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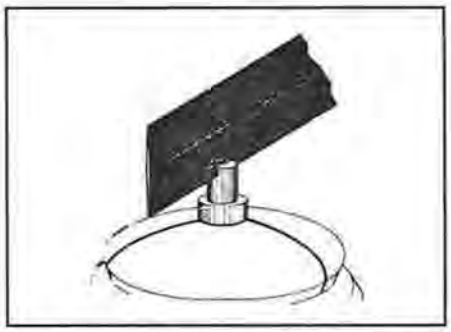
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ON THE COVER: This month's cover is of the Royal Canadian Gardens in Ontario, Canada by Dale LaDue of Rochester, New York.

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PRESIDENT'S MESSAGE

In my last official address to the members of AWI, I would like to reflect on my past two years as president and my overall involvement with AWI.

Since joining AWI in 1975 at the tender age of eighteen, I have seen my meager annual dues turn into an investment in my future without limits. In the beginning, the return on my investment was simple—the monthly magazine which at that time was called the *American Horologist and Jeweler*. Every month I waited for its arrival like a kid waiting for his decoder ring to come in the mail. As soon as it arrived, I would stop whatever I was doing and begin to browse through it quickly. Later I would spend time to actually read it from cover to cover. It was through this magazine (later AWI published the *Horological Times*) that I began to develop respect and admiration for the various contributing editors, notables such at Orville Hagans, Henry Fried, Marvin Whitney, Archie Perkins, and many more.

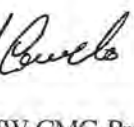
It wasn't until my first trip to Cincinnati in 1982 as an alternate delegate for New Jersey that I became aware of how much more there was to realize from my investment. The mere fact that I had the opportunity to sit and break bread with these icons of horology was worth the time and money away from work.

It was also at this time that I began to believe that I too could make a contribution, however small, to AWI. It was time to start giving back for what I had received. Since my first trip I have not missed a year in attending the annual meetings. I have served on several committees with many very dedicated people and have made many friends, and I'm sure a few enemies also. The most rewarding experience for me was to be part of the Building Committee that worked long hours with the AWI staff to design and contract our new world headquarters.

Last year before our ribbon-cutting ceremony, a group of volunteers finished the Henry B. Fried tower clock that was dedicated to Henry for his contribution to horology and to AWI. In his obituary in the New York Times it states that this day was one of which he was most proud. It was also one of mine. In the past year we have said good-bye to Marvin Whitney and Henry Fried. I cherish all the memories and times that I have spent with these two great men.

AWI is undergoing change as you read this column. Our leader for thirty years, Milton Stevens, is retiring this year. We are hoping to replace him with someone who can continue the job that Milt has done.

This past year has been a tough one for many of us at AWI. Change is not always easy but it is always necessary and it will always continue. I want to thank everyone who has worked with and believed in me. I want to apologize to anyone whom I might have offended during my tenure. I'm sure that if we all have and hold the best intentions for AWI we will continue to grow and be the best we can be.



Joseph L. Cerullo, CMW, CMC, President

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QUESTIONS & ANSWERS

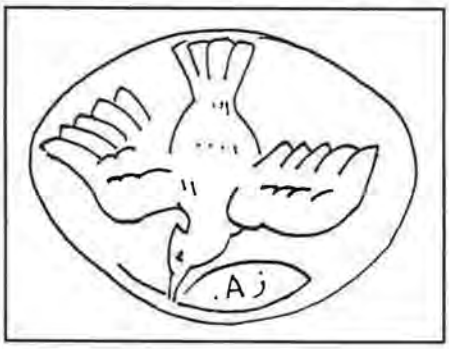
By Henry B. Fried, CMW, CMC, FAWI, FBHI, ★FNAWCC

QUESTION

I am wondering if you could lend your extensive knowledge concerning a watch which one of my customers brought to me recently. This watch is a Swiss pocket watch made by Jules Favre, number 104518. It is a 43 mm, 7-jewel movement with a lever escapement with a pendent activated, single-action, 60-second chronograph which has pendent winding and lever setting. It is a pillar wheel style chronograph with a seconds heart and flyback lever as well as a brake. It appears to have been recased in a gold-filled open-faced case made by C.W.C. Co., #627816.

The owner of the watch would like to know when the watch would have been made and how rare it might be. I have found a Marius Favre and Sons registered in Geneva in 1893 but the style of the chronograph mechanism suggests to me that it is not this old. Is my reasoning sound?

Christopher Lucic, Tucson, Arizona



ANSWER

I have searched through my many resources and can't come up with a Jules Favre although there were many in that industry with that last name, all making quality products.

I find that in matters of Swiss origin, when I cannot come up with anything, I send the request to Kathy Pritchard who is probably the best authority on the Swiss manufacturers (and that includes the Swiss themselves). *Henry B. Fried*

I have six or seven pages of Favres—as you say, there were many of them. The only Jules Favre I have is one who took over the firm of Favre Frères of La Neuveville (not the one on Cormoret) in 1897. Within a few years, the name had reverted back to Favre Frères. It is perfectly possible that Jules Favre also had a sales office in Geneva, before, after, or during his time of running that company. Or, it may have been another Jules Favre altogether.

In any case, the movement was made by someone else. The symbol of the movement looks to me like Ch. Chopard's of Sonvilier—the shape of the bird, the little crest on the bird's head, etc. are the same. The bird Japy used on L'Alouette was quite different. Chopard also used the letters "C.A.C." and it is possible that those are the letters on the leaf. I don't have a picture of a registration that includes both the bird and the letters, but I have each separately. My first recorded registration of a bird, and also "C.A.C.," by Chopard was in 1892. The date fits the watch, as far as I can tell. (It is too bad we dotimes andn't have pictures of the original case; it would have been easier to date.) It also fits the dates of a Jules Favre who could have been active in Geneva and/or La Neuveville. Mr. Lucic thinks the chronograph mechanism is later than the 1890s and perhaps he is right. The dial and hands, however, make it not later than 1910 I think. Chopard was active at least until 1903.

Kathleen H. Pritchard

QUESTION

Could you please date the following Waltham Grandmothers clock. The plate number is 9077. The pictures enclosed are not great but may be okay to date.

David Ryckman, Moses Lake, Washington





Continued on page 48.



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ROCK QUARRY

By Fred S. Burckhardt

It may take longer, but from now on I'm going to drive instead of fly. It isn't because of the fear of flying or hitting the ground quite hard when something happens to the plane thirty thousand feet above the ground. The reason is, I'm ill and fatigued (sick and tired) of calling for reservations.

Calling for plane reservations should be fun like they show on television where everybody is smiling and having a good time while the actors show you how enjoyable it can be. It's amazing how quick they get an operator, usually on the first ring. In real life a good part of your vacation is gone by the time you get to talk to a live person. Whenever they say, "Your call is very special to us. Please hold and an operator will be with you in a minute," what this means is, you'll have plenty of time to run down to the taproom and get a pitcher of beer before your call will be answered.

To give you an idea of why it is so irritating, a few days ago I had to make reservations to go on a little trip. After missing both lunch and dinner while waiting, a voice finally came on the line and said "This is Ilga, how can I help you?"

I said "Ilga, I want to go to Jahrwhar, Wisconsin from DFW leaving on Friday the fifth in the morning. Can you tell me what's available?"

"There's one flight that leaves at 6:20 and arrives in Jahrwhar at 10:37. The next leaves at 10:05 and arrives at 2:23. Which one would you prefer and how many will be traveling?"

"Let's plan on the 10:05 and I'll be traveling alone. Now, how about coming back on Monday the eighth in the morning?"

"The first flight leaves at 8:15 and arrives at 11:03. Will that be satisfactory?"

"That will be fine. Now tell me how much a round trip ticket will cost."

"Beings you will be staying over a Saturday night, the round trip will cost $395.00."

"Fine," I said. "I'll get back to you after I get an okay."

An hour later I called back and told the new operator which flights I wanted. After getting all the information Ilga gave to me, she asked how I was going to pay. I told her I had a coupon for a free trip through the advantage miles. "Let me check a minute to make sure of something, No, I'm sorry," she said. "There are no advantage seats open on that first flight. The only seats open are for regular fares."

"How much is a regular fare?" I asked.

"It's only $753.00," she answered.

"Are there any fares less expensive?" I asked. "You're always advertising cheap fares."

"I'll be happy to check," she said with a smile in her voice. In a minute she was back on the line. "Good news," she said. "If you can leave a day early and stay for seven nights, changing planes in St. Louis, Chicago, and Minneapolis both going and returning, the fare will be $28.73. You will leave at 4:33 in the morning and arrive at 9:27 at night. I can't guarantee any seats on the return flights. You'll have to get them at the gates."

"Do they serve any meals on these flights?"

"Yes sir," she answered. "You'll receive our semi-deluxe meals which consist of a brown paper bag filled with goodies left over from the previous flight."

I could see I was getting nowhere fast so I thanked her for her time and hung up. The next day I went downtown to the airlines ticket office thinking that I was going to have to pay top dollar for a ticket. I figured I would try one more time for the later flight so I asked if there were any seats available for the late morning flight on the fifth. The young lady checked and said, "Yes sir. There are seats available. When would you like to return?"

I let her go through the whole itinerary and thought for sure I'd pull a good one on her when I told her it was for an advantage ticket. "That will be fine sir," she said. Then she added, "I would like to recommend you save that ticket as we are having a special fare on this flight and your advantage ticket is good for a year. Of course it's up to you."

"There must be something wrong," I said. "After all the time I spent on the phone trying to get tickets and here you are giving me everything I need, just the way I want it, with no hassle and in just a few minutes time. I can't believe it."

"We're here to serve you and will be happy to help you at any time," she said. Just then two men in white suits came in and took her by the arms and led her away. Another woman came over and said, "Sorry about that. We had to send her to Happy Hill Farm She forgot all her training and was actually trying to help people with their tickets. Now, how can I help you?"

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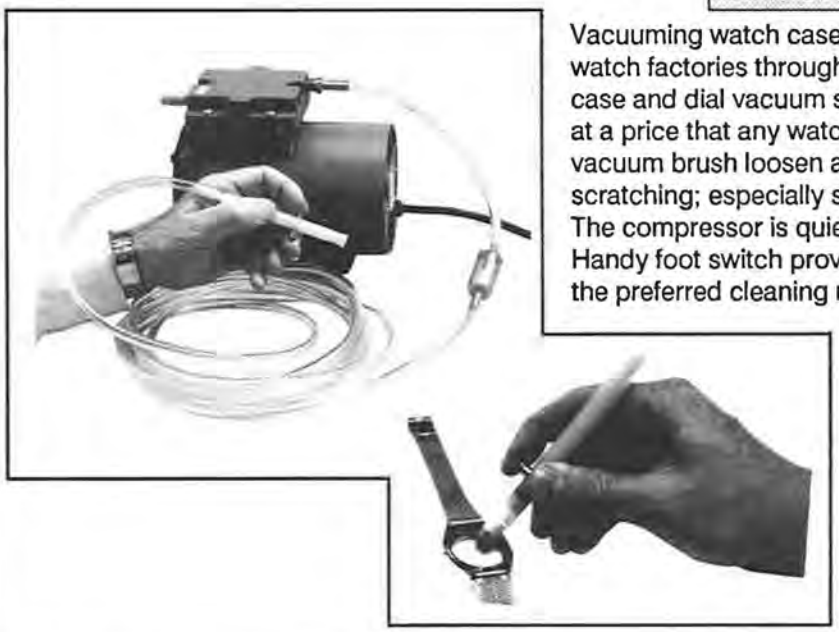
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ASK HUCK

By J.M. Huckabee, CMC, FBHI

Pendulum Wobble

Q. Why does a pendulum wobble? Old American clocks often do this without an obvious reason. The old General Store Regulators are very bad. What solution can you offer?

A. I know the situation you describe. Most literature avoids the subject, other than possibly: "...a kink in the suspension spring." Now that is true in some cases, but the trouble is much deeper.

Let's talk about one of those old box regulators. These have a pendulum ball in the order of 4" in diameter, and a total length of 16"-18". The door glass may read: Standard Time, Regulator, Browns Mule Chewing Tobacco, etc. Let's disconnect the crutch wire and make a few observations.

Turn the pendulum ball about 1/8 of a turn (twist the pendulum rod), release, and observe the oscillatory rate. It will oscillate in the rate area of 1-4 times per second. It may take several cycles to cease. Estimate the time per cycle. Now swing the pendulum in its normal mode of operation. The oscillatory rate will be between 1 and 2 cycles per second. Here a cycle is a one-way trip. This pendulum has these two rates of resonance. Under low energy excitation it will oscillate at either or both modes and rates. The normal swing is established by the pendulum length and the ball location. The torsional mode is established by the inertia of the pendulum and the torsional strength of the suspension spring.

The pendulum needs excitation to swing normally, and excitation to oscillate in the rotational mode (wobble). Where does the wobble excitation come from? Lack of symmetrical shape in ball and rod is one source. Another is the wire rod does not follow a plumb-line where it passes through the crutch. That imparts a cranking motion to the pendulum.

The inertia of these pendulums and typical suspension springs frequently result in a torsional oscillatory rate of 2-4 times the normal escapement rate. If the harmonic relationship nears 2, 3, or 4 times the beat rate, the pendulum wobbles badly. A torsional rate of 2-x escapement rate is most commonly found.

How can the problem be corrected? A longer, thinner, narrower suspension spring slows the torsional rate. A wider, thicker, shorter spring speeds the torsional rate. The pendulum ball that shows a double-wobble (2-x rate) may be corrected by making the spring shorter, or thicker, or wider, or a combination of these. If you carry the torsional rate to about 5-x normal rate, the excitation will probably be too low to sustain the wobble. I have found that it is easier to get results by an increase in rate; usually it must be three or more times the normal rate.

Many replacement rod and spring assemblies have an active spring size of about 0.750" long, 0.200" wide, and 0.004" thick. Most wobble in these old clocks can be eliminated by a shorter spring of the common size, for example, 3/8"-1/2" active length. It is simple to strike a dimple, or pierce a hole in the spring with a watchmakers staking set, and hook the spring up shorter.

The old Kitchen clocks have the same problem and solution.

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Magnetism

Q. How can small pieces be magnetized? Tools and small clock parts, for example.

A. Most pieces of a simple clock cannot be magnetized. Mild steel pieces are attracted by a magnet, but do not retain the magnetism when the magnet is removed.

Copper and essentially all of its alloys are nonmagnetic. They are generally not attracted, neither will they respond readily to a static magnetic field. Brass is a combination of copper and zinc and is considered nonmagnetic.

High-carbon steel that is very hard can usually be magnetized by exposure to a very strong magnetic field. Some of your shop tools, clock mainsprings, steel hairsprings, and some of the winding parts of a mechanical watch can usually be magnetized. The split rim of a watch bimetallic balance wheel often becomes magnetized.

A degaussing coil is widely used in industry to magnetize or demagnetize tools and manufactured parts. Gauss is the unit of measure of magnetic flux density.

The coil is a helix of wire energized by an alternating current source of electricity. The simple demagnetizers watchmakers used a half-century ago is an example. Properly used, no other device is more suitable for your use. The tool must have a switch that will turn on or turn off quickly. This is usually a simple push-button.

The piece to be demagnetized is inserted into the helix central area, power turned on, and the piece withdrawn slowly, over a period of 2-3 seconds. It must be outside the external field prior to turning the power off. Test the result with a compass.

To magnetize a piece, a screwdriver for example, place it in the helix and momentarily apply power, then remove the piece. Test with a compass and observe the magnetic polarity. Try again and again. Polarity may be either way, depending on the wave form at the time power was cut off. If polarity is important, as a compass needle, you may need to try several times to get it correct.

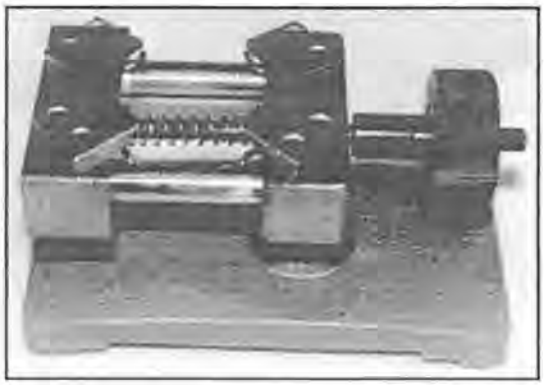
I hate magnetized tools. However, I keep my demagnetizer on the bench, often charge a screwdriver to pick up a small piece, and then demagnetize it. This is an interesting subject that has lots of use in the clock shop.

If you have any questions, please write:
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MISCELLANEOUS REPAIRS—PINS AND THEIR FASTENINGS

By Marshall F. Richmond, CMW

Being an all around jewelry repair person requires first of all, common sense and the application of logic, a good mechanical aptitude, as well as a dedicated interest in doing this type of work. Skills must be developed in the use of heat for soldering, annealing and tempering, the use of files, saws, cutting stones, abrasives in shaping and finishing the materials we have to work on and with. The craftsman must gain knowledge about the chemicals used for fluxing, pickling, testing metals, removing solders and dissolving materials. The craftsman must also develop skills in the use of tools and their maintenance, such as sharpening, and making tools for specific jobs. To be able to become an all around jeweler requires a lifetime of learning.

After learning the basics, you will devote your life to being a student of the trade. I have worked at it for a half-century. I still learn something new each day and find the work to be so interesting that in all these years I have never put in what seemed like a long day, even though it may have been twelve or more hours.

