

DECEMBER 1993

HOROLOGICAL TIMES™



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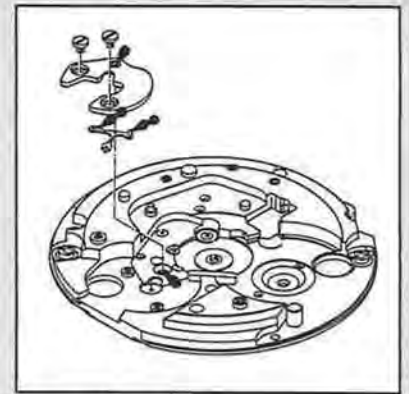
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HOROLOGICAL TIMES™

Official Publication of the American Watchmakers-Clockmakers Institute

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President's Message

'Tis the season to be jolly! It's hard to believe that we are coming to the end of another year. It seems like each year goes by a little faster than the preceding one. Some say this is just another sign of getting old (or at least older). Even though we are a little older, we seem to have some of the same problems we had last year and the year before that. We are extra busy making up or just repairing jewelry or watches for our customers to give as Christmas gifts. Playing Santa Claus or Santa's helper can be frustrating at times--too much to do and too little time to do it, but jobs must be finished by this Christmas. So what do we do when we have more work than we can possibly get finished by Christmas? We have some options:



(1) We can work more hours. Unfortunately, I fall into this classification. It is surprising how much work one can accomplish by working an additional six hours after spending a full eight-hour day with customers and many phone calls. Even with my wife, Betty, waiting on most of the customers, there are those who bring in jobs that need my immediate attention, such as replacing cells, adjusting bands, or just fitting spring bars. Of course, customers that want to buy a new watch or a diamond ring must be waited on and these jobs all take time away from our other regular repair jobs. So, those extra six hours at night are valuable hours without the phone ringing and without any of the usual daily interruptions.

(2) Hire more help. This is a good idea if one can find good temporary help for the rush season; however, this person may be hard to find.

(3) Refuse work. We must be careful not to make our customers mad if we choose this option. We may want this customer for a customer next year, so we do not want to jeopardize our relationship with this customer. We need to use a good excuse or we should have a good reason for our job refusal. I know of one store owner whose engraving machine would "break down" around this time of the year. It always amazed me that this always happened each year during the busy Christmas season. The customer would be told that they were very sorry that they could not do any engraving just now because their engraving machine was broken, even though it was on a watch or other item sold by that store. I guess I have been lucky--my engraving machine works fine all year long.

(4) Longer promise dates. I find this option very usable, especially for jobs that are really not Christmas gifts. For example, we can get extended promised time on that old pocket watch that was passed down from grandpa and will end up in a safety deposit box at the bank.

Whether you need to use one of these options or not, I hope you have a very nice Christmas and a Happy New Year.

Wes Door

ON THE FRONT: Happy Holidays! Photo by
F. Sieb/H. Armstrong Roberts.

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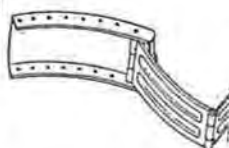
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4	5/16"	Fold-over	10	12mm	Fold-over
5	1/2"	Rolex Fold-over	11	5/16"	Case Fold-over
6	11/16"	Fold-over	12	9/16"	Fold-over

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TO-BR100.....\$19.95

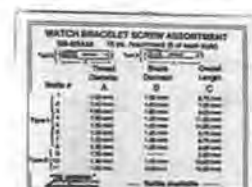
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Questions & Answers



HENRY B. FRIED

CMW, CMC, FAWI, FBHI, ★FNAWCC

A General Stark Pocket Watch

Q Could you please give me information on the watch in these photos? The movement is marked :

1366873
Gen, L Stark
Safety Pinion

As seen in the photo, the dial is marked:



The case is gold-filled and marked:



Thanks a lot for your help!

Scott Aalund
Kingwood, TX



A The photos of your watch reveal one made by the Dueber Hampden Watch Company of Canton, Ohio in 1900 (according to the serialized production number 1,366,873).

The General Stark model as in your photo appears to be of 15 jewels. The trademark appearing on the movement was used on movements made after 1890. The watch case was also made by the Dueber-Hampden Company. The whole watch is of moderate quality and price range.

The term "General Stark" was named after a well-known military hero and after whom Stark County in Ohio is named. It became a popular model and still later a smaller watch, the Molly Stark appeared, to become one of the earliest to find itself in a watch case made for the wrist.



Send your questions to:
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Please enclose an SASE

MORE ABOUT BRASS

In the October HT we featured a "Question & Answer" on brass and its properties. Mr. John Grass sent us the following supplemental information:

The recent explanation regarding brass hardness needs to be slightly modified. From the Revere brass facts booklet, and a little more inquiring, we find that when soft brass (that is, brass as cast) is reduced in thickness by about 7%, it becomes 1/4 hard (this is #1 hard). Another 7% reduction produces 1/2 hard brass (#2 hard); 7% more, 3/4 hard (#3 hard); 7% more, full hard (#4 hard); 7% more, extra hard (#6 hard); 7% more reduction, spring temper (#8 hard), and another 7% reduction gives extra spring temper (#10 hard).

At any stage, brass can be re-annealed by heating it to a red temperature and the reduction process started over. I don't believe it is possible to take hard brass and make it a little softer by heating it a little; I think it is an all-or-nothing effect.

Cartridge brass, the most common, is 70% copper and 30% zinc. Red brass is 85% copper and 15% zinc. Free-cutting brass is 61.5% copper, 35.5% zinc, and 3% lead. Nickel silver is 66% copper, 24% zinc, and 10% nickel (also known as Silveroid, etc.)

John Grass
Redwood City, CA

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

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

TAPE 1: Approximately 2 hours

SUBJECT MATTER: A brief view and discussion of a variety of clocks and tools used in the Huckabee shop.

TAPE 2: Approximately 2 hours

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

TAPE 3: Approximately 2 hours

SUBJECT MATTER: Discussion and demonstration on lathe operation using the Boley watchmakers lathe and the C&E Marshall watchmakers lathe.

TAPE 4: Approximately 1.50 hours

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

TAPE 5: Approximately 2 hours

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

TAPE 6: Approximately 1.75 hours

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

TAPE 7: Approximately 1.75 hours

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

TAPE 8: Approximately 2 hours

SUBJECT MATTER: Making a great wheel and mounting the great wheel on its arbor.

TAPE 9: Approximately 1.75 hours

SUBJECT MATTER: Making and fitting a replacement pinion for a clock wheel.

TAPE 10: Approximately 1.50 hours

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

TAPE 11: Approximately 2 hours

SUBJECT MATTER: Huckabee discusses the IBM #37 Master Clock Movement and IBM 90 Series Clock Movement.

TAPE 12: Approximately 2 hours

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

TAPE 13: Approximately 2 hours

SUBJECT MATTER: Cutting clock wheels—a demonstration of cutting the wheels used in the AWI CMC examination.

TAPE 14: Approximately 2 hours

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

TAPE 15: Approximately 2 hours

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

TAPE 16: Approximately 1.50 hours

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

TAPE 17: Approximately 1.75 hours

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

TAPE 18: Approximately 1.75 hours

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

TAPE 19: Approximately 2 hours

SUBJECT MATTER: Pivot work in the American antique Sessions, count wheel, and clock movement.

TAPE 20: Approximately 2 hours

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

TAPE 21: Approximately 2 hours

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

TAPE 22: Approximately 2 hours

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

TAPE 23: Approximately 2 hours

SUBJECT MATTER: Pivot and bushing problems and their repair.

TAPE 24: Approximately 2 hours

Not available at this time.

TAPE 25: Approximately 2 hours

SUBJECT MATTER: Clock mainspring and barrel work.

TAPE 26: Approximately 2 hours

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

TAPE 27: Approximately 2 hours

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

TAPES 28 & 29

Not available at this time.

TAPES 30-34: Approximately 2 hours each

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

TAPES 35 & 36: Approximately 2 hours each

SUBJECT MATTER: Two tapes which demonstrate the use of the lathe accessories produced in the Series 30-34. This encompasses all facets of pivot work encountered in the clock shop.

TAPE 37: Approximately 2 hours

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

ROCK QUARRY et tu

The Man Upstairs Has Spoken . . .

FRED S. BURCKHARDT



One day while I was figuring how to change megahertz into pennyweight, I heard a voice call my name. At first I thought maybe the radio was on, but it wasn't. No one else was home, so thinking it was just my imagination, I continued with my work.

In a few minutes I heard my name again. Thinking it was somebody playing around with some electrical type of stuff, I didn't pay any attention. Then again I heard: "Fred. . ."

I said, "Quit fooling around! I'm busy working on something that'll revolutionize the entire industry!"

The voice answered, "This is *no joke*, Buster."

I couldn't recognize this particular voice but though it might be that of Elvis, as I saw him over at the shopping center the day before eating three cheeseburgers. I knew it was him because he was wearing bluesuede shoes. So I said to him, "Okay, what do you want?"

The voice replied, "Do you want to go to heaven?"

"Sure," I said, "but I don't want to die to get there."

Unimpressed, the voice said, "If you want to get to heaven, send me one hundred pounds of used pithwood."

"What do you want with used pithwood?" I asked.

"The watchmakers and clockmakers up here are running short and they need a new supply," was the answer.

Laughingly I said, "Why don't you just ask for *new* pithwood?"

"I can make it like new and it will help to get rid of all the old pithwood," said the voice.

This was starting to get a little ridiculous, so I said, "You're starting to bug me! If you are who you're trying to make me believe you are, show me a sign!!"

I knew this would bring the whole thing to a screeching halt. Then, all of a sudden, I watched a pair of my 3C tweezers melt into a little ball. This was a good enough sign for me.

So then I said, "How about a hundred pounds of used batteries instead?"

"We don't need no stinkin' used batteries," was the reply.

"Okay, okay!" I said. "But that deal you made with Oral Roberts was a lot easier than this. It'll take a long time to get that many used pithwood buttons together! One button lasts me a long time."

"I don't have time for excuses," the voice answered. "You have a lot of friends; ask them for help. We have to have the complete shipment by the first of the year--no ands, ifs, or buttons."

I said, "I don't know about friends. I have a lot more enemies, but I'm not sure if they'll participate if they know what the deal is."

I could tell that the voice was getting a little perturbed, because it said, "Are you going to do this, or should I let everybody know about your investments with the Widow & Orphans Savings & Loan?! Jimmy and Tammy are a couple of *pikers* compared to *you*!"

