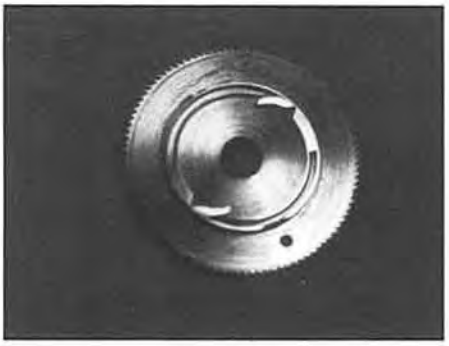


Figure 1.

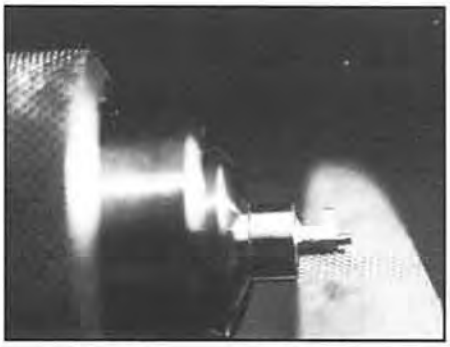


Figure 5.

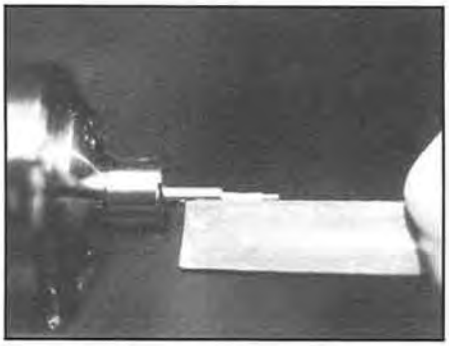


Figure 9.

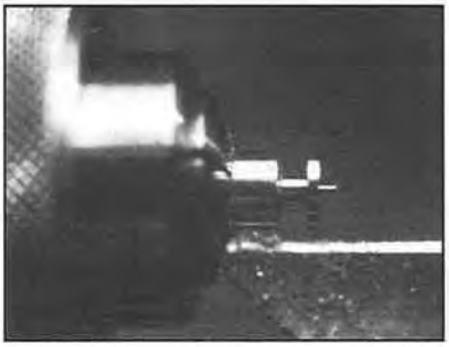


Figure 2.

Figure 6.

Figure 10.

Figure 3.

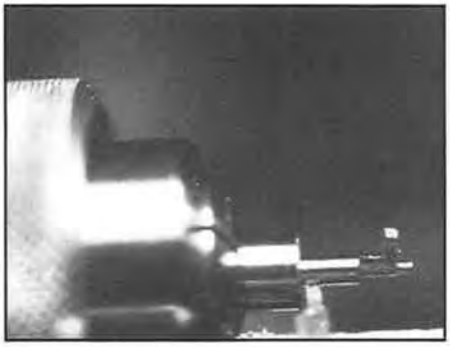


Figure 7.

Figure 11.

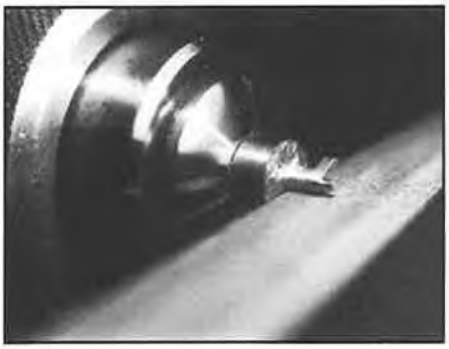


Figure 4.

Figure 8.

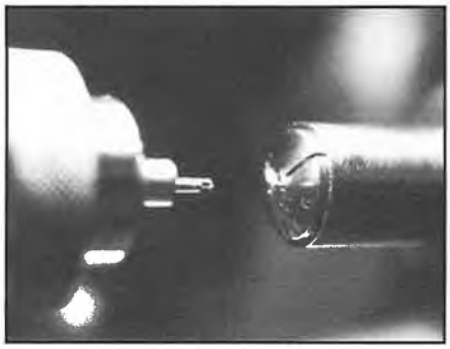


Figure 12.

An Angelus Clock

By David J. Carlson

Figure 1. Angelus clock.

Figure 2. The monk.

A collector friend of mine recently purchased the clock shown in Figure 1 and brought it into the shop for repair. The clock is in the form of a church with a sanctuary, or main section, and an attached clock tower. It is a large clock made from quarter-sawed oak. It measures 29" high, 22" long, and 12" deep. The clock features a door in the church section which, when opened, reveals a monk in the act of pulling down on a bell rope. A close-up of the monk with the outer door removed is shown in Figure 2. The term "Angelus Clock" is used because when the monk rings the bell the people hearing it are called to prayer to say the "Angelus." (The "Angelus" is a prayer to the Virgin Mary, commemorating the Annunciation of the Angel Gabriel, offered in Roman Catholic countries at the sound of a bell. The "Angelus" is named from the first word of the prayer.

Access to the clock is through two removable roof sections: one on the tower and the other on the church. Figure 3 shows the roof removed from the church. Note the detail in the shingles of the roof. The small, oval brass plate visible near the roof line of the church against the tower is marked: "Gg.Beyer,

Figure 3. Church roof removed.

D.R.G.M. 159960, BURGSINN." I believe this indicates the maker, patent number, and location. Figure 4 is a front view of the clock with both the main section and the tower open. The works are divided into two sections: the tower clock and the chime movement in the body of the church.

The time movement in the tower has a 3 5/8" silver dial, visible in Figures 1 and 4. The rear view of the movement is shown in Figure 5. The movement is held in place by two threaded studs which pierce both plates of the movement. One of the two knurled nuts is visible in the upper left side of the rear plate. In addition to its time-keeping function, the movement is used to trigger the chime assembly. A pin on the minute wheel activates the shaft and lever arm on the right side of the rear plate. The motion of the lever arm is carried by a shaft through the common wall into the chime movement.

In Figure 6, the chime movement is obscured by the Angelus gong which is immediately above it. A stand-alone view of the chime movement is shown in Figures 7 and 8. In Figure 7, the front view, the left winding arbor is for the hour/strike and the right winding arbor is for the Angelus chime. The chime movement performs several functions which can be explained as follows.

The shaft carrying the hour-strike signal from the time movement can be seen at the bottom of Figure 6. The shaft connects to a long lever arm which is pivoted in the middle. The other end of this teeter-totter assembly connects to the chime mechanism through a lift wire. As the hour or half hour approaches the left end of the lever arm is depressed which in turn raises the lift wire thereby activating the strike warning. At the hour or half hour the lever is released and the right end falls, thereby initiating

Figure 4. Both removed.

the strike. The connection point to the movement can be seen in Figure 7. The screw at the end of the lever is located adjacent to the big disk at approximately seven o'clock. The hammer assembly is on the rear of the movement as shown in Figure 8. The drive point for the hammer is adjacent to the count wheel at two o'clock. The coiled gong for the hour-strike is located immediately to the rear of the movement in Figure 6. The gong is vertical so only the edge of it can be seen.

The Angelus chimes are activated by the hour-strike mechanism. The release lever for the Angelus chimes can be seen in Figure 8. The lever arbor is at the upper right-hand corner of the movement. The lever extends down and forms a hook at the nine o'clock position in front of the count wheel. Pins on the count wheel raise the lever and activate the chimes at six o'clock and twelve o'clock.

The Angelus chime sequence is unique. The strike system uses double hammers and would be considered a bim-bam except the hammers strike on the same gong. The gong is located over the movement in Figure 6. A full-strike cycle is composed of three periods of fourteen double-strikes with a several second delay between each period. The double hammers are visible in Figures 7 and 8. The hammers are driven by a pin wheel which is comprised of fourteen double-sided pins which are equally spaced over approximately 300 degrees of the pin wheel. The pin wheel rotates three times for a complete strike cycle.

Figure 5. Clock tower movement.

The door in front of the monk is opened when the Angelus chimes are sounding. The operation is very similar to the door opening technique used on a cuckoo clock with a music box. In Figure 8, the large disk over the right winding arbor has a "V" slot. A pin follows the contour of the wheel and activates a lever. The screwhead of the lever can be seen at one o'clock above the disk. A wire connected to the screwhead is fed through a hole in the back of the monk's chamber and hooked to a pin on the door.

The arm movement of the monk is obtained from a lever which is attached to one hammer of the Angelus strike. The lever with wire attached can be seen on the right side of the movement in Figure 8. The motion is transferred via the lift wire to a lever and arbor mounted on top of the box housing the monk. The lever and arbor assembly can be seen on the rear section of the box housing the monk in Figure 6. The monk's arms are attached via a thread to the arbor assembly thereby causing the arms to move in time with the Angelus strike.

Both the hour and Angelus chimes can be manually activated by cords which are tied to their respective lift levers. In Figure 4, the cords come out through a small brass plate near the upper left of the window. The hour chime is indicated by an "S" near the exit hole of the cord and the Angelus chimes by an "L."

At this writing the unit has been reassembled and is under test. The transfer of the hour-signal from the time to the chime movement requires critical adjustment or the time movement will stop due to too much loading. As yet this adjustment is not 100 percent, so more work has to be done.

❐

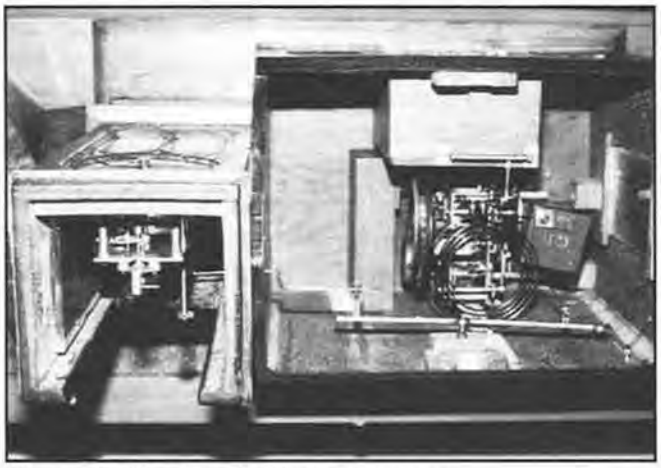


Figure 6. Clock and chime movement.

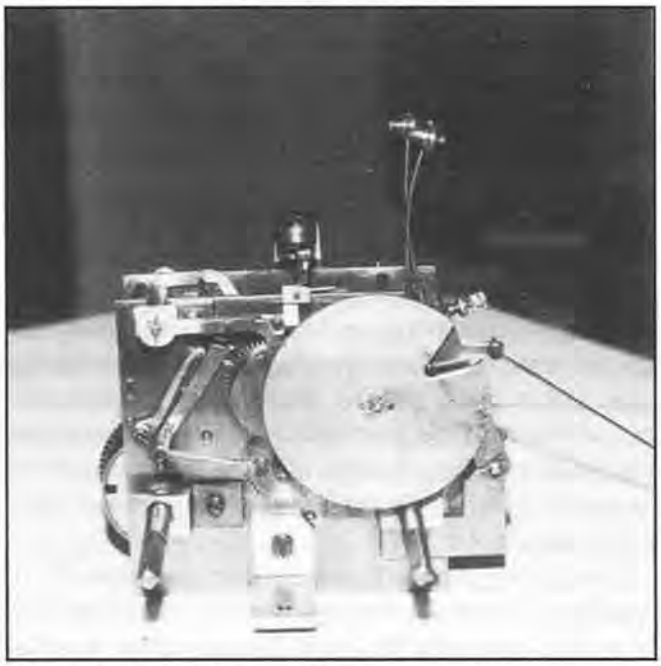


Figure 7. Front view of chime movement.

Figure 8. Rear view of chime movement.

The Hanging (Suspended) Barrel

Part I

By Henry B. Fried, CMW, CMC, FAWI, FBHI, ★FNAWCC

During meetings of watchmakers and occasionally through the mail, requests are made for information on the proper dismantling of these unusual barrel and bridge assemblies. Some have admitted to damaging the barrel bridge and/or the barrel. They appear puzzled that the barrel with its heavy work load should have but one support and not have bearings at both ends.

Key-wound, set watches of the period preceding the introduction of stem winding and setting watches, are becoming attractive to certain collectors—many as pendant watches. The watchmaker is then asked to put these in running condition. Furthermore, very little instruction or illustrative materials are available on these type of units, the following should be very helpful.

In older watches, through attempts to make the movement thinner, the lower or bottom bearing was omitted. In this manner, the mainspring barrel was almost flush with the mainplate. Removing the dial exposed the barrel cover, which often contained a Geneva stopworks (Maltese cross and index). This type was very popular about the middle of the nineteenth century, just prior to the introduction of stem winding and setting.

The barrel remained horizontal and in position by the ratchet which was an integral part of the barrel arbor. This was clamped between the barrel bridge bearing by the barrel arbor bearing. The widest part of the barrel arbor was actually a threaded ring that screwed onto the lower part of the barrel arbor. Thus the clamping action, with due tolerances, allowed easy rotation on the barrel bridge. This is shown in the exploded view of a typical unit of a lever escapement, French or Swiss ebauche. This is similar to one by Charles Cachot a'Alger that is pictured in "Montres Francaise" (Adolphe Chapiro).

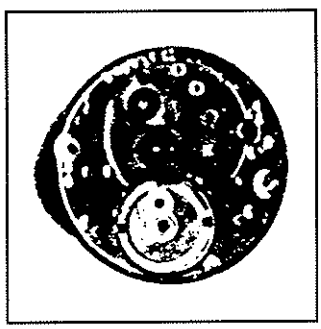


Figure 1. Dial side with stopwork missing.

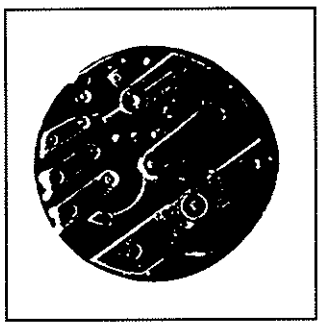


Figure 2. Movement side with key-wind bar movement, lever escapement, c-1850.

Dismantling such watches is not difficult if the following instructions are heeded. Since most watch movements with this type of barrel assembly employed the convenient cylinder escapement, it would be prudent to remove the balance and its bridge. Should it contain a lever escapement, as this model does, the pallet and bridge should follow in removal. In such movements, each wheel had its own bridge. The center wheels almost always were of the hollow center pinion and cannon pinion system. Repairs and removal of these parts are well-covered in this author's "Bench Practices for Watch and Clockmakers." Many of the old-time watchmakers did not remove the center wheel bar-bridge because most often the barrel could be removed if repairs to the barrel or mainsprings were the main object of repair.

In the model used in Figure 3, the ratchet click (F) is slotted as shown in the detailed view (J). Therefore, it is best to first dismantle the click. In these older watches screws were of different sizes and character and weren't interchangeable, so place the dismantled screws close to the parts they secured for easier and quicker reassembly. Remove the four screws and the ratchet cover (D), also keep these screws close to the parts they secure.

Next, turn the movement over to the dial side, (assuming that it has been removed first). This will reveal the barrel cover (N). The barrel cover can be removed by first removing the stopworks. Very often, some watchmaker in the past has either lost these parts or omitted them. If they are presently part of the cover unit, carefully remove these parts because there could be a strong residual action remaining in the partially wound-up mainspring. Many sets of these were lost when this latent power sent them away during their dismantling. Loosen, but don't remove, the Geneva stopworks screw so that the stop finger (K) may safely revolve under the Maltese cross with the barrel arbor to relieve the remaining strain. Then the star-wheel, Maltese cross may be removed. Remove the taper pin (L) of the stop finger and the stop finger (K).

Before removing the barrel cover, first examine it. In those early days these were key-marked, so that when as-

sembled to the barrel, the cover and barrel were perfectly matched as to their concentricity. Make a note of these markings. They are most often found on the barrel rim, and their mate-marks are on the cover. Remove the cover.

The barrel arbor and mainspring can then be examined. Note however the barrel arbor ring (G) is threaded onto the barrel arbor lower pivot shown at A, B, and M. The barrel ring (G) has its mainspring hook at (H). To remove the ratchet wheel, and thus the barrel arbor from the movement, place the points of a strong pair of tweezers, such as a Dumont #2, into the holes of this arbor and turn in a counterclockwise direction while the barrel arbor square is held in its winding key. A pinvise will also allow this part to be removed and the barrel arbor lifted out. If the click were to be left in the watch, the fact that the ratchet wheel is inside the slot of the click may damage it when the barrel arbor unit becomes loose. In models which have a hook-type of click, the click may be left assembled. If the center wheel has been left in the watch, it should be easy to remove the loose barrel.

To remove the barrel arbor, remove the four screws from the ratchet cover plate (D). But before doing so, make a note on how the plate fits the bridge. While it may appear perfectly symmetrical, the screw holes may not be so. The barrel bar-bridge may then be removed. Repairs to the mainspring and barrel, or general cleaning may then proceed.

To assemble such a unit, first replace the barrel arbor into the bearing hole of the barrel bridge (E). Lubricate the bearing surfaces, including that of the bottom bearing hole of the barrel. Then, turning the bridge over, replace and rethread the barrel ring (G). Make certain that it is secure. It is best to use a pinvise to hold the square (A) of the barrel arbor so that a tight fit may result. Lubricate the mainspring. Replace the cover so that it is keyed in relation to the barrel rim as noted earlier. Replace the ratchet cover (D), making certain that it has been aligned as previously noted. Replace its four screws. Next replace the click (F) and screw. With the watch key or pinvise, wind the mainspring only for three or four teeth of the ratchet.

Now replace the Maltese cross, lightly lubricating its bearing on the stud-hole. Replace the stop finger (K) and its tapered pin through the extending arbor hole (M) so that it will fit into the slot of the Maltese cross and allow full winding with the fifth extension of the cross positioned in order to act as the stop for which it was designed. Test for ease of action, endshakes between the ratchet and the cover, barrel horizontal, and click action, aided with a light oil on every fourth ratchet tooth.