The next several articles will be devoted to miscellaneous repairs. This began with last month's article on bead and pearl repairs and stringing. This article will be about pins and their fastenings, such as pin stems, safety catches, pin stem hinge joints, hinge rivets and other rivets, emblem attachments, and other related repairs.

Let's start with pin backs, pin stems, safety catches, and pin stem hinge joints (see Figure 1). Figure 1-a shows a simple pin for attaching an ornament or emblem to cloth such as a dress, coat, or shirt. It is very inexpensive and can be made of brass or nickel silver wire by forming a point on one end and bending to shape with round nose pliers. The pin can then be soft soldered to the piece which is to be pinned to cloth. The bending and shaping of the wire will cause it to work harden so the double coil that works as a hinge also works as a spring. Soft soldering will not use enough heat to remove the hardness by annealing. Figure 1-b is a manufactured pin back that is available from jewelry suppliers or findings suppliers. They can be obtained in assortments or individually. These can be obtained from material suppliers, mostly available in nickel silver. They are used mostly on repairs of inexpensive costume jewelry. These pin backs have a safety type catch. Figures 1-c and 1-f show two different types of safety catches—on one the pin enters from the top and on the other it enters from the side. These are also available in nickel silver but can be had in karat gold from complete findings suppliers. Figue 1-d shows a hinge joint for a pin stem and Figure 1-e shows the components assembled. Figure 1-d shows a rivet that the pin stem hinges on. Figures 1-g, 1-h and 1-i show a pin stem in three stages of being made from a piece of brass or nickel silver wire. Figure 1-e shows the three components assembled. These components are available separately because they are mostly used for repairs, and many times to make a repair it only requires one of the three components.

Usually the hinge joint and the safety catch are attached directly to the piece of jewelry by hard soldering if the piece

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is made of metal that will stand hard soldering. Metals such as pewter (pot metal) or plated metals will not stand hard soldering without damage, so they must be soft soldered. In soft soldering pewter or other low melting point metals, it is better to use a soldering iron or gun because it is almost impossible to control the torch heat without melting these metals.

Pin stem hinge joints and safety catches are available for hard soldering or with a larger base made for soft soldering. (See Figure 2.) Figures 2-a and 2-c are the type made for hard soldering, and 2-b and 2-d for soft soldering. Notice the larger base for soft soldering which is hard soldered to the catch and hinge joint. The base has a rim around the outer edge so it can be heated and filled with solder. When it is installed the heat can be applied with a soldering iron to the catch or joint while it is in place. As the solder melts and flows, it carries enough heat to the piece being soldered that the melted solder will bond making a durable solder joint. If a hard solder type is needed and you only have the soft solder type, the base that is hard soldered to the catch or joint can be removed by heating until the hard solder flows and the two pieces separate. Even though there is hard solder on the piece to be installed, a little more should be added before installing. Figure l-e is a complete pin stem that can be installed on either l-c or 1-d with a rivet as shown in the drawing. I normally use a piece of nickel silver wire to make the rivet. The head is formed by fluxing the end of the wire, then by heating it with the torch until the end melts forming a small ball on

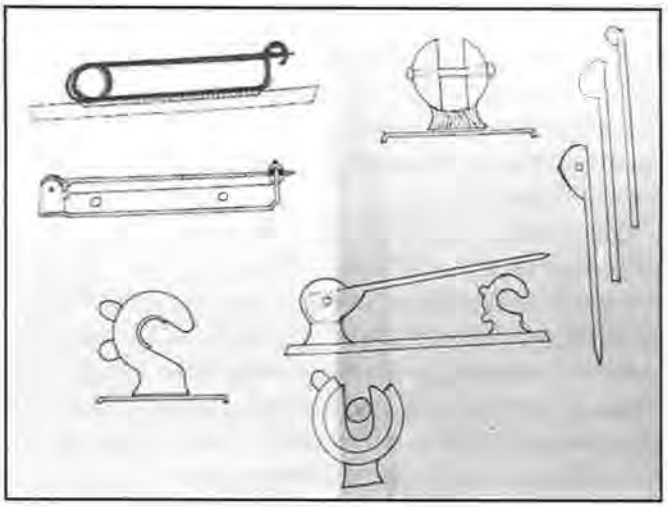


Figure 1.

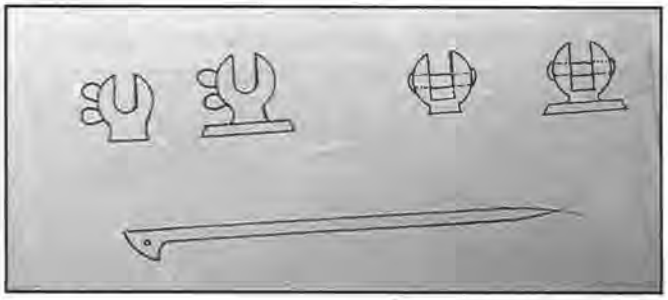


Figure 2.



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the end. When the rivet is cut off to length away from the ball, it can be installed, and with the head on a steel anvil, the end can be riveted with a chasers hammer.The ball end of the chasers hammer works well to spread the end of the rivet which can then be tightened with the face side of the hammer. (See Figure 4.)

Pin stems are available in lengths from 3/4"-3" in length and in more than one thickness. Likewise the catch and joint are made in sizes small to large. It is important that the diameter of the pin stem will work in the catch and the size of the rocker is compatible to the hinge joint. When installed and riveted, it has to be so that when hooked in the catch it has a spring pressure. That is why there is a rocker shape on one end of the stem. The length of the stem can be changed if too long simply by cutting it off and shaping a new point. This can be done with a pin vise and a file. When you shorten the pin stem, you should always polish the end with abrasive buff sticks.

Riveting pin stems is only one of the many riveting jobs

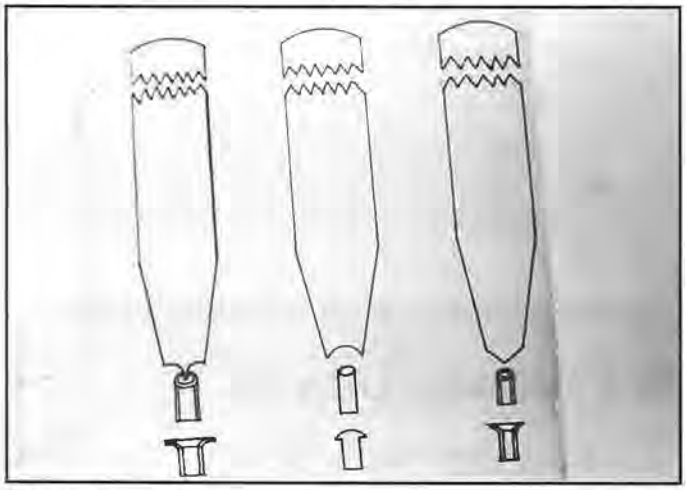


Figure 3.



Figure 4.

that will be encountered in repairing or making jewelry. Basically there are only two types of rivets: solid and tubular. (See Figure 3.) Figure 3-a shows a tubular rivet with a punch designed to spread the rivet into a flair. Then tighten it down as shown in the riveted rivet. Figure 3-b shows a solid round rivet with a punch made to rivet the end. This leaves a dome or bead as shown in the finished rivet below it. Figure 3-c shows another tubular rivet with a punch sharpened like a centering punch. It will spread the rivet like the finished one under it. This rivet can be flattened with a flat bottom punch or with the chasers hammer.

Study Figure 4 and notice the ball end for peening and the other large end for hammering and riveting. The chasers hammer is one of the most used tools for jewelry repairing. Riveting does not stop with riveting the ends of hinge pins; many other pieces of jewelry are bonded together with rivets. Examples are emblems on drilled stones set in finger rings, and even some rings have the top attached with rivets. Drilled stones usually use tubular rivets and generally two different sizes. The stone is usually countersunk slightly in the underside of the hole and a slot is cut across the hole so when the emblem is riveted as shown in Figure 3-c, a narrow punch can push metal into this groove. This will keep the stone from turning. Another method of attaching an emblem to a drilled stone is to have two small holes in the stone and use two solid rivets. With two rivets the stone cannot get turned. These rivets are either cast in the emblem or attached with hard solder joints. The old "Z" and "X" expansion watch bands had rivets and springs in every joint. Most of them could be repaired without replacing a rivet. If the rivet was tubular, the caps could be removed as well as the springs and the rivet could be burnished tight using the punch. (See Figures 3-a or 3-c.) The springs and caps are then installed. Some of the "X" type bands had solid rivets on the outer ends of the link with a tubular rivet in the center where the spring body goes through. I found that there are small copper rivets available in two sizes from watch material suppliers. They are made to replace dial feet on watches, but being copper they make excellent rivets and worked well in repairing these old expansion bands. Although it has been years since I have had an old expansion watch band to repair there has been an occasional "Carmen" bracelet given to me for repair and these can be repaired in the same way as the old expansion bands. At one time there was a riveting block, riveting punches and spare rivets and springs for repairing the old expansion bracelets and watch bands. Some "old-timers" may still have these.

Tennis bracelets, as they are called now, are link bracelets generally containing diamonds in some or all of the links and each link is hinged on each end with a tubular hinge. These are usually karat gold (10 or 14) and many are made of very light material so they start breaking in the hinges. Although the hinges use a gold wire for the hinge pin it is not riveted on the ends. After the tubes have been repaired and the pin fit each end, it should be gold soldered and dressed off so that when polished the ends of the pins are not visible.

This requires utmost caution for in gold soldering the ends too much heat can solder the hinge solid. A future article may be about the repairs on these tennis bracelets including the clasps used and the repairs on them, as well as replacement catches available.

Rivet wire is available in 6" lengths in assortments from #10 to #70 drill sizes in brass or nickel silver. Tubing is available in assortments in gold filled or sterling silver. Besides riveting, the wire and tubing has many uses and it is always a good idea to have this in stock. Although it is not practical to make rivets since they are available ready-made, occasionally even with a good assortment of ready-made rivets, one is not available for the job on which you are working. Then it becomes practical to make one. Even if the type and size you need is available, the cost of ordering just one or a few plus having to lay back an uncompleted job makes it worthwhile to take time to make a rivet. Occasionally, the need arises for karat gold rivets so it is a good idea to have on hand round gold wire. I keep on hand 18 gauge (1 mm), 20 gauge (.750 mm), 22 gauge (.625 mm), and 24 gauge (.500 mm) in 14K, both yellow and white. It is available from material houses in 3" lengths. In doing jewelry crafting and repair, the wire in these sizes is used for many things such as making prongs, ear wires for pierced ears as well as for hinge pins which can be either riveted or gold soldered in place.

Seamless karat gold tubing or sterling silver tubing is also available in diameters of 1 mm to 3 mm in light, medium, and heavy wall and can be used for many repairs or components when custom making a piece of jewelry. When getting started it would not be practical to start with a complete inventory of all the materials you may need over the years. It is wise, when the need arises, to order material. Always order some extra and keep your material organized so the next time you need it you will be able to find it. This is the way I have built my material stock and although I am working on a semi-retired basis, I do use quite a bit of these materials and rarely have to lay back a job while waiting for material. One of the reasons that I have been able to build up my inventory is that I buy it directly from the refiner who has a minimum order. When ordering what is needed, I order anticipated needs to fill out the minimum order.

In the Pickle Barrel article on "Fluxing, Shielding, Annealing and Pickling," found in the April issue of *Horological Times*, I referred to carbon steel and mentioned that I could find no listing for carbon steel small drills. I prefer them for drilling the small holes needed in jewelry work. I prefer them because high-speed drills cannot be annealed when broken off in a job but the carbon drills, when annealed, can be drilled out if no other method works. A communication from Mr. Edgar L. Routh, an AWI member from Maize, Kansas, gave me a source in New York where these are available. I will check this out and give anyone information on what I learn if they will contact me. In the next article, a continuation of miscellaneous jewelry repairs will be discussed, possibly the repair of chains, earrings, and catches.

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TECHNICALLY WATCHES

ANTIQUE WATCH RESTORATION, PART CXXVII

TRUING HAIRSPRINGS TO THE BALANCE COCK

By Archie B. Perkins, CMW, FNAWCC, FBHI
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Truing hairsprings to the balance cock is done before the hairspring is placed in the watch for final truing. It is done to minimize the amount of truing needed in the watch.

Truing hairsprings to the balance cock consists of three operations: (1) Circling and centering the regulator sweep, (2) Centering the hairspring collet to the balance hole jewel in the balance cock, and (3) Leveling the hairspring to the balance cock. These three operations are done in this order, therefore they will be discussed in this order.

Importance of Regulator Pins' Condition

Before attempting to true a hairspring to the balance cock, it is very important to have the regulator pins in proper condition and position. This is shown in Figure 1.

View A, Figure 1 shows the regulator used for a flat hairspring. This regulator has a key and a pin to control the hairspring. The key is turned one-fourth turn with a screwdriver when removing or replacing the hairspring on the balance cock. The key has a lip extending out to cover the end of the regulator pin to close up the space between the key and the pin. The space between the key and the regulator pin should always be parallel and allow adequate space for the outside coil of the hairspring.

View B, Figure 1 shows a regulator for an overcoiled hairspring. This style of regulator has two regulator pins as well as a key. This style is used by Bulova. The closed key prevents a coil of the hairspring in the body of the hairspring from getting caught between the regulator pins if the watch should get a sudden shock.

View C, Figure 1 shows a regulator for an overcoiled hairspring. This style of regulator is mostly used for overcoiled hairsprings.

View D, Figure 1 shows another view of the regulator pins which shows them lined up with each other. The pins should be straight and at a 90° angle with the regulator.

View E, Figure 1 shows a hairspring that has been bent between the regulator pins and the hairspring stud as the regulator was moved toward the slow side of the regulator scale. This condition was caused by the regulator pins being too tight on the regulator sweep of the hairspring. The regulator pins should always be adjusted so there is adequate clearance on the regulator sweep of the hairspring between the pins.

Shaping the Flat Hairspring at the Stud

The hole in the balance cock for the stud of a flat hairspring is always placed a greater distance from the jewel hole than the distance that the regulator pins are placed from the jewel hole. This practice is to allow clearance between the stud and the second coil of the hairspring when the hairspring is breathing. Since the hairspring stud is farther from the center than the regulator pins, we must shape the hairspring inward at the stud in order to circle the regulator sweep of the hairspring. This is shown in Figure 2.

View A, Figure 2 shows a flat hairspring after it has been pinned at the stud and before it has been shaped at the stud. At this stage, the hairspring needs to be shaped at the stud to allow the regulator sweep to be circled for the regulator pins. Note that the hairspring collet is off-center with the jewel. This is caused by the stud position being farther from center than are the regulator pins.

View B, Figure 2 shows the hairspring after it has been shaped at the stud with a dog-leg shaped bend. This bend should be a rounded double bend. Tweezers that have jaws which are rounded inside can be used to form this double bend.

View C, Figure 2 shows another pattern that can be used for shaping the outside coil of a flat hairspring when circling the regulator sweep. This pattern allows for two dog-leg bends on the outside coil of the hairspring, one at the stud and another just beyond the regulator sweep. This is a more modern approach to shaping the outside coil of a flat hairspring.

Circling the Regulator Sweep of a Flat Hairspring

Figure 3 shows a flat hairspring after the regulator sweep has been circled and centered between the regulator pins. Note that when the regulator is set on center and at the fast and slow positions, the hairspring is still centered between the regulator pin and key. Anywhere between the slow and fast positions, the hairspring should be centered between the pin and key. The lip on the bottom of the regulator key has been removed in the illustration in order to show the space between the key and the pin.

Figure 4 shows the procedure used for circling the regulator sweep of a flat hairspring. This operation is started with the regulator set in the slow position as shown in View A. Note that in this position of the regulator, the hairspring is resting against the regulator pin. To correct this condition, the outside coil is pulled outward near the stud to center the hairspring between the key and the regulator pin.

View B, Figure 4 shows the regulator after it has been advanced to position "a." In this position, the hairspring is resting against the regulator key. To correct this condition, the regulator is backed up to position "b," then the outside coil is pushed in against the regulator pin to bend the coil inward so it will be centered between the key and the pin when the regulator is returned to position "a."

View C, Figure 4 shows the next step in circling the regulator sweep. The regulator is now advanced toward the fast side to position "a." In this position, the outside coil is resting on the regulator pin. To correct this condition, the regulator is backed up to position "b" and the coil is pulled outward against the regulator key to bend the coil outward so it will be centered between the key and the pin when the regulator is returned to position "a."

View D, Figure 4 shows how the regulator sweep is checked to make sure that it is centered between the key and the pin at all positions of the regulator from the slow to the fast positions. A good final test of the regulator sweep circling is to move the regulator from slow to fast as the hairspring is observed. There must not be any movement of the hairspring as the regulator is moved through its complete range. If there is any movement, the regulator sweep must be re-adjusted. After the regulator sweep has been formed, the hairspring is centered on the balance cock without disturbing the regulator sweep.