"You have me over a barrel," I replied. "What if I can't get that much together by the end of the year?"

"Up you come," the voice answered. "Remember, you can't let your fellow W & C's down."

By this time, I was in a cold sweat. I knew for sure I must have been having an hallucination, or else my flu shot didn't take.

Well, rather than take a chance, I'm going to have to ask all of you who read this column to ship my your used pithwood. In return, I'll send you a choice of either some Holy Water from a little creek that runs through Toad Suck Ferry, Arkansas, or a tape of Ben Matz singing "*Tiptoe Through the Tulips*." I know this will be a hard choice for you to make, as both are in such demand. For 50 dollars, which is strictly for postage, you'll receive both water *and* tape. (Not a bad deal! After listening to the tape, you'll want to douse yourself with the water and give yourself Last Rites!)

If you don't hear from me after New Year's, you'll know what happened . . .

□

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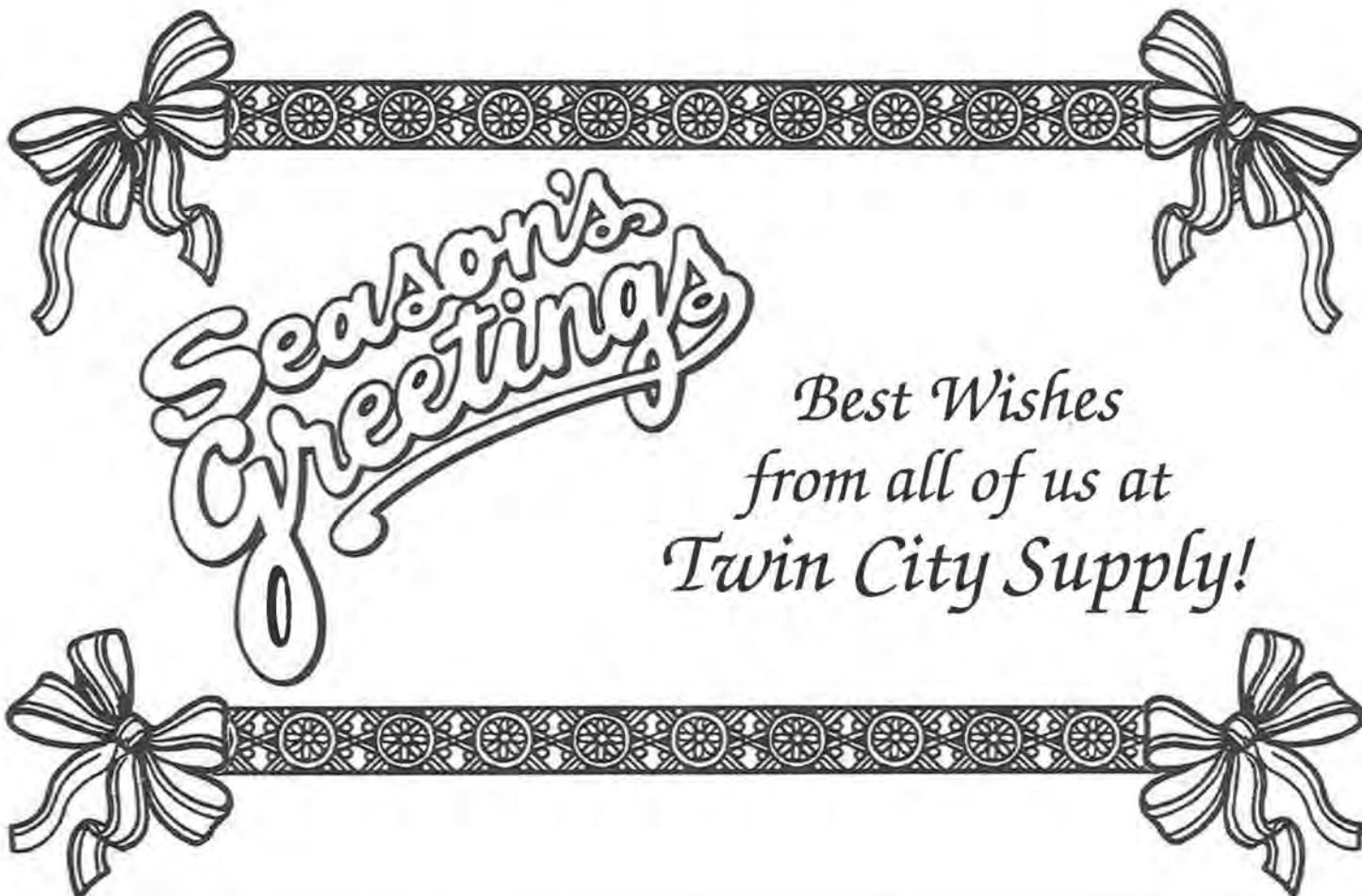
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As a Clockmaker Turns

Preparation for Wheel Work



J.M. Huckabee, CMC, FBHI

This will be a series of three articles dealing with wheel making. The material will be applicable to cutting clock wheels in a size range up to about 2-1/2 inches in diameter. That size is about the practical limit that can be accommodated with the watchmakers lathe.

A number of lathe feature modifications will be needed to facilitate the job as well as a number of smaller accessories must be made. These items are not readily available and I have made many of the tools myself. This is a never-ending process if you do any serious lathe work.

The lathe and its accessory features we will be using is a grand mixture of brand names with many adaptation devices. It's folly to believe you can get into serious machine work without some of this type of activity.

This article will deal with the most basic pieces that will be needed. These will be in the size range suitable for making a 60-tooth, 0.5 mm module wheel--the wheel in our AWI CMC exam. Three subsequent articles will deal with making the pinion of the same exam.

WORK ARBORS

The first step is to find how the wheel blank will be

held during cutting and how the cutter is powered. In the most simple terms, the wheel is made from a disc of brass with teeth formed by sawing away the spaces between the teeth. This is accomplished one space at a time as the disc is indexed through 60 positions. The cutter (saw) has a profile that corresponds to the space between a pair of teeth. In this application the cutter has about a dozen teeth and is a little more than a half inch in diameter.

The brass disc will be held in an indexing fixture and must be rigidly supported. A heavy disc is placed on each side of the workpiece; its diameter should almost reach the root of the teeth being produced.

Refer to Figure 1. We have an arbor to support the workpiece and another to drive the cutter. I usually stack two or more workpieces. The three wheels shown were produced in a stack. The wheel arbor shown has a stack of uncut discs.

Examine Figure 2. This wheel holding fixture is mounted in a #64 collet and extends into the spindle drawbar, also shown. Cutting stresses are about the maximum that a watchmakers lathe can withstand. The large collets of an 8 mm lathe has a very shallow pocket and may not be suffi-



FIGURE 1. Wheel holding fixture and cutter arbor with finished wheels.



FIGURE 2. Wheel fixture with drawbar. Note that the wheel fixture extends through the lathe collet.

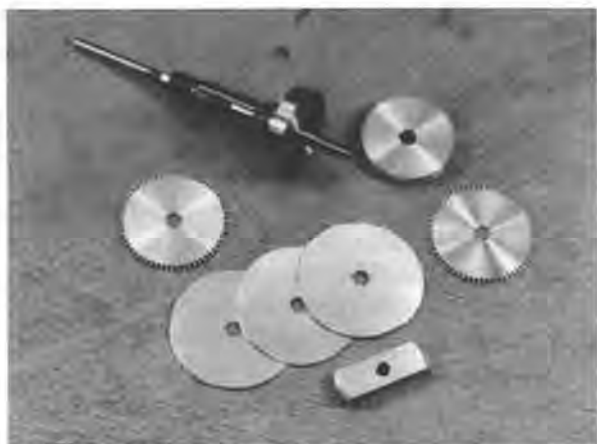


FIGURE 3. Wheel fixture with wheel blanks and finished wheels.

cient to withstand the cutting stress. We will speak on that subject later.

Study Figure 3. The holding fixture is disassembled showing the heavy support disc and cross-bar nut. Uncut discs and finished wheels are shown. These discs are about 0.5 mm thick. The holes are skin-tight fit on the arbor and cut with a tin shear to a little oversize. Mount these in the fixture, place in the lathe, and turn to the exact diameter you desire for the finished wheel. Keep these in the fixture until the tooth formation is complete.

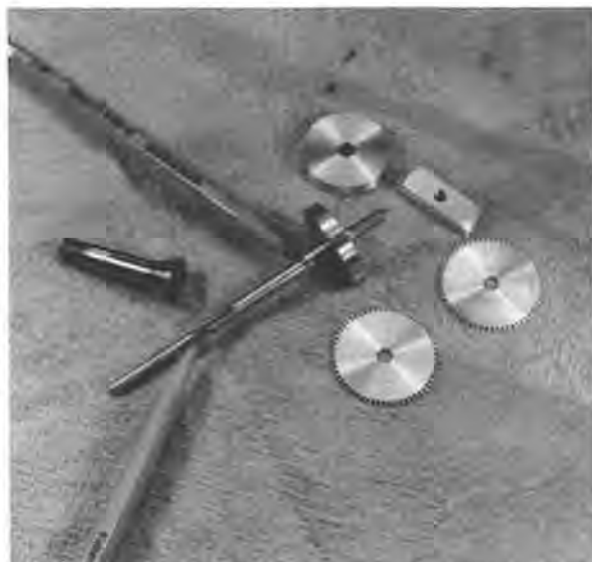


FIGURE 4. Wheel fixture with collet removed. Note the large hub which fits into a #64 collet.

Turn your attention to Figure 4 for detail of the arbor tang.

The larger arbor section identified is the exact diameter and length of the collet pocket. I used a #64 which is approximately 1/4 inch. The smaller extension is sized to a snug fit through the collet body, in this case about 3/16 inch. It overhangs the collet end about 1/8 inch, is threaded

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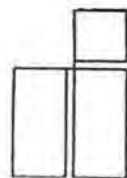
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#5-40, and split. An extension is threaded and screws into the split region as an expander. This gives the strength needed to withstand cutting stress.

We have an example of the cutter arbor problem in Figure 5. We will need numerous arbors to accommodate this cutter group. I reduce the problem by use of a cutter adapter. The adapter is used when the cutter bore diameter is larger than the available arbor.



FIGURE 5. Cutters are made in many sizes which causes a problem in holding them.



FIGURE 6. An arbor adapter reduces the number of arbors a workman will need.