❐

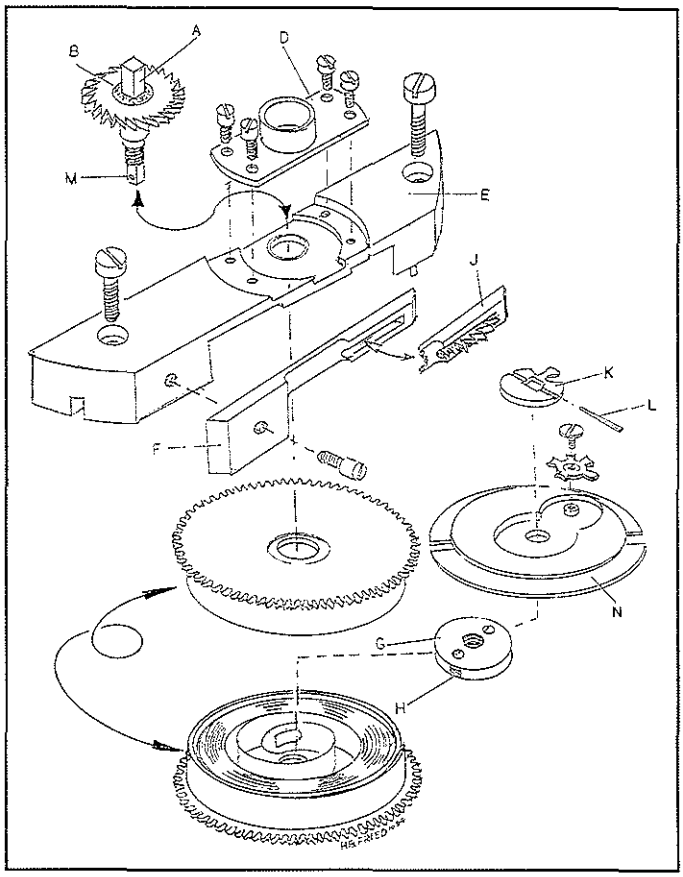


Figure 3. Hanging barrel system in mid-nineteenth century parallel-bridge movements.

Repairing Mechanical Watches & Clocks

A Complete Series of Bench Practices

Correcting the Bent Hairspring, Part VIII

By Henry B. Fried, CMW, CMC, FAWI, FBHI, ★FNAWCC

Find The Bending Point

First we must establish certain principles of procedure. When correcting in the round, the important factor was establishing the point at which the spring was bent. You will remember that this spot was generally found to be 90 degrees inward from the widest (or narrowest) spot between the coils.

When truing in the flat, the point at which the error is situated in the majority of bends is 180 degrees inward from the point of highest deviation between the two levels of the spring. Figure 52 appears as two separate springs. Figure 53 shows the same type of bend, simplified, since it is on the outermost coil. The highest spot is at A. Spiraling inward from A toward the collet 180 degrees, the bending point is found at B.

There are three types of out-of-flat bends: those with coils twisted upward suddenly; those twisted gradually; and those with a "Breguet" bend, similar to the bend in a hockey stick, in which the ribbon of wire is bent against its width.

The best method of correction depends upon the cause of the bend. Usually out-of-flat bends in the last coil are caused when the spring gets caught in a part of the movement while the balance and bridge are being removed from the watch. In such a case, the spring's coils are *pulled* out of alignment. The logical correction, then, would be to *push* them back into alignment.

Gradual Bend

The gradual bend can best be corrected by holding the spring behind the start of the bend with sturdy, pointed tweezers and pushing down on the highest outer half-turn with the index finger of the opposite hand, as in Figure 54.

If the hairspring is small, the finger method may not work too well. A pointed piece of pegwood or a needle set into a pegwood stick is often more successful to nudge the spring back into shape. This is shown in Figure 55.

Sudden Twist

The sudden twist as seen in Figure 56 can also be corrected as in Figures 54 and 55, although some watchmakers would rather correct the kink with two pairs of tweezers. Figure 57 shows how one pair grasps the spring behind the kink closest to the spiral leading to the collet, while the other grasps the spring as close to the first tweezer as possible. Twisting the second tweezer in the direction shown by the arrow removes the kink and helps to level the spring. The vertical tweezer's points should touch the bench.

Breguet Bend

Figure 58 shows a method of removing and correcting an inadvertent Breguet bend. Use a special pair of tweezers with a pin frictioned in one blade, fitting into a hole in the other blade. Grasp the hairspring at the top of the bend and rest it on a block of soft wood *across* the grain, tweezer points down. Now push down on the points into the wood. Usually this method of correction causes the spring to bend out of the round, but this is the easier of the two bends to correct.

To correct bends at the collet, use two pairs of tweezers. Grasp the coil close to the bend and push down (or up) on the opposite side. If the coil is bent at the spot where it emerges from the collet, place the collet over a tapered pin. Grasp the pin in a pinvise, and with another needle set into a pegwood stick, nudge the bend back to a level position. Remember, the closer you get to the collet, the finer the tweezer points required. You recall that bends and their correction are more critical at these central spots than on the outside coils.

Spiral Helix

Sometimes a hairspring is pulled grotesquely out of shape as in Figure 59. This spring looks hopeless. Actually it is one of the easiest to correct, but the method is always impressive to the student as he watches his master.

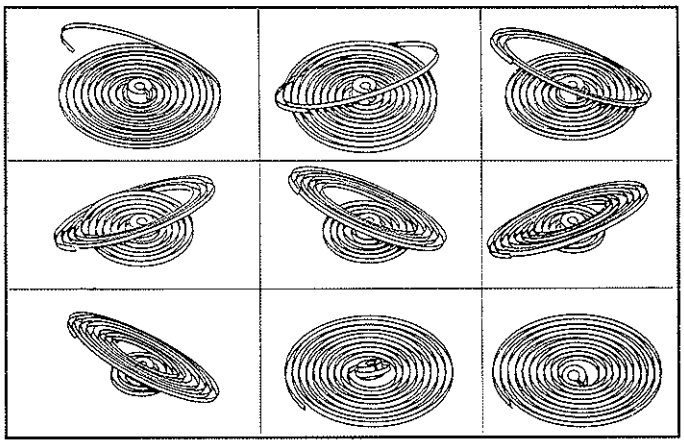


Figure 51. Just as there are exercises to develop skills in truing hairsprings bent out of round, there is a similar set of exercises to increase skills in correcting hairsprings out of flat. At first the spring is deliberately bent upward a half turn, then corrected. This chart shows only the intermediate steps. The complete exercise should show progressive bends of a half-turn until the entire spring has been manipulated. Since the student or his master purposely imposed these bends on the spring, he knows how the bend was inflicted and where it is located.

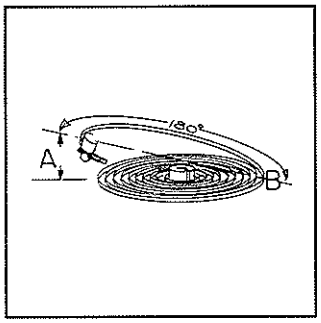


Figure 52.

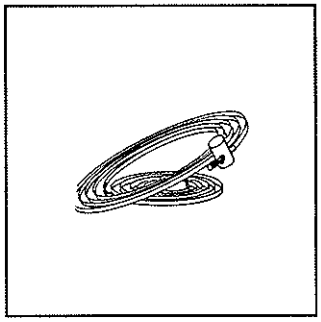


Figure 53.

Figures 52 and 53. When viewed from its edge, an out-of-flat hairspring appears to be two springs, as in Figure 52. Figure 53 shows a simplified example, with the bend on the outermost coil. The bending point is at B, exactly 180 degrees from the highest spot between coils, A.

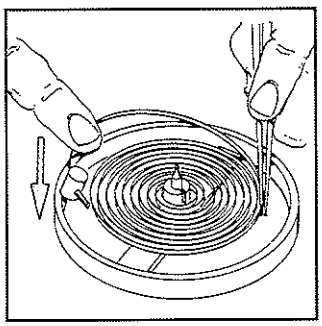


Figure 54.

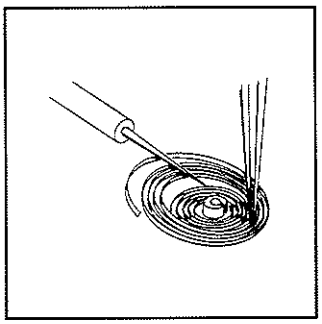


Figure 55.

Figures 54 and 55. A gradual bend can be corrected by grasping the coil with tweezers just behind the bending point and pushing down with the index finger. A needle can substitute for the finger when working with a particularly small hairspring.

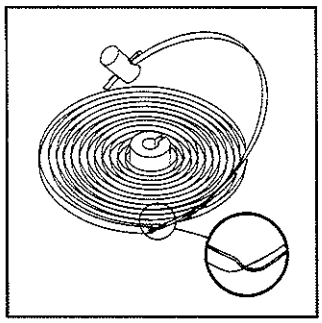


Figure 56.

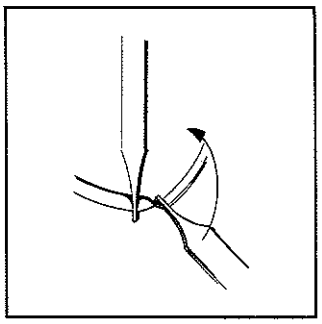


Figure 57.

Figures 56 and 57. Figure 56 shows a sudden twist in an out-of-flat hairspring. Correct it as shown in Figure 57, by twisting in the opposite direction with two pairs of tweezers.

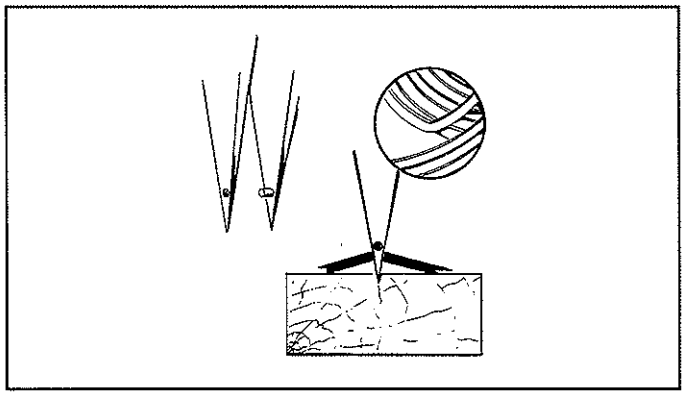


Figure 58. A Breguet bend should be handled with a special pair of tweezers fitted with a pin in one blade and a matching hole in the other, Grasp the hairspring at the top of the bend and rest it on a block of soft wood, across the grain. Gently press the tweezer points into the wood until the bend is straightened.

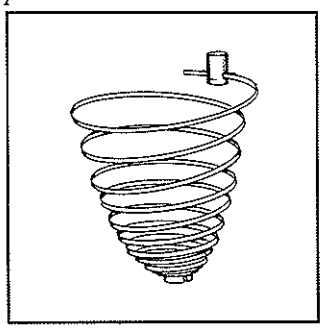


Figure 59.

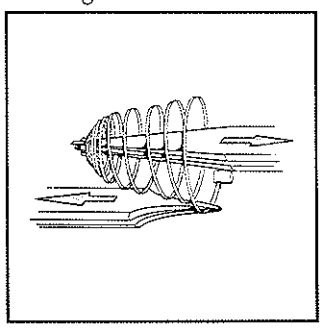


Figure 60.

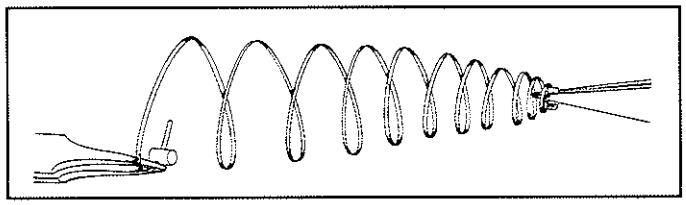


Figure 61.

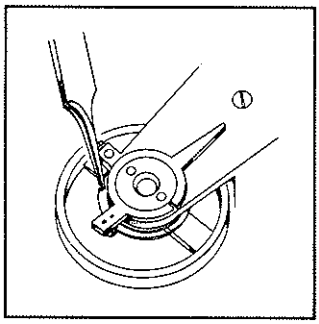
Figures 59, 60, and 61. The spring in Figure 59 has been stretched into a spiral helix. Take it from opposite directions with two pairs of tweezers as shown in Figure 60, one down through the inside of the coil, grasping the collet; the other along the outside of the coil, grasping near the stud. Pull the tweezers apart along a parallel axis until they pass each other and stretch the spring in the opposite direction, as shown in Figure 61.

Such a spring has become a spiral helix, probably because the watchmaker carelessly pulled the balance bridge out of the movement, thinking that the balance, attached to the bridge by its hairspring, would easily follow. In these rare exceptions when it doesn't, the pivot has become lodged in the clogged jewel hole. The result is a spring such as you see in Figure 59.

Remove the spring from the balance. With one pair of tweezers, grasp the collet from the stud side down through the vortex of the spring in the following manner.

Insert one blade through the center of the collet and the other blade along the outside edge of the collet between the collet wall and the first turn of the hairspring. With a second, sturdier pair of tweezers, grasp the hairspring near the stud from the direction of the bottom of the stud, as shown in Figure 60.

Now pull the two tweezers apart along a parallel axis, as illustrated in Figure 61. The pull in the opposite direction must be greater than the distance the spring has been distorted, in order to exceed the point of elasticity and restore the spring to its original condition. Of course don't overdo it! Pull the spring apart in gradual, trial distances. Should you overcorrect the level of the spring, merely reverse the process until the spring is level.



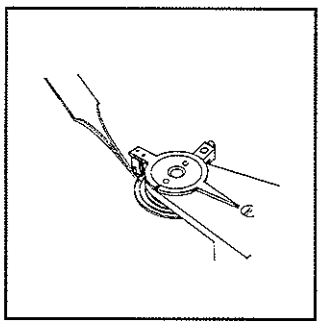


Figure 62. *Figure 63.*

Figures 62 and 63. Sometimes it is advantageous to correct the hairspring while it is still in the balance. If the bend is situated between the stud and the regulator, as in Figure 62, consider the stud as an anchor point and pinch the bend gently with tilted tweezers to bring it back to shape. If the bend is outside the regulator as in Figure 63, consider the regulator the anchor point and pinch the bend in the same manner.

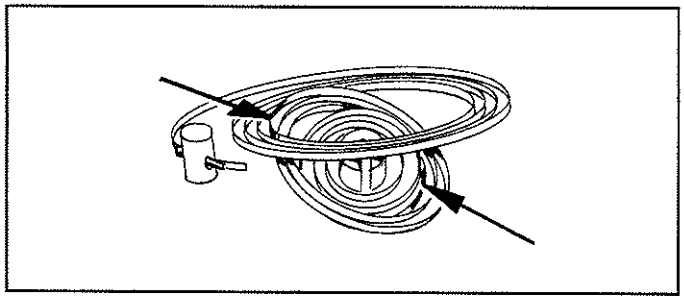


Figure 64. If a hairspring has two out-of-flat bends, treat each section of coil one at a time, working from the collet outward.

Without Removing The Hairspring

Sometimes it is preferable to correct the hairspring while it is still in the balance, especially if the bends are situated in the first one-third turn outward from the stud. This requires a slightly different procedure.

When the bend is situated between the stud and the regulator, consider the stud as an anchor point, acting as tweezers would. Pinch the hairspring near the stud with a pair of tweezers tilted in such a direction to bring the spring up or down to correct its level.

This is a particularly good method of correction when the coil diametrically opposite the stud is interfering with the overlapping center wheel or rubbing on the balance arm, as shown in Figure 62.

When the bend is situated just outside the regulator, consider the regulator as the anchor point. Pinch the spring with a tilted tweezer as shown in Figure 63.

The regulator can be shifted to act as a close tweezer to make corrections at opposite points. Merely move the regulator 180 degrees studwise from the bend. The closer the regulator is, the more effective is the correction.

Do not pinch the spring excessively between the stud and the regulator. This will only cause a secondary bend when and where the spring comes in contact with the center wheel or the bottom of the balance bridge, or when, in the opposite direction, the spring is given a secondary bend at the point where it bears on the toe of the regulator boot.

Always consider a hairspring as being in separate parts divided by the bends. If the spring has just one bend, treat it as being in two sections: one part is the main and correct part spiraling from the collet outward to the bend; the second is that with coils tilting at a different angle from the first part. Should there be two bends as in Figure 64, again treat each section separately, always using the section from the collet outward as a standard.

Proceed by correcting one section at a time. It may be more convenient to correct the outermost bend first, then work inward, but most experienced hairspring manipulators prefer working from the collet outward.

❐

Book Review

Painted Dial Clocks, by Brian Loomes, hard cover, 280 pages, 275 b/w and 44 color illustrations. Pub. 1995, distributed by Antique Collectors Club, Wappinger Falls, NY @59.50.

Brian Loomes' earlier book, *The White Dial Clock,* has been a standard reference on clocks with white or painted dials since its appearances in 1974, 1977, and 1981. All editions are now out of print.

This is a new, greatly expanded exposition of clocks with "japanned" white dials that are sometimes decorated in colors, scenery or other motifs. The book also contains many charts and tables which list dial makers, clockmakers who used them, and dates and the initial costs to the clockmaker by the dial makers.

Loomes is a respected authority, clock dealer, and restorer. His early profession as Fellow of the Society of Genealogists has provided him with a rich background for research in his fourteen previous books on clocks. His expertise is apparent throughout this informative volume about clocks whose dials are painted rather than fired, vitreous enameled, silvered, or engraved brass.

White dial clocks were made in the period from 1770 to 1870. According to Loomes, they were so popular that at the turn of this century the clocks were selling for £1 to dealers. A few decades later Loomes and other dealers paid anywhere from £3 to £5 for them. Loomes states that, "in fact research has shown that a painted dial longcase clock would have been more costly when new than a brass dial equivalent."

The terms white dial and painted dial fall under the common term, "japanning." This is a term defined in the *Random House Dictionary of the English Language* as an adjective: "any of various hard, durable black varnishes originally from Japan for coating wood, metal, and other surfaces." While this definition stresses black as the typical application, in the case of clock dials it defines the term as any durable hard lacquer surface. As a white dial, it provided a durable, hard, legible surface which often invited embellishment with pastoral scenes or other motifs.