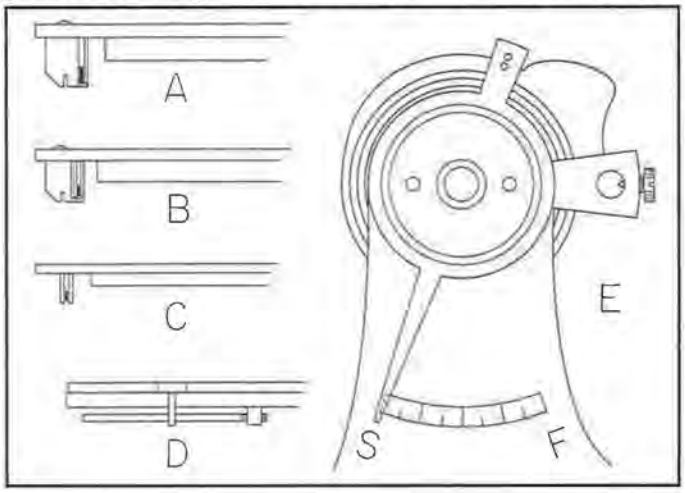


Figure 1.

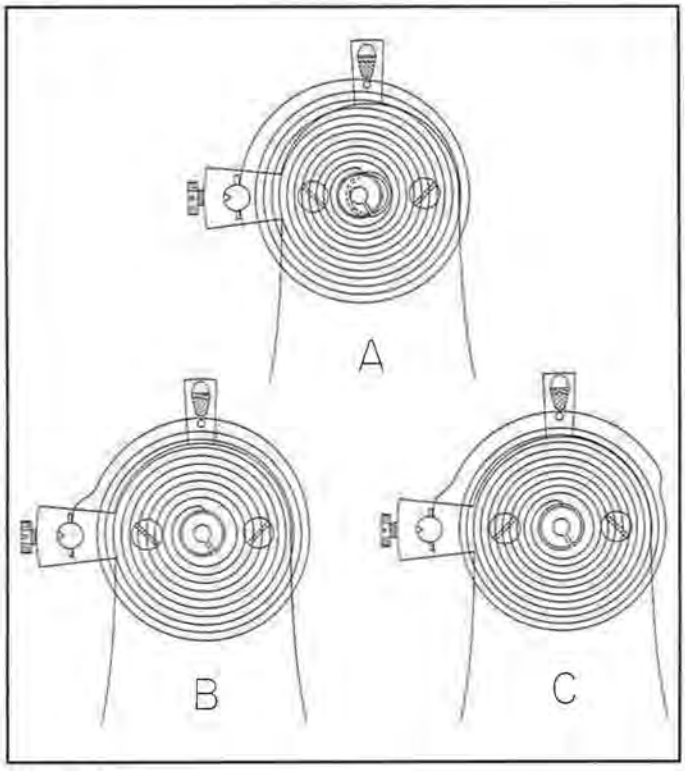


Figure 2.

Centering the Hairspring on the Balance Cock

Figure 5 shows a flat hairspring with two off-center, out-of-true conditions. View A shows a condition where the hairspring collet is off-center with the hole jewel in a direction away from the hairspring stud. The error is on the outside coil just outside the end of the regulator sweep. (See arrow, Figure 5.) This illustration shows the regulator set at the end of the regulator scale at the fast side. To center the collet with the hole jewel, the outside coil is corrected at the arrow with a pair of overcoiling tweezers or with tweezers which have rounded jaws. The outside coil is bent so its radius is decreased at the point where the arrow is located. This bend should be a very gradual bend, not sharp. The bend should be almost invisible, just enough to center the collet with the balance hole jewel. Note: It is very important that the

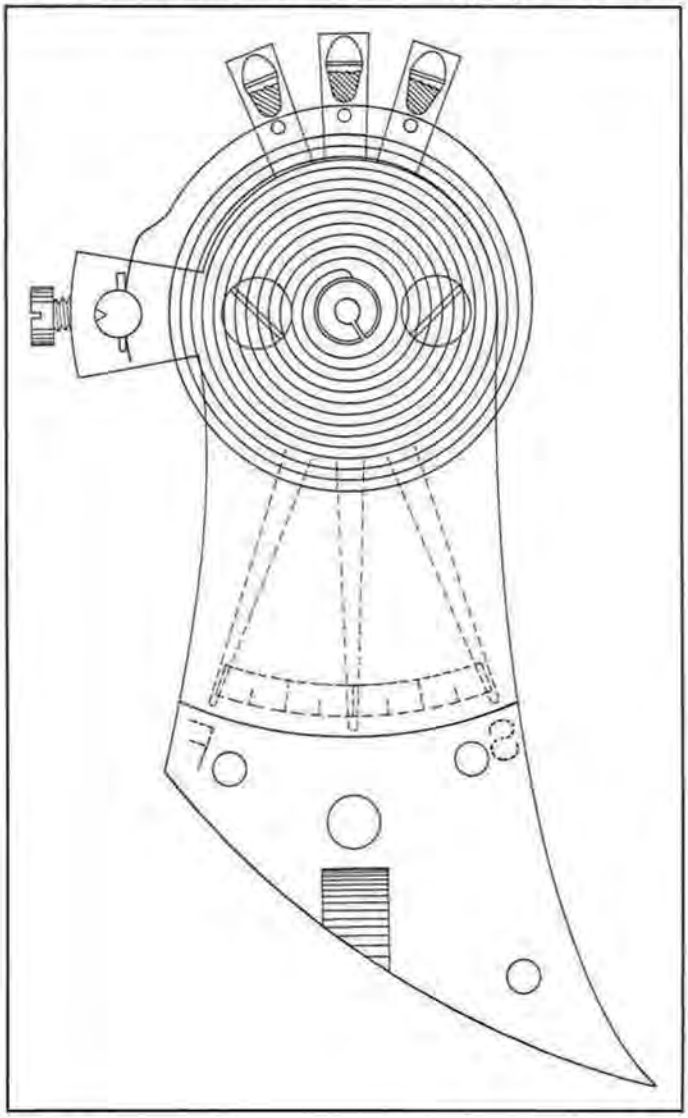


Figure 3.

hairspring has been trued on the collet before trying to center the collet with the jewel.

View B, Figure 5 shows another off-center condition. In this example, the hairspring and collet are off-center in a direction away from the regulator pins. The position of the bend is at the arrow. This bend can be corrected with overcoiling tweezers by reversing the tweezers on the bend so the concave jaw of the tweezers is on the outside of the coil and the convex jaw of the tweezers is on the inside of the coil over the bend. (See inset "a" in View B.) The bending should be kept to a minimum, just enough to center the collet with the jewel. This correction can also be made with a pair of round-jawed tweezers to hold the spring next to the bend while a needle is used to manipulate the coil of the hairspring.

Circling the Regulator Sweep of an Overcoiled Hairspring

Figure 6 shows the circling of the regulator sweep of an overcoiled hairspring. The circling is done in the same manner as for a flat hairspring. There is one difference between the two operations. The difference is that the stud's position on an overcoiled hairspring is usually the same distance from the center as the regulator pins are which makes it unnecessary to make a dog-leg bend at the stud.

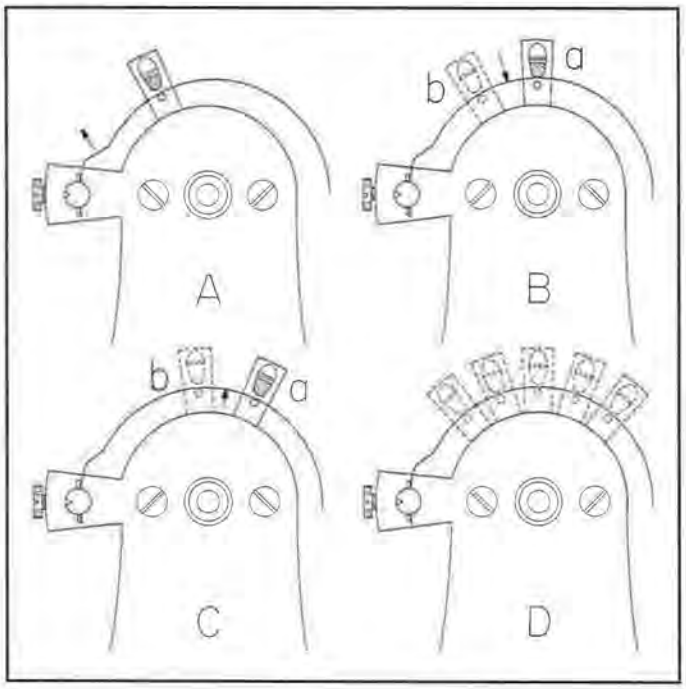


Figure 4.

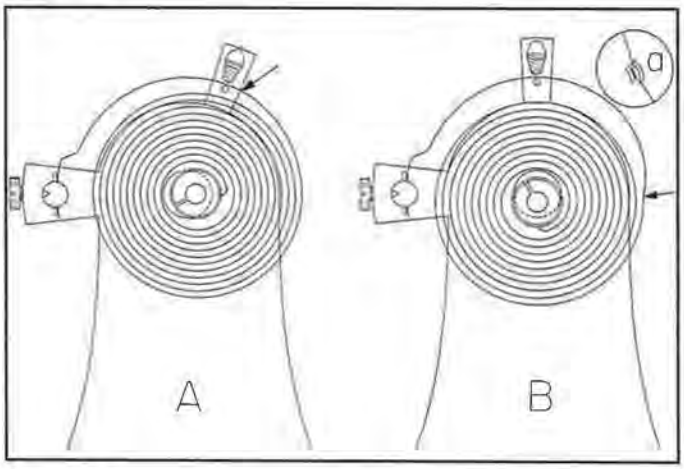


Figure 5.

Centering an Elgin Overcoiled Hairspring to the Balance Cock

Figure 7 shows how an Elgin overcoiled hairspring is centered to the balance cock. Since the Elgin overcoil is of the double quadrant type, these same procedures can be used on any double quadrant type of overcoil.

View A, Figure 7 shows a hairspring and collet that is off-center in a direction which is toward the straight part of the overcoil. The error is in the second bend which joins the regulator sweep. This is shown by an arrow. The second bend has a radius that is too long, and it must be shortened. This can be done with the overcoiling tweezers as shown in the inset in View A. By squeezing the tweezers, the bend is closed up more which will shift the hairspring and its collet to a centered position over the hole jewel. This operation can be done by holding the hairspring close to the bend with rounded-jaw tweezers and using a needle to manipulate the hairspring to center it.

View B, Figure 7 shows another off-center condition in an Elgin hairspring. In this case, the hairspring and collet are off-center in a direction away from the regulator pins. This condition is caused by the straight part of the overcoil being too long. The reason for this is that there is a sway in the straight part of the

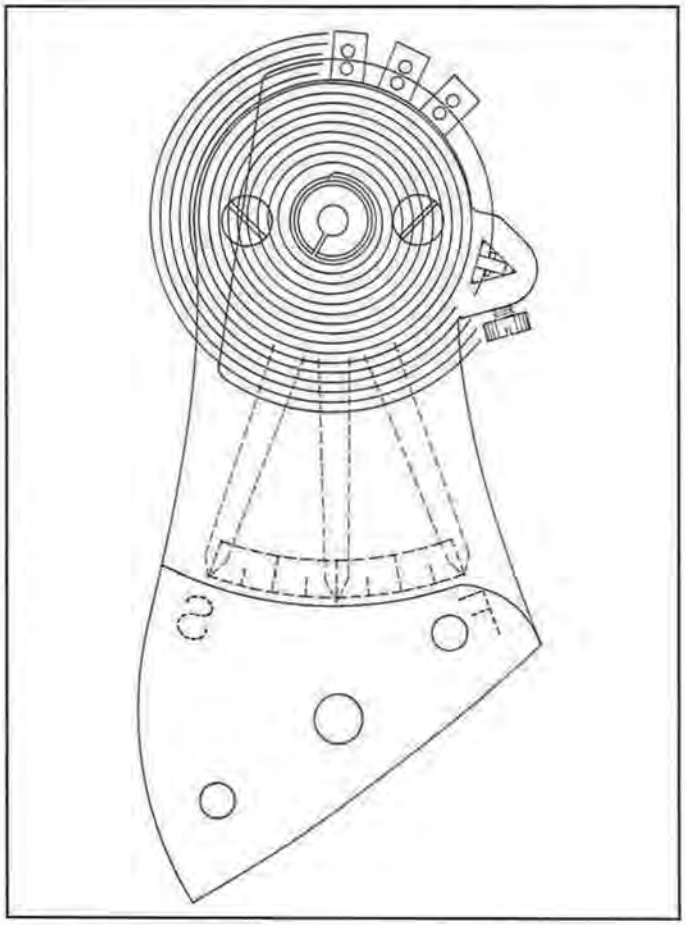


Figure 6.

overcoil. The reverse of this would be a hump in the straight part of the overcoil causing the straight section to be too short. To correct the condition in View B, Figure 7, the sway is removed making this section straight which will shift the hairspring and collet to center.

Figure 8 shows two other examples of Elgin overcoils that are off-center with the hole jewel. View A shows a condition where the hairspring and collet are off-center in a direction which is opposite the straight section of the overcoil. The error is in the first bend of the overcoil as the overcoil starts across the hairspring. This position is shown by the arrow. The radius of the bend is too long. This condition causes the straight section of the overcoil to be too far away from the center of the collet. The correction is to shorten the radius of the bend which will shift the whole body of the hairspring and its collet toward the straight section of the overcoil, bringing the collet back on center with the hole jewel. This correction can be done very nicely with the overcoiling tweezers, or it can be done with the rounded-jaw tweezers and a needle.

View B, Figure 8 shows the other example of an off-center Elgin hairspring. In this case, we have the opposite condition. The hairspring and collet are off-center in a direction toward the straight section of the overcoil. This places the straight section too close to the center of the hairspring collet. This condition is caused by the shortened radius of the first bend. (See arrow, Figure 8.) The correction would be to lengthen the radius of the bend which would shift the body of the hairspring and collet back

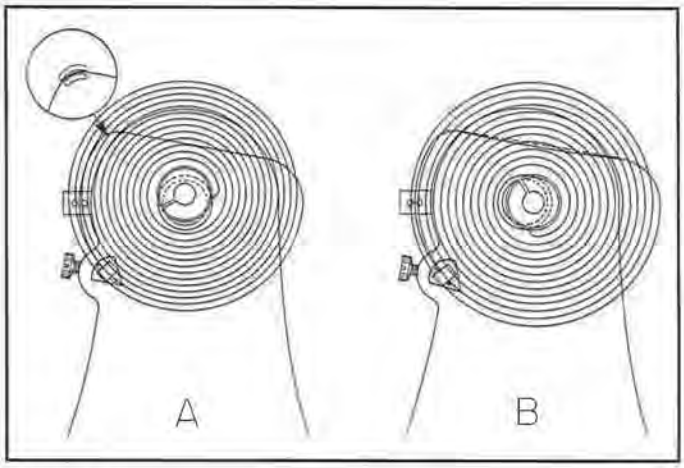


Figure 7.

on center with the hole jewel. This manipulation can be done with the overcoiling tweezers by placing the concave jaw on the inside of the bend and the convex jaw on the outside of the curve. The tweezers are squeezed just enough to correct the radius of the bend and center the collet. The bend can also be corrected with the rounded-jaw tweezers and a needle. When this bend is manipulated, the overcoil does not move; only the body of the spring moves in relation to the overcoil. When the second bend is manipulated, the straight section of the overcoil moves with the body of the hairspring.

View C shows a correctly shaped Elgin overcoil. The straight section of the overcoil encloses the first three coils from the collet

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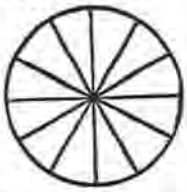
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HATTORI SEIKO RICOH ORIENT SEIKO KIF LANCO lavina

and the regulator sweep goes between the second and third coils from the outside of the hairspring. These conditions may vary slightly from watch model to watch model.

Centering Hairsprings with Circular-Style Overcoils

Figure 9 shows three examples of off-center hairsprings that have circular-style overcoils. View A shows a condition where the hairspring and collet are off-center in a direction away from the hairspring stud. This condition is caused by a bend in the overcoil at the arrow in the illustration. The overcoil at this point is too flat or the radius of the curve is too long. The correction is to shorten the radius of the overcoil at this point which will shift the spring and collet back on center. This manipulation can be done with large overcoiling tweezers or with rounded-jaw tweezers and a needle. Care must be used to avoid making kinks in the overcoil while correcting the condition.

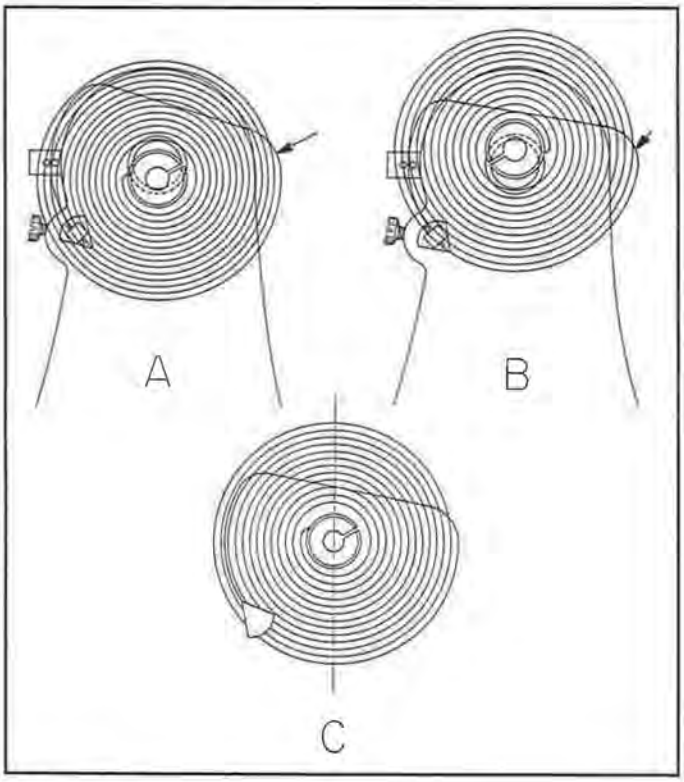


Figure 8.