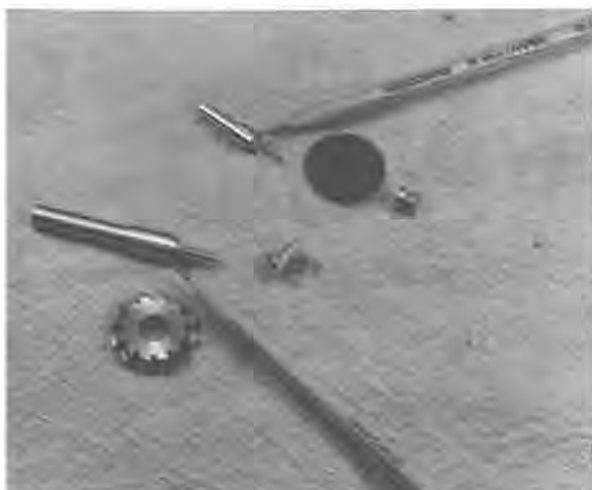


FIGURE 7. Arbors for cutter sharpening. The smaller arbor holds a very thin stone which is driven at high speed.

If the cutter does not run true in round, one or more teeth may do all of the cutting, rendering the setup no better than a fly cutter. It is of utmost importance that the cutter run as true as possible. Therefore, placing a bushing inside the cutter is not satisfactory in general terms.

My technique is shown as a size adaptation (Figure 6). A brass collar is placed on the arbor using a light press fit. Place the arbor in the lathe and turn a cutter seat in the collar. This should be a snug fit to the cutter bore and a true face for the cutter to seat on.

The same technique should be used to hold the cutter when it is sharpened. Touch up the arbor center point so that it can be returned to the lathe later and inspected for true running. A deep collar can be recut a number of times before replacement. Possibly you will be able to see the adapter in Figure 6. It is a lighter color than the arbor main body.

CUTTER SHARPENING

The cutters I own have a range of about 10-16 teeth and are about a 1/2 inch to 1 inch in diameter. More teeth are better, but with all things considered, the smaller sizes are best in a watchmakers lathe for clock wheels. I prefer a tooth count of 10, 12, or 15 teeth for ease of sharpening. Dull cutters are a way of life--you must be able to sharpen your own.

I prefer to hold the cutter on the adaptation arbor, in the lathe spindle, and index the tooth position in the headstock; that is why I like 10, 12, or 15 teeth. The grinder is a stone about an inch in diameter and about 0.030 inch thick. A Dremel #400 stone works nicely. The stone is driven in the same type of setup as used in making pinions. This is a vertical spindle on the tool slide. Each tooth face is touched lightly, usually a total cut depth of 0.001 inch. Two or three passes around the wheel will restore the edge to like-new sharp-



FIGURE 8. The cutter is sharpened by grinding the face of each tooth. These stones are 1/32 inch thick.



FIGURE 9. These cutters have been in use about 30 years. They have been sharpened dozens of times. The left indicated cutter has been used most.

ness. Cutters may be sharpened many times if they have been used with reasonable care.

Figure 7 relates a cutter support arbor and a grinding arbor. Grinding stress is less than wheel cutting but the cutter must be on a true arbor. The stone may be dressed in round with another stone and may be stacked two or more deep if the tooth spacing of the cutter permits.

An example of grinding pieces is shown in Figure 8. Be sure to preserve the face angle of the tooth. Being of constant profile, the reground cutter continues to produce the same shape after numerous sharpenings.

Refer to Figure 9. This cutter group is the size suitable for old American clocks. The cutter indicated at the left has been sharpened dozens of times, and almost half of the tooth has been ground away. All have been heavily used since the early 1960s.

The next article will relate the indexing fixture, milling spindle, tool slides, and features needed to continue toward building the lathe into a wheel engine.



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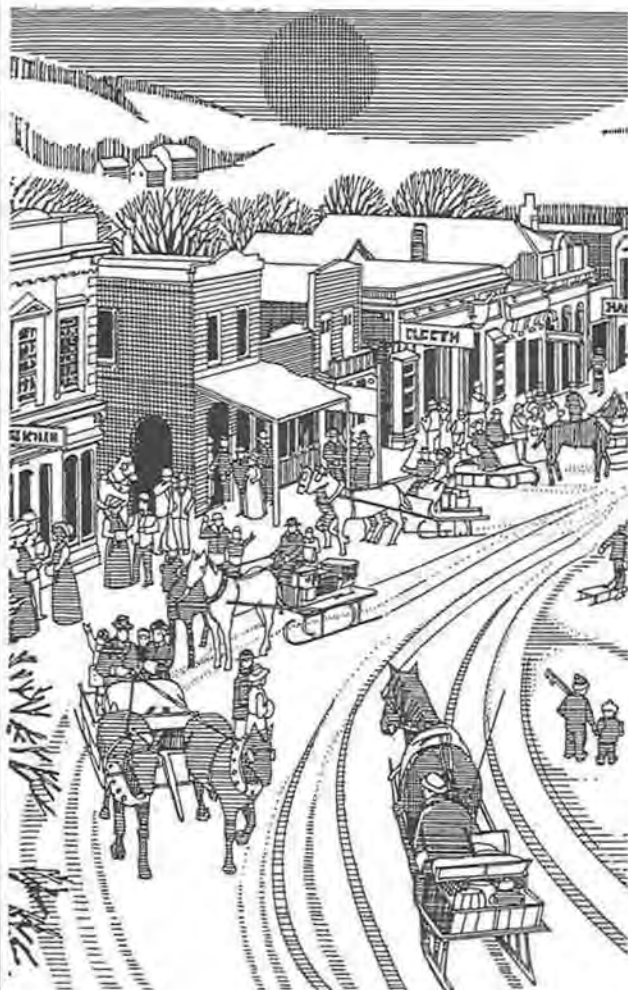
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PART 2

METHODS OF WATERPROOFING, PRACTICAL TESTS FOR TIGHTNESS, & SERVICING HINTS



HENRY B. FRIED
CMW, CMC, FAWI,
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No watchmaker, manufacturer, or designer-inventor can be sure that the watch or watch case he makes, sells, or services is water-resistant/waterproof unless the case is tested with the movement enclosed, ready for wear. The watchmaker has heard of numerous tests but may be confused by the different principles of operation. The main types of tests to determine whether the case is water-resistant or waterproof are the pressure test, the vacuum test, and the fathometer test. A short explanation of each test as well as an evaluation of the advantages of each type will be helpful.

Pressure Test

The pressure test will not harm or wet the movement even should the watch case prove faulty. The testing equipment consists of a heavy glass cylindrical jar half filled with water set into a platform (Figure 4). The watch case is hung from a hook (A) attached to an adjustable rod at the bottom of the jar cover (B). The cover is fastened over the rubber-gasketed jar top and becomes airtight. An air pump (C) connected by a valve allows

air to be pumped into the sealed jar. The pumped air occupies the upper half of the jar, above the water level, and is gauged by a dial gauge (D) which operates similar to a regular air-pressure gauge.

If the watch case is faulty it will admit air as well as water. Therefore, when the air is pumped into the jar, it will force its way, under pressure, into the same crevices that water would enter. When the air-pressure gauge shows pressure equivalent to water pressures at certain depths (to be explained later), the hook holding the watch case is pushed down by a gasketed sleeve (E) and immerses the watch case into the water. The air valve then releases the compressed air in the upper half of the jar. If the watch case is faulty, air (under compression) will have entered. When the watch case is submerged in the water, the air pressure now in the (leaky) case is equal to the pressure of the water trying to enter; thus, neither does water enter nor does air escape. However, when the air pressure above surface is released through the valve, the pressure upon the surface of the water is relaxed and so is the pressure of the water upon the watch case. The air now in the case has a greater pressure than the water pressing

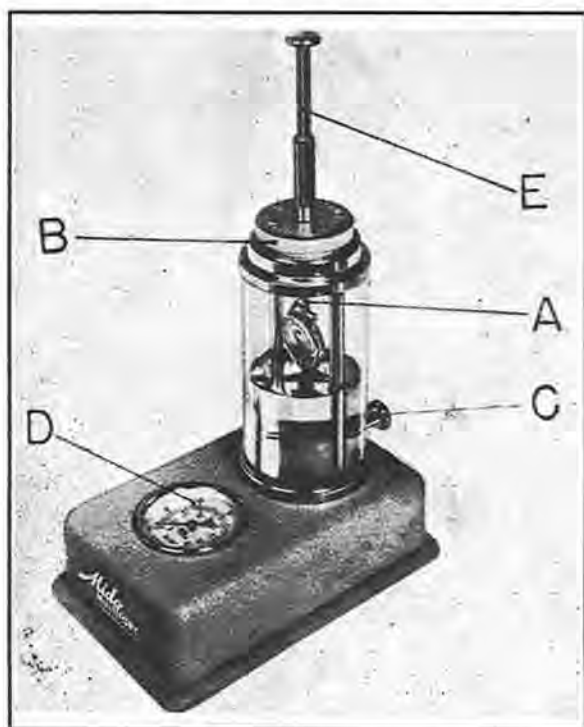


Figure 4. A device for testing water-protected watches using the air pressure principle.



Figure 5. In the pressure test, air bubbles escaping from the watch case under water indicate the case has defects and is not water-protected.

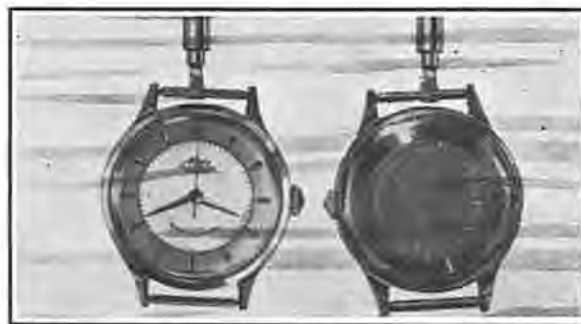


Figure 6. If no bubbles appear, the watch is airtight and therefore waterproof/water-resistant.



Figure 7. This waterproof testing device uses the vacuum principle in detecting leaky or faulty watch cases.

upon it, and thus expands out of the case. If the case is leaky, this air can be seen in the form of bubbles escaping from the same point it entered and the watchmaker can see where the leaky spot is (Figure 5), just like testing a leaky tire tube. The watch is then immediately removed. Water has not entered the case because air is still escaping, pushing away any moisture at the leaky spots, even after the watch has been removed from the testing jar. The watchmaker can then make any adjustments to the faulty crown, screw, snap-back, or crystal. If no bubbles appear, the watch is airtight and therefore waterproof or water-resistant.