Loomes describes such dials as iron sheet whose surfaces were first treated with successive baths of white paint. The earliest and subsequently a majority of dial makers were based in Birmingham. One of the very earliest was Osborne & Wilson, dated about 1770. Since these dial makers placed their names on the reverse side of their dials, some erroneously attribute the making of the clock to the dial maker, especially when no other clue was apparent.

At first, dial legs were riveted to the dials themselves. With some mishandling, this would result in fissures shown on the dial's reading surface. This was overcome with the introduction of a "falseplate" in which the dial legs would be refitted to a cast-iron frame which itself had standard legs that could take rougher handling and fit into the dial holes of the clock movement. Such iron frames were cast with the dial and falseplate maker's name, giving rise to the false identification referred to earlier.

Many examples are shown in photos and in drawings which clearly illustrate their application. Decorative designs and the manner of their application are pictured with good color. The American printmakers, Currier and Ives are mentioned derivatively.

There are alphabetical lists of dial makers, painters, and "japanners" with dates and the initial costs to the clockmaker. The overwhelming number were from Birmingham but others were in Liverpool, Glasgow, and Edinburgh operating from the latter part of the 18th century and some well into the 19th century. Loomes lists Alexander Johnson, a "japanner" of Edinburgh who operated until 1898, and J. S. Cooke of Birmingham from 1858 to 1888.

Each period of development until 1870 is covered with lists, makers, and dates. The text and illustrations include the chronological development as well. Some also contain the prices of movements, dials, and complete clocks during those periods.

American clocks are covered in ten pages of text and good photographs. For example, one clock was made by Silas Hoadley with wooden movement and dials. Loomes states that probably 75 percent of painted dials on American clocks came from Great Britain. Loomes quotes the American, Penrose Hoopes in this respect. By 1815, American-made dials were predominant. American-made wooden dials began to appear about 1815.

Final chapters are: "Is it Genuine?", "Handling and Research", "Longcase Dial Features." Also offered are some practical movement hints. "Researching A Clockmaker" is a bibliography of British regional makers and contains a fine chart of longcase clock features and six columns of index. The book is of high-quality paper, binding, illustrations, and color. For those interested in British clocks or the decorative, restorative art in dials, this new volume is a valuable addition to authoritative information.

Henry B. Fried

A Practical Course In Clock Repair

Safety in Clock Repair, Unit I

By J. P. Kenyon, CMC

For many years AWI has offered a Practical Correspondence Course of Instruction in Clockmaking. Many students have completed the course over the years and become very competent clock repairers. To some it offered a new career or a second career. Many students became certified and now operate their own successful business.

Now we are fortunate to have a qualified craftsman/educator, John P. "Jack" Kenyon, to update the lessons presently being used in the course. They will be serialized for the information of all *HT* readers. Since his retirement as a professor from Ohio State University, Kenyon has advanced his hobby of collecting and restoring unusual and valuable timepieces. He is an AWI Certified Master Clockmaker, and has developed and taught short courses in advanced clock repair for AWI. Most recently he has been authoring the bi-monthly series "Apprentice Clockmaker" for *Horological Times*.

The lessons will be developed in units. The first, Unit I, will deal with basics. Successive units will become progressively more advanced. Much of the text will be a reorganization of our present correspondence course. When a sufficient number of units have been rewritten, they will form the nucleus of our home study program. When the clock repair lessons have been completed, we will concentrate on watch repair. *AWI staff*

Safety in Clock Repair

Safety is defined as freedom from danger or hazard. In clock repair, it means proper utilization of hand tools and power equipment, and using eye protection and other defending devices when and where appropriate. It also means using common sense and being constantly aware of dangerous situations that might occur.

Eye Care

Eye care is of primary concern to the clockmaker. Inappropriate lighting and/or improper magnification can lead to impaired vision quickly.

Lighting

Good lighting at the work site is a necessity for healthy eyes. Natural daylight is an excellent source, but very difficult to harness inside the shop. A suitable alternative comes from either fluorescent or incandescent lighting located directly above the work area.

There are several kinds of bench lamps available to the clockmaker. For those who prefer fluorescent lighting, supply houses sell a standard two-bulb (15 watts each) fluorescent bench lamp. This style provides a uniform, cool light over a large work area. If incandescent light is preferred, a 40- or 60-watt soft white bulb is suitable, but it should be kept in mind that heat will be generated on the work area by this type of bulb. Also, there are combination lamps available with both florescent and incandescent bulbs that can be lit separately or together. Another type of bench lamp has a 5" or 6" diameter magnifier lens with a 12"-15" focus that allows constant magnification under adequate light.

Lamps should be clamped to the side of the bench to conserve valuable working surface that would be required for a base. The lamp arm should have counterbalanced spring action so that it can be moved to various positions or held stationary. Most bench lamps have the interior of the shade enameled white, and some have diffusers fitted into the shade to cut down on glare.

Magnification

Most clockmakers use a binocular for magnification. These can be found in the clock supply catalogs. You should not try to skimp here. Select one of good quality that has ground and polished optical lenses. They can be worn over eyeglasses, and are pivoted so that they can be tilted above the head when not in use. There are a variety of lens powers available. Most clockmakers use the one with an 8" working distance and 2 1/2 times magnification; also, there is an attachable auxil-

iary lens (loupe) available which adds 2 1/2 times magnification for fine work. Some manufacturers offer replacement lens plates and other parts for certain models.

If an eye loupe is preferred, there are several types available for consideration. A single-lens loupe with a 2 1/2" focus and 4-power magnification is satisfactory for most clock work, although some clockmakers prefer a 10-power loupe when checking for pivot wear.

Eye loupes can be set in front of either eye. To fit one, carefully push downward on the loupe to force the fleshy portion of the skin under the eye to the cheekbone, then tilt the top part of the loupe slightly toward the eye socket and let up on the downward pressure, until the skin holds the loupe in place. This takes a little practice. For those who are unable to hold a loupe this way, a style is designed to be held in place by a metal band that wraps around the back of the head.

Single- and double-lens spectacle loupes are available for those who wear prescription glasses. These are designed to clamp onto the eyeglass frame and can be swung out of the way when not in use. To help prevent eye fatigue, always keep both eyes open when using any kind of magnification.

Workbench

The standard watchmaker's bench has desirable features such as a catch-all tray and drawer space, but not enough elbowroom for clock work. The top surface needs to be approximately 60" wide and 30" deep. The bench height should be about 40" or high enough to be able to stand in comfort while working, since many tasks are carried out from a standing position. The bench should have a low-gloss finish to cut down on glare and should be attached to the floor so that it is sturdy enough to prevent wobbling.

A bench chair of adjustable height, with a full-sized adjustable cushioned seat and back, should be used to encourage proper posture and to minimize bench fatigue. It is helpful to have a foot rest, either on the chair itself or attached to the bench. The chair should be equipped with smooth rolling casters.

Hand Tool and Power Equipment Safety

It is important that tools and equipment are kept in good condition for successful clock repairing. To try to do good work with poor tools and equipment is a waste of time and effort. Proper use and care of tools and equipment will keep them in good condition for many years and contribute to a safe work environment.

Hand Tools

Many of the hand tools used in a clock shop are common to other trades, while some are specifically designed for clock repair. There is an abundance of lit-

erature available concerning the safe use and proper care of ordinary hand tools (pliers, screwdrivers, hammers, etc.). Safe use and proper care of specialty tools will be discussed later in this series, as we introduce some of the specific work associated with these tools.

A basic component of skillful clock repair is an adequate and complete set of tools, with knowledge of their use; but, good tools do not necessarily make a good mechanic. Skill, another ingredient, needs to be nurtured by hands-on experience. There is an old cliché: a craftsman is no better than his tools. In other words, a good craftsman with poor tools will turn out work that is below his potential. This is not to imply that a poor craftsman with good tools will turn out good work, but it does mean that a combination of ability and tools determines workmanship. For this reason, it is important to have a set of good quality tools dedicated only to clock repair. If you acquire decent tools, they will last for many years and you can be confident that safety and work quality will not be compromised because of them. It is not necessary to purchase a complete set of tools in the beginning. A few essentials will get you started; then, you can add more as you need them. Some tools designed for specific tasks can even be fabricated in your shop.

The ordinary tools used for clock repair can be purchased at a hardware store, but some of the more specialized tools must be ordered from the catalogs of suppliers. It's a good idea to peruse these catalogs as they come in, to see what is available. Special tools have been designed for some repairs that will pay for themselves quickly in time saved.

Power Equipment

Lathes, drill presses, grinders, cleaning machines and other power-driven equipment need periodic attention and maintenance. This includes frequent cleaning, oiling, and periodic inspection for wear. Bearings, fittings, attachments, and machine accessories also require frequent inspection and maintenance. When power equipment is substituted to do a grade of work for which it is not intended, a safety hazard is immediately uncovered. This becomes a "loose cannon" in the hands of the operator.

Safe Storage of Tools and Equipment

Safety in the shop includes the complete knowledge of how and for what purpose each tool is intended, and a full understanding of proper tool maintenance.

Hand tools and power equipment must be protected from rust. Moisture from excess room humidity, sweaty hands and cleaning solutions cannot be avoided, but can be controlled by wiping tools with a paper towel after use and by placing them in a tool box or drawer containing camphor gum. Emery paper can be used to remove rust, if it develops, followed by a wiping with a very thin coating of light oil.

Edged and cutting tools such as gravers, drills, files, broaches, taps, and screwplates should be inspected prior to each use. A poorly sharpened or edged tool will result in poor work and will be a safety hazard.

Always store tools in the same location on the bench or in drawers to prevent damage by other tools and equipment. This will also save time and eliminate the frustration of searching for tools.

Chemicals

You should never use gasoline, kerosene, benzene, or similar solvents. They are highly flammable, explosive, and hazardous to inhale. Also, they do not clean clock parts nearly as well as products specifically formulated for that purpose.

The cleaning machine, rinse tank and dryer should be located on a table near a sink, in a well-ventilated area. To prevent deterioration, all chemicals should be returned to their original labeled containers, and stored in a locked, approved metal fireproof cabinet. You should keep in mind that some of the chemicals used for cleaning and rinsing clock movements are combustible, corrosive and toxic to inhale. Always read the label and comply with the manufacturer's instructions and precautions to the letter, before using and/or disposing of any chemical.

Ten Rules of Safety

1. Always use the right tool for the job.
2. Be sure to observe safety precautions when using hand or power tools.
3. Be especially careful about wearing neckties and loose clothing around machinery.
4. Keep your mind on your work and avoid distractions.
5. Use eye protection, when necessary.
6. Be sure that belt and machine guards are always in place.
7. Use good sound judgment.
8. Always do everything possible to prevent accidents and to avoid injury.
9. Use good ventilation when working with chemicals.
10. Make "dang" sure you memorize the first nine rules! Safety is *your* responsibility, so make it one of your work habits.

❐

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

The series of "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 tapes by number along with your name, address, and $5.00 service charge. Send to: **AWI Audio Visual Library, 701 Enterprise Dr., Harrison, OH 45030.**

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.

The Novice Watchmaker

Specialized Tools

By David A. Christianson, CMW, FBHI

As we've been looking at band and case repair techniques, we've been using the very basic tools that the new watch repairer would have at his disposal. Specialized tools dedicated to a specific task are a luxury for the novice. However, it is well worth noting these tools for future reference. If you find yourself doing a lot of one kind of task, it might be worth it to consider purchasing a specialized tool for that specific repair task, because the tool will definitely speed up your work in that area. But if, for example, you have only fitted two notched leather bands in the past six months, don't buy a leather notching tool (see Figure 1). Instead you should continue relying on your

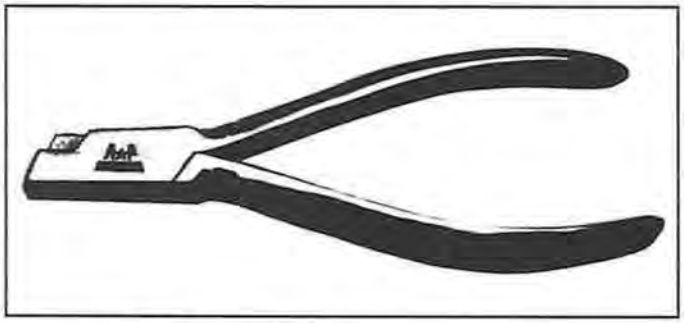


Figure 1. Leather notching pliers.

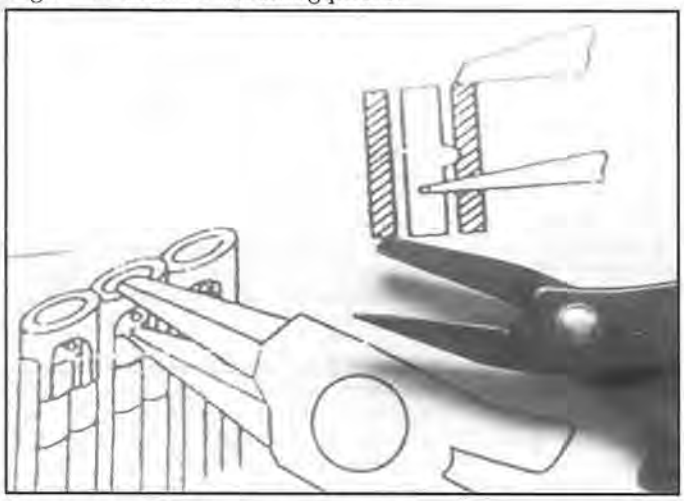


Figure 2. Euro Tool #PLR 136.00 for removing watchband clips.

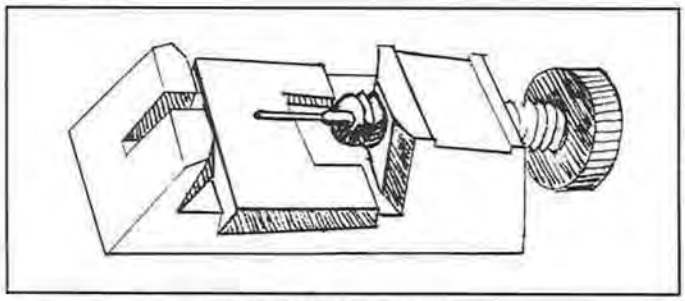


Figure 3. Euro Tool #HOL 118.00 link pin remover.

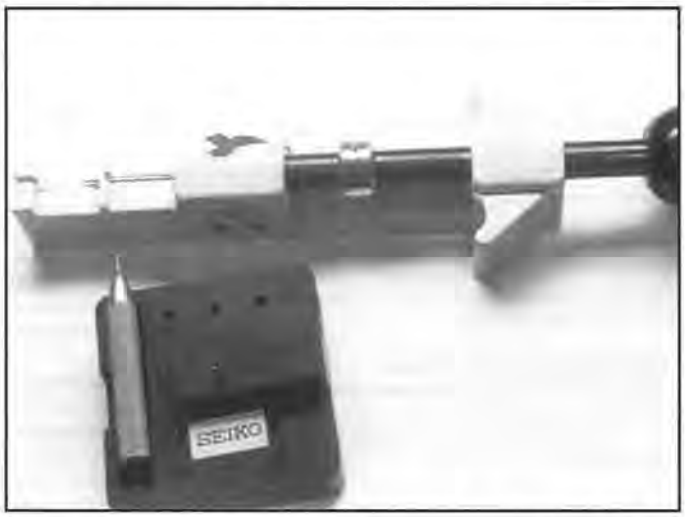


Figure 4. Two link pin removing tools, one from Citizen Watch Company (top) and one from Seiko.

Figure 5. A pair of large nippers used to cut mesh watch bands to length (top) along with a pair of compound leverage clippers designed specifically for this task.

Exacto™ knife as we did in the March 1995 issue of the *Horological Times*.

Let's look at a few of the specialized tools that relate directly to case and band repair. In the November 1994 "Novice Watchmaker" article, we looked at adjusting link watch bands using a pair of chain nose pliers and, in extreme cases, a screwdriver blade. A tool specifically designed for the removal of the clips in link watch bands is available from Euro Tool of Lenexa, Kansas. This tool, Euro Tool #PLR 136.00, provides a safe and efficient means for removing these link clips. The illustration, Figure 2, is provided by Euro Tool's president, Mr. Herman Kirkpatrick.

Where we used our staking tool to remove link pins in the December 1994 segment of the "Novice Watchmaker," several other specialized tools have been designed specifically to perform this task. Euro Tool distributes their product #HOL 118.00 (see Figure 3). Many of the watch companies also provide a variety of tools to help us remove these bracelet link pins. Figure 4 shows two: a Citizen version and a Seiko version.

Most of these link-pin tools were designed for sales people and are inexpensively produced so that the watch distributor can provide them to their customers at either no cost or for a nominal fee. There are numerous designs. The two mentioned are just divergent examples. Of the many that I've tried, the staking tool and punch of our December article seems to work the best.

Mesh bands can be cut with a separating disc in either a flexible shaft machine or in a Dremel™-type tool. They can also be cut with a pair of large nippers. The nippers shown in Figure 5 were designed for trimming horses' hooves and are available from almost any hardware store. Figure 5 also shows a pair of nippers designed specifically for cutting mesh watch bands using a compounded leverage action. Figure 6 shows another, less expensive version of a band cutter. If you're adjusting a lot of mesh bands, the compound nippers might be a good investment. If the number you do is less than one a week, you might

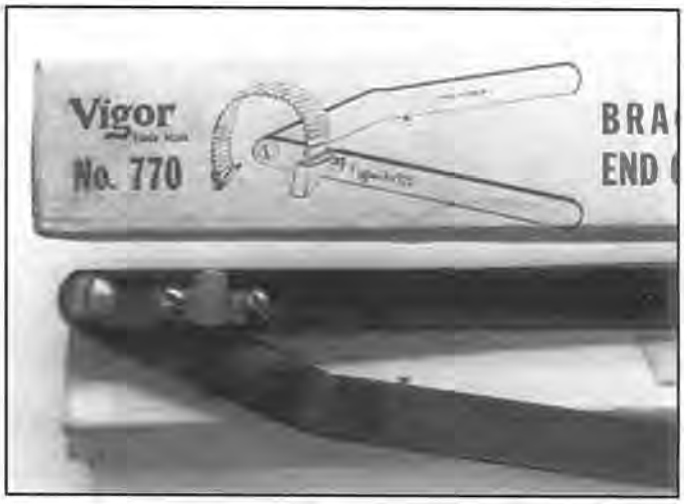


Figure 6. A bracelet end cutter designed to trim the end of watchbands so that they will fit properly between the lugs.