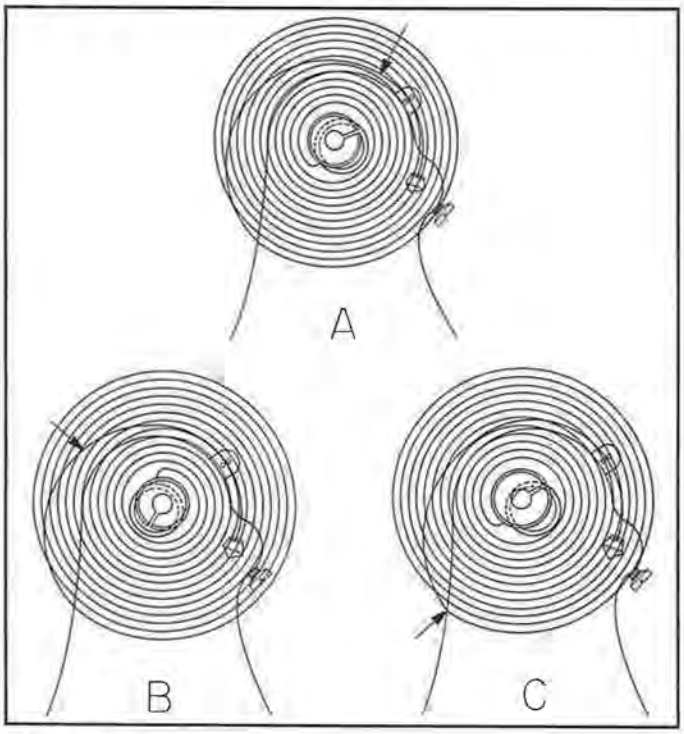


Figure 9.

View B, Figure 9 shows another off-center condition. In this example, the hairspring and collet are off-center in a direction toward the regulator pins. This condition is caused by a bend in the overcoil at the arrow. The overcoil at this point has a radius that is too short. When the radius of the overcoil is made longer, the hairspring and collet will shift back on center.

View C, Figure 9 shows the third example of an off-center hairspring which has a circular overcoil. In this example, the hairspring and collet are off-center in a direction away from the stud. This condition places the first part of the overcoil too close to the hairspring collet. This indicates that the bend is at a point where the overcoil starts across the body of the hairspring as shown by the arrow. This bend is too sharp, causing the overcoil to start across the body of the hairspring too suddenly. The correction is to round out the bend giving it a longer radius. This will cause the hairspring to shift back to center and, at the sane time, the collet will be moved away from the overcoil. When the conditions are the exact opposite to these examples, the corrections will be just the opposite.

"Antique Watch Restoration" will continue next month.

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"RANDOM CLOCK TALKS"

BY J.M. HUCKABEE

This series of 37 "Random Clock Talks" video tapes 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. When ordering, please send your name, address, phone number, and AWI membership number along with the $5.00 service charge. Send to: **AWI Audio Visual Library, 701 Enterprise Drive, Harrison, OH 45030**. For a complete list and short description of "Random Clock Talks" please contact AWI Central at the above address, or phone **(513) 367-9800**, or fax **(513) 367-1414**.

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Trade-Ins Taken

SCHOLASTICALLY SPEAKING

By Arnold Van Tiem

Career Prep Center—Sterling Heights, Michigan

In today's high-tech computer-oriented world, is there a future in watch and clock repair? This question is often asked. However, few people realize that there is a shortage of watch and clock repair people in the United States as well as all over the world. As a matter of fact the Swiss watch manufacturers project a worldwide shortage of 10,000 horologists by the year 2002. According to the Michigan Employment Report by the *Detroit News*, watchmakers and clockmakers are in demand with yearly salaries ranging from $9,148 for part-time work to $56,980 (late 1990) for full time.

Furthermore, as the horology instructor at Warren Consolidated Schools Career Prep Center and as the Vice Chairman on the Research and Education Council of the American Watchmakers-Clockmakers Institute, it is easy for me to assure career-minded students that there is a high demand for watch and clock repair people everywhere! This is no surprise since today's horologist's average age is nearly 60 years old. Many watch and clock repair people are retiring, and there are very few new people to replace them. There is a shortage now, and there will be an even greater shortage in the future.

As an instructor, I am often asked "How does one learn the trade?" and "Are there still schools that teach watch and clock repair?" In the United States there are seventeen schools affiliated with the American Watchmakers-Clockmakers Institute Research and Education Council. A listing of these schools appeared in the June 1996 edition of *Horological Times*. In Michigan there are two of these schools. One is the State Technical Institute and Rehab Center, located in Plainwell; and the other is the Horology program at the Career Prep Center in Sterling Heights. The Career Prep Center is a high school vocational center which offers classes primarily to high school students. However, if there are openings available after the high school students have enrolled, adult education students are allowed to enroll into the horology classes.

The Career Prep Center provides excellent career opportunities for students. The facility and the equipment are up to date and better than most repair shops. We are continually upgrading our equipment, such as watch timers, cleaning machines, etc.

The program's performance objectives are updated and revised as needed. Also, to keep the horology program current with innovations, we collaborate with an advisory committee. This committee consists of members who work in the trade. They meet annually to assist in the revision of the course objectives and to make suggestions on new equipment.

Enrollment at the Career Prep Center horology program is constant. As a high school vocational program, we draw students from the district's three high schools, as well as students from several neighboring school districts. We have two classes per day. Normally this is a two-year program for eleventh- and twelfth-graders and adult education students; but in some cases, students have enrolled for three years. A third-year advanced program was developed for advanced studies in horology.

For enrollment information on horology programs, write to: Arnold Van Tiem, Warren Consolidated Schools Career Prep Center, 12200 Fifteen Mile Rd., Sterling Heights, MI 48312. With the generation of sufficient interest, additional classes may evolve so that we can match the future need for watch and clock repair personnel. For a national list of schools contact the American Watchmakers-Clockmakers Institute.

CPC Horology—Warren Consolidated Schools' First International Program

Jeff Ferrari is a typical adult education student at Career Prep Center (CPC). When not attending third-year advanced classes at the Center, he helps his father run the family-owned store, "G&G Jewelry," on University Street in Windsor, Canada.

Arnold Van Tiem, Jeff's instructor, points out that through the extensive training Jeff has received at CPC he is now able to do almost all the watch and clock repair work brought into the store. With pride, Van Tiem observes that when Jeff Ferrari completes his third year of training he should have the job skills necessary to insure himself employment well into the future.



Figure 1. Jeff waiting on customers.



Figure 2. Jeff hard at work repairing watches.

EDUCATION UPDATE

By James E. Lubic

As of this writing we have awarded the four tuition scholarships to attend the Academy of Watchmaking that will begin July 15, 1996. Due to the deadlines associated with this article, we will have to announce the names of the recipients in the August issue. The classrooms are ready and we are anxiously awaiting the students' arrival.

We would like to take this opportunity to remind members interested in participating in a future Project Extend Watch Class that there is no longer a minimum registration. If you want to attend a class (see schedule on back of magazine) all you have to do is register. You will receive a confirmation of your registration, and then all you have to do is be here for the dates of the class. No more waiting to see if we have enough interest before making plans. Contact AWI Headquarters for hotel information. We will be happy to assist you in any way we can.

As for our members interested in Project Extend Clock Classes, we have a full schedule of excellent courses this year. For starters, during the month of August, Buddy Carpenter will teach "Striking and Chiming Clocks" followed by a new course on "French Clock Repair" taught by Ron Iverson. David Christianson will be the instructor during the month of September teaching "Antique Clock Restoration" and also "Preparation for the Certified Master Clockmaker Examination." Jim LaChapelle starts the month of October off with "Introduction to Clock Repair" followed by another new course, "Advanced Cuckoo Clock Repair" taught by Jim Williams. There should be something for everyone. See the back of the magazine for exact dates and cost. We do require a minimum of six registrations for all clock courses thirty days before the scheduled date of the class.

I would like to thank everyone that responded to the "Bench Course Survey." This information will be most helpful for scheduling future courses. We will also use this information to develop affiliate chapters and assist existing chapters. If you have not yet participated in the survey, you may still do so by sending a letter requesting three bench courses to be held in a city near you. Also, tell us if you are a member of an affiliate chapter.



Figure 1. Brad Van Vleet studies his clock movement.



Figure 2. Students of the recent "Introduction to Clock Repair" course held at Project Extend. Front row (left to right): Gar Downing, Alfred Young, and Instructor Jim LaChapelle. Back row (left to right): Gil Davis, Bill Farris, Brad Van Vleet, Jonathon Collins, and Carol Tillett.



Figure 3. Gil Davis receives some pointers from Instructor, Jim LaChapelle.

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MUSIC BOX CLOCKS

TWELVE-TUNE MUSIC BOX WITH SIX BELLS, PART 12

By Leo A. Jaroslaw
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Introduction

In Part 11 we disassembled, cleaned, and repaired the governor. Now we will put it back together and test it.

15. Reassembly and adjustment of the governor. (See Figure 12.1.)

15.1. With governor block (20) on its side, place the two gear arbors (89 and 91) in position.

NOTE: The worm gear (24) is closest to the endless screw arbor (15).

15.2. Install adjustable lower bearing (72). (See Figure 11.2., June 1996 *HT*, p. 34.)

CAUTION: IF THE ADJUSTMENT SCREW (19) WAS NOT DISTURBED FROM ITS ORIGINAL SETTING, DO NOT MOVE IT NOW.

NOTE: Some early governors had a solid, nonadjustable lower bearing.

15.3. Install governor block side plate (73). Guide pivots into their respective bearings.

15.3.1. Install and tighten plate holding screw (99).

15.3.2. Check gears for free running, end shake, and mesh.

15.4. Place airbrake/endless screw assembly (17) into its lower end bearing (72).

15.5. Install governor bracket (18).

15.5.1. Insert upper pivot of endless screw arbor (15) into its bearing hole in the upper end of the bracket.

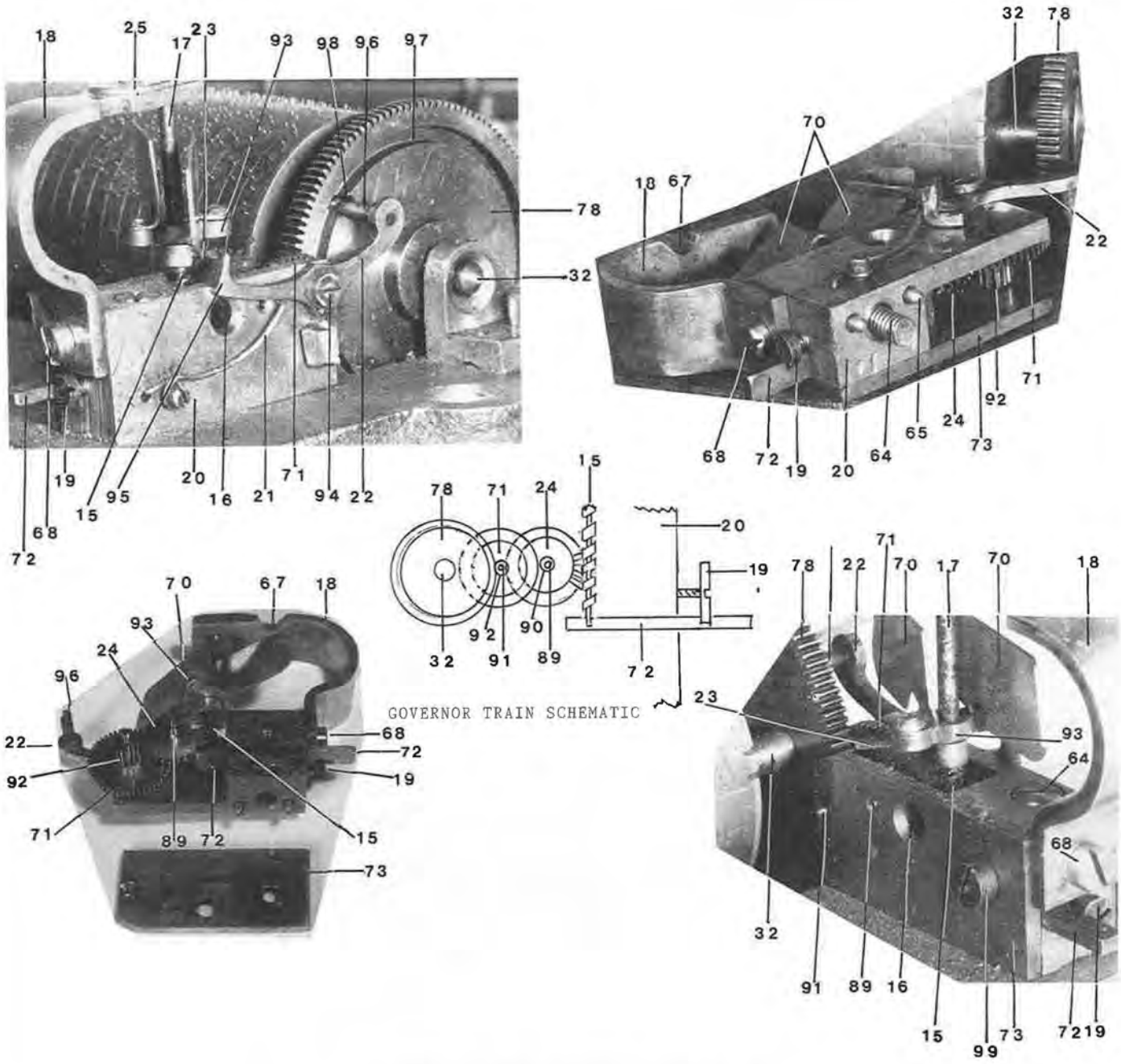
CAUTION: TAKE CARE WHEN MOVING THE BRACKET WITH THE ARBOR PIVOT INSERTED. THE ASSEMBLY IS BRITTLE AND PIVOTS CAN BE DAMAGED.

15.5.2. Carefully line up and insert the steady pins (not shown) in the lower end of the bracket into its holes in the governor block.

15.5.2.1. Replace governor bracket attaching screw (68). Tighten.

15.5.3. Oil endless screw arbor pivot bearings in the bracket and lower bearing.

15.5.4. Replace the jewel/endstone with its retainer (25) on top of the governor bracket. (See Figure 11.4., June 1996 *HT*, p. 36.)



GOVERNOR TRAIN SCHEMATIC

15 Endless Screw
16 Endless Screw Peep Hole
17 Fan, Air Brake or Butterfly
18 Governor Bracket
19 Adjustable Bearing Screw
20 Governor Block
21 Stop Spring
22 Stop Arm
23 Stop Tail
24 Worm/Middle Wheel
25 Jewel Plate
32 Cylinder Arbor
64 Governor Attaching Screw
65 Locator/Alignment Dowel Pin
67 Attaching Screw Access Cutaway
68 Bracket Attaching Screw
17 Endless Screw/Fan Assembly
70 Adjustable Fan Blades
71 First Wheel
72 Adjustable Lower Bearing
73 Block Side Plate
78 Cylinder Great Wheel
89 Second Arbor
90 Second Arbor Pinion
91 First Arbor
92 First Arbor Pinion
93 Collar Bar
94 Stop Arm Shoulder Screw
95 Stop Arm Hook
96 Controller Pin
97 Control Groove
98 Stop Notch
99 Side Plate Screw

Figure 12.1. Governor assembly.

NOTE: If it is the old jewel in operational condition, position it so that the pivot end contacts a smooth surface.

15.5.5. Check governor operation. This is accomplished by applying upward pressure with the thumb on the first wheel. The airbrake assembly should start to rotate evenly with little pressure.

15.5.5.1. If start requires much pressure, first reposition the jewel. Loosen the jewel retainer screw and reposition the jewel. Retighten and recheck.

15.5.5.2. If there is still no easy start, check the depthing of the worm gear and endless screw. This can be observed through the holes in the governor block and side plate.

15.5.5.3. If the governor has an adjustable lower endless screw arbor bearing, increase or decrease depthing in small increments (one-fourth turn of screw suggested). Recheck per 15.5.5.

NOTE: Our governor had too deep a mesh. It required a one-half turn to run freely.

CAUTION: UPON COMPLETION OF THE ADJUSTMENTS, MAKE CERTAIN THAT THE UNDERSIDE OF THE ADJUSTMENT SCREW HEAD IS AGAINST THE SIDE OF ITS SLOT CLOSEST TO THE BLOCK. IF NOT AS DESCRIBED, IT IS POSSIBLE THAT THE BEARING BAR WILL BACK OUT TO THE OTHER END OF THE SLOT. THIS COULD POSSIBLY, DEPENDING ON THE DEPTHING, DISENGAGE THE WORM GEAR FROM THE ENDLESS SCREW CAUSING A RUN!

15.5.5.4. If there is still no easy start, recheck for worn teeth in the worm gear, worn bearing holes, and flat, rough, or unpolished upper endless arbor pivot end. CORRECT AS REQUIRED.

15.5.6. Wrap completed governor and set aside until reassembly of the whole.

This completes Part 12. In Part 13, we will start with the cylinder assembly.