Vacuum Test

Another test of waterproofing of watches is the vacuum test (Figure 7). It is very much like the pressure test, but instead of pumping air into the area above the water in the sealed jar, air is drawn out.

The watch is fastened to the hook on the bottom of the jar cover and is submerged into the water after the cover is secured. Since the air in the watch case was packed into it when the case was closed, and since the watch is submerged just below surface level, the internal air pressure and the external water pressure are equal. No water will enter unless, of course, the case is very poor. The pump in Figure 7 is a suction pump. It will withdraw the air in the area above the water. This will decrease the pressure upon the water and, therefore, the pressure upon the submerged watch case. Now the inside of the case will have a greater pressure than the water pressing against the case. If the case is leaky, this greater internal pressure will force its way out of the case through the crevices or defects in the case. These defects can be detected by looking for the escaping air bubbles. When the bubbles are seen, the case should be immediately withdrawn from the water, removed from the device, and repaired.

In another version of the vacuum test, the jar consists of a heavy glass cylinder with a thick rubber diaphragmed bottom. The jar is completely filled with water (Figure 8a), the watch is suspended in water, and the jar cover is fastened securely (Figure 8b). A lever pulls down on the rubber-bottom diaphragm (Figure 8c). This, of course, lowers the water level (although not below the watch) and creates a partial vacuum. The



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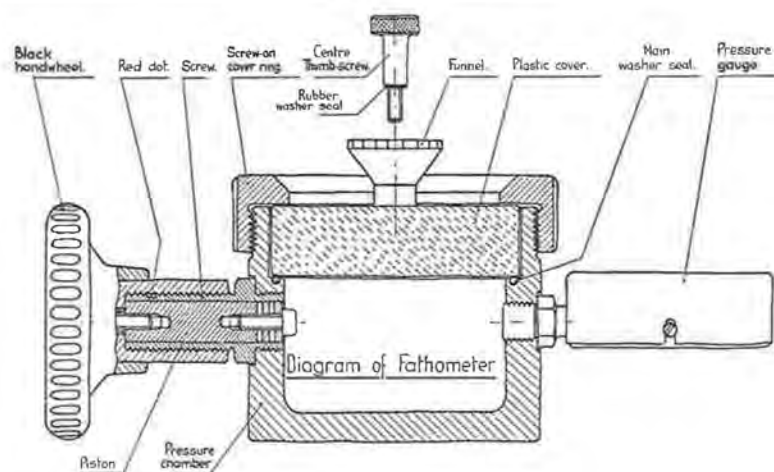
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Figure 8. In another version of the vacuum test, the watch is placed in a water-filled jar, the water level of the jar is then lowered by means of a rubber-diaphragmed bottom and a partial vacuum created above the water level.



← **Figure 9.** The fathometer provides a severe test of waterproofing. Its dial gauge will measure pressures equivalent to a depth of 660 feet under water.

air in the case now has greater pressure than the surrounding water and, if the case is leaky, will escape through these crevices and will be observed as bubbles.

Fathometer Test

The fathometer test is a rather severe test of waterproofing the case, which simulates actual conditions of water under the pressure of great depths. Figure 9 shows a drawing of a fathometer device. To get an idea of the strength needed in the materials that make up this device, the plastic cover, for example, is almost an inch thick and the walls of the pressure chamber are nearly half an inch thick. A dial gauge indicates pressures equalling a depth of 660 feet. The watch is placed into the pressure chamber and the chamber filled to the brim with water. The plastic cover is then placed over the top and into its recess. This forces some of the liquid to overflow through the funnel.

The screw-on cover ring is next secured. The center thumb screw with its rubber seal ring is screwed into the threaded funnel, which now makes the inside completely watertight. The hand-wheel at the left operates a piston which can be advanced to compress the water in the chamber, placing the same pressure

on the watch in the water that would be placed on it if it were submerged at great depths.

The piston is advanced until the gauge indicates the pressure required for the test. If the watch or case is leaky, water will actually enter and the watch will have to be dried and re-tested.

This device operates under tremendous pressures. Unless the tester is familiar with this device, pressures equal to a half ton per square inch for the entire area of the watch case may be released suddenly with dire results. This device is used mostly for testing watches, especially built for skin-divers or other deep-sea divers.

In recent years a dry method of testing watch cases for water-resistant/waterproofness has become popular. We will deal with this method later in this series.

Next month: A comprehensive glossary of terms used in discussing waterproofing/water-resistant tests and procedures. □

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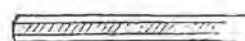
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Making a Ratchet Tooth Escape Wheel



ARCHIE B. PERKINS
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The ratchet tooth escapement is used in many of the earlier English lever watches. This escapement uses an escape wheel which has pointed teeth that operate on pallet stones which are wide enough to supply sufficient impulse to the balance wheel of the watch. With this type of escapement, all of the impulse is supplied by the impulse angle on the ends of the pallet stones, unlike the club tooth escapement where the impulse is divided between the angle on the teeth and the angle on the stones.

The teeth on a ratchet tooth escape wheel are very delicate and are quite often broken or damaged beyond repair. In this case, a new wheel must be made for the watch.

Figure 1 shows a ratchet tooth escape wheel and the most important specifications of its teeth. The angular distance between the tips of the teeth on a 15-tooth wheel is 24° . The locking faces of the teeth are undercut 24° and the angular width of the teeth is 12° . The tips of the teeth should not come to a sharp edge. They should

have a thickness of about $1/2^\circ$ at the tips.

The ratchet tooth escape wheel can be safely made with a single tooth fly cutter if the cutter is made correctly and used correctly. However, a multiple tooth circular cutter would be more desirable, although it is much more difficult to make than a single tooth fly cutter.

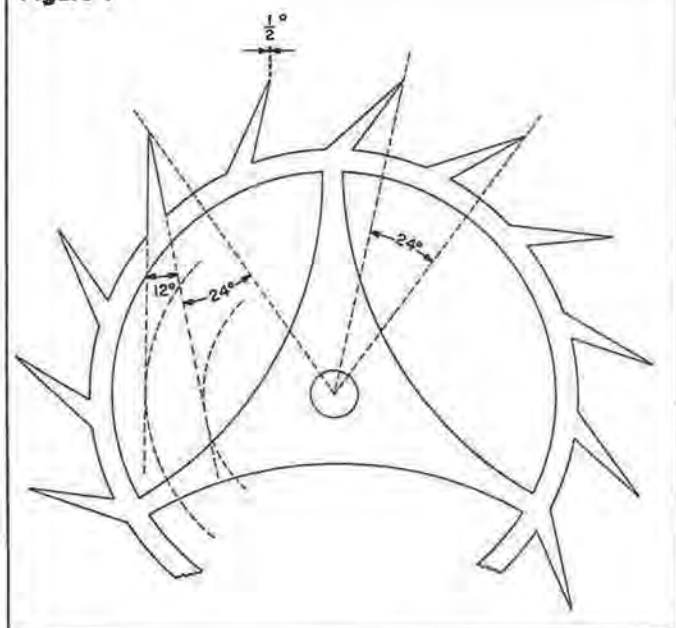
MAKING A SINGLE TOOTH FLY CUTTER

A fly cutter is usually made from round high carbon water hardening drill rod. The rod selected should fit the cross hole in the arbor chuck that is available for holding the cutter. One end of the rod is filed down in thickness to the center of the rod's diameter. This flat face will be the front face of the cutter. The length of the filed down section should be long enough to form the cutting section of the cutter. Next the back side opposite the face is filed down to reduce the thickness of the material at the cutting section of the cutter. Then the material is filed or ground to fit the space between two good teeth of the escape wheel as shown in Figure 2. If there is no sample wheel available, one must make a large scale drawing of the wheel, and then the drawing is reduced to actual size to be used to fit the cutter. The cutter is relieved toward its back side as shown by the dashed lines in Figure 2.

The edge of the cutter which cuts the locking faces of the teeth needs a 5° slope from the point of the cutter so the point of the cutter will have relief. This allows the point of the cutter to cut a smooth surface without the danger of the cutter bending the tooth backward during the cutting process. This edge of the cutter is also relieved toward the back of the cutter. This is shown in Figure 3.

The front face of the cutter should be ground flat and smooth. One must have very sharp, smooth-cutting edges on the cutter in order to cut well-finished teeth on the escape wheel. Note: If the cutter is dull, it is likely to shift the position of the wheel blank on its arbor chuck during the cutting of the teeth which will spoil the blank. Also, if the cutting edges are not smooth, the cutter will not cut smooth surfaces on the teeth.

Figure 1



HARDENING AND TEMPERING THE CUTTER

After the cutter has been shaped, it is hardened and tempered. Only the cutting part of the cutter is hardened. The round body of the cutter is left soft so the set screw of the arbor chuck will bite into the cutter body. This is to help keep the cutter from loosening up in the arbor chuck during the cutting of the wheel. One can hold the cutter by its round body with tongs while heating the cutting end of the cutter. To harden the cutter, one would first warm the cutter and drop it into a container of boric acid powder. Then roll the cutter in