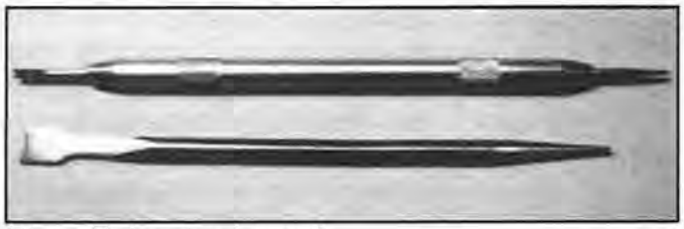


Figure 7. A spring-bar tool.

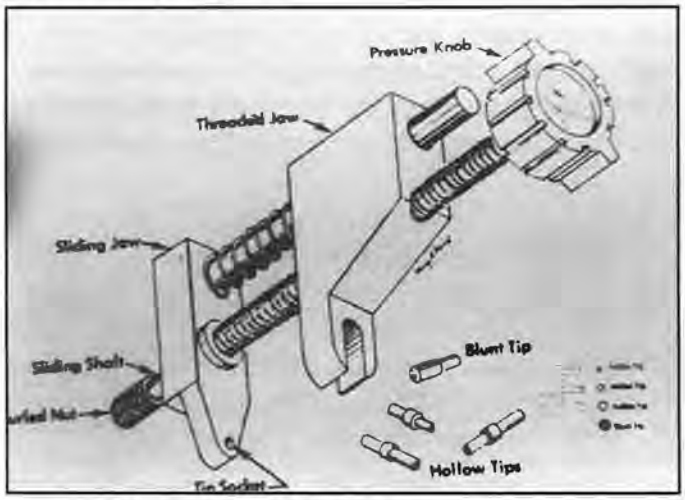


Figure 8. Zantech-Fried Watch Button Press.

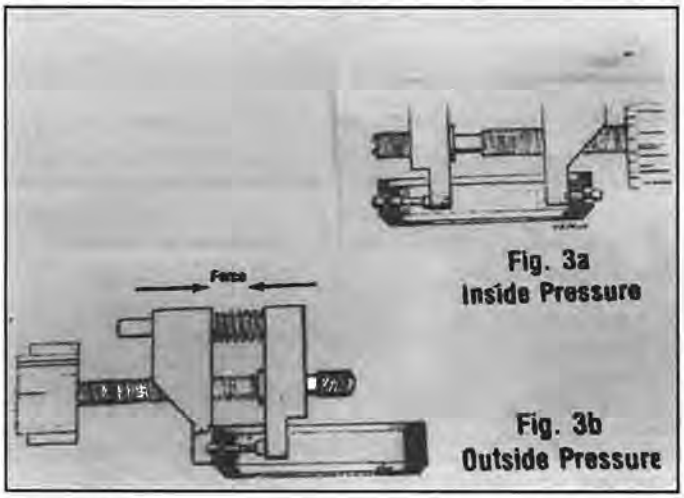


Figure 9. The Zantech-Fried Button Press used to insert and remove a case tube.

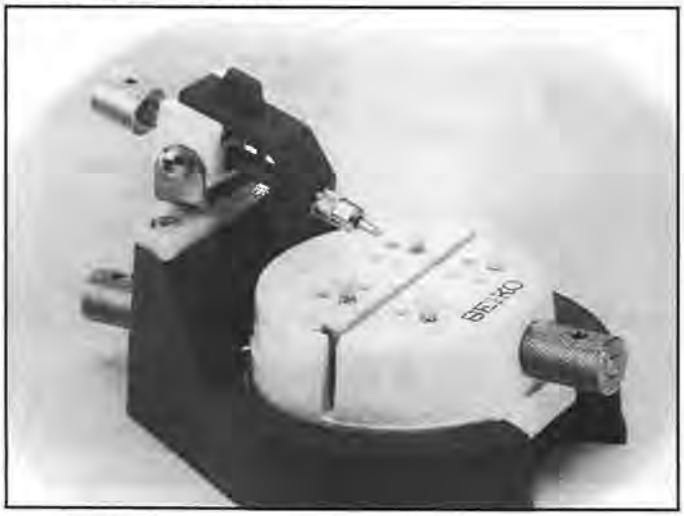


Figure 10. The Seiko Easy-Snap Caseback Opener.

consider the large nippers from the hardware store or your Dremel™ tool or flex-shaft.

The spring bar tool in Figure 7 is another example of a specialized tool. It's not expensive by any means and is quite suitable to the task at hand. However, I've found that a thin-blade knife and, on occasion, a screwdriver blade to be just as suitable and useful.

When it comes to the watch case itself, two tools designed for a specific task come to mind: the Zantech-Fried Watch Button Press (Model #440) and the Seiko Easy-Snap Caseback Opener.

Figure 8 shows a line drawing of the Zantech-Fried Watch Button Press. Although designed to remove and replace command buttons for digital watches, the tool is uniquely suitable for the removal and replacement of case tubes as well.

In our April 1995 "Novice Watchmaker" article, we saw a method of removing case tubes using a cutting broach and a pair of pliers, and a method of replacing a case tube with a pair of pliers. Figure 9 shows a line drawing representing the Zantech-Fried tool installing a case tube—certainly a safe and controlled method of doing the job.

The May and June issues of the *Horological Times* included articles on various case backs and their removal and replacement. Scott Chou and the Seiko Time Corporation developed an all-inclusive tool for the safe and efficient removal of case backs. Figure 10 pictures this unique tool. This tool is an example of another specialty tool designed especially for a specific task.

Summary

Our premise, when we started this series, was to address the novice watchmaker and give hints and help in using the tools and skills that he would bring with him from his formal schooling. We assume that the novice won't have money for specialized tools, so he must rely on the ones he brings from school along with any of those his employer might happen to have. We want to help the novice watchmaker build on his newly developed skills using the tools he started with so that he quickly can become useful and productive for his new employer. As the novice's skills and speed improve and he can judge which specialized tools might help increase his productivity, then he would be wise to purchase them.

Keep in mind that there are many tools out there to buy. Some are extremely useful, some are so shoddily made as to be nearly useless, and some are well made and useful to the task, yet may be seldom, if ever, used. Take time to consider and analyze the need and usefulness of any specialized tool before you purchase it. If you find you may need it infrequently and have an alternative method of doing your task, save your money for tools and supplies you do need. ❐

Affiliate Chapter Column

Affiliate Chapter Annual Meeting

By Jack Kurdzionak

I must first express my thanks to all of you for choosing me to be the Affiliate Chapter Chairman for the coming year. It is an honor to be chosen for this position and I will make every effort to continue to earn this honor.

Please allow me to tell you a bit about myself. I have had two careers, The first was that of high school science teacher for fifteen years, and the second has been that of a watchmaker-clockmaker for twenty-five years. For the past fifteen years, I have worked in our profession on a full-time basis operating a retail watch and clock repair shop with my wife and son in our hometown, just outside of Boston. In addition, we offer evening classes in watch and clock repair at our shop. I have been a member of my state affiliate chapter, the Massachusetts Watchmakers Association, for twenty-five years and currently serve as its newsletter editor.

Now that you know a little bit about me, I really would like to know a little about you. Of course, I don't expect to hear from every reader of this column, but I would be pleasantly surprised if I did. The purpose of this column is not only to keep you informed of the Affiliate Chapter activities but to provide you with ideas and help for your own chapter. During the annual AWI meeting, the delegates and directors meet a small number of our members but there are thousands more who are unable to attend. Unfortunately, many of these are not affiliate chapter members and do not have their views expressed unless they attend the annual meeting or communicate their concerns to AWI directly.

This column is one way for AWI to communicate with you and you with AWI. We know that there is a wide range of professions and businesses represented by the AWI membership. During the next year, send a note or a letter telling me a little about you, your affiliate chapter, your interests in horology, and how the Affiliate Chapters can help you or your chapter. It will be a place to express concerns and exchange ideas of importance to the Affiliate Chapters.

Membership, membership, and membership are probably the most frequent topics discussed by chapter members when they get together. Many chapters once had larger memberships than they do now and some chapters have even disbanded. Remaining members often comment about the good old days when potential members were found in every jewelry store or nearly every watch material supply house. They try, but they just can't get new members to join their local chapter. It is time to recognize that times have changed and will continue to change. We were accustomed to great numbers of World War II vets, trained under the GI Bill, entering our profession and then joining our local chapters. Our membership grew with this influx of new people entering the profession. These veterans reached retirement age and left the profession in great numbers in the recent past. The watch and clock industry did not remain static during the past forty years. The manufacturers designed and built timepieces which require less maintenance, are more rugged, and are less expensive than those built in past years. While the number of horologists declined, the number of them required by the industry has also declined.

We cannot change this, we must accommodate these changes. We will be here now and in the future. We will not be doing the same work our members did fifty years ago, but we will be servicing timepieces. Watches and clocks are not going away, there are more of them in every household than ever before. Many of these will require service of some kind. We have to recognize that the industry has changed and will continue to change whether we like the changes or not.

Our local chapters will change as the industry changes. Yes, they may be smaller than they once were, but they will be there. The watch and clock makers of today must provide their own networking structure and the local chapter is a good place to begin. AWI provides a national framework, but the local chapter is the foundation of that structure. Watch and clock manufacturers once provided technical information and some training to repair people, but this is now history. We now have to provide for ourselves. Again, the local chapter is the place where it begins with good meetings and educational programs. The officers of the local chapter should explain the local chapter benefits to anyone who demonstrates an interest in the horological professions. There are potential new chapter members in your area and you have to find them. We just can't continue

Continued on page 36.

Sagacious Advice, Continued from page 2.

Salesmen in any business are a necessary evil. The best way to deal with them is to answer all of their questions with an unexpected reply. Their sales pitch is the same in any business, only the products are different. Salesmen will try any kind of ploy to get an order. I was told that they needed a percentage of the order for me to show the company my good faith. My statement always was, "I am giving you my money to show you my good faith, now what are you going to do for me to show me your good faith?" If they wanted the business, no down payment was necessary, otherwise cancel the order. I canceled many a four- or five-figure order.

I have found that people will beat you for pennies if they can. One day while a woman was waiting for a prescription she asked my supervisor, "How much is this toothbrush?" He quoted her a price and she said, "Ah ha, I just beat you for a dime." Meanwhile, while filling her prescription and hearing this, her prescription went up $.50. The moral of this is, don't try to beat a man at his own game.

Everybody should have to operate a retail business for two years out of their lives. We would live in a different world.

As to business school, it is great in theory, but everything doesn't go by theory. You need hands-on experience to deal with the eccentric public. ❐

Management, Continued from page 7.

It is hoped that this series of articles have been of some help to you. Managing a business, whether large or small, will give you a certain amount of satisfaction plus a large helping of excitement. You'll have to make many decisions. That's part of the game, but right or wrong, the main thing is to make them.

In closing this series, I would like to leave you with a quote from President Theodore Roosevelt: "Far better it is to dare mighty things, to win glorious triumphs, even though checkered by failure, than to rank with those poor spirits who neither enjoy much nor suffer much, because they live in the gray twilight that knows not victory nor defeat." ❐

Affiliate Chapter Column, Continued from page 36.

to ask World War II vets to join us, they have already done their share. There are people in every area of the country who are fascinated by our profession but just don't know about us or AWI. Many good members can be recruited amongst people who practice horology as an avocation. As an example, NAWCC has quite a few members around the nation. Many of our members belong to that group, why not invite some of them to join ours? It is not a bad combination.

The so called good old days are gone. We have to recognize that and get on with the business of earning a living, pursuing an avocation, and strengthening our chapters so that they will provide for us the services we need.❐

Association News

INDIANA

The Indianapolis Horological Association held their monthly meeting on July 19 at the Heritage House in Indianapolis, Indiana. "Servicing Tips on the Rolex Watch" was presented by Ray Vance of Lawrence, Indiana, and Rudy Hoellein of Indianapolis, Indiana. The program featured a narrated slide presentation followed by an interesting round-table discussion on the dos and don'ts regarding this high-grade classic.

MINNESOTA

The Minnesota Clockmaker's Guild (MCG) gathered on August 3 at St. Paul Technical College for a program presented by Douglas Bateman. Accuracy of pendulums and the many factors that influence them was the topic of discussion.

At press time, plans were being finalized for the second annual MCG Horological Symposium to be held October 21 at the Yankee Square Inn in Eagan, Minnesota. For more information contact Jim Winkels at (612)825-0209.

MISSOURI

The Metro-St. Louis Watchmakers Association met on June 1 for their regular monthly meeting. The new meeting place for the association is the Prairie Commons Branch of the St. Louis County Public Library.

Discussions included changing the name of the association to include clockmakers and the possibility of a group tower clock restoration project.

Steven Conover's video *Repairing American 8-Day Striking Clocks* was shown. This viewing generated an exchange of tips and hints from the members.

For more information on the association's monthly meetings, contact Gene Bertram at (314)822-2150.

NEW YORK

The American Watchmakers-Clockmakers Institute sponsors an ongoing battery recycling program. It encourages competition among its chapters to collect exhausted batteries. These are sold and the proceeds are used to finance the training of needy students.

This year the Horological Society of New York (HSNY) again won first in its division which was comprised of the following states: California, Florida, Illinois, Michigan, Ohio, New York, Pennsylvania, and Texas. A breakdown of the collection results: grand total nationwide - 601 pounds; total for our division - 229 pounds; total for HSNY - 63 1/2 pounds. ❐

Technically Watches

Antique Watch Restoration, Part CXVIII

Colleting Hairsprings

By Archie B. Perkins, CMW, FNAWCC, MBHI

When colleting hairsprings, the watchmaker should have a good understanding of the design of a hairspring collet. Figure 1 is used to show the general design of the top and bottom of a hairspring collet. View A shows the top of a collet. The top of a collet is usually finished better than the bottom side. This is mainly for the sake of appearance. The top is usually flat or beveled slightly toward the center hole. The outside corner of the top is beveled slightly. Sometimes the corner of the hole is also beveled slightly, as shown, but not always.

View B, Figure 1 shows the bottom side of the hairspring collet. The outside corner of the bottom is usually beveled more than the top corner. This is to allow a tool to be more easily inserted between the balance arm and the bottom of the collet for removing the collet. The bevel that extends into the hole on the bottom of the collet is usually very steep into the hole. The purpose of this bevel is to allow the collet to start easily onto the shoulder of the balance staff.

Figure 2 shows the relationship between the slot in the collet and the cross hole into which the end of the hairspring is pinned. View A shows a collet in which the slot has been sawed parallel to the cross hole in the collet. This is considered a good collet design. View B, Figure 2 shows a collet that has the slot sawed at a 90° angle to the cross hole. This design has undesirable features. The cross hole goes through the flex point of the collet. When removing the collet with a wedge-shaped tool in the slot of the collet, the pinning of the spring in the cross hole is likely to be disturbed. Also, if the collet is thin and delicate with a large cross hole, the collet will break or become fatigued at the cross hole during removal.

A third style of hairspring collet is one which has the slot sawed at a 45° angle to the cross hole. This is a compromise between the two other styles of collets.

Figure 3 shows two different hairspring collets. The collet that is shown in View A has the cross for the hairspring drilled near the top of the collet. This collet is used for a flat hairspring. The cross hole location more nearly divides the space between the balance wheel arm and the under side of the balance cock. Note: Sometimes the cross hole is drilled in the center of the height of the collet for a flat hairspring.

The collet shown in View B, Figure 3 has the cross hole drilled near the bottom of the collet. This collet is used for an overcoiled hairspring. The low cross hole position allows space for the overcoil between the body of the hairspring and the under side of the balance cock.

Making a Hairspring Collet

When colleting a hairspring, it is best to use the old original hairspring collet whenever possible. If the original collet is damaged, then a new genuine collet should be bought to be used if obtainable. If a new collet is needed and cannot be obtained, one should be made.

Figure 4 shows the first steps in making a new hairspring collet. The new collet is made from hard brass turning rod. The diameter of the rod should be large enough to allow for stability when drilling the cross hole and sawing the slot. The rod is chucked true in the lathe headstock. Then, the rod is turned down in diameter at its end so it is slightly larger than the finished collet is to be. Next, a center is made in the end of the rod for drilling the center hole. Then, the center hole is drilled slightly smaller than the shoulder on the balance staff where the collet will be used. After this, the end of the rod is shaped for the top of the collet. This consists of facing the end of the rod and beveling the corner. Next, the length of the collet is determined, and a parting tool is used to cut a groove to lay off the collet length.

After this, the cross hole is drilled for the hairspring. When this is done, the drill is used in the milling attachment set on top of the slide rest. The spindle of the attachment is set in a vertical position. The drill is chucked true in the spindle of the milling attachment. A 360° index plate is used on the spindle of the lathe so the spindle can be indexed a degree at a time. After this, the point of the drill is centered with the lathe center and located at the proper place on the collet for starting the cross hole. The hole is drilled straight toward the center of the collet to a depth that is just deep enough to hold the drill point in position for drilling the cross hole after the collet has been repositioned for drilling the cross hole.

Figure 5 shows the collet after it has been indexed into position for drilling the cross hole. The collet is indexed 40° counterclockwise to position it for drilling the cross hole. The drill has also been moved over into position for drilling the cross hole. After the cross hole has been drilled, a graver is used to turn the collet to size and smooth up its outside surface. This will also remove burrs created when the cross hole was drilled. Next, the slot is sawed.