1996 Election Results

AWI Board of Directors

The tabulation of ballots in AWI's 1996 election for Board of Directors has resulted in the following candidates being elected to serve three-year terms: James H. Broughton, Columbus, OH; Fred S. Burckhardt, Ft. Worth, TX; Alice B. Carpenter, Tarboro, NC; David A. Christianson, Kendallville, IN; and Gerald G. Jaeger, Sheboygan, WI.

AWI members voting in the 1996 election also approved the proposed change and amendment to the AWI Constitution, Article XII, Section 4.

Thanks to all the members who voted in this year's election! Our thanks also go out to the candidates for allowing their names to be placed in nomination. All of them were eminently qualified and have already contributed to the progress of the Institute. We look forward to utilizing their special talents as we strive to better the field of horology for the members of the American Watchmakers-Clockmakers Institute.



James H. Broughton
Columbus, OH



Fred S. Burckhardt
Ft. Worth, TX



Alice B. Carpenter
Tarboro, NC



David A. Christianson
Kendallville, IN



Gerald G. Jaeger
Sheboygan, WI



THE NOVICE WATCHMAKER

WATCH CRYSTALS, PART 3

By David A. Christianson, CMW, FBHI

All of our discussions on cutting and fitting crystals presupposes a lack of a genuine factory replacement crystal. By all means, try first to obtain your replacement shaped (fancy) crystal from material supplier by using the make of the watch and its case number. If there is no case number or model number, then you must find a generic replacement of exact fit, alter a near fit, or cut a new one from a crystal blank.

Fitting, Cutting, and Polishing

Most of the time, finding the crystal of the correct dimensions (known as crystal fitting) is a relatively easy proposition. In the case of round crystals, whether they be flat, domed or tension ring, simply measuring the diameter of either the old crystal or the crystal bezel opening and knowing the relative height will get you the one you need; either from your own assortment or from your material supplier.

The same applies to shaped flat crystals, although the sizes and shapes available are quite limited. If the size and shape are not listed in your current crystal catalogue, you'll need to either send the bezel to your material supplier to have one fitted for you or do the job yourself.

Genuine and Generic Replacement Crystals

All of our discussions on cutting and fitting crystals presupposes a lack of a genuine factory replacement crystal. By all means try first to obtain your replacement shaped (fancy) crystal from your material supplier by using the make of the watch and its case number. If there is no case number or model number, then you must find a generic replacement of exact fit, alter a near fit, or cut a new one from a crystal blank.

Fitting Crystals

In the case of fancy-shaped cylinder crystals, measure the dimensions (length and width); note the shape (both top view and side view); and search for a match in your crystal catalogue. Most of the time it will be there and you can go to your assortment or your supplier for the one needed. Unfortunately, this is not always the case; and, as with fancy flat shapes, it is not unusual to have to send the bezel to your supplier to let them fit a fancy cylinder, or for you to do it yourself. If you cannot find an exact fit, fancy-shaped plastic crystals are easily altered. Whether they be of the flat or cylinder type, you need only to find a shape that is similar to the one you need and a size that is slightly larger in one or both dimensions. Use a file to reduce the dimensions to the required size, an emery stick to smooth out the file marks, and then a leather buff stick with Krystal-Kleer™ or tripoli, and a buff stick with rouge to polish out the emery stick marks on the edges of the crystal. (See Figures 1 and 2.)

In the case of flat crystals you can even buy sheets of plastic crystal material in two thicknesses from your material supplier. Trace the outline of the crystal bezel slightly larger than needed. Saw out the shape with a jewelers saw, file to exact size and shape, followed by the emery and buff sticks. It's easier said than done, but not a difficult task at all.

A few comments are in order with this discussion, however. Plastic crystal material scratches easily, so keep the area under your crystal clean of debris while sawing and filing. Also while sawing and filing, lay the crystal top-side down on a soft cloth or smooth leather pad (watch tissue will even work). It's easier to control your file and keep the sides perpendicular if the crystal is laying on a flat, rigid surface.

If you're reducing the size of a cylinder crystal, remember that you must retain a portion of the crystal wall (its "cylinder"

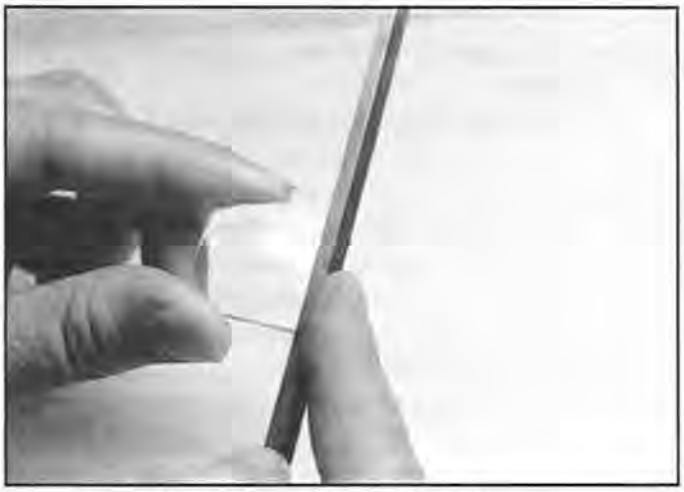


Figure 1. Reducing dimensions with a file.

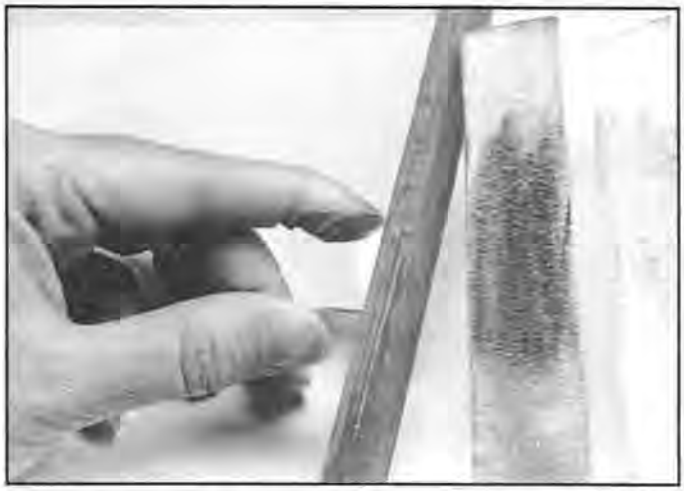


Figure 2. Removing file marks with an emery stick. Two polishing sticks (tripoli and rouge) on the right are used to polish the edges.

portion). Reduce opposite sides equally.

Glass crystals present a different picture. This work takes some more specialized equipment:

1. You'll need a motorized crystal cutting wheel (water cooled).

2. You'll need a motorized buffing wheel for polishing the edges, or one of the newer crystal tracing and cutting machines.

Since we're new at this work, we'll pass on the crystal tracing/cutting machines. Most of us won't encounter the volume of crystal work that would require one of these machines. If you work up to that kind of volume, then you definitely should consider its purchase. Remember to balance the cost of the machine against the number of actual glass/mineral glass crystal fitting jobs you have. Also remember your material supplier; most offer a fitting service at a fairly moderate cost.

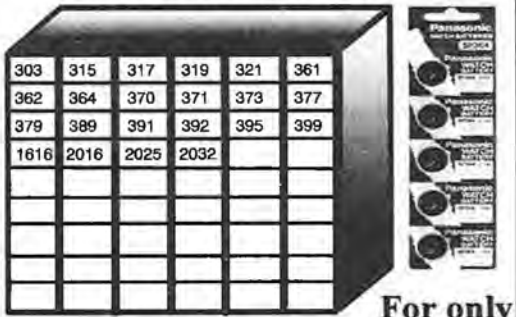
To do the occasional glass crystal fitting job in your own shop, you'll need a corundum crystal grinding wheel mounted on a motor-driven spindle. Most watchmaker's shops have one

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ETA 955.114	12.95	11.50	Pulsar VT83	11.95	10.50
ETA 955.414	12.95	11.50	Pulsar VX10	8.90	7.00
ETA 956.414	13.95	12.50	Pulsar VX22	10.95	8.00
ETA 562.001	7.95	6.25	Pulsar VX43A	12.50	10.50
			Pulsar VX43E	13.50	11.50
Ronda 751	8.95	7.95	Pulsar VX51A	8.95	6.50
Ronda 753	8.95	7.50	Pulsar Y 121	6.50	5.00
Ronda 762	7.50	5.50	Pulsar Y L60	18.95	16.95
Ronda 763	7.50	5.50			
			ISA 258	9.50	7.50
Miyota 2030	5.95	4.50	ISA 268	6.50	5.50
Miyota 5Y30	9.95	7.50	ISA 369	6.95	5.95
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Figure 3. Edging, or reducing, the dimensions of a glass crystal using a corundum crystal grinding wheel. (The water trough has been removed to give a better picture.)



Figure 4. Polishing the ground edges with a hard tripoli buff.



Figure 5. Beginning to shape a fancy-shaped crystal from a round mineral glass crystal.

of these, and if not, a little search at NAWCC marts might produce one. Also, fine corundum wheels are available from your material supplier.

The wheel needs to be kept wet, either with water flowing onto the wheel or with the wheel running in a trough of water (this keeps the work cool and lubricated). Whether reducing the size of a glass cylinder crystal or flat mineral glass crystal, or fashioning a new flat crystal from a blank mineral glass crystal, you must present the crystal edge to the wheel in a longitudinal plane, and you must use a very light pressure (see Figure 3). Trying to grind too much, too quickly, will cause chipping and cracking. It's a slow process, but for the occasional needs that your supplier cannot meet, it's well worth the trouble.

Once the crystal has been reduced to the needed size, polish the freshly ground edges with a rock hard felt buff wheel (1/2" thick and 6" in diameter) charged with Fabuluster™ or tripoli (see Figure 4). This will give a smooth luster to the edges after several applications—quite acceptable for most jobs. If a glass-like finish is required, such as on a beveled edge or on the sides of a cylinder crystal, then you must polish the edges or bevels with successive application of diamond compounds on a flat aluminum or Lucite wheel to a final polish of 1,600 grit. To get a transparent finish you'll need to work up to an 18,000 grit. However, this is getting into lapidary work and equipment that we normally wouldn't have. For most of our work, this isn't necessary.

To make a shaped crystal from a flat glass blank (or from one of the round mineral glass crystals you might have in stock), lay the blank over your bezel and trace with a wax pencil. Cut the blank to shape on your crystal grinder (see Figure 5). It will take a few minutes. A beveled edge with a smooth luster finish can be created by positioning your crystal at an angle to your Fabuluster™ buff (see previous paragraph). After several successive applications, a bevel with a smooth luster will appear. This smooth lustrous finish will have more of a smooth opaque (matte-like) appearance but is quite acceptable.

Polishing Scratched Crystals

A very common request from clients is to have the scratches polished out of their crystals. In fact it would be cost effective to polish the scratches from crystals during the repair/restoration process, rather than replace those crystals.

Plastic Crystals

Plastic crystals are no problem. As long as the scratches are not too deep, the surface can be restored to like new appearance with common shop tools. Even a crystal surface with some rather deep scratches can be greatly improved with polishing.

An emery stick (1/0 grit) is used to remove the surface abrasion followed by leather buff sticks, the first charged with Krystal-Kleer™ or tripoli and the second charged with red rouge for a final polish. (See Figures 6 and 7.) Each successive step (from emery to tripoli to rouge) is hand-lapped with the crystal secured in its bezel. Remember to wash the previous abrasive from the crystal surface as each step progresses. A motorized polishing buff can be used with a soft muslin buff wheel charged with tri-

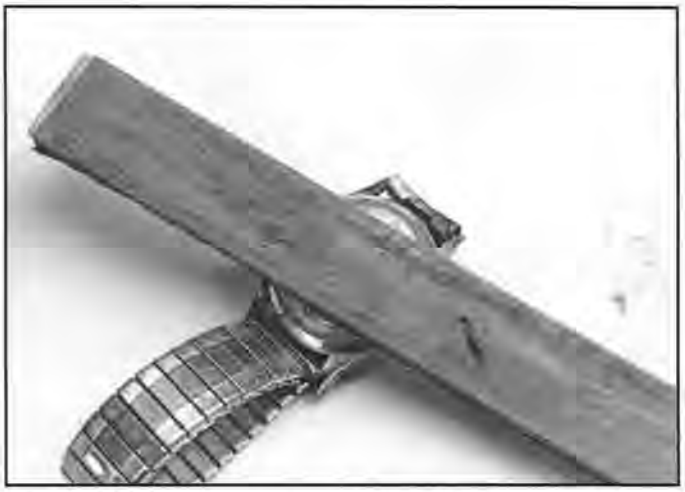


Figure 6. Cutting away scratches and scuff marks by hand with a 1/0 emery stick.

poli and then rouge (see Figure 8). You have to be very careful to use very little pressure and only brief contact with the wheel because the rapidly rotating wheel will melt the crystal surface, smearing the surface and rounding any edges. Buffing without removing the scratches with an emery will simply exaggerate the scratches rather than remove them.

Glass Crystals, Mineral Glass, and Synthetic Sapphire Crystals

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Figure 7. Buffing the crystal by hand using a tripoli and a rouge stick.

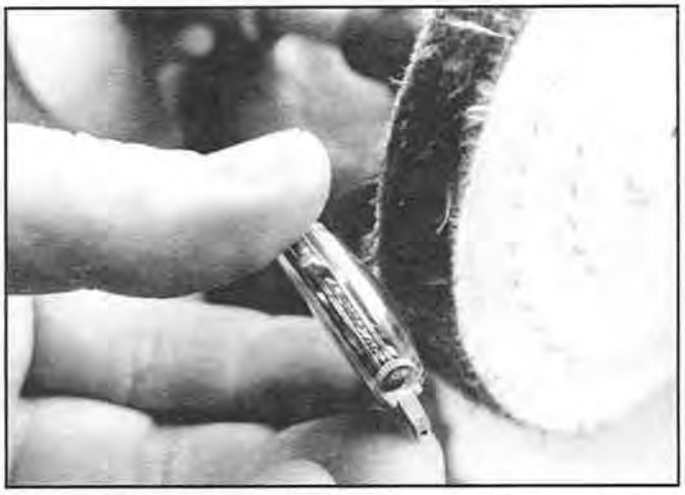


Figure 8. Buffing crystal with a motorized rouge buff.

Coarseness		Abrasive	Grit size	Micron size	
very course	#3	emery	30 — 40		cutting abrasives
course	#2 1/2	emery	—		
	#2	emery	50 60		
medium	#1 1/2	emery	—		
	#1	emery	80		
	# 1/2	emery	— 100		
fine	#0	emery	—		
	#2/0	emery	150		
	#3/0	emery	180		
very fine		silicon oxide	220 325	45	
		tripoli	600	30	
		rouge	800	25	polishing abrasives
		silicon carbide	900	23	
			1,200	15	
		Linde A	1,500	10	
			3,000	6	
		diamond	8,000	3	
		diamantine (cerium oxide)		1.5	
		tin oxide		1.2	
		diamond	14,000	1	
		chromium oxide		.5	
		aluminum oxide		.3	
		diamond	18,000		

Figure 9. Chart of abrasives with various coarseness indications.

and sapphire crystals (synthetic corundum) are much harder materials to work with than plastics and require special materials and equipment to polish—the skills and equipment of the lapidarist. For this reason, other than shaping and edging glass and mineral glass, the work of polishing out scuffs and scratches in these crystals is not germane to the practice of watch repair.

To give you an idea of what goes into polishing the surface of a glass crystal, if you were to do it, we'll go through the steps.

To begin with we'll need a Lucite, aluminum, or hard maple lap wheel, turned perfectly flat and running on a trued, motorized spindle. The lap would first be charged with a very fine abrasive and water slurry such as a 220 grit to remove the scratches and scuffs from the crystal's surface. After the crystal and lap are thoroughly cleaned to remove *all* traces of abrasive, the lap is charged with a 600-grit abrasive to polish out the very fine scratches left by the 220 grit. After the crystal and laps are thoroughly cleaned, the crystal is then polished with successively finer applications of abrasives going from 1,500-grit to 8,000-grit to 14,000-grit diamond paste. Remember to thoroughly clean both the crystal and the lap between abrasive applications. Any residue left from a previous abrasive will appear as scratches on the subsequent polished surface.

About six applications of finer and finer abrasives are required to produce that fine finish that you will need. Keep in mind that there are many abrasive materials that can be used to cut and polish glass, mineral glass, and sapphire crystals. Certain combinations would be better than others, depending upon the type of crystal material you would be polishing and the kind of abrasives that you would be using. Many abrasives come in a variety of grit sizes. Some abrasives can be used following others; some will not polish well if used following certain other ones. Diamond, for example, can be purchased in any of the grit sizes and is ideally the best to use, but at $20-$30 for a syringe of each grit size, it can be quite expensive. To get the "crystal-clear" final finish on your glass, mineral glass, or sapphire crystal, a final polish of 18,000-grit diamond paste would then be required.

Suffice it to say that, even though you can make a perfectly flat wooden lap to run on your polishing machine, charge the lap with the requisite cutting and polishing abrasives, and produce a perfectly acceptable final finish, the time required would far outweigh the cost to replace the scratched glass crystal in the first place (unless, of course, you don't charge for your time).