Figure 2

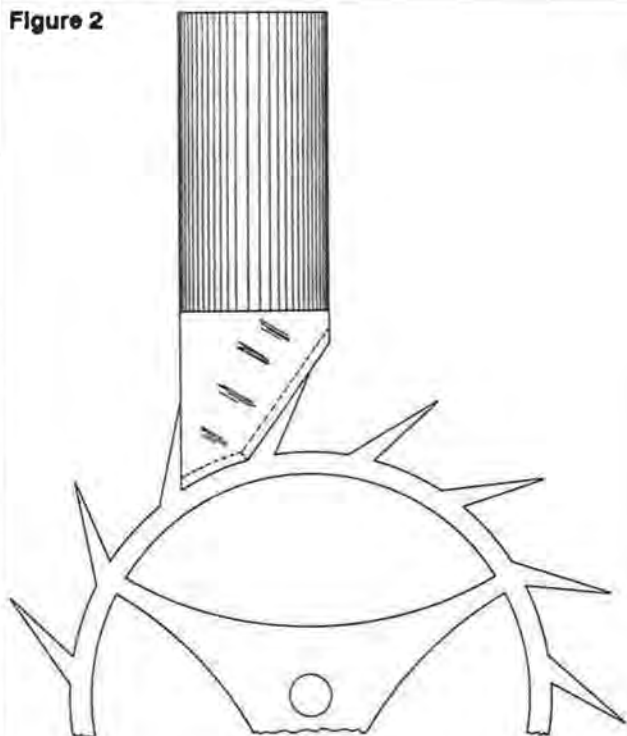
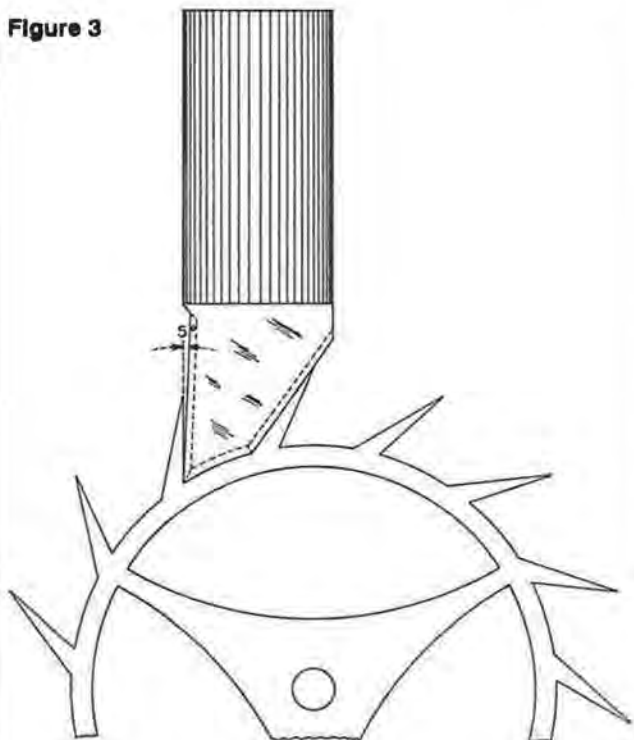


Figure 3



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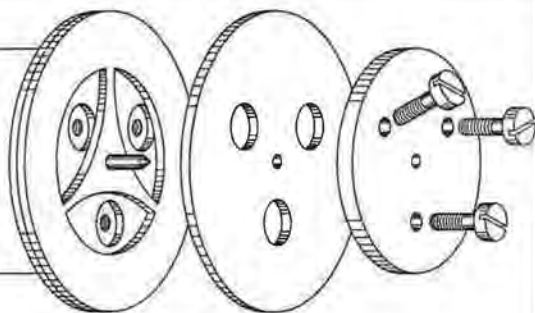
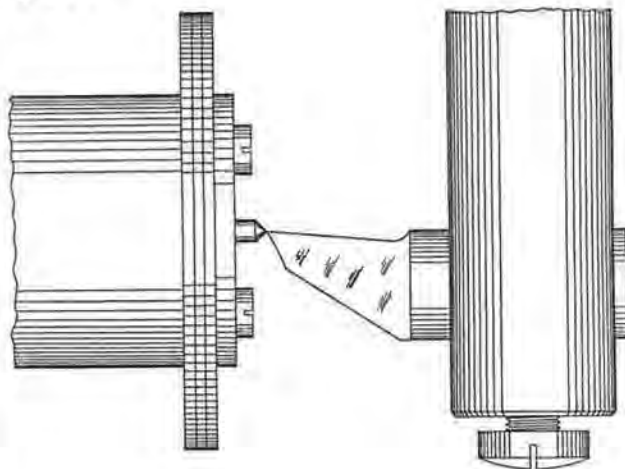
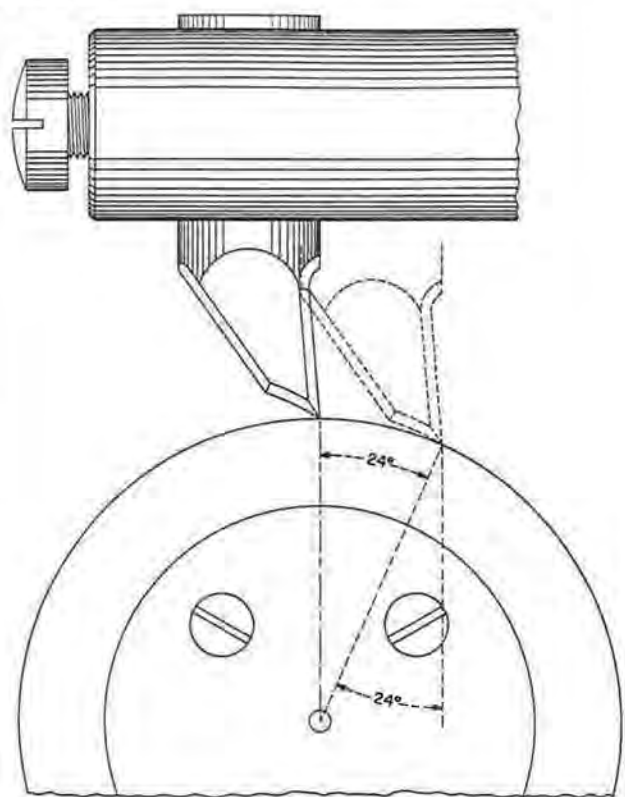
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Figure 4**Figure 5****Figure 6**

the powder so a thin uniform coating of the powder is attached to the cutter's surface. Now heat the cutting end of the cutter to a uniform medium cherry red. While at this temperature, the cutter is quenched end first in cold tap water. The cutter is then tested with a fine file for hardness. If the cutter is hard, the file will slide over the surface without biting into the surface. Next the cutter is cleaned with fine emery paper and is then tempered to a light straw color.

MAKING AND HOLDING THE WHEEL BLANK

The wheel blank should be made from hard free machine brass. The brass can be in sheet form or rod form. It is advised to cross out the blank before cutting the teeth. If one should cut the teeth first, there is danger of damaging the delicate teeth during the crossing out process. It is best to scribe out the spokes on a larger piece of material than is needed for the blank. This gives something to hold onto while the blank is being crossed out. After the crossing out has been completed, the blank is sawed out of the material.

Figure 4 shows how the blank can be held while the teeth are cut. An arbor is made up to hold the blank. The diameter of the arbor should be slightly smaller than the root diameter of the escape wheel teeth. The end of the arbor is faced flat, then it is drilled and tapped for three screws. The wheel blank is sandwiched between two other wheel blanks or backup discs. One can avoid the necessity of crossing out three blanks by making the backup discs with three holes to clear the arbor screws as shown in Figure 4.

The end of the arbor chuck should be fitted with a blue steel pin which is used to center the blanks. The end of the pin is turned to a sharp point which is used to center up the wheel cutter.

SETTING UP THE EQUIPMENT

When setting up the equipment to cut the escape wheel, the slide rest is placed on the lathe bed from the back side of the bed. The spindle of the milling attachment is set in a horizontal position and its scale is set on zero. The milling attachment is fastened to the top of the slide rest with its spindle at right angles to the lathe bed. Make sure that the slide rest is set squarely with the lathe bed and is securely attached to the lathe bed. Also, make sure that the milling attachment is securely fastened to the slide rest and is set squarely with the slide rest.

The index plate used can have 15 divisions or any multiple of 15. The index plate selected is placed on the end of the lathe spindle. The index latch is attached to the end of the lathe bed. Next the arbor chuck holding the wheel blank is placed in the lathe spindle and the blank is turned to the proper diameter. Then the arbor chuck holding the cutter is placed in the spindle of the milling attachment.

Figure 5 shows the point of the cutter being centered up with the pointed center of the arbor chuck

holding the wheel blank. One should make sure that this pointed center runs true before trying to center the cutter. If the center is out true, it should be turned true or ground true.

SETTING THE CUTTER ON THE BLANK

Although the cutter has already been centered, one must still set it in relationship to the wheel blank in order to make the undercut on the locking faces of the teeth. Figure 6 shows how this is done. First, we would engage the index latch into a notch in the index plate. Then the cutter is moved so it is above the edge of the blank as shown. In this position the milling attachment spindle is turned slightly by hand to allow the tip of the cutter to make a mark on the edge of the blank. Then the blank is indexed 24° clockwise. This would be one division on the 15 division plate, or two divisions on a 30 division plate, or four divisions on a 60 division plate.

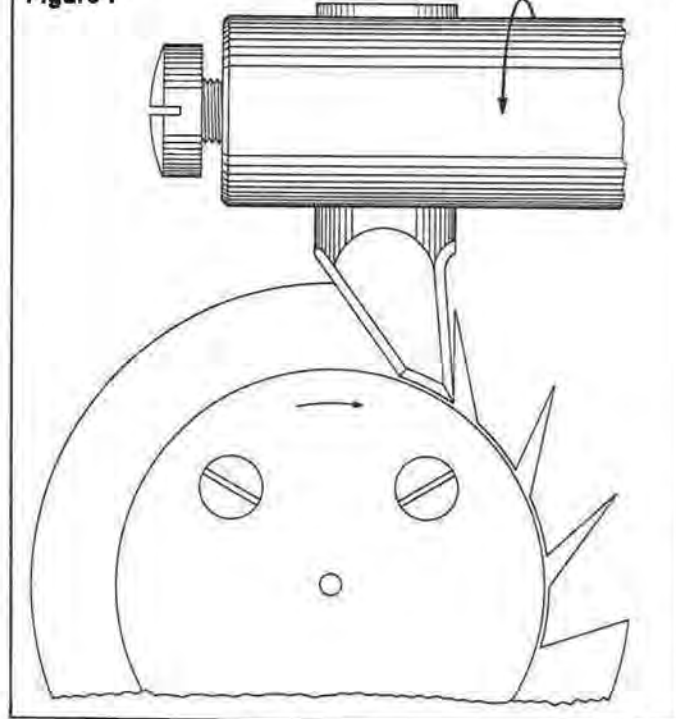
After the blank has been indexed, the cutter is moved over until its tip once again lines up with the mark made previously on the edge of the blank with the tip of the cutter. This sets the cutter so it will undercut the teeth 24°. After this we are ready to cut the teeth on the blank.