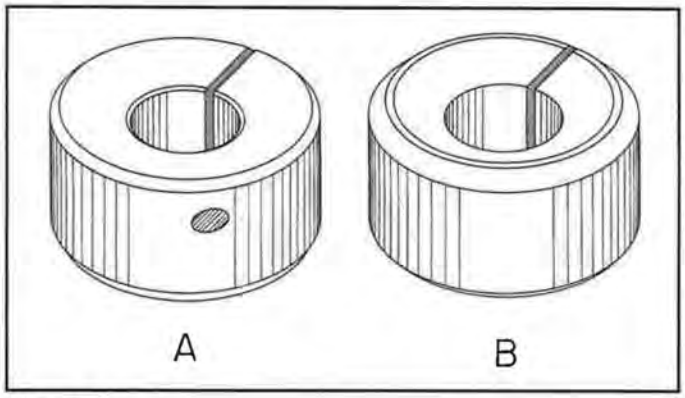


Figure 1.

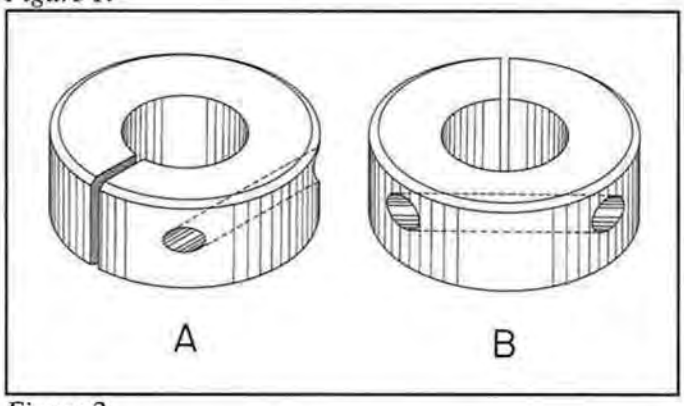


Figure 2.

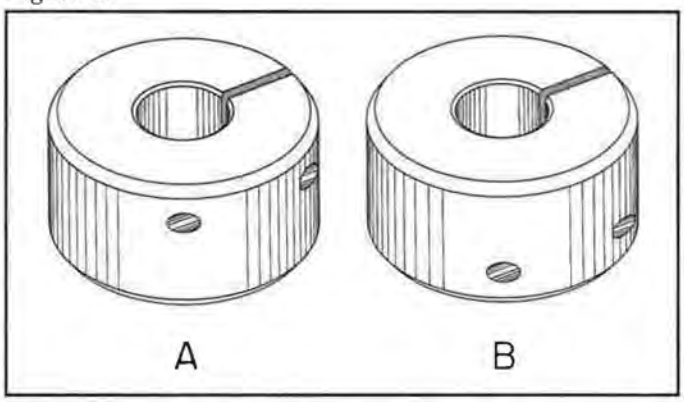


Figure 3.

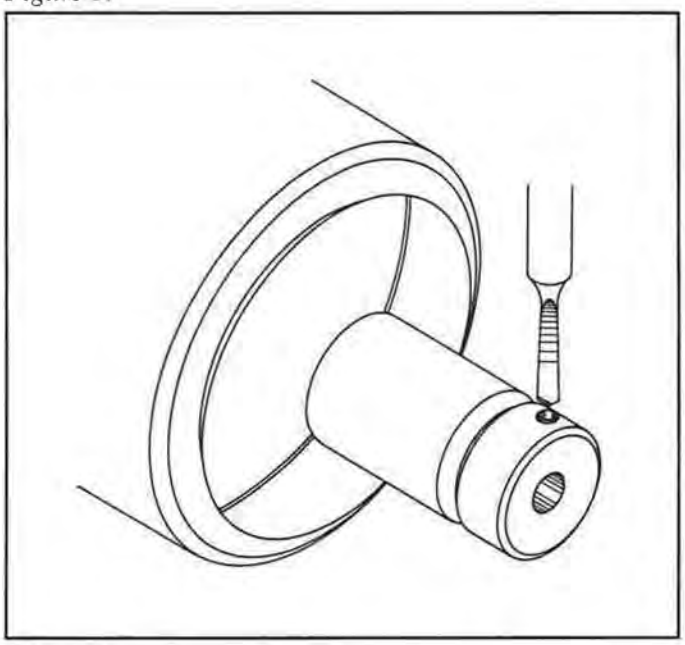


Figure 4.

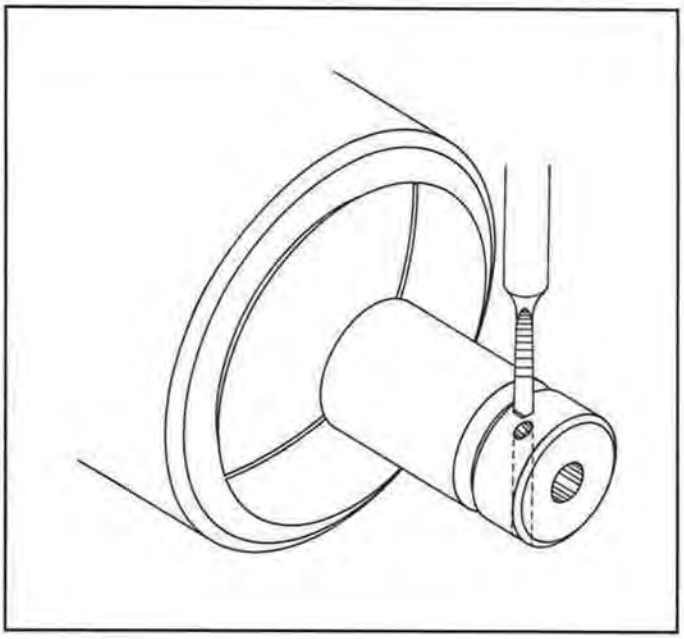


Figure 5.

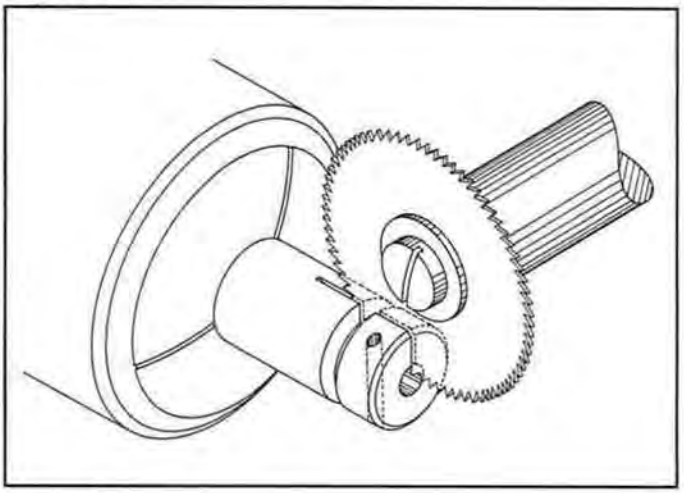


Figure 6.

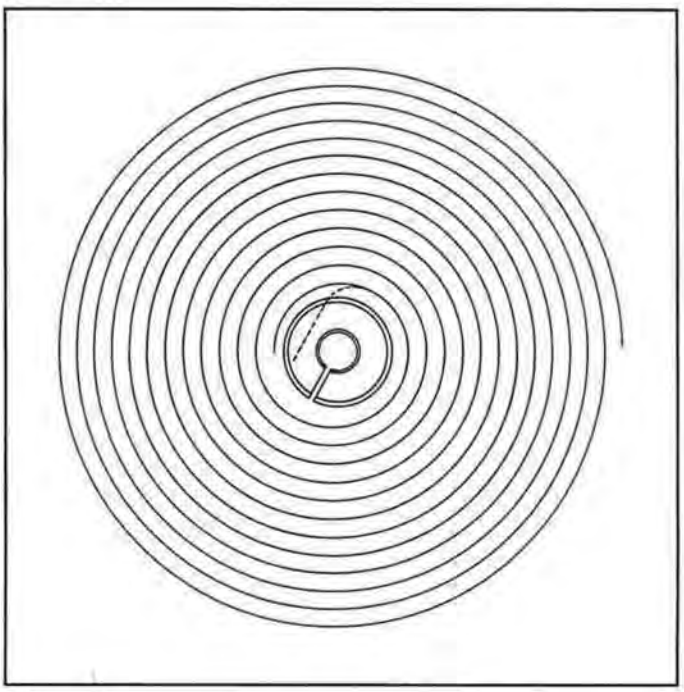


Figure 7.

Sawing the Slot in the Collet

Figure 6 shows the slot being sawed in the collet. To saw the slot, the milling attachment is used with its spindle set in a horizontal position. The saw is held on an arbor chuck and fastened in the spindle of the milling attachment. The edge of the saw is centered with the lathe center. The thickness of the saw should equal approximately one-fifteenth of the hairspring collet diameter (diameter of collet divided by 15). After the slot has been sawed, the collet is cut off of the rod with a cut-off tool or jewelers saw. Next, the collet is chucked in a wire chuck or a step chuck while the bottom of the collet is shaped and finished. If collets are being mass produced, they could be frictioned onto a post in the end of a rod for sawing the slot after the cross hole is drilled.

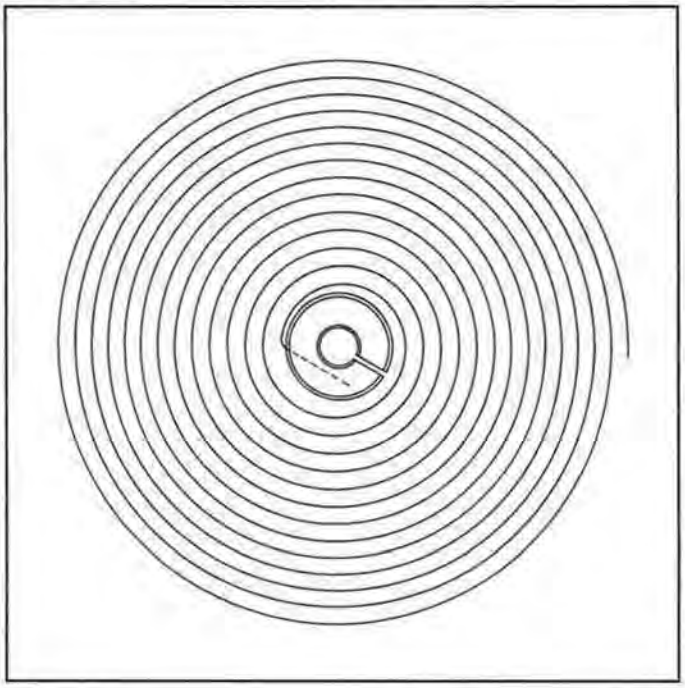


Figure 8.

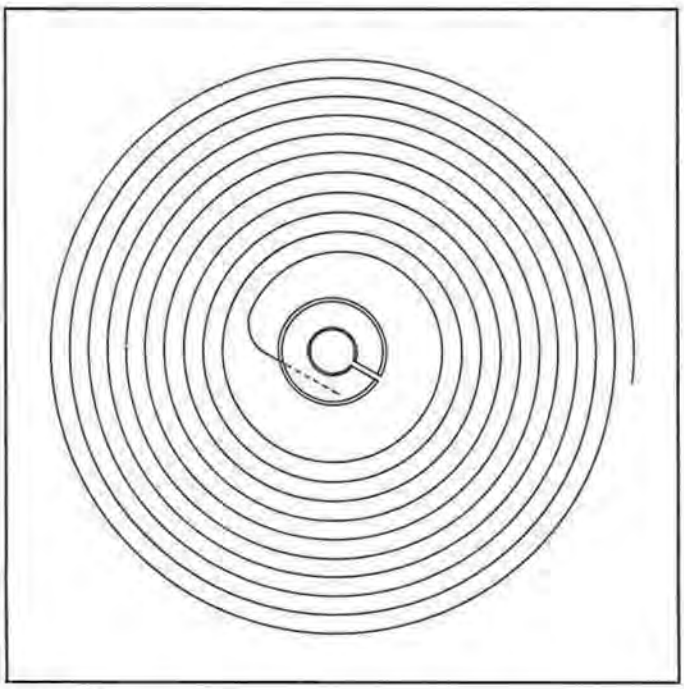


Figure 9.

Breaking out the Center of the Spring for the Collet

When colleting a hairspring, there is almost always the need to break out some of the center of the hairspring to fit the collet. Figure 7 shows a hairspring that has had the proper amount of hairspring broken away to fit the collet. With the collet centered in the spiral, the spring should be broken off at a point where there will be about half of a normal space between the end of the spring and the edge of the collet. The bend to form the tongue of the spring should start about one-fourth turn back of the end of the spring. The tongue after it is formed is shown in broken line in the illustration. At the point where the tongue starts to leave the body of the hairspring, the space between the first coil and the collet should be equal to the distance between two coils. There

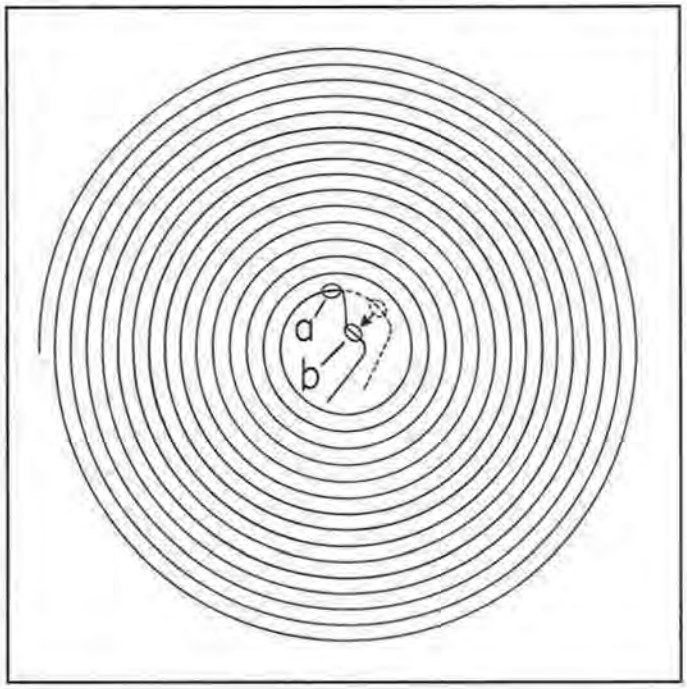


Figure 10.

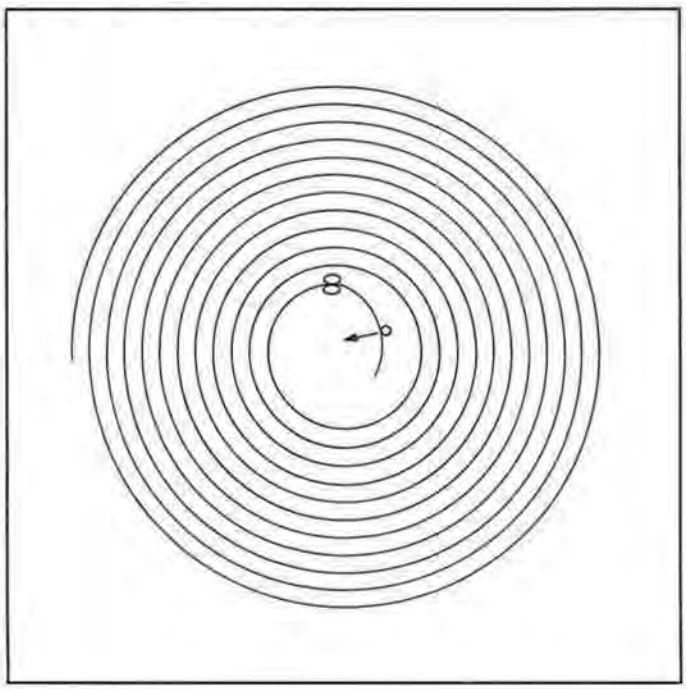


Figure 11.

are exceptions to this rule. If the coils of the hairspring are extremely close together, more space should be allowed between the collet and the first coil than the distance between two coils. If the space between coils is wide, the space between the collet and the first coil should be less than the distance between the coils.

Space not Large Enough for the Collet

Figure 8 shows an undesirable condition where not enough spring has been broken out to allow for the collet. This condition sometimes allows the first coil to touch the collet as the spring contracts during vibration. This causes the watch to run faster when the spring touches the collet as this would shorten the active length of the hairspring.

Space too Large for the Collet

Figure 9 shows a case where too much of the inner coil has been broken away for the collet. This causes a condition where the timing point of the spring will be moved farther out on the coils of the spring. This may cause the spring to be too large in diameter for the watch, especially if the watch requires a flat hairspring. Also, when too much of the hairspring is broken out for the collet, it becomes more difficult to true the spring around the collet due to the wide spacing.

Figure 10 shows a method that can be used to break off the hairspring when making space for the hairspring collet. The hairspring is held with tweezer "a" where the spring is to be broken off. Then, the spring is pulled over sharply with tweezer "b" in the direction of the arrow to cause a sharp bend next to tweezer "a." Now, if it is necessary, the end of the spring held by tweezer "b" can be moved back and forth to finish breaking off the spring. Care must be used when doing this operation to prevent the inner coils of the hairspring from being distorted.

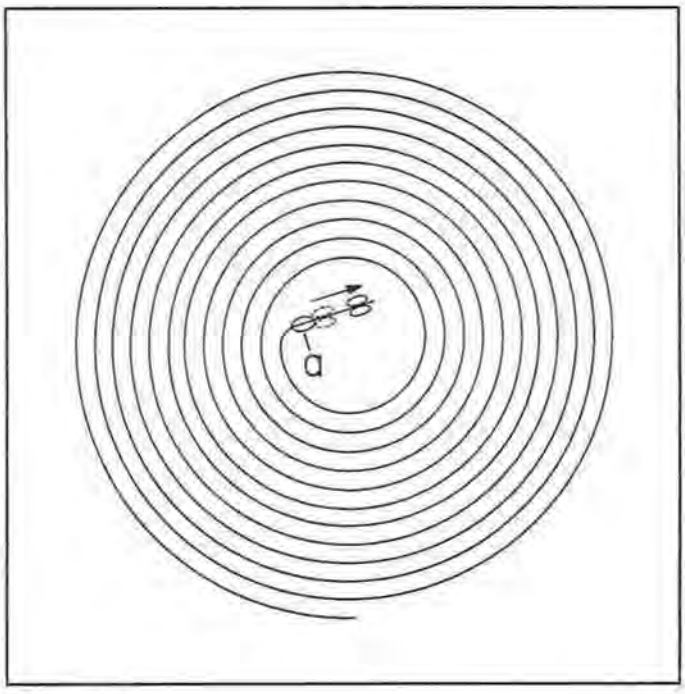


Figure 12.