I have included a chart as Figure 9 to give you an idea of the various abrasives used in cutting and polishing and to give you an idea of how some of the compounds you might be familiar with relate to other compounds that we've mentioned in this discussion. You'll recognize some of the standardized grits, such as 80 - 180 - 220 grits used in fine and very fine sandpapers (only they usually use silicon oxide as an abrasive material). You'll also recognize the familiar emery sticks that we commonly use with their coarseness numbers (3 through 3/0) and their corresponding grit sizes. The dashed line running through tripoli (600 grit) indicates that gray area where the abrasive acts as both a cutting compound and as a polishing compound. This may possibly be a good reference for future use and/or information.

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VARIOUS TYPES OF SCREWS AND HOW TO MAKE THEM, PART II

By Henry B. Fried, CMW, CMC, FAWI, FBHI, ★FNAWCC
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Although almost all watch parts are available today, occasionally it is necessary to make some parts of the watch. This is especially true of screws. Some watchmakers who possess bottles of assorted screws often find themselves in a position where they must make a different kind.

The knowledge required to make a screw encompasses more than the use of the screwplate. The diameter and height of the screwhead, the type of fit, the bearing surface, if any, the direction and character of the thread, the polish and temper of the screw, all enter into the watchmaker's finished product.

For a sample project, the making of a set lever screw will be undertaken and described. The set lever screw is selected because this screw contains practically all the parts of every type of screw used by the watchmaker. (See Figure 1.)

(1) It has threads which turn into the hole of the set lever (H-J, Figure 1); (2) it also has a post which fits through a close fitting hole in the lower plate and extends below it just enough to provide clearance for the set lever (G); (3) it has a retaining shoulder (A-F), most often in the middle of the screw's length which governs its endshake. The post above the shoulder usually extends upward until it is level with the upper plate. This shoulder (B-E) is slotted at the top so that it receives the blade of a screwdriver handily.

Let us suppose that the original screw has been lost. In making a replacement, we must use the parts which it fits as the guides for its construction.

To make the screw, a piece of annealed high-carbon steel or drill rod is used. (Phonograph needles, dentists' burrs, or the shanks of old drills, annealed, make acceptable material.) The thickness of the metal for this screw must be at least as thick as the hip, which is the thickest part of the screw. (See A, Figure 1.)

Since we must proceed without a sample, we get this gauge from the countersink which is on the inside of the barrel bridge (shown in Figure 2). This recess is used to accommodate the

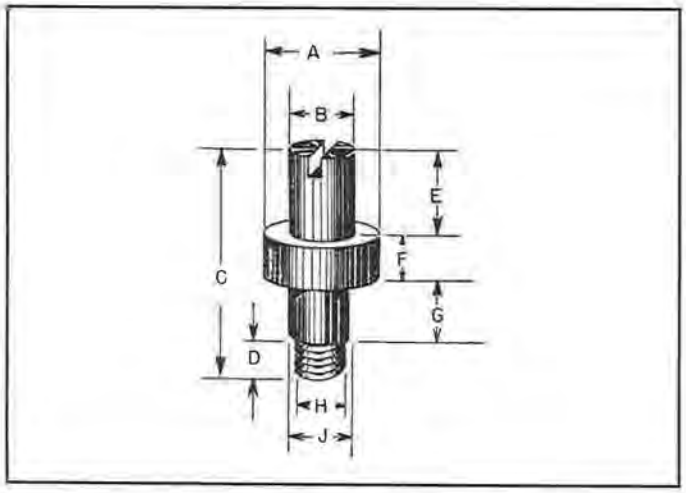


Figure 1. Some of the measurements to be considered in making a set lever screw.

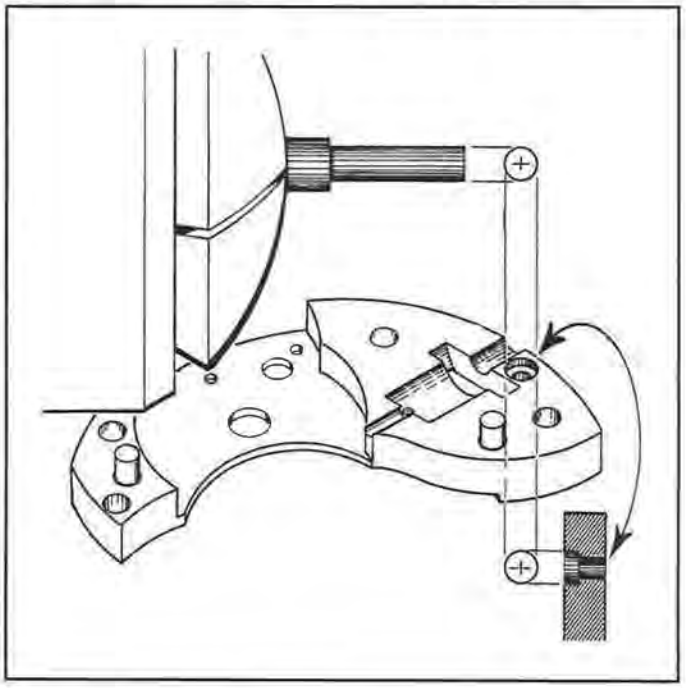


Figure 2. Countersink in barrel bridge is used to determine thickness of stock with which the set screw is made.

retaining shoulder (see A, Figure 1). The metal is cut cylindrically until the flat blunt end of the stock fits snugly into this recess and long enough to provide for the entire length of the screw.

The next operation is to reduce the thickness of part of this cylindrical section until it fits through the hole in the *lower plate*. This new post must fit snugly, otherwise the screw might have too much sideshake. It also should be cut long enough to extend through this hole a short distance but sufficient to have threads cut upon it to accommodate the set lever.

A shallow groove is cut upon this new shoulder at a point just above the area where the metal extends from the lower plate (shown by arrow in Figure 3). The space shown by the two smaller arrows indicates the clearance above the plate where the groove should be cut. This groove marks the lowest position on this extension where the threads may be cut. If the threads are cut lower than this groove or position, the set lever may be pulled down too far and bind upon the lower plate. Of course, if the threads are not cut low enough, the lever may not come sufficiently close to the movement to grasp the stem slot. In such a case, the stem will not be secure in the movement.

The thickness of the threads is determined from the screw hole in the set lever. A piece of soft brass is turned until it can be *pushed* through this hole. This size is the base diameter of the screw. Add one-quarter of its size to obtain the full thickness of the threaded section. Let us say, for instance, that the unthreaded wire fitting through the set lever hole gauges .68 mm; 25% of 68 is 17. This added to .68, totals .85 mm, the diameter of the screw to fit the set lever (screw) hole.

Screwplates

Threading this section of the screw is done with a screwplate (some models of which are shown in Figure 4). There are many types of screwplates available. Some are designated by letters such as B, E, F, G, L, M, S, etc. These letters usually suggest a difference in the distance from the crest of one thread to the crest of another ("pitch"). Some have fine threads used for watch screws, some are heavier for use as optical screws, and still others are coarser for jewelry. The numbers shown on the side of these screwplates run invertedly from "0," their largest diameter screwhole, downward to 1-2 and continuing until 20 or 21, becoming progressively smaller. (The higher the number, the thinner will be the screw it will cut.) Screwplates of German or English origin bearing the letter "L" on the screwplate, or this letter added to another, denotes that it is a left thread. Some French or Swiss screwplates that are left threaded are marked with the letter "G" for "gauche" (left). Today most screwplates are in metric gauges.

Sometimes, two screwplates made by different companies and marked with the same letter vary as to the number of threads each will cut to a millimeter. Furthermore, the diameter of the numbers, 0, 1, 2, etc., do not always conform. On one screwplate, the number "0" may cut a thread gauging 2.20 mm, and on another the thread cut on the "0" hole may gauge 1.80 mm. If one need be purchased, it is recommended that a screwplate with millimeter markings such as shown in Figure 4-B be obtained. The hole sizes marked indicate the outside thickness of the threads it will cut in tenths of a millimeter. Thus, a hole marked 9 will thread a screw whose thickness will be .90 mm.

Screwplates come in three styles: plain (A, Figure 4), combination plain and single cut or "notched" (C, Figure 4), and double notched (B, Figure 4). The best of these three is the double notched.

When the plain "cut" is used, the threads are squeezed rather than cut into its surface. This requires more force to thread and often results in breaking. Also, when such a screwplate is used,

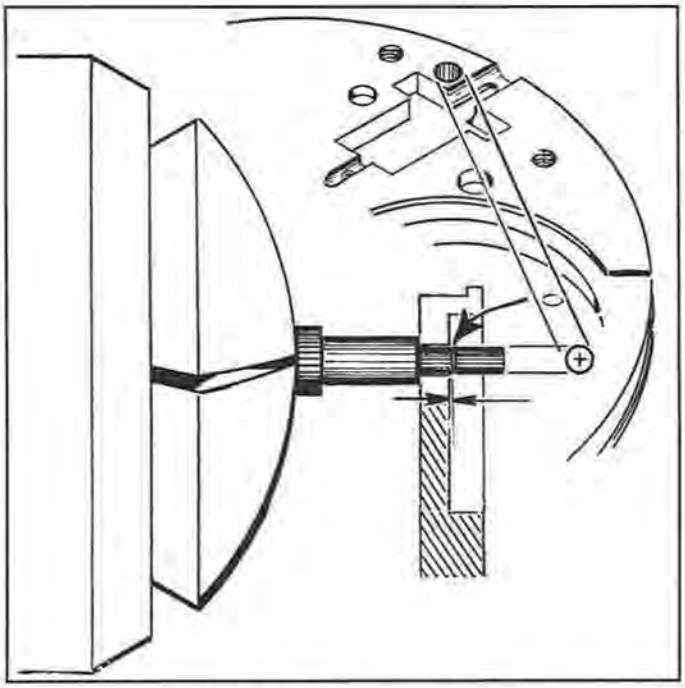


Figure 3. Part of stock cut cylindrically to fit through hole in main plate; light groove is cut at upper arrow (at point beyond main plate, indicated by dimensional arrows.)

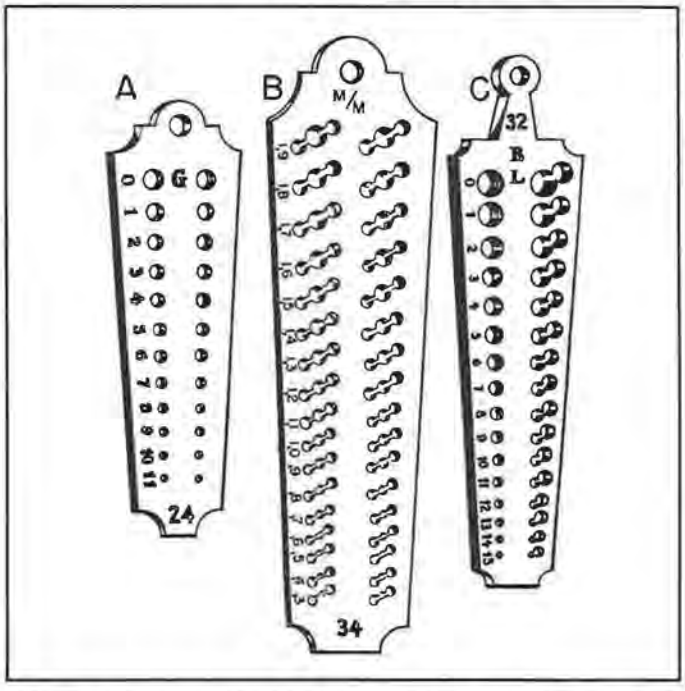


Figure 4. Screwplate "A" is plain; "C" is single-matched with a row of plain holes; "B" is double-matched with metric graduation.

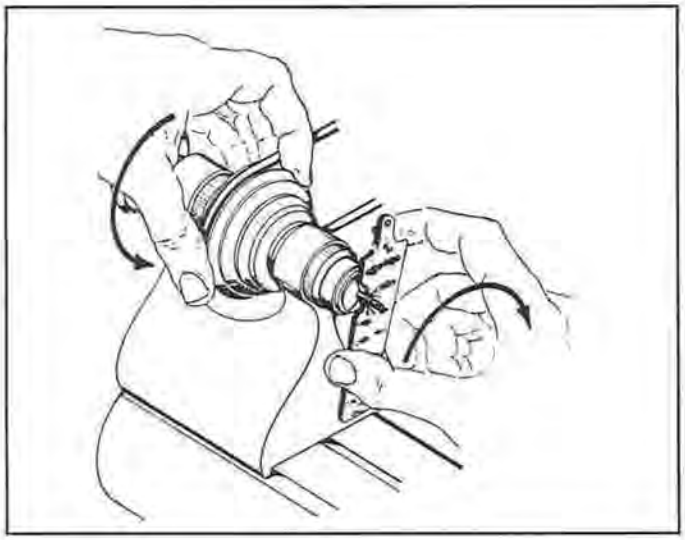


Figure 5. Threading is done in gradual cuts with lathe head turned only by light hand-twists.

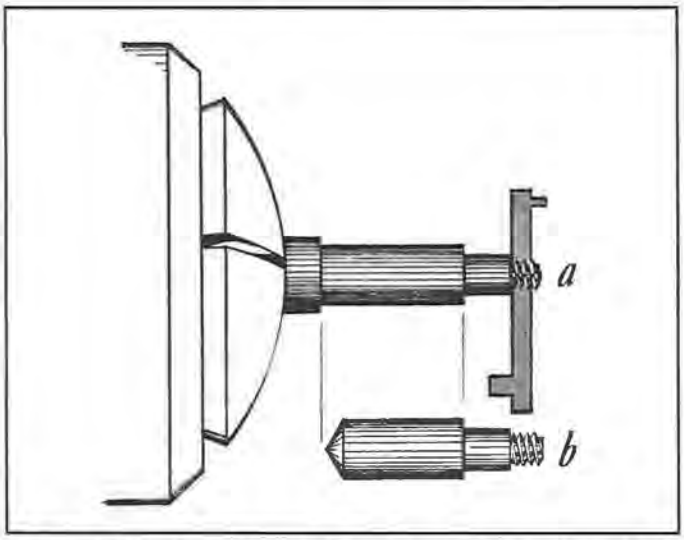


Figure 6. Set lever is tested on the nearly cut thread (a). After surplus thread is removed the blank is severed as shown (b).

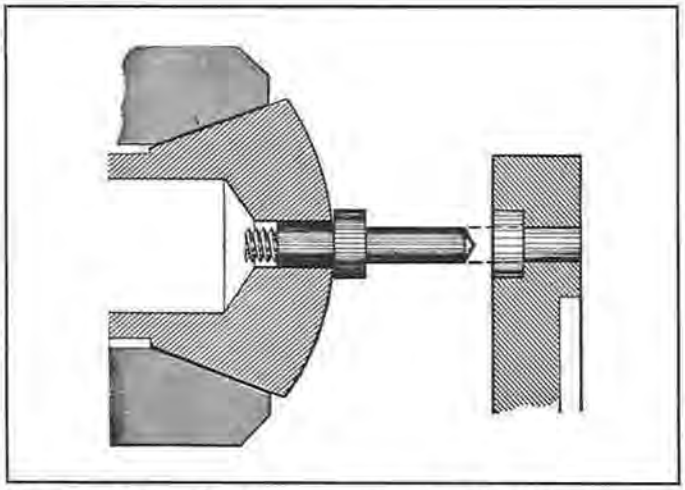


Figure 7. After the blank is reversed in the lathe, a cylindrical portion is turned to fit through the hole in the barrel bridge.

the screw blank must be prepared a little *thinner* than the eventual thickness planned for the threads. With this screwplate, should an .85 mm thread be desired, the prepared blank should gauge .80 mm. This is suggested because in forcing the blank through the thread die, the sharp edges displace rather than cut the metal. The displaced metal is literally squeezed into the crests of the threads in the die and the result is a screw with a diameter greater after threading than before threading. This is also true of worn or old screwplates.

With the single cut (C, Figure 4), and better with the double cut or notched (B, Figure 4), the threads are cut rather than knurled. The cutting edges, at either side openings of the die, cut the grooves which form the bottom of the screwthreads. The number (34) at the bottom or top of the screwplate gives the number of the holes in the tool. Most often, these are supplied with a double row of holes. One row contains the full or even sizes, such as 9 (.90 mm), 8 (.80 mm), etc., while the opposite row has the half sizes, .85, .95, 1.05, etc.

A method of determining the thread sizes has been given previously; however, with the mm screwplate, this is simplified. The pin that originally was turned to fit (unthreaded) into the set lever screwhole can be fitted through the hole in the screwplate in the same way. The full diameter will be found marked in tenths of a millimeter next to the hole into which the pin fits closest. Should the pin fit snugly through the number 8, the diameter of the screw will be .80 mm. The screwblank should gauge this size.

It is a good practice to make the threaded section a little longer than needed. This provides for some imperfection in the threads which occurs until the screwplate has sufficient metal in it to cut evenly. Also, to permit easy entry into the screwplate, a slight taper should be cut on the beginning of the portion to be threaded. When the threading is done, the taper and excess length may be cut away, leaving the screw just long enough to emerge perceptibly through the set lever.

Actual cutting of the threads should be done while the stock is held in the lathe. The screwplate is held on its sides between the index, middle finger and thumb of the right hand while the left hand grasps the headstock lightly and supplies the force needed to rotate the stock through the screwplate. This manipulation is shown in Figure 5.

A little lubrication is desired during the threading operation. The threading should be done by turning the stock with the screwplate about 1/4 turn and then reversing this action at least an entire half-turn. This will cause the shaving to break off, leaving the next 1/4 cut easier to take. It also will prevent these shavings from clogging the work and spoiling the threads.

The stock and screwplate are twisted towards each other again until the "feel" indicates that further force may either strip the thread or break off the screw. Usually, advancements of 1/4 turn should be safe and insure against failure. This is continued cautiously until the threading is done.