CUTTING THE TEETH

Figure 7 shows the teeth being cut. One should gradually lower the cutter into two adjacent spaces until a tooth is formed which has the correct width tip. Then all

of the other teeth are cut at the same depth. The cutter is fed through the blank slowly. The cutter is turned in the direction of the arrow on the cutter arbor chuck. Note: In order to protect the delicate teeth of the wheel to prevent them from becoming bent during the cutting

Figure 7



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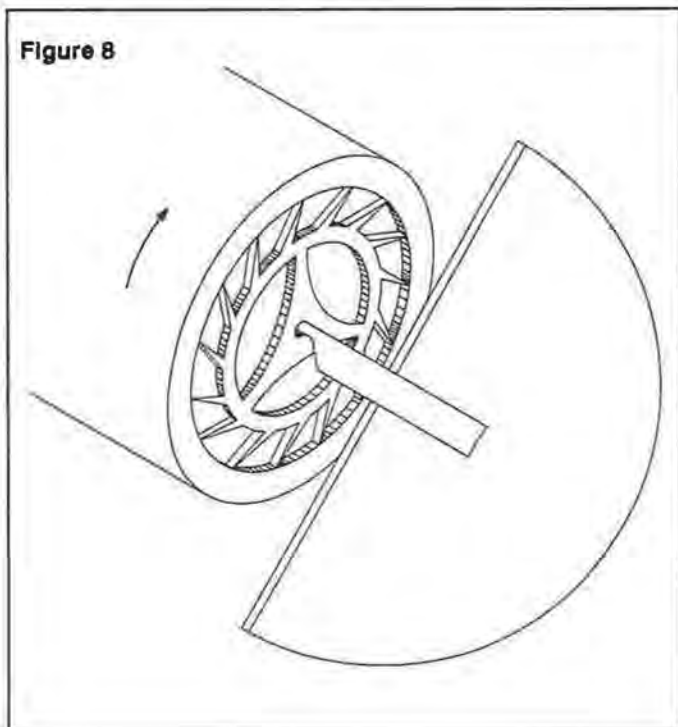
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of the wheel, one should index the blank in a clockwise direction. This is shown by the arrow on the arbor cap. This prevents the sloped edge of the cutter from bending the teeth over as the spaces are being cut. After all of the teeth have been cut, the wheel is removed from the arbor chuck and any burrs removed from each side of the wheel on a piece of fine emery paper cemented flat on a piece of plate glass. One should move the wheel in a circular motion on the paper. Next the hole in the wheel is bored out to fit the pinion.

Figure 8



BORING OUT THE HOLE IN THE WHEEL

When boring out the hole in the wheel, one must chuck the wheel so the ends of the teeth run absolutely true, otherwise the hole will be bored off center. Any eccentricity of an escape wheel cannot be tolerated since this can affect the escapement actions greatly.

Chuckling the wheel for boring out the hole is a delicate job. If the wheel is chucked in a wheel chuck, there is danger of the teeth becoming damaged, especially if the boring tool should get caught in the hole. The safest way to hold the wheel true while boring out the hole is shown in Figure 8. The wheel has been cemented into a sink which has been turned in the end of a cement brass or brass rod. The sink is of a diameter which fits the wheel diameter closely without any side shake.

The cement brass and wheel are cleaned in denatured alcohol before cementing the wheel into the sink. The cement brass is heated with an alcohol lamp to melt some shellac in the sink. Then the wheel is placed in the sink as the cement brass is heated further to cause the shellac to adhere to the wheel. Now with the shellac melted, the wheel is pressed flat against the bottom of the sink and held flat until the shellac cools. Then the hole is bored out for the pinion. The hole can be bored with a hand-held boring tool over the T-rest or a boring tool can be used in the slide rest.

After the hole has been bored, the cement brass is reheated to remove the wheel. The shellac can be removed from the wheel by soaking the wheel in denatured alcohol.

"Antique Watch Restoration" will continue next month.



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Two Tutorials Available for Self-Study by J.M. Huckabee

You've learned from his videos on lathe work and clock repair. Now you can learn from tutorial guides designed for self-study in your own shop.

A TUTORIAL GUIDE FOR THE CLOCKMAKER

This is a tutorial project and instruction to prepare the craftsman with the skills needed in the AWI CMC Examination. Although not all-inclusive and not identical to the CMC Examination skills required, it closely parallels that material.

The exercise at hand is a two-stage gear set with arbors, pivots, and bearings similar to those found in a mid-size mechanical clock. The work is centered around the use of a typical watchmaker's lathe doing jobs that are commonly found in restoration and repair of current and antique clocks.

The work involves the use of basic raw materials, and working these into a functioning precision mechanism. Tools required are a watchmaker's lathe, a small drill press, and numerous hand tools. The basic wheel and pinion material used is from a previous source. A multi-deck tool slide will be of great help, but not required. The lathe will need a tailstock and variety of collets. Special tools will be constructed as work progresses.

Presentation of the material is in 14 parts and illustrated with 151 photographs. The material has been prepared for and by the education program of the American Watchmakers-Clockmakers Institute by J.M. Huckabee.

CLOCKMAKING ILLUSTRATED:

THE LATHE, STEADY REST, & PIVOT REPAIR

Originally prepared by J.M. Huckabee for Project Extend, members may now borrow this tutorial lesson from the AWI Library.

This work illustrates the use of a steady rest accessory with a watchmaker's lathe. Replacement of a broken pivot on an escape wheel arbor was chosen to demonstrate the steady rest use. Critical notes are featured with each illustration. Although some side issues are discussed, working time to replace the pivot is in the order of 15-20 minutes. This assumes that all tools are in order and the workman is familiar with this mode of lathe work.

Subjects covered and fully illustrated by 25 photos of the actual work in process include:

- Two types of steady rest
- A shop-built steady rest in use
- The commercial steady rest in use
- A broken pivot and repair accessory group
- Making and use of soft sub-collets
- Support problem and solutions
- Locating center and arbor drilling
- Forming and inserting the new pivot
- Finishing the new pivot
- Inspection of the finished job

Either of these self-teaching manuals may be borrowed from the AWI Library for two weeks. They are the beginning of a series of Huckabee tutorials to be offered by AWI.

Soon to be available are two more in the "Clockmaking Illustrated" tutorials: *Turning Between Centers*, featuring various methods of work support for speed and accuracy fully illustrated with 76 work photos and a companion tutorial *Escape Wheel Work: Rebuilding Wheel, Arbor, Hub, & Pinion*. This will feature a variety of lathe turning techniques illustrated with 36 work photos.



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Clocks Inside & Out

Soldering

John R. Plewes, CMC
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Should our universities ever offer a Ph.D. course in the profanities, they would probably use the techniques of soldering as a means of raising their students' level of frustration. It certainly does appear that a great many people have so much trouble with even soft soldering that they don't even think about hard soldering at all.

Both types of soldering utilize the same general principles and, invariably, it is violation of these principles which cause people to swear that they simply cannot solder. There are only two of these principles, but their importance can hardly be overemphasized. Perhaps they even merit a place on your workshop wall, as a reminder in case of difficulty. They are:

- 1) Absolute cleanliness.
- 2) The application of sufficient heat.

Basically, you can only solder *metal* in the most literal sense; you cannot solder dirt of any kind. There are several ways of obtaining the necessary cleanliness—emery cloth, filing, wire brushing, or even turning on the lathe, for example, the underside of a bolt head. Should pits be present, they must be filed or machined out as otherwise they will harbor dirt and cause a joint reminiscent of pumice stone. Never consider this prior cleaning process as optional. It is absolutely essential, and its omission is a prime cause of poor joints. The metal should not be polished; the fine scoring of a file or emery will enhance the grip of the solder.

Not only must the job itself be clean, so should the soldering iron and the solder. When the soldering iron accumulates its customary black scale, file it off down to clean copper again. Dipping an iron (why isn't it called a copper?) into corrosive flux to clean it often results in a greater loss of copper than that caused by filing. Filing also restores the iron to its correct shape. Wire-type solder is easily cleaned by running it through a coarse cloth. Such solder should always be stored in its box or in a plastic bag, or both.

The second essential principle is also imperative: Always remember that heat transfer, whether from a soldering iron or a flame, is a *time* proposition. Hence, you must apply the heat long enough to brew the job up until solder will freely run through it where required.

The bigger the job, the longer it will take to heat up; soldering a milk can will obviously take a lot longer than soldering a clock arbor, for example.

The role of flux in soldering is often misunderstood; many people seem to look upon it as a cleansing agent, which is quite wrong. Flux will certainly not work as a substitute for prior mechanical cleaning. Even an acid flux which might attack the metal of the job somewhat will rarely attack the dirt thereon. In reality, flux works as an air excluder—it shields the metal from the air which would oxidize it when heat is applied—that is its real role. Hence, if you haven't done your cleaning prior to the application of flux, the solder still cannot bond to the dirt, be it fluxed or not. Flux then promotes soldering by excluding air from previously cleaned metal, but it neither dissolves nor removes dirt therefrom. To prevent possible later corrosion, all flux residues should be removed. Acetone, for example, readily removes resin flux, but contact with it and its inhalation should be avoided.

In practice, soldering falls into two main categories which are known as soft and hard, according to the metal, flux, and temperatures used. Both are used in clock repair and will be dealt with separately.

Soft Soldering

Soft solder is a tin-lead alloy of various proportions, a usual mix being 60:40 (60% tin and 40% lead). It is used to join many metals such as steel, nickel, tin, lead and copper and its alloys, including the brasses, gun metal, phosphor-bronze, beryllium bronze, beryllium copper, etc. Soft solder will also readily bond to noble metals such as gold and silver, but this is usually a value-destroying crime which is hard to rectify. Such metals should only be soldered with alloys containing a large percentage of their own metal. For soft soldering, the flux used is usually resin. However, for some stainless steels, an acid flux may be necessary. Old zinc clock dials can be repaired with soft solder, but zinc oxidizes readily and the filing-scraping procedure may have to be repeated before a sound bond is obtained. Zinc is not a nice metal to deal with.

The temperature at which soft solder melts varies somewhat according to the particular alloy used, but is in the range of 370°F to 450°F. Flux cored wire-type solder

is excellent for most jobs, often obviating the need for prior fluxing in small non-ferrous jobs. However, steel should always be fluxed before it is heated to prevent oxidation; it does not solder quite as readily as copper and its alloys.

Clock repair soldering almost always involves a soldering iron or a small flame, the choice of either being largely a matter of experience. The contact area between the job and the soldering iron is quite small, and little heat can transfer. A small puddle of molten solder in the contact area, however, conforms to the shape of both the iron and the job, and a useful transfer of heat will then occur. What is so often overlooked is that this transfer takes time, so the iron must be left on the job in its solder puddle until added solder can flow through the job.