Making the Tongue on the Hairspring

Figure 11 shows the first step in making the tongue on the hairspring. The hairspring is held with a tweezer where the spring is to be bent at the start of the tongue. The tweezer should have jaws that have smooth rounded corners. This is to prevent making a sharp bend in the tongue. As the spring is held with the tweezer, a needle is used to push the end of the spring in the direction of the arrow to form a rounded bend where the spring is being held with the tweezer. Note that the needle is used on the spring about halfway between the holding tweezer and the end of the spring. This is to avoid making a sharp bend at the holding tweezer.

Figure 12 shows the second step used to make the tongue. The spring is held with one tweezer at point "a" while a second tweezer with rounded polished jaws is used to make the straight section of the tongue. The second tweezer is used to grasp the spring next to the holding tweezer "a." The second tweezer is shown in broken line. Then, the second tweezer is slid along the coil toward its end, as shown by the arrow, to make the straight part of the tongue.

"Antique Watch Restoration" will continue next month.

❐

BIBLIOGRAPHY

Bowman, John J. and Borer, Emile. *Modern Watch Repairing and Adjusting.* Chicago: Henry Paulson and Co., 1941, pp. 157-158.

Daniels, George. *Watchmaking.* London: Sotheby's Publications, 1985, pp. 347-351.

DeCarle, Donald. *Practical Watch Adjusting.* London: N.A.G. Press, 1964, pp. 44-50.

DeCarle, Donald. *Practical Watch Repairing.* Chicago: Henry Paulson and Co., 1946, pp. 134-137.

Fried, Henry B. *Bench Practices for Watch Repairers.* Denver, Colorado: Roberts Publishing Co., 1954, pp. 12-23.

Fried, Henry B. *Watch Repairers Manual.* Cincinnati, Ohio: A.W.I. Press, 1986, pp. 249-255.

Jendritzki, H. "Watch Adjustments," *Swiss Watch and Jewelry Journal.* Lausanne, Switzerland, 1963, pp. 42-46.

Joseph Bulova School of Watchmaking. "Colleting Hairsprings," *Training Unit 6.* New York, 1972, pp. 132-138.

Sweazey, Thomas B. "Colleting and Truing Hairsprings," *Master Watchmaking Lesson 18.* Chicago: Chicago School of Watchmaking, 1908.

News of the Trade

WATCH-MASTER QUARTZ WATCH ANALYZER FROM VIBROGRAF U.S.A. CORP.

Mr. Joseph D. Presti, President of Vibrograf U.S.A. Corp., announced the introduction of the Watch-Master Quartz Watch Analyzer. This handy instrument automatically performs all the recommended troubleshooting tests for quartz watches. The Watch-Master can be easily used by watch repairers of all skill levels. The Watch-Master will quickly locate faulty parts enabling the user to save time and money.

PLEDGE KICKS OFF JOSEPH BULOVA SCHOOL'S FUND-RAISING CAMPAIGN

Well-known philanthropist Norman Morris has launched the Joseph Bulova School's first fund-raising campaign with a pledge of $25,000.

The Joseph Bulova School, a nonprofit institution, was opened in 1945 to provide injured World War II veterans with a marketable skill. It is now the region's only school specializing in watchmaking and the jewelry trade. Since its inception, the school has graduated more than 2,500 students.

Informally titled "the dean of the jewelry industry," Mr. Morris, who is ninety-six years old, has been a watch importer for sixty-five years. A former president of the American Watch Association and the 24 Karat Club, he made Omega the best-selling Swiss watch in America.

Mr. Morris has been retired for fifteen years and now lives in Harrison, New York, where he devotes his energy to administering his foundation, which serves charitable organizations worldwide.

When asked why he chose the Joseph Bulova School as a recipient of his largess, Mr. Morris noted that he had personally known both Arde Bulova, founder of the school, and his father, Joseph, for which it is named. Mr. Morris said that he felt the school still has an important role to play in today's society.

Currently, nationwide demand for skilled craftspeople in the watch and jewelry industry is at its highest level in over twenty years. However, there are fewer and fewer people entering the trade.

According to Carole Schwartz, president of the Joseph Bulova School, upon completion of the school's curriculum, which can take anywhere from eight to seventeen months depending upon the program, graduates can earn a competitive salary comparable to that of an entry-level engineer. The school also offers *lifetime* placement assistance to its graduates.

Mr. Morris' contribution is the first the school has received as part of the first fund-raising campaign held in its fifty-year history. The school's goal is to raise 5 million dollars to expand classrooms and update their equipment and tools. They also need extensive work to revitalize their historic building in Woodside, New York.

The Joseph Bulova School was founded near the end of World War II to give handicapped returning servicemen new skills. Today, this nonprofit organization provides a variety of services to its Queens neighborhood, New York City, and beyond. Services include high-quality vocational training and job placement, respite care for families with developmentally disabled members and recreation. The wheelchair basketball team is one of only five in the New York metropolitan area. This spring , the school will become home to the city's first complete health and fitness center designed specifically for individuals with disabilities.

MEISKEY'S MERGES WITH CAS-KER

The material and tool business of Meiskey's in Lancaster, Pennsylvania, has been merged with the Cas-Ker Company of Cincinnati, Ohio, as of July 1. Brian Opp, principal of Meiskey's, will join Cas-Ker as a sales representative in eastern Pennsylvania and Delaware.

All customers will be serviced from Cas-Ker's distribution facility in Cincinnati. Same-day shipping will be provided for most orders and next-day delivery will be offered for as low as $5.75.

For more information call either Brian Opp or Cas-Ker president, Patrick Cassedy, at 800-487-0408. Orders may be placed by calling the same number.

WITTNAUER'S FALL 1995 INTRODUCTIONS

Wittnauer takes a fresh approach to the classics

with its Fall 1995 introductions. New styles include additions to the Strap, Wisp™, Krystal™, Longlife™, and Golden Odyssey collections that reflect Wittnauer's time-honored Swiss tradition and commitment to quality and style.

The new strap styles are impeccable in their simplicity. Meticulous details include a classic black leather band with a round two-tone case accented with a gilt or black dial, black cabachon crown and Roman numerals marking the 12, 3, 6 and 9 o'clock positions. For the true signature of classic style—there's the understated tank watch which features a black leather band, rectangular gold-tone case with a white Roman numeral dial. Available for men and women, the new classics are perfect with any attire from khakis to pinstripes.

The ultra-thin Wisp™ collection takes on a contemporary look with three distinct new styles. The first is pure sophistication featuring a black leather band, gold-tone case, black dial and a diamond at the twelve o'clock position. Sleek lines dominate the second model with a dramatic bezel encased in gold-tone surrounding a black dial with a single diamond at the twelve o'clock position and a black cabachon crown. There is also a modern classic that is sure to turn heads, with a unique coin-edged bezel, gold-tone case, textured cream dial, gilt applied markers (Roman numerals at twelve o'clock and six o'clock positions) and calendar at three o'clock. Available for men and women. Suggested retail price: $350.

The three new dressy Krystal™ bracelets combine the function of an intricate timepiece with the elegance of fine jewelry. Twisted open links adorned with Austrian crystals highlight the oval-shaped case encircled with even more gems. A choice of black or mother-of-pearl dial and applied markers with Roman numerals at the 12, 3, 6 and 9 o'clock positions make this watch a fashion statement. There is also a new style with a round, textured dial with applied markers and a white rhodium-finished case and bracelet making a perfect backdrop for the eye-catching Krystal™ stones. Suggested retail price: $475.

Diamonds have been introduced to the Golden Odyssey collection this season. The stainless steel and 18K water-resistant sports bracelets have been "dressed up" with diamond bezel rings (thirty-two diamonds for women and forty-four diamonds for men).

A new series of sporty, yet durable, surgical-grade stainless steel bracelets have been added to the Longlife™ twenty-year battery collection.

The WITTNAUER Krystal™.

The WITTNAUER Wisp™.

The new additions, like all Wittnauer timepieces, carry a Buckle-to-Buckle™ warranty which guarantees repair or replacement of any part of the watch—no exclusions. Wittnauer also offers a three-year movement guarantee in addition to its extensive coverage.

Founded in 1880 by Albert Wittnauer, the company is a subsidiary of Westinghouse Electric Corporation. The Fall 1995 introductions are available at fine jewelry and department stores in North America and the Caribbean. Contact: Jeanine M. Magarine or Jean Brandolini, Markham/Novell Communications. (212)687-1765.

SPRING & WEIGHT-DRIVEN MOVEMENT AVAILABLE FROM FRANZ HERMLE

Franz Hermle now offers a spring and weight-driven movement with the following features: Westminster, Ave Maria (Fatima), and Strike on the Full Hour. These movements are based on our highly successful models 1051 and 1151. Production of these movements will take place as of October 1995.

Hermle also now offers a five-tube cable-driven movement, which is based on our top of the line Flagship model 1171. Availability of this movement is November 1995.

For further information, please contact Hermle

Black Forest Clocks at the following numbers: phone (804)946-7751, fax (804)946-7747.

A DANIEL ROTH SINGLE FACE TOURBILLON

There is something very recognizable about a Daniel Roth watch. It is unique in shape, creative, and simply beautiful. Daniel Roth watches are simultaneously round, rectangular, and oval; a refreshing difference from other watch brands on the market.

The Double Face Tourbillon, which brought international renown and prestige to this talented watchmaker, was the first watch created in this unique shape. It is now available without a power reserve and date option on its back. Daniel Roth's creations revive the ancient Swiss tradition of quality watchmaking.

At the 1995 Watch and Jewelry Fair in Basel, Daniel Roth introduced a Single Face Tourbillon, an exceptional watch with a mechanical hand-wound movement, and a power reserve of forty hours. On this Single Face Tourbillon seconds are indicated by three hands of varying lengths, on three superimposed zones, ranging from 0-20, 20-40, and 40-60. The constant rotation of the escapement and the balance in its cage considerably reduce the rate of errors due to Earth's attraction. The Single Face Tourbillon in now available at an irresistible price.

Like all Daniel Roth complications, the Single Face Tourbillon is numbered, and is available in white, yellow, or pink gold, as well as in platinum. It is guaranteed against manufacturing defects for two years.

For more information: Daniel Roth SA, Rue de la Gare 4, CH-1347 Le Sentier, Vallée de Joux, Suisse.

THE NEW "CAL-PAL"

H.R.S. Instratec introduces their new Quartz Watch Analyzer named the Cal-Pal. Time accuracy calibration is the keystone feature of the Cal-Pal. It also features battery testing and evaluating, current measurement, gear train efficiency testing, resistance and continuity measurement, making the Cal-Pal the only test instrument a watchmaker would need.

The Cal-Pal is user-friendly with only two buttons controlling all of its functions and information is viewed on an intelligent sixteen character LCD display. The Cal-Pal is designed for the watch and battery retail store, as well as the service center. The price is only $689 plus $10 s/h/i. To order call 1(609)427-2525.

❐

JUST OFF THE PRESS!

A NEW BOOK FROM J.M. HUCKABEE

The Top 300 Trade Secrets of a Master Clockmaker

The material in this 111-page book covers essentially all of the more difficult tasks encountered in the restoration of older American clocks. Each step is given in such detail that journeymen and students alike can enrich their skills as "with the master's touch". Most of this work can be readily adapted to other clocks encountered in our craft. The guideline for this work is to create instructional material that is easy to read, well illustrated, and time-efficient in use. Tools used are those economically available and within the bounds of the earning ability within the clockmaking trade. A large portion of the jobs are those which many workmen send to a specialty shop. Each task is broken down into a series of simple operations. None are hypothetical in nature, and all are presented in a logical series of events. Commonplace jobs are not included. For example, no mention is made of cleaning, lubrication, and the multitude of minor adjustments. Those items are covered in a variety of good literature available to our trade. No claim is made as to the methods being "the only way". However, a claim is made to technical excellence, easy to achieve, time and cost efficiency, and the ability to withstand the most critical review by those skilled in the art. The origin of these skills is a consolidation of formal training, technical literature, and association with numerous masters in our trade. This has been enhanced by a half century of experience in the clockmaking and machine tool industry. It is my sincere desire that you will be able to add some new ideas to your personal skills.

$21.00 postpaid

The Ship's Chronometer

by

Marvin E. Whitney

CMW, CMC, FAWI

First published in 1985, this 1991 revised and updated edition is a comprehensive treatise on ship's chronometers. There are 499 pages of scholarly research, profusely illustrated with photos, charts, and original, easy-to-understand drawings. A must for the practical watchmaker and for every serious student of these remarkable timepieces. Printed on glossy, heavy stock quality paper. Written by Marvin E. Whitney, author of the popular book *Military Timepieces.*

$75.00 postpaid

ORDER FORM

I'd like to purchase:

_____ *The Top 300 Trade Secrets of a Master Clockmaker* - **$21.00**

_____ *The Ship's Chronometer* - **$75.00**

Name _____

Address _____

City _____

State _____ Zip _____

Phone _____

❑ Check ❑ MasterCard ❑ Visa

Credit card # _____

Expiration date _____

Signature _____

Detach & mail to:

AWI CENTRAL
701 ENTERPRISE DRIVE
HARRISON, OH 45030
PHONE (513) 367-9800 FAX (513) 367-1414

Education Update

Now that our new headquarters is completed, and the shortage of qualified watchmakers has reached the critical point, AWI is announcing a 45-week watchmakers training program. The training will take place in our new state-of-the-art training rooms in Harrison, Ohio. The cost of the program is $6,250 plus tools. There are four tuition scholarships available for qualified applicants. This new watchmakers training will begin July 15, 1996. If you or anyone you know is interested in starting a career in the highly skilled craft of watchmaking, please contact AWI Central for more details.

A local AWI member, Louis Burwinkle has completed organizing and setting up each of the training rooms and tool room. This was a huge job and without Louie's hard work we would still be unpacking boxes. Everything looks great! Thanks again Louie for all your help.

Project Extend

There are still openings in the Watch III, IV, and V classes scheduled for this month. The "Wheel Cutting" course taught by Roy Hovey, October 30 through November 3 is full.

We have several new classes scheduled for 1996 in the Marvin E. Whitney Education Center. The first class of the year, January 26-28 is "Repair of the Ship's Chronometer," Instructor: DeWitt (Dewey) S. Clark. This is a course for experienced watch/clock technicians. Using the Hamilton 21 ship's chronometer, Mr. Clark will guide his students through the delicate and complicated mechanisms of a ship's chronometer. Students should plan to provide their own Hamilton 21 chronometer. Mr. Clark will have a limited number of chronometers available upon request.

March 18-22: Bernhard Stoeber will be the instructor of a new course on "Repair of the Mechanical Chronograph." Mr. Stoeber will provide several different calibers, and the students will be invited to bring their own as well.

June 10-14: "Mr. Accutron," Henry Frystak, is scheduled to give a course on "Repair of the Accutron." As many of you know, Mr. Frystak traveled the country for the Bulova Watch Company teaching Accutron repair. The main focus of this class will be on the Accutron 214 and 218. The other Accutron models will also be covered.

When you look at the schedule of Project Extend classes for 1996, there will be a change in the titles of all the classes. To cut down on some of the confusion concerning Project Extend classes, we are going to drop the Roman numerals. Instead of Watch I, Watch II, etc., we will call the class exactly what it is, as we do with the bench courses.

OLD	NEW
Watch I	American Pocket Watches
Watch II	Introduction to Watch Repair
Watch III	Hairspring Vibrating and Timing Adjustments
Watch IV	Repair of Calendar and Automatic Mechanisms
Watch V	Watch Restoration
Watch VIII	Certified Master Watchmakers Examination

Watch VI instructor, Antoine Simonin, and Watch VII instructor, Philippe Dufour, are still planning to teach courses for AWI when they are available. Their courses could change from what they have done in the past.

OLD	NEW
Quartz I	Basic Electronics and Meter Reading
Quartz II	Advanced Quartz Watch Repair
Quartz III	Certified Master Electronic Watchmaker Exam
Clock I	Introduction to Clock Repair
Clock II	Chiming and Striking Mechanisms
Clock III	Clock Escapements
Clock IV	Advanced Clock Repair
Clock V	Clock Restoration
Clock VI	Clock Repairing Operations
Clock VII	Preparation for Certified Master Clockmakers Exam

Bench Courses

Bench courses for the remainder of this year are being well attended. The following courses are lagging in registrations and are at risk of being canceled. If any of the following courses are of interest to you and are in your part of the country, contact AWI Central for more information.

October 12 & 13	Mechanical Chronograph Repair Houston, TX
October 21 & 22	Cuckoo Clock Repair Boston, MA
November 11 & 12	Striking Clocks Orlando, FL

❐

1995 INDEX

A complete index for 1995 issues of *Horological Times* will appear in the January, 1996 issue.

PROJECT EXTEND

AWI's continuing Education Program offers one-week and two-week classes in various phases of watch & clock repair techniques. Work alongside recognized leaders in the field of horology. See how they handle the everyday situations we all encounter.