The screwplate is removed from the screw carefully lest this movement strip or tear the threads. If the work is cleaned and cleared of shavings occasionally as the threading progresses, the

danger of "tearing" a thread will be practically eliminated. Cleaning the threads after the screwplate is removed is done by pressing a piece of cork against the threads while the lathe motion is reversed.

The threads should be cut up to the groove previously made to indicate the lowest thread for the set lever. The lever is then threaded on the screw, testing for fit and closeness to the groove. All excess threads but one, extending out of the lever, should be removed (Figure 6, "a"). This leaves a safe margin and permits the thread to be short enough so that eventually it does not interfere in any way with the dial.

Next, the post fitting through the barrel bridge is cut. To do this, the blank is cut off at a height just above where it will reach through the barrel bridge (Figure 6, "b"). The extra length is required to compensate for the later grinding and polishing of the head. This is done because the blank, as far as it is finished, will have to be held in the lathe chuck on the lower shoulder (Figure 7). If too much stock is left out of the chuck, strain on the stock held in the chuck may result in difficulties in cutting and inaccuracies in fitting.

After the blank is reversed in the lathe, held by a well-fitting chuck, a portion of the end is reduced in diameter until it fits snugly into the hole in the barrel bridge. (This establishes the correct diameter of the shaft of the screwhead.) The shaft may be made longer by cutting down the shoulder of the collar until the shaft fits through the hole in the barrel bridge and the back shoulder of the screw is flush with the edge of the countersink in the barrel bridge.

As shown by the arrows in Figure 8, the shoulder may be slightly below the level of the bridge (the amount indicated), allowing for the maximum of endshake permitted. All shoulders must be cut square and no *rounds* may exist on the inside corners (round corners give a false fitting which will in a short time work loose, and then the stem itself will easily fall out of the movement).

Excess length which extends through the barrel bridge may be trimmed off so that the end is almost flush with the plate, leaving just enough for grinding and polishing. (This should be checked while the stock is still in the lathe.) The barrel bridge is fitted over the stock, and the amount of metal protruding is noted for removal.

The next operation is slotting the screwhead with a screwhead file (see Figure 9). If such a file is unavailable, a suitable slotting saw may be made from a single-edged razor by placing the razor lengthwise over a No. 4 file and hitting its back with a sharp blow of a hammer. The sharp edge of the razor will assume the profile of the file's surface, and these indented teeth will slot a screw of moderate temper.

The screw now may be tried in the movement and tested for endshake, which must be barely perceptible and with practically no sideshake. However, a set lever screw that is too tight between the plates will cause difficulty in pulling the stem into the setting position and may loosen the set lever when it is pushed back into the winding position. Conversely, one that is too loose may cause the stem to fall out.

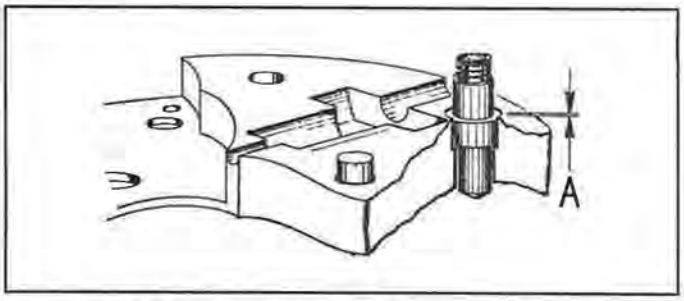


Figure 8. Hub is cut until it fits below counterbore (amount shown by lines "A" provide for endshake).

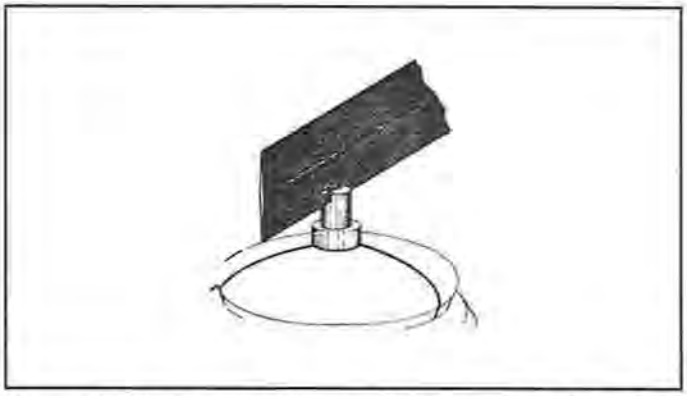


Figure 9. The screw slot is cut with a screwhead file, while the blank is held in the lathe or pinvise.

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A Practical Course In Clock Repair

Unit 1

Making A Click Spring

By John P. Kenyon, CMC

Most flat steel clock parts are no longer available from suppliers. When it becomes necessary to fabricate a replacement in the shop, the clockmaker should endeavor to produce a replacement that will be equal in appearance and quality to the original part.

Flat steel clock parts, such as click springs that are made in various sizes and shapes, occasionally break or wear out. Most of these parts are no longer available from suppliers, and replacements must be fabricated in the shop. When this becomes necessary, the clockmaker should endeavor to produce a replacement that will be equal in appearance and quality to the original part.

Small parts are usually made by using the old part for a pattern. A piece of sheet metal is sawed, filed, and ground to the same size and shape. Then it is hardened and tempered and the surface is ground and polished to match the original finish.

Skills and techniques in the use of hand tools that have been developed in previous sections of this unit will be put into practice this time to make a click spring, one of the most frequent parts to be replaced.

Fabrication

Procure a piece of sheet steel (tool steel) 3/4" x 2" x 1/32", and remove any scale from the surface with emery paper. Color the metal to dark blue, using one of the methods described in a previous exercise.

Trace or cut out Figure 1 to use for a pattern. Use a scriber to inscribe the outline of the click spring, including the rivet hole center.

Next, use a center punch to mark a center for the click rivet; then, drill a 1/8" hole in the stock. Sometimes a click will have a countersunk hole for the rivet head or screw head. If so, use a drill bit that has been sharpened to a flat angle to cut a recess to the proper depth.

Place the metal stock in a bench vise and file it to shape. Tool steel is difficult to saw but relatively easy to file. If a lot of metal needs to be removed, a "V" groove is filed across the piece near a scribed line, about halfway through the metal (see Figure 2). This will weaken the metal enough so that the excess can be broken off.

The spring section of the part (on the end) should be left somewhat wider than necessary as in Figure 3, and then ground to final size and shape as shown in Figure 4, after hardening and tempering. Otherwise, the thin spring segment could be overheated in the heating process, which would damage the spring action.

Use the flame of an alcohol lamp to harden and temper the spring to pale blue; then, use a grinding wheel to grind excess metal from the thin end of the spring.

Finishing

The finish on the click spring should match that of other parts used on the front of the movement. Usually, it will be a stone finish. Another type, the ground finish, gives the part a satin-like appearance that will result in a satisfactory finish, especially if it is followed by polishing with a very fine abrasive.

Stoning

Prepare a flat combination carborundum stone by cleaning it with solvent and a firm brush, if necessary, to remove old oil and metal particles; then, apply a very thin coating of light oil to both surfaces of the stone. Place the click spring on the coarse side of the stone and hold it flat with your finger or a small piece of cork. Stone it uniformly, by moving it lengthwise on the stone (see Figure 5). Repeat on the other side of the click spring.

Lay the click spring on the fine grit side of the stone and hold it flat with your finger or a small piece of cork. Stone it by moving it lengthwise until it is smooth, with straight lines running across the surface. Repeat on the other side of the click spring.

The modern clockmaker may prefer to use 100-grit Aluxite, or Adalux paper instead of a carborundum stone for stoning work. The paper should be cemented to a 4" square piece of board and the click spring prepared as described above. An adequate finish will result.

A stone finish is satisfactory for the small parts of most clock movements.

Grinding

Some high-grade clocks may have a ground finish on small parts. It is attained by grinding and polishing the parts with a paste made from abrasive powders and oil. Oilstone powder, a natural oily white stone serves well for this purpose.

To grind, prepare a waxy paste from oilstone powder (or substitute) and clock oil on a flat block of iron, or a piece of glass. When mixing oilstone powder, re-

move any specks of stone which do not crush and mix easily with the oil. The compound, when properly mixed, should be quite stiff with no dry powder. Next, spread the oilstone paste on the grinding block in a circle of about two or three times the diameter of the length of the part. Now, place the click spring flat on the paste and grind it with circular strokes, keeping paste under the part until it assumes an even gray finish and all of the lines and pits have been removed. (See Figure 6.) Clean the click spring with a solvent to remove the oil and grit.

If ground properly, the click spring will have a satin-like, gray appearance. If the finish is darker than the sample or the surrounding parts, it can be lightened by rubbing it with a flat cork charged with oilstone paste and using the same circular stroke as when grinding on a block.

Other abrasives, such as emery powder, rotten stone powder, pumice, and Vienna lime can also be used for grinding. These abrasives, as well as oilstone powder, are becoming increasingly difficult to obtain. A substitute called "Isolox 50" is available from: Raytech Industries, Inc., P.O. Box 6, Stafford Springs, CT 06076.

You are encouraged to experiment with various forms of aluminum oxides and similar abrasives, that are available from lapidary supply houses. Excellent finishes can be attained with these compounds.

Polishing

After a satisfactory ground finish is achieved, the part can be polished to a brilliant finish. Polishing is done on a polishing block, in a similar manner as grinding. These blocks are made from boxwood, a plate of ground glass, or a lead block.

A very fine abrasive powder such as diamantine, sapphirine, rouge, diamond powder, or an equivalent substitute mixed with oil is used.

To pre-polish, mix the abrasive powder with oil on a piece of flat frosted plate glass (6" square) or on a similar finely ground surface. Clean the click spring again with a solvent to be sure there is no oilstone powder left on it. Spread the polishing paste on the plate in a circle, about two or three times the diameter of the length of the part. Place the click spring flat on the paste and move it briefly in circular strokes, keeping paste under the part. This will create a proper surface for final polishing.

For the final polishing operation, mix a fresh batch of abrasive powder and oil and transfer a small portion of it to an absolutely clean plate of ground glass or other suitable polishing block.

Clean the click spring again with a solvent and proceed to polish it in the same manner used for grinding. Apply light pressure during the polishing. If the spring has been prepared correctly and is free of lines and pits, only a few minutes of polishing will produce a brilliant finish. Cleanliness is essential for a good polish. Dust and other debris must be avoided.

A correctly polished hard steel part will appear black when held at an angle to the light and should reflect like a mirror.

Since polishing abrasives are difficult to obtain, a satisfactory substitute product called "Raybrite B" is available from Raytech Industries.

A flat jasper stone can also be used for polishing.

Emery Paper

With the increased scarcity of grinding and polishing abrasives, many clockmakers are turning to 2/0 emery paper for grinding, and 4/0 emery paper for polishing, with good results. The paper should be cemented to a wooden block to insure an even surface.

Special finishes, such as "raying," "damasking," "polished rings," or a combination of these are given to some clock movement parts at the factory. These processes and the special equipment required to apply them are not available to the average clockmaker. In this case, if a replacement part is not available, a finish is applied by one of the processes described.

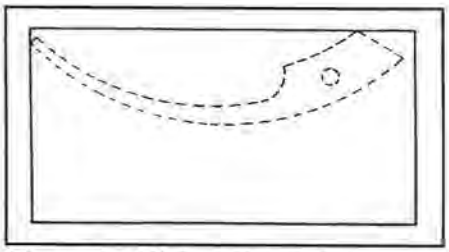


Figure 1. Click spring pattern.

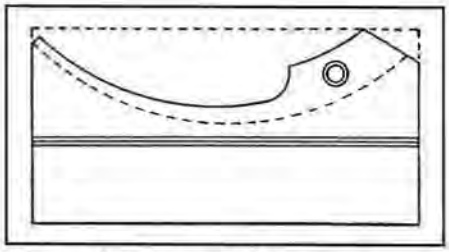


Figure 2. Using a "V" groove.

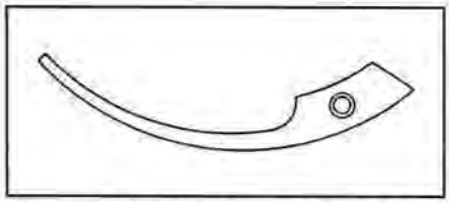


Figure 3. Click spring with unfinished end.

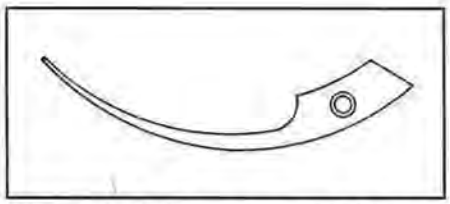


Figure 4. Click spring with finished end.

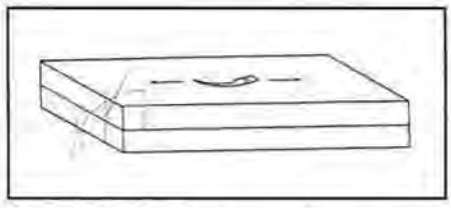


Figure 5. Stoning procedure.

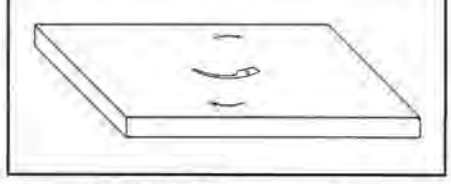


Figure 6. Polishing procedure.

AFFILIATE CHAPTER COLUMN

By Jack Kurdzionak

The Future Is Bright

Recently a newspaper in central Maine published an interview featuring a watchmaker who had pursued his craft for over fifty years. This watchmaker studied at the Waltham Watch Company school at the end of the second World War. He noted that very few of his classmates continued in the profession because "there was never any money in it." His dedication to a profession he enjoyed kept him at the bench for the past fifty years but not many others had his enthusiasm for a profession that made it difficult to support oneself, let alone a family.

I have heard this same sentiment echoed by many others over the years who either gave up the horological profession or strongly advised friends and family not to enter the field. This interview was the first time I recall seeing that sentiment in print. There is no way to ascertain whether that sentiment caused the decline in American horology or merely reflected its existing condition for the past fifty years. There is no denying the fact that America had over 50,000 horologists at the end of World War II. We have no accurate number today, but I have seen estimates that there are about 7,000 full-time horologists serving our nation with a population that has almost doubled since the end of the war. Again there is no way to be sure, but it is commonly thought that the average age of these practicing horologists is well over sixty years. Is this the end of the profession with little hope for the future or will we see a stabilization in our numbers as well as a secure future?

My wife and business partner (same person) and I have just returned from the Henry B. Fried Memorial sixteen-day horological tour of central Europe with a number of observations about the horological profession. Our first stop was at the Basel Fair which is where all of the major watch and clock manufacturers display their products. There are less Swiss watch companies producing watches than in the recent past, but these remaining companies produce about 50% of the dollar value of the world's watches while making about 10% of the unit volume. This translates into the fact that Swiss watches are amongst the world's most expensive and these products are selling here as well as around the globe. Someone will be servicing these high-quality products well into the future. With unit costs as high as these watches are commanding, they are not throwaway commodities.

There were many clock manufacturers represented at the fair and for the most part their products were not in the "use it once and throw it away" category. Someone will be called upon to service these fine timepieces in the future because as we all know, nothing will run forever without service.

High-quality horological tools filled a small building at the fair. I will admit that not every watchmaker or clockmaker needs a computer-driven watch case milling machine or clock pinion cutter but the vast selection of tools included many that should be included in a modern horologist's shop. There were machines to clean clocks and watches, time them, and aid in their repair. It was good equipment to help the horologist earn a decent living while doing more and better work.

You may be thinking that all of these tools are fine to look at, but who can possibly afford to include them into his shop here in the United States since they can be costly. After the fair we visited several watch factories and their repair facilities. The factories of course used modern machinery in their watch and clock production including banks of computers for designing new products coming to the market. We were also shown the after sales service facilities in two factories and the technicians were using up-to-date cleaning equipment, genuine parts, and up-to-date timing machines. All of these are available here in the United States. There is no substitute for a horologist's skill but it can be enhanced by using modern methods and equipment as they do in the factories.

We also met with two groups of watchmakers and clockmakers during the tour. One in Italy and one in Austria. Their youth and enthusiasm was a pleasant surprise. Their level of horological education amounted to a four- or five-year degree in horology from a technical school after graduation from high school. Many of these watchmakers spoke English as well as their native language and were employed by high-quality factories and retailers in their countries. One member of our group was carrying a Breguet pocket watch for show and

Continued on page 48.

ASSOCIATION NEWS

NEW JERSEY

The Watchmakers Association of New Jersey held their annual May Anniversary Meeting on May 14, 1996. The WANJ celebrated their fifty-seventh anniversary. Good food and drinks were enjoyed by the WANJ members and their guests. A Buy, Sell, and Swap Mart was also enjoyed by everyone in attendance.

The WANJ would like to thank Jesse Hueg, the program committee, and Lou Zanoni of Zantech, Inc. for presenting the association with a most innovative program. Video and microscopic equipment were used to view minute watch parts and enlarged views of some very expensive watches and their inner works. This was all projected onto a large TV for all to view. Joe Cerullo and Hans Schragg brought in some expensive and unique watches for members to examine and hold. The advantages of using Epilame to oil escapements was also discussed.