With the iron still in place, adjust the parts as necessary and then hold them in position with a scribe, screwdriver, plier tips or other device, and only then remove the iron. Keep the hold-down tool in place, holding it dead still until well after the solder has appeared to set; this may take 10 or 15 seconds, depending upon the size of the job. Remember that cooling also takes time, and the visible solidification is only a surface effect; internal cooling takes a few seconds longer, so don't be in a hurry to remove the hold-down tool.

Solder flows toward heat, so where possible it is as well to rest the iron and its small puddle of solder under the job, say a clock gear when you are fitting a new tooth, and apply the solder to the topside. Once the solder has run through the job, do not apply more, as you will only have to file off all the excess. Remember that only the solder in the joint is doing real work, i.e. holding the new tooth in place.

Once the joint is sound, always remove flux residues, lest corrosion occurs later. This particularly applies to acid fluxes and acid core solders. However, these are very rarely required in clock repairs. Try to avoid them.

Although not as strong as hard soldering, soft soldering has the advantage in that its operational temperature is far below the range of 700°F to 800°F, which anneals copper and its alloys, and thus preserves any built-in work-hardening. One would not hard solder a clock gear in any way, for example, because it would become too soft to be useful. The case brass spandrels of old brass dial longcase clocks are often 3/16" thick, yet since they haven't been work-hardened, they can be bent in your fingers. Silver soldered brass is similarly malleable.

Hard Soldering

This term is generally taken as synonymous with silver soldering as far as clocks are concerned, where the solder is made up of silver, copper, and zinc. A red heat in the range of 1300°F to 1500°F is required; the flux used is borax, applied as usual, after prior careful mechanical cleaning.

Old longcase clocks often call for both types of soldering. Collets for the odd gear and also the pallets are usually soft soldered on their arbors. Two areas which sometimes require silver soldering repairs are the steel hands and the pendulum crutch, which less often suffer transit damage. Soft soldering would be inadequate in

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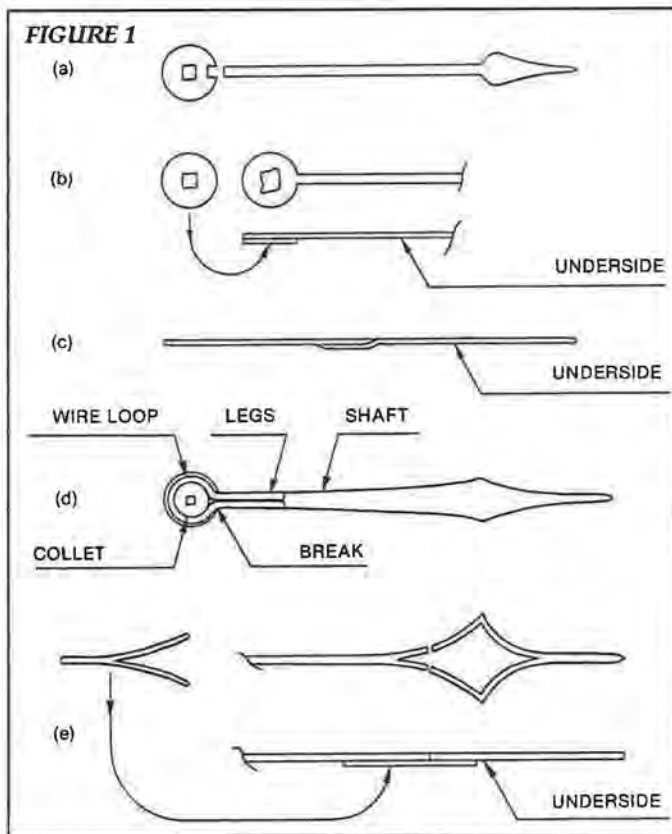
both these instances, but would be virtually essential for repairs on brass hands. Brass hands can, of course, be silver soldered and the butt joint repair would be hardly noticeable; however, the annealing action of the requisite red heat renders the brass too soft for comfort, and further bending and consequent breakage in everyday use is almost a certainty.

Typical hand repairs are shown in Figure 1. In (a) a steel hand would have to be silver soldered. If the hand in (a) was brass, silver soldering would so soften the hand shaft that it would readily bend under normal resetting and use. A new brass hand would be best, but a partial rebuild along the lines of Figure 1 (c), soft soldered, would also work well.

Be they brass or steel, soft soldering would be entirely adequate for the repairs of Figure 1 (b), (c), and (d). The wire loop of (d) would make the hand even stronger than it was originally.

In Figure 1 (e) a soft soldered butt joint would be quite useless, so a supporting fork of brass under the hand would be used to make an almost unnoticeable strong repair which would not soften the hand in any way.

Longcase crutches generally break off at the lower end rectangle. Both pieces should be filed bright and clean, and, where possible, a small slot should be filed in the end of the rectangular fork to accept the end of the filed-down arm from the escapement. This will help to hold the pieces together for soldering. Flux both pieces and fit them together, holding them thus in any convenient manner,



say, using a vise and an asbestos sheet as a rest for the free end.

Heat may be supplied by a propane torch using the tip of the blue cone in the flame--the hottest area. When the parts are red hot, apply a small amount of silver solder; it should run immediately into the joint. Use the solder sparingly, for a buildup is undesirable, structurally and financially. When the job has cooled, hold it under boiling water to remove the flux residue; a wire brush will help, but a file will be swiftly ruined by the hard glaze of the residue. No flux residue must remain as corrosion is somewhat more likely to occur than it is in soft soldering.

Two small pieces of asbestos sheet are useful when silver soldering two parts together. Each part is clamped to a sheet with the joint positioned in the gap between them whilst overhanging the edge of the workbench. With a weight on each asbestos sheet, the joint is both securely held and easily accessible.

As long as the principles and practices outlined above are scrupulously observed, both soft and hard soldering are decidedly feasible for anyone--even them as claims it ain't so.



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Ask Huck

CLOCKMAKING BITS

By J.M. Huckabee
CMC, FBHI

About . . .

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Q. What is the best method to touch up the appearance of the cast ornaments on old clock cases? Many of these pieces are tarnished and even have a white bloom on them.

A. Ornaments on many old American clocks were cast from a lead-like material and, like lead, show a dust-white surface tarnish with age.

I don't know "the best method," but I will relate my experience.

Many workmen use a touch-up paint called antique gold or antique silver. The outcome never seems to really look like what I imagined the original appearance to have been. Also, when brushed on, the paint will obscure detail of the casting to some extent.

The thing that seems best is to brush away all loose surface tarnish and spray on a new finish. A brush of the type used to refurbish suede leather products is suitable. It is best to remove the ornament for this action.

Most larger hardware stores have cans of spray paint called "brass". This has an appearance closer to the original than those colors under the name of "gold". While searching for spray paint, keep an eye for one called "bright silver". This works nice on pieces that originally had a frosty silver appearance.

Hang the piece on a small wire and coat lightly, again if deemed necessary. Each coat will be dry-to-touch in a few minutes.

These materials may also be used on hands with a good result.

Q. What is the worst disappointment you ever experienced as a clockmaker?

A. I usually cast those things out of my memory, but I remember one that completely tied my hands over a technicality.

A jewelry store, for which I was doing trade watch work, phoned for an emergency clock repair to be completed by the next morning. I picked up the clock, a naked Seth Thomas #10 modified to one-day operation for use as an instrument chart drive. A local manufacturing plant was making aircraft parts for the USAF and the chart recording was required by the contract. The two springs were big and strong, and that was death on pivot holes. A simple repair and the movement was returned the next morning. The owner was elated.

The plant asked me if I would do all their work. I was elated!

I drew up an agreement of conditions and they submitted it to their legal department. It was okay, except the government contract required me to be a certified clockmaker. At that time there was no known clockmaker certification program available. I could not be their official clockmaker! However, they could send me their emergency repairs, and did so for several years.

My first contact with AWI and Milton Stevens was in search for a source of clockmaker certification. A number of years later AWI did implement the Clockmaker Certification program that we now know.

Yes, my greatest disappointment was to fall before a technicality that was beyond my control!

Q. Have you had experience with parking meters or do you know anyone who has?

A. No, I have not. However, I gave the parking meter idea a trial about 30 years ago and failed. The idea intrigues me and I would like to hear a success story about parking meters.

When I tried the idea, our city had three types of meters. The first was crank wound at weekly intervals and worked automatically when the coin was inserted. The second type was similar, but wound by an

expensive battery good for about six months. The third was wound by turning a knob on the coin insertion mechanism.

The city had a man who exchanged the naked movements into the meter case. The coin mechanism was a separate device in the case. They had several hundred naked movements that were dead. I proposed a working plan. Pick-up would be naked movements in lots of 50 or more. Those physically damaged would be used for salvage parts, new parts would be consigned to me with no markup or I would finance spares with nominal markup. All repairs would be dated and warranted. A flat fee per returned unit would be charged. This sounded good to a businessman but not to a politician!

The first decision was that there was not a revenue problem under the existing scrap-rate they had. And second, no one wanted to fool with administration of the action.

My parking meter experience was a failure. Surely there is a way to get into the parking meter business. Who has a success story?

□

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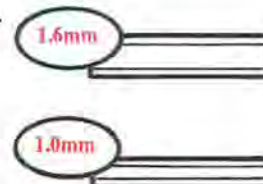
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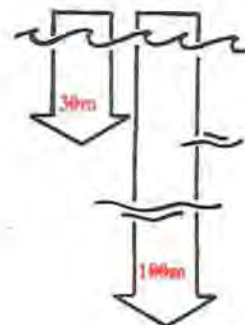
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This not only makes it less vulnerable to breakage, but gives it the strength to withstand water pressure to the depth of 100 meters.



Water Resistance

Thanks to the screw-down crown-and-back, the 1.6mm thick crystal and stainless steel construction, Mallard JB is water-resistant to 100 meters (328 feet). The average watch is water-resistant to only 30 meters (98 feet).



Gold Plating

Where there is plating, Mallard JB is plated on stainless steel. The crown and case parts are plated to 5 micron thickness. The average watch is plated no more than 1 micron on brass.