DATE	CLASS	INSTRUCTOR	FEE
OCTOBER 1995			
9-13	Hairspring Vibrating & Timing Adjustments	James Lubic	$250.00
16-20	Repair of Calendar & Automatic Mechanisms	James Lubic	$250.00
23-27	Watch Restoration	Ron DeCorte	$250.00
30-Nov. 4	Lathe Course - Phase IV	Roy Hovey	$480.00
JANUARY 1996			
26-28	Repair of the Ship's Chronometer	Dewey Clark	$150.00
29-Feb. 2	Beginning Horology	James Lubic	$250.00
FEBRUARY 1996			
5-9	American Pocket Watches	Alice Carpenter	$250.00
12-16	Introduction to Watch Repair	James Lubic	$250.00
26-March 1	Machine Shop Practices	Ron DeCorte	$250.00
MARCH 1996			
4-8	Introduction to Clock Repair	Jim LaChapelle	$250.00
11-15	Chiming & Striking Mechanisms	John Nagle	$250.00
18-22	Mechanical Chronographs	Bernhard Stoeber	$250.00
25-29	Clock Case Repair	Jim Williams	$250.00
APRIL 1996			
15-27	12-Day Lathe Course	Roy Hovey	$780.00
29-May 3	Basic Electronics & Meter Reading	Gerald Jaeger	$250.00
MAY 1996			
6-10	Advanced Quartz Watch Repair	Robert Bishop	$250.00
13-17	Clock Repairing Operations	John Nagle	$250.00
20-24	Hairspring Vibrating &Timing Adjustments	James Lubic	$250.00
JUNE 1996			
3-7	Basic Jewelry & Watch Case Repair	Marshall Richmond	$250.00
10-14	Accutron Repair	Henry Frystak	$250.00

All Project Extend classes are held in AWI's new training rooms in Harrison, Ohio. Call or write for information and details for the classes that interest you!

American Watchmakers-Clockmakers Institute
701 Enterprise Drive • Harrison, OH 45030
Phone (513) 367-9800 • Fax (513) 367-1414

Bulletin Board

A. NEW REQUESTS

SELF WINDING CLOCK COMPANY OF NEW YORK MOVEMENT

Michael D. Loebbaka, Saugerties, NY, inquires about a clock manufactured by the Self Winding Clock Co. of New York which appears in the photo below. The movement is missing an escape wheel, arbor and pinion. Mr. Loebbaka needs to know the number of teeth for the escape wheel, the number of leaves on the pinion, and the diameter of the escape wheel and pinion.

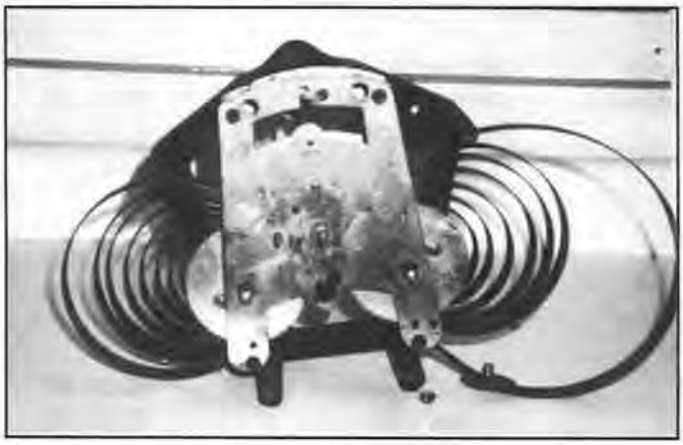


Figure 1. Self Winding Clock Co., New York, NY.

THE FABRICATION OF WHEEL AND PINION CUTTERS

Charles W. Smith, New Berlin, NY, wants to learn how to make wheel and pinion cutters (exclusive of fly cutters). He is seeking a bibliography of articles and books on practical wheel and pinion cutter fabrication which he can use for study. He would also like for individuals who make or have made cutters to share their expertise with him. A search of horological literature in the library leads us to believe that this kind of information must come from the literature of the machinist.

C. & E. MARSHALL STAKING TOOL INSTRUCTION BOOKLET

Robert Standriff, Cincinnati, OH, seeks a copy of C. & E. Marshall's staking tool instruction booklet.

DEJUNO WATCH COMPANY

In the past we have tried unsuccessfully to locate a distributor or service agent for the Dejuno brand watch which originates in Hong Kong. Dan Sherred, Decatur, IL, is the most recent reader to request this information.

ELGIN TOOL WORKS CATALOG FOR ORNAMENTAL LATHE

Greg McCrieght, Lima, OH, recently purchased some Elgin factory machinery. One interesting item that turned up is the ornamental lathe shown in the following photos. The machine is complex with many small attachments. McCrieght indicates that he needs more information to use and/or assemble this piece. He has all of the books on ornamental lathes and almost every horological tool book. He would like to locate a catalog of the maker, the Elgin Tool Works, if one exists, or any information or factory photos one might be able to provide.

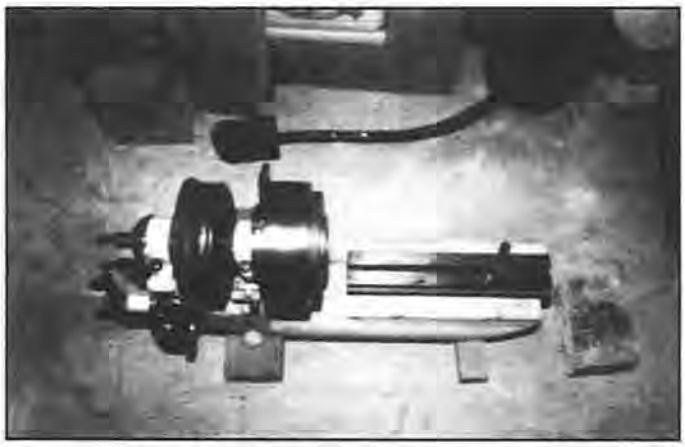


Figure 2. Machine in question. Tailstock with revolving spindle not shown.

Figure 3. Faceplate has two slides that offset several dividing systems and one worm gear part of the overhead drive.

B. RESPONSES

ANDRE BECHLER S.A., HORIZONTAL MILL PINION CUTTER

Ken Leeseberg, Montello, WI, has supplied the information Robert Lackey sought for the Andre Bechler S.A. Horizontal Mill Pinion Cutter. The data includes installation, maintenance, and operation of the equipment along with eighteen pages of instruction and illustrations.

Bulletin Board

AMERICAN WALTHAM WATCH COMPANY CATALOG, 1903

We received two positive responses to the request of W.E. Wilkins, Somerset, CA, for information detailing 1870s and 1880s Waltham vintage material for complicated watches as featured in the *American Waltham Watch Company Catalog* of 1903.

Tom Mister, Virginia Beach, VA, was first to respond by faxing to us pages 45 through 60 from the catalog. Mr. Mister did not have the entire catalog.

Next, Eileen Doudna, Librarian of NAWCC in Columbia, PA, sent a copy of the complete catalog which their library has recently acquired from someone. The entire catalog involves ninety-seven pages larger than the standard 8 1/2 x 11" size.

AWI will provide copies of the fifteen pages which Tom Mister supplied for those members who need this information. We thank Tom Mister and Eileen Doudna for their cooperation!

EMCO-UNIMAT LATHE

Since the last "Bulletin Board" column in the August issue, we have learned of a number of new sources for Unimat lathes. The one source most often mentioned was Emco Maier Corporation, 2757 Scioto Parkway, Columbus, Ohio 43221. Phone (614)771-5991. Fax (614)771-5990.

Many readers took the time to provide information and we received a copy of the manual that member R. A. Barnes in Germany originally sought. Thanks to all who cared enough to help out!

C. ITEMS STILL NEEDED

ATTONA BRAND CLOCKS

William Braunschweiger, Sr., New Providence, NJ, writes that on a recent vacation he saw a line of clocks with the name "Attona" on them. He would like to contact the distributor, but can find no listing for them in any of his trademark/brand name books. Can anyone provide information on these clocks?

PEERLESS LATHE CATALOG AND OWNER'S MANUAL

Dr. M. Weiner, Penacook, NH, seeks an owner's manual and catalog of accessories for the Peerless lathe which is no longer manufactured. If you have one to loan, AWI will copy it and return your original to you.

VIBRASONIC 614A SERVI-ELECTRONIC OWNER'S MANUAL

William Carson, Groton, MA, is seeking the owner's manual for a Vibrasonic 614A Servi-electronic cleaning machine. If you have one to lend to us, we will photocopy it for Mr. Carson and for our file.

PRECISE WATCH TIMER MANUAL

Robert Lackey, Salisbury, MD, is looking for a manual for a Precise Watch Timer. It uses lights to check the beat.

BOSTON CLOCK CO. BALANCE INFORMATION

A second item Robert Lackey is looking for is any balance interchangeability information you might have for Boston Clock Co. clocks.

DISTRIBUTOR OR SERVICE CENTER FOR PELTIER WATCHES

George Stuscavage, Martinez, CA, seeks the name and location of a distributor or service center in the United States for "Peltier" brand Swiss watches.

❐

New Members

ALABAMA
Andress, Ronnie A.—Satsuma, AL

ARIZONA
Dargitz, Mary—Mesa, AZ
Hay, Robert M.—Sun City, AZ*
Miller, Larry D.—Phoenix, AZ
Sponsor: Timothy Caldwell—Scottsdale, AZ
Wallace, Lois M.—Mesa, AZ
Sponsor: Timothy Caldwell—Scottsdale, AZ

ARKANSAS
Mills, Roger S.—DeQueen, AR

CALIFORNIA
Alleeson, Paul—Simi Valley, CA
Bazarnicki, Buzz—Arroyo Grande, CA
Burger, Theo—Los Altos Hills, CA
Debrick, Joseph—Orange, CA
Flynn, Michael—Granada Hills, CA
Fuentes, Abraham—Pamono, CA
Sponsor: Timothy Caldwell—Scottsdale, AZ
Hall, Jeremy—San Jose, CA
Lofgren, Ralph—Palo Alto, CA
McCollum, Lyle—Riverside, CA
Wattanakran, Narathip—Sherman Oaks, CA

COLORADO
Berejiklian, Vahe—Aurora, CO*
Sponsor: Timothy Caldwell—Scottsdale, AZ
Heintzelman, Dick—Loveland, CO*
Melton, Claude—Littleton, CO
Sponsor: Kenneth Fuhr—Littleton, CO
Portanova, Nick—Lakewood, CO

CONNECTICUT
Krutolow, Alvin—Danbury, CT*

DELAWARE
Armbruster, Michael—Newark, DE

DISTRICT OF COLUMBIA
Sickle, Abraham B.—Washington DC

FLORIDA
Castro, Alfredo—Miami, FL*
Derghazarian, Roger—Ormond Beach, FL*
Dutton, John—Miami, FL
Grinder, Luther—Cape Coral, FL
Marchant, James L.—Tampa, FL
Sponsor: Loman Lee Largen—Homestead, FL
McConnell, James T.—Cape Coral, FL
Rennert, Rose—Port Charlotte, FL*
Underwood, Joel L.—Navarre, FL
Varjabedian, Deborah—Vero Beach, FL
Westrick, Lane P.—Lakeland, FL
Sponsor: Kenneth J. Pell—Altamonte Springs, FL
Wheeler, Bud—Merritt Island, FL
Williams, Larry V.—Boca Raton, FL
Sponsor: Gus Kiriazis—Boca Raton, FL

GEORGIA
Jordan, Roy—Manchester, GA
Tumlin, Ron—Rex, GA
Sponsor: Jeff C. Jacobus—Chamblee, GA

ILLINOIS
Choi, Jung Henry—Carpentersville, IL
Kelson, Bud—Fairbury, IL
Lewis, David G.—Quincy, IL
Narducy, Anthony—Chicago, IL
Watkins, Susan—Chicago, IL
Sponsor: Werner Alcuenberger—Green Valley, AZ

INDIANA
Hoellein, Rudolf—Indianapolis, IN*
Koze, Reynold—South Bend, IN
Lawson, Joe—Martinsville, IN
Parrish, Adam—Kokomo, IN
Sponsor: Larry Blanchard—Kokomo, IN
Schaefer, Walter B.—Speedway, IN*

IOWA
Vierkant, James H.—Mason City, IA

KANSAS
Childs, A. Scott—Wichita, KS*
Golden, Nancy E.—Lawrence, KS

KENTUCKY
Schafet, Joe A.—Eddyville, KY

LOUISIANA
Cooper, Derrick—Sulphur, LA

MAINE
Ronnquist, Charles—Kittery Point, ME
Sponsor: William P. Carson—Groton, MA

MASSACHUSETTS
Bottoms, John W.—Concord, MA
Sponsor: Paul H. Garnick
Bubb, Paul L.—Stow, MA
Sponsor: Leo A. Jaroslaw—Acton, MA
Giglio, Christopher—Attleboro, MA*
Newsom, David—Holliston, MA
Sponsor: William P. Carson—Groton, MA (Life Member)
Paradise, Michael J.—Athol, MA
Semich, Mark A.—Cambridge, MA
Tuckwood, John D.—Plymouth, MA
Sponsor: John Lelievre—Natick, MA

MICHIGAN
Beningo, Anthony R.—Riverview, MI
Ferrari, Jeff—Dearborn Heights, MI
Knoll, Steve—Traverse City, MI
Rowell, Frank E.—Holt, MI

MINNESOTA
Dorsch, John G.—St. Paul, MN
Miller, Lee T.—Kettle River, MN

MISSOURI
Crescenzo, William—Kansas City, MO
Sponsor: Jerry M. Faier—Overland Park, KS
Mary, E. R.—St. Charles, MO
Sponsor: William P. Carson—Groton, MA

MONTANA
Kihara, Kenneth—Havre, MT

NEVADA
VanBuren, Harold—Las Vegas, NV

New Members

NEW HAMPSHIRE
Wilcox, Brian—Bradford, NH
Sponsor: Leo A. Jaroslaw—Acton, MA

NEW JERSEY
Andrews, Russell J.—Washington Twp., NJ
Baker, Edward—Englishtown, NJ
Sponsor: Henry Frystak—Linden, NJ
Carlson, James H.—Pennington, NJ
Costantino, George M.—Voorhees, NJ*
Samnick, Steven—West Caldwell, NJ

NEW MEXICO
Graha, Vincent—Santa Fe, NM
Olson, Mark—Tijeras, NM*

NEW YORK
Boessmann, Rolf—Ontario, NY
DiBona, Paul James—Mamaroneck, NY
Sponsor: Nelson D. Boronat—Woodside, NY
Farricy, Robert G.—Syracuse, NY
Gargano, Brian—Spencerport, NY
Genter, Keith R.—Wallkill, NY
Guttenberg, Mitchel S.—New York, NY
Hawley, William—Penfield, NY
Haziza, Victor—Brooklyn, NY
Kowalsky, Stephen—Brooklyn, NY*
Minsky, Arnold—Massapequa, NY
Troll, Bruce—Mount Kisco, NY*

NORTH CAROLINA
Gerritsen, Burton H.—Hillsborough, NC
Heinbaugh, Kenneth H.—Waxhaw, NC
Heinbaugh, Kristen L.—Waxhaw, NC
Kahn, Sherman E.—Winston-Salem, NC
Sponsor: William P. Carson—Groton, MA

OHIO
Blakeman, David—Akron, OH
Sponsor: Al Hudson—Akron, OH
Crist, Wayne A.—Xenia, OH
Hissong, Russell—North Canton, OH
Pema, Yatin—West Chester, OH
Randolph, William B.—West Chester, OH
Sobotka, Henry K. A.—Hilliard, OH

OKLAHOMA
Tran, Tung Dai—Oklahoma City, OK*

OREGON
Moritz, J. P.—Portland, OR

PENNSYLVANIA
Bragg, David A.—Pittsburgh, PA
Cole, J. Michael—Beaver Falls, PA*
Hostetler, Jack W.—Uniontown, PA*
Judy, Lewis A.—Roseto, PA
Kerr, John R.—Meadville, PA
Sponsor: Howard Farance—Conneautville, PA
Layos, Elias C.—Philadelphia, PA*
Woodward, David—Littlestown, PA

RHODE ISLAND
Walker, Edward R.—Cumberland, RI*

TENNESSEE
Alden, John D.—Columbia, TN
Anderson, Teresa—Knoxville, TN
Carpenter, Mary—Knoxville, TN*
Fuson, Robert N.—Nashville, TN
Marshall, Bill—Clinton, TN
Miller, J.D.—Knoxville, TN
Mosiej, Tom—Memphis, TN
Talley, Charles E.—Chattanooga, TN

TEXAS
Ball, Phil—Garland, TX
Barcak, Ronald P.—Beasley, TX*
Boone, David M.—El Paso, TX
Sponsor: Timothy Caldwell—Scottsdale, AZ
Burke, Jack D.—Temple, TX
Christian, Craig W.—Buda, TX
Chrysler, Dennis—Ft. Worth, TX
Conner, Ben F.—Houston, TX*
Cook, Frank—Forney, TX
Craft, David J.—Austin, TX
Davis, Brian—Coppell, TX
Dearing, E.C.—Frankston, TX
Harris, Eldon W.—Boerne, TX*
Huckabee, J. Mark—Pflugerville, TX
Mason, Hugh—Kilgore, TX
Noel, James A.—San Antonio, TX
O'Neil, Joseph—Galena Park, TX
Palmer, Terry A.—Austin, TX
Thomas, George A.—Paris, TX
Wilson, Wayne—Terrell, TX

UTAH
Femanias, Thor—Salt Lake City, UT

VIRGINIA
Brown, James T.—Ashland, VA
McNeely, Dudley—Chatham, VA
Slagle, Raymond C.—Newport News, VA

WASHINGTON
Harris, Clinton R.—Kirkland, WA
Reisdorph, Margaret A.—Spokane, WA
Sponsor: Timothy Caldwell—Scottsdale, AZ

WISCONSIN
Holly, Donald—Oregon, WI
Ritchie, Don—Prairie DuChien, WI

CANADA
LeBlanc, Charles C.—Sturgeon Falls, Ontario
McCloskey, Vincent—Edmonton, Alberta
Singh, Gurdev—Vancouver, British Columbia

FOREIGN
Brandt, J. P.—Napier, NEW ZEALAND*
Groves, Michael—Horsham, West Sussex, ENGLAND
Law, Peter B.—Abbots Park, Chester, ENGLAND
Main, B.—Fleet, Hants, ENGLAND

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

CLASSIFIED ADS

REGULATIONS AND RATES

Ads are payable in advance $.75 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 $5.00 additional for postage and handling. The first of the month is issue date. Copy must be received 30 days in advance (e.g. December issue closes for copy on November 1st).