NORTH CAROLINA

The North Carolina Watchmakers Association hosted the first Full Participation Round Table Discussion on April 21 in Charlotte, North Carolina. Two years ago President Chris Wiles presented the idea to host a Round Table with local talent. A committee brought this idea to reality.

Forty-two technicians attended. The panel consisted of five trades. Scott Lemons operates a trade shop with several employees. Quality repairs and case refinishing are the specialty. George Jackowitz operates a jewelry store with several employees and takes in trade work. Russell McKenzie specializes in jewelry repairs. Emilio Aponte runs a one-man watch trade shop and specializes in Accutron repairs. Buddy Carpenter teaches clock repair and is highly qualified in microelectronics. Chris Wiles was the Master of Ceremonies.

The questions asked were answered by the entire panel, and then those in attendance were asked to answer also. The topics covered were: engineering plastic, brazing clock wheels to rebuild broken teeth, modern jewelry repair techniques, computer lathe, fracture-filled stones, new products, finding hard to get material, EPA, pricing repairs, a simple way to phase double indexing Accutrons, case refinishing, estimates, and disposing of repairs after ninety days.

OHIO

The Watchmakers/Clockmakers Association of Ohio will hold their eighth annual auction on Sunday, October 13, 1996 at the American Legion Hall, Southway Post 144, 325 South High Street, Columbus, Ohio.

Sale items should be brought to the Legion Hall the morning of the sale so that potential buyers can look them over prior to sale time. Any watch or clock materials, tools, benches, lamps, clock or watch cases or just about anything connected with the trade can be entered in the sale.

The sale will begin at noon and continue until everything is sold. The hall opens at 9:30AM.

For more information contact Karl Farnlacher, 1404 Neva Dr., Dayton, OH 45414.

TEXAS

The AWI Education & Technical Department did it again! On March 29 - April 4, 1996, Phase IV of the Lathe Program took place at Austin, Texas. Eight students participated in a most rewarding training. Roy Hovey is the instructor for the AWI Lathe Programs.



Left to Right: Roy Hovey (instructor), George Kiser, Nino Gonzales, Mike Webb, Sue Ann Wysong, Ron Robbins, Carroll Bell, Chris Travelstead, and Bob Dodd.

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INDUSTRY NEWS

Parsec Enterprises Announces Publication of Home Page on Internet's World Wide Web

Parsec Enterprises, located in Peoria, Illinois, is one of the largest independent watch service companies in the United States. Parsec Enterprises provides customer watch repair through the largest jewelers and general retailers in the world, warranty service program development and implementation, assembly, custom dial printing, volume stock refurbishing, and other watch services.

Parsec's web page serves as an introduction to the comprehensive range of in-house services provided by the company to various segments of the industry—retail, manufacturers, importers, and ad specialty. The page also provides a source of information to retailers desiring background information and basic technical terminology to improve their watch selling efficiency. Also, Parsec has provided information regarding the original LED Pulsar and service capabilities on this unique timepiece. Parsec has also addressed part of the page to the frequently asked questions regarding water resistance, service terminology, and a tour of the Parsec Enterprises service facility itself.

Parsec Enterprises also will E-mail customers the location of jeweler or retailer nearest them providing Parsec's quality service capabilities.

Parsec's page address is: http://www.parsecent.com. Contact: Parsec Enterprises, Attn: Marc C. Young, 7501 N. Harker Dr., P.O. Box 195, Peoria, IL 61650-0195.

Cas-Ker Company Introduces New Watchband Clasp Assortment and Quartz Watch Stem Assortment

New clasp assortment No. 5000 includes four different styles of clasps in a total of twenty-four sizes. Each clasp is featured in both yellow and white for a total of forty-eight pieces. The clasps are used in many bands used by Seiko, Pulsar, Citizen and many others. If purchased separately, the clasps would cost over $100. The new assortment comes in a clear plastic compartment box with extra spaces for additional items. Cost is only $49.95.

The CK-48 stem assortment includes two each of the most popular stems used in today's quartz watches. The stems cover over 100 different movements manufactured by Seiko, Pulsar, Phasar, Lorus, Citizen, Miyota, ETA, ISA, and Orient. Interchangeability chart is located on the plastic container with handy bottles for each of the twenty-four different stems. The stems would cost $72.00 if purchased individually. Cost of the assortment is only $39.95.

For more information contact Lou Esselman, Cas-Ker's Material Department manager at 1(800) 487-0408.



Figure 1.

Esslinger & Co. Unveils Two New Precious Jewelry Lines

Esslinger & Co. has announced that it unveiled two new unique, precious jewelry lines at the 1996 JCK International Show in Las Vegas, May 30-June 4.

The first of these new lines is the ultrasonically-carved cameos which are set in unique, copyrighted 14K settings. Most of these cameos can be worn as brooches and pendants. The other new line they are featuring is the "Loving Relationships" collection—a very extensive line of copyrighted family jewelry which builds on itself as relationships grow.

These lines have never been displayed before and will be ready for delivery to retailers in time for the 1996 Fall and holiday seasons.

For more information, call Esslinger & Co. at 1 (800) 328-0205 or fax 1 (800) 548-9304.

IWC, International Watch Co., Opens State-of-the-Art Service Center

IWC, International Watch Co., Ltd., Schaffhausen, Switzerland, has officially opened a fully equipped, state-of-the-art service center in its U.S. headquarters in Virginia.

The service and repair center assures customers of quality control and quick, efficient service every step of the way. Employing four full-time, fully certified watchmakers (two of whom worked at IWC, Schaffhausen, prior to coming to the United States), the service center offers factory original parts, and has the necessary equipment for refinishing, refurbishing, waterproofing, and fulfilling all other needs.

In addition to the four

watchmakers, two full-time technical assistants are employed, as well as a staff of administrative backup. The IWC After-Sales Service Center is a division of Swiss Prestige, and will handle all service needs for both in-warranty and out-of-warranty IWC and Porsche Design watches.

The Center is located at IWC headquarters at 188 Brooke Road, Winchester, VA 22603. The phone number is (800) 492-6755. The fax number is (540) 678-2935.



Figure 2.

World Watch, Clock and Jewelry Show BASEL '96 Good Reason for Optimism

As BASEL '96 closed its doors, Switzerland's exhibitors expressed satisfaction with the event's favorable outcome. An overwhelming majority thought business volume had equaled or even exceeded expectations. They also believed the contacts they had made were of better quality.

During Basel's World Watch, Clock and Jewelry Show held from April 18-25, 1996, a representative sample of 65 watchmakers, 15 jewelers and 25 related companies were surveyed. Of the 100 questionnaires received, 35 were supplemented by in-depth personal interviews. Shortly before the closing of the event, a very large majority expressed greater optimism than at the Show's opening. Indeed, the concern of Swiss watchmakers had been fueled by last year's slight drop in exports—following ten successive years of record-breaking sales, and today's economic or social climate hampering sales in certain countries.

However, nearly 90% of watchmakers and 80% of jewelers found that business volume concluded at BASEL '96 was good or satisfactory and that results equaled or surpassed their expectations, in particular for 4 watchmakers out of 10. Compared to 1995, 60% of watchmakers and 40% of jewelers questioned posted higher sales. Watchmaking-related businesses reported no substantial change. In the final analysis, jewelers suffered most from lackluster markets: one-third of them expressed concern about declining sales.

With a changing profile of trade visitors to the Basel Show reported by Swiss exhibitors, a large majority believed contacts to be of a better quality. While the 1995 edition closed with only 40% of expected business volume actually concluded after the Show, 1996 figures inspire great confidence and point to substantial progress in the months to come.

Here is a look at one of the latest creations introduced at the World Watch, Clock and Jewelry Show.



Figure 3. Philippe Dufour - Double régulateur. A world first, this double-escapement wristwatch was designed and manufactured by Philippe Dufour, a master watchmaker from the Joux Valley. The double escapement, which is one of the most difficult complications to make, is even more complex than the tourbillon. Unlike the latter, there is no mass added to any of the escapement parts. The complicated differential system, which is essential for operating the two balances, also reduces by half the errors caused by the escapements. This extremely technical timepiece will thrill the true watch connoisseur.

Nikon Inc. Names Suriano to Head Up Launch of Perrelet Watches in the U.S.

Andrea V. Suriano has been named to spearhead the introduction of an exclusive line of Swiss luxury watches in the U.S. by Nikon Inc., the sole agent for Perrelet watches in this country.

In her new capacity as manager of sales and marketing for Perrelet, Ms. Suriano will be responsible for the launch of the new Perrelet collection. She will work with Nikon to establish a vital presence in the watch industry, forecast market trends, and expand the company's involvement in the watch marketplace as appropriate. Ms. Suriano was formerly owner and operator of two high-end retail jewelry establishments in Palm Beach, Florida, and managed an international watch and jewelry buying office in Switzerland.

"Andrea brings us years of experience in this exciting field. Nikon is world renowned for its high-quality products, and we look forward to the growth and success that we know she will help bring as we expand into this new market," said Steven Jarmon, Nikon's general manager of new product development.

The new Perrelet timepieces made their debut at the Basel Fair in Switzerland. The first official U.S. showing was at the JCK Show in Las Vegas.

For more information on the new collection of Perrelet luxury watches, please contact Ms. Suriano in Perrelet's U.S. office, 1300 Walt Whitman Road, Melville, NY 11747; or phone (516) 547-4246.



Figure 4.

BULLETIN BOARD

A. NEW REQUESTS

Schematic for Tickoprint TC47A

Richard Watkins, Kingston, Tasmania, Australia, seeks a circuit diagram and a repair/service manual for the Tickoprint T45TA.

Boley "Dreadnaught" Lathe

Richard Watkins also seeks a manual and any other information for a Boley "Dreadnaught" Lathe. The lathe has the European-style "D" bed.

Electric Skeleton Clock

David Boyd, Tampa, FL, is looking for a source for a clock which he describes as an electric clock that has stick men to make the movement work (skeleton clock). It comes in chrome and brass with no case, the insides are exposed.

Junghans Clock

Don Myers, Superior, WI, writes that he has the Junghans clock pictured here and everything is working fine except the strike train. The lift bar that is supposed to lift the hammer pawl does not lift high enough to release it. The trouble area is in the circled part of the photo. He does note that the snail pawl was on backwards when the photo was taken; it has been corrected. The plates are 5 1/2" x 5 1/2". Two markings are stamped on the movement, 2712 and 100. On the gong bar there appears the Junghans trademark symbol and DRP 134527.



Figure 1.

B. RESPONSES

Clock Strikes at Rapid Speed

We have received additional responses from: Jim Davis, Seneca, SC; Jamie Duck, Hudson, OH; J. M. Huckabee, Austin, TX; and Jim Osborn, Niland, CA. These people have offered possible solutions to the problem which we will eventually publish in the "From the Workshop" column.

J. M. Huckabee writes that he has had a similar clock for thirty-five years, a Seth Thomas. It strikes two times per second on a wire gong. Huck observes that this seems faster than most others and if everything else appears to be mechanically normal, it probably was built to be a fast striker.

Regina Music Box

Eugene Saboda, Central Islip, NY, offered to have our member call him so he could provide the information he was seeking. Mr. Saboda also offers to help other members with music box questions.

Wilcometer 40 Operating Instructions

C. Anthony (Tony) Voight, National Sales Manager for Witschi Electronics, USA in Palmyra, NJ, has sent two copies of the operator's manual. One we sent to Mr. Kiska and one we have on file.

Clock's Identity

Three have come to the aid of Bernard Petit, Dothan, AL, regarding the identity of his clock which has been featured in "Bulletin Board."

Ken Pippin, Sparta, TN, called to say he can supply information and suggested that Bernie Petit call him.

Willis Lynes writes:

In reference to the inquiry by Bernard Petit ("BB," May 1996, p. 50), I do happen to have a similar clock to the one described. Mine is almost complete, and I would be happy to correspond with Mr. Petit regarding any missing parts he needs to restore his clock. Also, I would be very interested in knowing the history of this clock. If you get any other responses to this query, please put me in contact with anyone else who owns one. Mine is, as I said *almost* complete, apparently missing one section of the pendulum, which appears to be about four feet long.

Finally, William J. Perkins, Centralia, WA, says it appears that the clock was one produced by the Beiberich family, (Goldsmiths) of Geneva, Switzerland. They were made during two different times, 1918-1919 and 1944-1945. There were numerous inexpensive "knock offs," primarily under the name GOTIKA. These were made during the 1950s through at least the 1960s.

C. ITEMS STILL NEEDED

Correction Cam for British Clock

Vic Broski, Whittier, CA, writes:

I am working on a British-made mantel chime movement that does not have a chime correction cam. I hoped to find one behind the sequence cam

but none was there.

I made two attempts at making one but no luck. I did come close on one of them but no cigar.

Per the enclosed photo, there is a lever with a hole in it and I am guessing that the owner would have to reach in and trip it to correct the chimes. It seems strange that this would be an original concept of the maker.

I am hoping that perhaps you would have a design for such a cam.

The sequencing cam seems to be machined on the back to take a pressed-on cam. I saw no evidence that a cam was riveted on

Any help will be greatly appreciated.



Figure 2.

"Thomas Rogers - London" Clockmaker

Adolph Baker, Rochester, NY, writes:

I would like to know if you have any information indicating that "Thomas Rogers - London" or any of his contemporaries ever made a floor clock movement that was generally similar to the standard movements of the period (1750 - 1850), *except* the pendulum was suspended between the plates. Is there a possibility that the pendulum could have hung from a pendulum support on the *inside* of the back plate?

A. W. Haydon Motor for Ben Franklin Clock

Heidi Freeborn, Byran, TX, writes:

I hope that you can provide me with some information. I am trying to find a source for a special clock motor and the company that made it is no longer in business. Local clock repair companies have not been able to help me.

The motor that I am looking for goes to a special clock. It is a Ben Franklin clock that has only one hand which makes one revolution every four hours. I grew up on this clock (my parents have clock number 89) and have recently inherited my grandmother's (number 90). Both clocks are dated 1970 and worked well for over 20 years but then the poor little motor just wore out. I found your name and address on the Internet and am turning to you for help.

The motor was made by the A.W. Haydon Company of Waterbury, Connecticut. Here are the specs from the back of the motor:

Volts 115
Pt. No. KR42197-94
Hz 60
Synchronous Motor
Watts 2.5
RPM 1/240
U.S. Pat. No.
2,981,855-3,014,141
Rot. CW
Can. Pat. No.
612,221-664,758

Any information that you can provide on a new motor, or replacement parts for the old will be greatly appreciated.

Verichron Brand Clocks

Neil Rassnick, Madison, PA, is seeking to contact the manufacturer or distributor of "Verichron" brand clocks. At one time they were distributed by Harris & Mallow in Lakewood, New Jersey.

Screws with Matching Tap and Die Set

Rives McDow, Malibu, CA, writes:

I am looking for a source of screws with matching tap and die set for connecting the top plate and bottom plate of watch movements together in a man's size watch. I am not particular about the exact size, but something which would screw into a stand-off between .045" and .050" would best suit my needs. I am looking for a source of a quantity of these screws, with the type of flat head normally used for this type screw, and also threaded tubing if available—if not, a tap which matches. I have tried all the material supply houses I am aware of, and have not been able to get anything other than assortments of screws, and tap and die sets which do not match most of the screws.

Bulova Wristwatch "1928" Model 13AT (Font 29) Direct Read Model

Dennis Warner, Springfield, MO, is seeking spare parts and service information for a Bulova wristwatch model 13AT. It is of 1928 vintage and the ebauche is Font 29. R. A. Julian at Bulova and Henry Frystak, former Bulova instructor, are unable to provide any details on this watch. AWI has in its files the parts ID for the basic calibre Font 29, but nothing on the direct reading version of this watch.

Branson Cleaning Machine B-52H

Edward Bolan, Bridgewater, NJ, seeks a service and operator's manual for a Branson cleaning machine B-52H, 117 volts, 50/60 hz, 440 watts.

Serrari Quartz Watches

Truman Hamilton, Burbank, CA, is seeking information about the distributor or service agent for a quartz chronograph watch, "Serrari," made in Japan.

22L Arogono 8-Day Alarm

Truman Hamilton, Burbank, CA, seeks information for a 22L Arogono 8-day, key-wound alarm clock, calibre 22N. Spare parts, distributor, and service information will be welcome. This item is listed in the "Bestfit" catalog on page 331.

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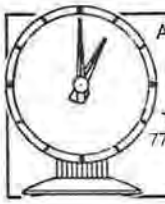


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Continued from page 4.

ANSWER

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Henry B. Fried

Continued from page 38.

tell and he displayed it to the Austrian watchmakers during dinner in a dimly lit restaurant. Every one of the watchmakers he showed it to recognized it immediately without hesitation. Many of them had worked on Breguet watches. Another member of our group mentioned that every watchmaker he met in Europe wore a better watch than he owned. They were wearing Pateks, Audemars. Rolexes, Breitlings, etc. The impression we were given was that horology in Europe had a future for well-educated, skillful people and they are earning wages that are commensurate with the level of skill and education they possess.

Horology in the United States can go two ways. We can be in the twilight of the profession as is our old-time watchmaker in Maine or we can have a bright future if we strive to emulate the European model of a well educated and trained professional whose earnings will be competitive with other similarly trained people here. The choice for the future is ours.

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3-4	Striking Clocks Buddy Carpenter	Dallas, TX $100.00
24-25	Intro to American Pocket Watches Alice Carpenter	Cleveland, OH $100.00
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7-8	Hairspring Vibrating Joe Cerullo	Greensboro, NC $100.00
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