HOROLOGICAL TIMES • 701 Enterprise Drive • Harrison, OH 45030
Phone (513) 367-9800 • Fax (513) 367-1414

TRADESMAN

HAMILTON ELECTRIC WATCH REPAIR. Expert, experienced service on all Model 500 and 505 Electric watches. -- *Want to buy* Hamilton Electric parts. Also unusual Hamilton watches, Hamilton advertising and memorabilia. -- Rene Rondeau, P.O. Box 391, Corte Madera, CA 94976. (415) 924-6534, Fax (415) 924-8423.

REPIVOTING - balance staffs, pinions, arbors for wrist and pocket watches. Do not replace original parts, let us repivot to manufacturer standards. Juliusz Dabrowski, J.D. Watchworks Co., 210 Post St., Suite 506, San Francisco, CA 94108; Phone: (415) 397-0310, Fax: (415) 397-0601.

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 Frugé
251 Greenwich Avenue
Greenwich, CT 06830
Tel: (203) 661-0056
Fax: (203) 661-0703

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

CLOCK and **MUSIC BOX** parts, mainsprings, material and tools. Custom made to order or repair of gears, pinions, and parts. Catalog $3.00. TANI ENGINEERING, Box 338, Atwater, OH 44201; (216) 947-2268.

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.

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.

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.

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

ACCUTRON REPAIR

Specializing in 214 & 218 Movements

- Quick turnaround time
- Guaranteed to be accurate for 1 year
- Using original parts
- Fully insured by Jewelers Mutual Insurance Co.

Little Swiss Watch Shop
3529 Chamblee Tucker Road
Atlanta, GA 30341
1-800-418-2345
Information: (404) 939-4511

CLASSIFIED ADS

Certified Master Watchmaker
Jonathan Rowe
Swiss Trained - WOSTEP
REPAIR AND RESTORATION
From Antique Verge Fusee to Modern Quartz
Case Repair
SPECIALIZING IN CHRONOGRAPHS
TM Services
(Time Master)
1290 Front St., Suite 125, Binghamton, NY 13901
For more info telephone 607-775-3302

WATCH REPAIR
Quartz, Mechanical, High Grade Watches, Rolex, Etc.
Quality & Fast Service • 25 Years Experience
Small or Large Accounts
ABC Watch Repair Center
4078 E. Yucca St., Phoenix, AZ 85028
Phone (602) 494-7204

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**

ALVIN KRUTOLOW FOR ROLEX SERVICE
Master Watchmaker, 47 years experience. Awarded technical certificate from Rolex in 1977. Service includes case & bracelet refinishing & waterproofing of case. All watch parts are genuine Rolex. We specialize in the repair of high-grade watches & clocks. Not affiliated with Rolex Watches, Inc. USA. Ask for Alvin or Marcus, (203) 792-4539.

Larry Blanchard Service Company
FINE WATCH REPAIR
- Accutron Tuning Fork all calibres, specializing in 218
- Classic American Wrist & Pocket

SERVICE TO THE TRADE
1545 West Sycamore St.
Kokomo, Indiana 46901
(317) 868-9161

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.
ZAMORA
280 PRESIDIO PLACE
BUFFALO, NY 14221-3746
(716) 633-6138
Fax (716) 633-7686

CLOCKS: gearcutting, repivoting, jeweling, rebushing. Aircraft clocks. ROY H. NIEGEL, CMC, CMW, N31552 Saint Joe Drive, Spirit Lake, Idaho 83869-9544. SASE or CALL (208) 623-4330.

SHIP'S CHRONOMETERS OVERHAULED. Also keys, box hardware, etc. I buy chronometers and partial movements. **1 year guarantee on repairs. DEWEY CLARK,** (410) 592-3617.

RESTORATION & PARTS MANUFACTURING FOR ALL TYPES OF WATCHES & CLOCKS - We restore all types of watches including tuning fork, electronic, quartz, mechanical, antique, high grade, etc. All types of clock restoration and custom watch, clock parts manufacturing including gear cutting, balance staffs all types, stems (regular and oversize), repivoting, etc. Over 35 years experience in watch, clock restoration and parts manufacturing. J.S. Park, CMW, CMEW, member AWI & NAWCC. Satisfaction guaranteed. **WATCHES UNLIMITED**, 222 Century Plaza, Birmingham, AL 35210; Phone (205) 595-2022. Hours: Mon.-Sat. 10-9; Sun. 1-6.

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.

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

ARTICLES FOR SALE

Watchmakers tools, equipment, material, and supplies, mostly used. Sold by free list, available from Dashto, Tom Mister, 983 Providence Square Shop Center, Virginia Beach, VA 23464; Phone/Fax (804) 495-2471.

FULLY WARRANTEED
Watch Timers & Cleaners

FACTORY REBUILT WATCH TESTING EQUIPMENT
Call or Write for details:
Tel: (516) 437-8700
Fax: (516) 437-8708
VIBROGRAF U.S.A. CORP.
504 Cherry Lane, Floral Park, NY 11001

CASIO WATCH PARTS
No Minimum Order Required
Kaben Enterprises
3529 Chamblee Tucker Road
Atlanta, GA 30341
Official Casio Distributor
ORDERS (800) 418-2345
INFORMATION (404) 939-4511

HENRY FRIED'S 23rd Horological Tour to France, Switzerland (Basel Fair), Austria & Italy. April 22 - May 8, 1996. $3,700.00 PP. For brochure call Nick Lerescu at 1-800-262-4284.

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.

BE ALL THE CLOCKMAKER YOU CAN BE! Thornton Cutters in stock. KEN LAW, CMC, 2185 Eldred Rd., Chino Valley, AZ 86323.

WATCHMAKERS LATHES BOUGHT & SOLD. JOEL LEVINE, ATLANTA, GA. (770) 923-5522.

NEW CLOCKS
45% - 65% OFF RETAIL
Howard Miller and Ridgeway floor, shelf and wall clocks. Also a full line of German Black Forest Cuckoos.
Call us before you buy!
Mel Taylor, A Time to Remember
P.O. Box 1007. Nashville, IN 47448
Call Toll Free 1-800-267-7756

CLASSIFIED ADS

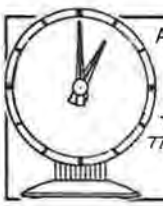
ARTICLES FOR SALE

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. Phone (610) 644-4272.

USED WATCH MOVEMENTS. H. HERB & SON, 908 RIVA RIDGE DR., GREAT FALLS, VA 22066; (703) 549-8045.

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

WATCH BATTERIES
Rayovac - 30¢ Maxell - 35¢
Send SASE for price list
Nestor Watch Repair Center
2222 Coronado Ave. #35
San Diego, CA 92154-2037
Phone & Fax (619) 423-2488


A complete selection of spare parts for the Golden Hour Clock
The Golden Hour Clock Co.
7745 East Redfield Road #500
Scottsdale, AZ 85260
602-483-3711

BUSINESSES FOR SALE

Wholesale watch material - old & new. Bestfit microfiche system, Bulova and Longines parts. Stems, crowns, crystals, glass, plastic, and hunting case. Owner deceased. Call for info (410) 744-6658, Tuesday - Friday.

CLOCK & WATCH SALES & SERVICES. Expanding business in Northern Virginia (Washington, DC metro area). Excellent opportunity for watchmaker/clockmaker owner/operator. Please call John Wyatt, (703) 709-0234.

Watch/Clock Repair and Engraving Shop. Est. 25 years. Sales: gifts, clocks, awards. Excellent equipment & inventory. Gross six figures & growing steadily. Located on Army base/5-year government contract requires watchmaker on premises. Perfect for watchmaker owner/operator. For serious inquiry please call (520) 458-0076. Business hours 9-5 Mon.-Sat.

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

MONEY MONEY MONEY
WATCH REPAIR PEOPLE
Has your salary doubled in the last 3 years?
Are you losing income?
Up to $52,000+ per year
Please call (810) 358-9080

WATCH SCHOOL GRADUATE OR EXPERIENCED WATCHMAKER
Full-time position. Work on high-grade watches. Good pay, good benefits. The Johnson Family's Diamond Cellar, Columbus, OH. (614) 457-0445, 1-800-222-6642.

Watch repair trade shop is looking for an experienced watch repair person. Benefits include medical and life insurance, paid vacations. Send resume or call: Pollak Watch Service, Inc., 13910 Cedar Rd., Cleveland, OH 44118; (216) 932-2500; (800) 878-3185; Fax (216) 932-2191.

SITUATIONS WANTED

Young experienced watchmaker seeking position in watch repair shop. Specialing in high quality watches. Anywhere considered. Write to: Jonathan Reed, 8030 Phillips Hwy., Suite 3, Jacksonville, FL 32256, Fax (904) 731-1350.

WANTED TO BUY

WANTED: Paying high prices for chronograph and high grade watches, movements, dials, cases, & parts. Dean Sarnelle, 25 W. Beverley St., Staunton, VA 24401, phone & fax (540) 885-6064.

ANYTHING ILLINOIS
Want to buy Illinois wristwatches, dials, movements and cases (complete or parts) in any condition for avid private collector. Please call 800-421-1968, x5520, Fax 714-725-9787 or mail to Fred Friedberg, c/o TAMS, P.O. Box 2068, Tustin, CA 92681-2068.

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.

RETIRING, RETIRED, OR OTHERWISE
Buying watchmakers' large or small accumulations of tools, equipment, etc. Will travel east of the Mississippi.
Ken Waldhorn (810) 399-3067

CLASSIFIED ADS

SEEKING PROSPECTIVE CANDIDATES FOR THE AWI BOARD OF DIRECTORS

The committee involved with securing candidates to run for the AWI Board of Directors is seeking recommendations from the membership. If you plan to suggest a possible candidate, please send that individual's name and background to: Chairman, Nominations for Board of Directors Committee, AWI Central, 701 Enterprise Drive, Harrison, Ohio 45030.

Each recommendation will be carefully considered by the committee. Candidates will be selected on the basis of their past local association or AWI experience, geographical location, present job status, horological experience, and willingness to serve.

Recommendations must be received before December 31, 1995 for them to be considered for the 1996 election.

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.

Ad Index

American Perfit Crystal Corp. 23

Borel 5

Butterworth Clocks 6

Cas-Ker ..... inside back cover

Cowells 33

Esslinger ..... inside front cover

S. LaRose, Inc. 9

Livesay's, Inc. 21

Maxell 3

McCaw, William S. 13

Newall Mfg. 49

S&G Industries 36

Twin City Supply 15

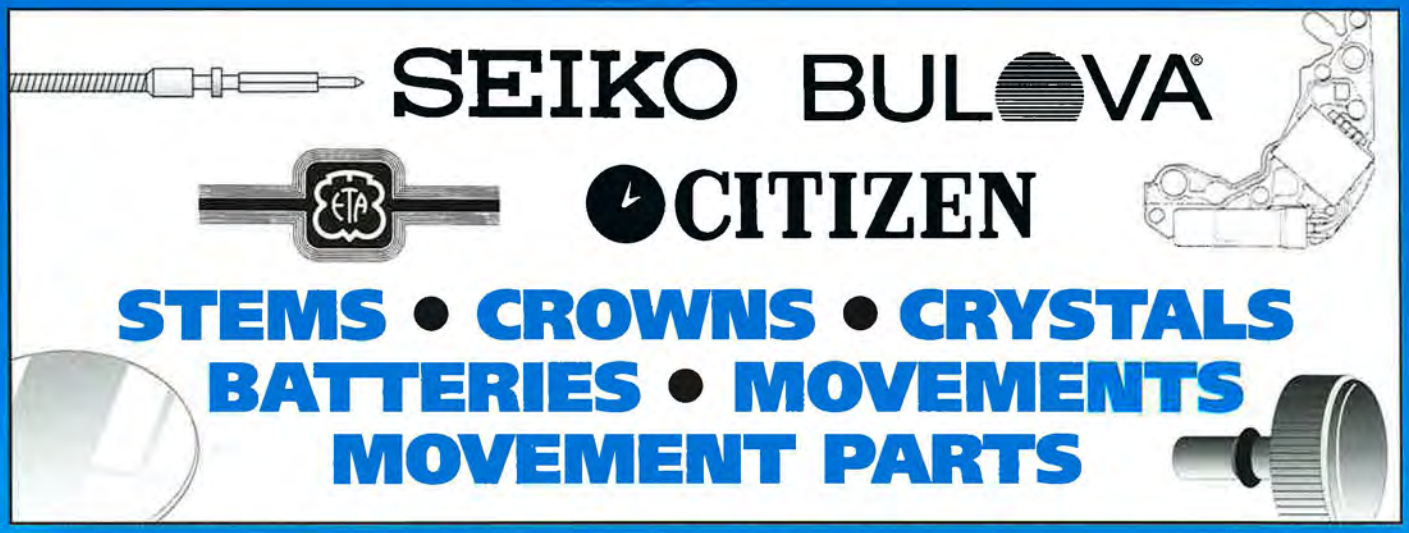
United Tool and Material Co. 36

Vibrograf USA Corp. 29

What-i-use 11

Witschi Electronics 37

Q. Watch Parts?
A. Cas-Ker Co.



Watch parts are no problem when you order from Cas-Ker. We provide same day turnaround on most orders and most items are shipped from our huge inventory. Our experienced and knowledgeable phone clerks will provide the quick and efficient service you need. If you have problems with watch parts or crystals, we can help you. Call us today!

Your Best Source for Watch Parts

Cas-Ker Co.

CALL 1-800-487-0408 FAX 1-800-487-5848

LOCAL PHONE 513-241-7073 FAX 513-241-5848

2121 SPRING GROVE AVENUE PO BOX 14069 CINCINNATI OH 45250-0069

VISA MasterCard

1995-96 Bench Courses

To register for these courses, please send with your request a registration fee of **$50.00 per instruction day** (AWI members) to: **AWI Central, 701 Enterprise Drive, Harrison, OH 45030.** 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, signature, and phone number. All registration fee checks and charges are now processed immediately upon receipt.
FAX (513) 367-1414 • PHONE (513) 367-9800

OCTOBER 1995		
6	Servicing the "Smart" Analog Quartz Watch	Effingham, IL*
6-8	Repair of the Bulova Accutron	Oakland, CA
6-9	Lathe Course (Phase II)	Tucson, AZ
8	Servicing ETA Quartz Chronographs	Minneapolis, MN
8	Introduction to the Watchmakers Lathe	Columbus, OH
12-13	Mechanical Chronographs	Houston, TX*
20	Introduction to Watch/Clockmakers Lathe	Minneapolis, MN*
21-22	Cuckoo Clock Repair	Boston, MA
22-23	400-Day Clock Repair	Minneapolis, MN*
28-29	Repair of the Atmos Clock (FULL)	St. Louis, MO
NOVEMBER 1995		
10-12	Mechanical Watch Repair	Dallas/Ft. Worth, TX
10-13	Micro Lathe Operations	Minneapolis, MN
11-12	Striking Clocks	Orlando, FL
JANUARY 1996		
26-29	Lathe Course (Phase III)	Tucson, AZ
27-28	400-Day Clock Repair	San Diego, CA
27-28	Cuckoo Clock Repair	Orlando, FL
FEBRUARY 1996		
23-26	Lathe Course (Phase I)	Charlotte, NC
24-25	Striking Clocks	Seattle, WA
24-25	Cuckoo Clock Repair	Dallas/Ft.Worth, TX
24-25	Repair of the Atmos Clock	Oakland, CA
MARCH 1996		
16-17	Hairspring Vibrating	Kansas City, MO
16-17	Advanced Quartz Watch Repair	Seattle, WA
22-25	Lathe Course (Phase II)	Charlotte, NC
23-24	Repair of the Atmos Clock	Minneapolis, MN
APRIL 1996		
13-14	Mechanical Chronographs	Oakland, CA
13-14	Advanced Quartz Watch Repair	Boston, MA
14	Servicing ETA Quartz Chronographs	Seattle, WA
27-28	Hairspring Vibrating	Dallas/Ft. Worth, TX
MAY 1996		
5	Servicing ETA Quartz Chronographs	Oklahoma City, OK
17-19	Advanced Clock Repair	Seattle, WA
17-20	Lathe Course (Phase III)	Charlotte, NC
18-19	Mechanical Chronographs	Dallas/Ft. Worth, TX
JUNE 1996		
15-16	Mechanical Chronographs	Seattle, WA

** Held in conjunction with a convention*

Bench Courses & Instructors

Advanced Clock Repair	Roland Iverson, CMC
Advanced Quartz Watch Repair	Robert Bishop, CMEW, FAWI
Clock Case Repair	James Williams, CC
Cuckoo Clock Repair	James Williams, CC
Filing & Flat Polishing	Joseph Cerullo, CMW, CMC
400-Day Clock Repair	John Nagle
Hairspring Vibrating	Joseph Cerullo, CMW, CMC
Introduction to American Pocket Watches	Alice Carpenter, CMW, CMEW
Introduction to Clock Repair	Buddy Carpenter, CMC, CMEW
Introduction to Quartz Watch Repair	Buddy Carpenter, CMC, CMEW
Mechanical Chronographs	Mark Heist
Mechanical Watch Repair	James Lubic
Micro Lathe Operations	Roy Hovey
Quartz Perpetual Calendar	Remy Waelchli
Repair of the Atmos Clock	Gerald Jaeger, CMW, CMEW, FAWI
Repair of the Bulova Accutron	Henry Frystak, CMW
Servicing ETA Quartz Chronographs	Jeff Broughton
Servicing the "Smart" Analog Quartz Watch	Robert Bishop, CMEW, FAWI
Striking Clocks	John Nagle
Watch/Clockmakers Lathe Course	Roy Hovey

Phase I: Basic Theory, Tools and Accessories for the Watch/Clockmakers Lathe

Phase II: Making Wheels, Function Control Arbors and Lantern Pinions

Phase III: Making Staffs, Jewel Settings for Watches and Marine Chronometers, Turning Between Centers, and the Jacot Tool

Phase IV: Making Wheels/Pinions and Use of the Pivot Polishing Accessory