Jules Borel & Company
1110 Grand Avenue
Kansas City, MO 64106

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

Borel & Frei
712 S. Olive
Los Angeles, CA 90014

Local (213) 689-4630
National (800) 654-9591
CA (800) 252-9392
FAX (213) 488-0485

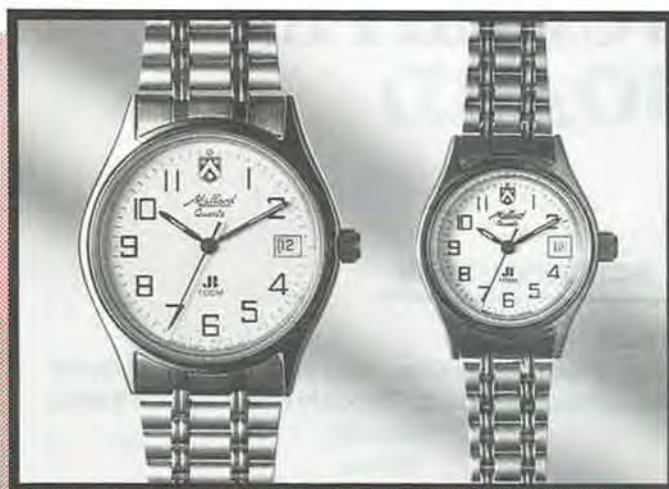


Combat !

Farm or factory . . . land or sea . . . sports or military . . . this is one watch that will be there when you need it!

All stainless steel. Screw-down crown and back. Water resistant to 50 meters. ETA 7 jewel quartz movement. Luminous hours and hands. Woven nylon band.

JB-W3	35mm diameter	\$55.00 Key.
JB-W4	30mm diameter	\$55.00 Key.



JB SERIES

Black Arabic numbers on white dial. Luminous hour-dots and hands.

Stainless steel Case and Band

Man's	JB-W8/S1	\$65.00 Key.
Lady's	JB-W9/S1	\$65.00 Key.

Two-Tone Case and Band

Man's	JB-W8/Y1	\$75.00 Key.
Lady's	JB-W9/Y1	\$75.00 Key.

All Gold-Plate Case and Band

Man's	JB-W8/YY1	\$89.50 Key.
Lady's	JB-W9/YY1	\$89.50 Key.



JB SERIES

Gilt applied hour-markers on white dial. Luminous gilt hands.

Stainless steel Case and Band

Man's	JB-W8/S2	\$65.00 Key.
Lady's	JB-W9/S2	\$65.00 Key.

Two-Tone Case and Band

Man's	JB-W8/Y2	\$75.00 Key.
Lady's	JB-W9/Y2	\$75.00 Key.

All Gold-Plate Case and Band

Man's	JB-W8/YY2	\$89.50 Key.
Lady's	JB-W9/YY2	\$89.50 Key.



JB SERIES

Gilt applied hour-markers on black dial. Facetted gilt hands.

Stainless steel Case and Band

Man's	JB-W8/S3	\$65.00 Key.
Lady's	JB-W9/S3	\$65.00 Key.

Two-Tone Case and Band

Man's	JB-W8/Y3	\$75.00 Key.
Lady's	JB-W9/Y3	\$75.00 Key.

All Gold-Plate Case and Band

Man's	JB-W8/YY3	\$89.50 Key.
Lady's	JB-W9/YY3	\$89.50 Key.

BULLETIN BOARD

A. NEW REQUESTS

LE CLIP

Melvin Mast, Circle City, AZ, has a money clip with a watch mounted on it. The only markings on it are:

©Le Clip

Swiss

Patent Pending

Mr. Mast sees no visible way to open the watch for battery replacement. If any reader has experience with this device, we will pass it on to Mr. Mast. The importer's identification would be helpful as well.



C&E MARSHALL CO.

FRICTION JEWEL ASSORTMENT

Jack Peardon, Bound Brook, NJ, has an old C&E Marshall Co. 2-drawer friction jewel assortment. It is in a red wood-grained cabinet with bottles marked #1 through #408. He is hoping someone can supply a chart or information regarding the size jewels the various bottles contain.

SCHEMATIC FOR WATCH HOLDER DT-311

Donald Homfeld seeks a schematic for a timing machine watch holder which he identifies as DT-311.

PLIER MAKERS:

SARGENT & CO. NEW HAVEN & FAIRCHILD

James Campbell, Lowell, NC, writes:

I have 2 case (watch) closing pliers with rubber inserts on them so when you squeeze the watch (snap back) cases back together it will not mar or scratch the case. I need the rubber inserts for the pliers. I cannot find a supplier for them. Can you help me?

Plier #1 was made by Sargent and Co. New Haven and plier #2 has Fairchild on the handle.

Please let me know if you know where I can get the rubber inserts for these.

JACQUES CARPENTER TALKING ALARM CLOCK

Darrell Mathis, Lake Havasu City, AZ, seeks a

service center or distributor for a Jacques Carpenter Talking Alarm Clock.

VIBROGRAF 4500 OPERATORS MANUAL

Prakash Patel, S. Pasadena, CA, is seeking a copy of a Vibrograf 4500 Operators Manual. If you have one to lend us, we will copy it and return yours to you.

SCHEMATIC FOR

BULOVA ACCUTRON TEST METER #600

George Berman, Milwaukee, WI, seeks a schematic for a Bulova Accutron Test Meter #600.

TERRY MODEL 5 WOOD MOVEMENT STRIKING LEVERS

Dick Marco, Yarnell, AZ, seeks details regarding the warning lift lever, stop lever, and arbor. They are missing from his clock.

WALTHAM MATERIAL CABINET CHART

Wesley Connally, Richardson, TX, has a Waltham material cabinet with 3 drawers. The drawers contain vials from #1 through #480. He seeks a chart to identify what each vial contains.

B. RESPONSES

No responses were received this month!

C. ITEMS STILL NEEDED

MASTERCRAFTERS MODEL 308

Frank Barrett, Franklin, MA, has a Mastercrafters Model 308 clock (built to resemble an Atmos clock). The 3-1/2 inch horizontal "balance wheel" has no relationship to the functioning of the movement; it is for show only. The clock runs fine but the slave gears that run the "balance wheel" are missing. Mr. Barrett seeks specs, parts, or information about these missing wheels.

ZEPPU MARX - MEDICAL WRISTWATCH

Richard Mazza, Atlanta, GA, writes:

I am in the process of reading a book about the Marx brothers. In it there is a section pertaining to the youngest brother named Zeppo. He claims that he invented a wristwatch that would warn a

person if they were having a heart attack. He also claims to have all the patents for this. He says that if a person's blood pressure were to go extremely high or low, a beep was heard from the watch. He claims he had controlling interest in this item and that people were working on it. His real name was Herbert, born 1901. I would imagine this invention or project took place in the 30s or 40s. Do you have anything on this in the AWI files or has this watch ever been manufactured and sold? If so, under what name?

ANSONIA MANTEL CLOCK

Frank Medhurst, Wantirna, Victoria, Australia, seeks information about the Ansonia clock shown here.



He writes: *I have an Ansonia mantel clock with the top part of the case missing. I have purchased the following books feeling sure my clock would be illustrated, but no such luck. The books I have tried are:*

*A Guide to Ansonia Clocks
Identification and Price Guide, Duy Ly
Ansonia Clock Company 1901 Catalog
Ansonia Clock Company 1894-1895 Catalog
1895 Supplementary Catalog
Ansonia Clock Company 1880 Catalog*

As I have exhausted all my avenues here, is it possible one of your members has an illustration or sketch of my clock case from which I can make a replacement part myself? Though it is very hard to read, I think it has "ATLANTA" on the label.

BRANSON B32 & B52

ULTRASONIC CLEANER SCHEMATIC

Marvin Blasser, Dallas, TX, is seeking a schematic for a Branson Ultrasonic Cleaner, Model B32. Thanks to "Bulletin Board" readers we have a collection of the following Branson schematics: B12, B12R, B12S, B220, and B220R. We would appreciate a copy of the B32 and B52 schematics.

VIBROGRAF MU700

Marvin Blasser, Dallas, TX, also seeks a schematic and/or service information for a Vibrograf MU700.

HERMAN BECKER THREE-WEIGHT CLOCK

C.E. Reed, North Adams, MI, is seeking information about a Herman Becker clock. He writes:

I would appreciate information on the Herman Becker clock. It has three weights and single striking hammers on both sides with a separate striking mechanism for each. I would appreciate knowing how this striking mechanism is supposed to operate. I know that the one on the left strikes the hour but do not know what rotation they are to strike, etc. Also, the one on the right as you face the works does not have enough weight or energy to go through the strike unless you pull slightly on the cable. The serial number on the clock is 601321. It is mounted in a fancy carved case which hangs on the wall. I shall appreciate any information you may give me on the clock and any illustration material that is available.

COMPLICATED WATCHES FOR PRACTICE

The course on complicated watches seeks mechanical movements for student work. Partial movements will be put to good use. These do not have to be complete or in good repair.

ULLMAN ELECTRIC CLOCKS

Martin Sarill, St. Petersburg, FL, is seeking the distributor of Ullman Electric Clocks which he says are Swiss made.

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

Pickle Barrel

JEWELRY CRAFTING AND REPAIR Sizes, Shapes, & Setting for Stones



Marshall F. Richmond
CMW

It is important to gain knowledge regarding the many stone sizes, shapes (cuts), and settings that are available. Many good jewelry craftsmen have spent many years at the craft with a minimum of knowledge about how to order stones or settings. You will find a big plus to know all you can learn about shapes, sizes, and settings if you are to pursue the jewelry crafting and repair as a profession.

I have worked in this field for about 50 years, and what I've learned could fill a book. However, what I don't know would fill a much larger book. Every day something new is learned.

When ordering stones or findings, the more you know the simpler it is to order what you need so that your supplier can fill your order promptly with exactly what you need. Stone catalogs and findings catalogs are available with complete listings of the stones, diamonds, settings, and other findings, along with details of the shapes, sizes, and prices. Such catalogs make it possible for you to estimate almost any job quickly, accurately, and profitably. This way you can have an understanding with your customer before starting work.

Genuine Stones

Genuine stones are available in different sizes, shapes, and cuts. They are available in shapes and cuts that enhance the particular stone, such as emerald cut, which is so named because it is a practical cut for the color, hardness, and toughness of the genuine emerald. Emerald is also available in round, oval, marquise, pear, and square cuts.

Because there are over 30 different genuine stones, I won't list all of them. I do encourage the use of catalogs to learn much about stones or findings. They contain information about the hardness and toughness of stones, which is information you need to know when setting these stones to avoid breakage or damage as you attempt to set them securely and attractively.

In the catalogs, stones are listed by sizes. Only the diameter of round, and the length and width in millimeters of other shapes is reported. No men-

tion is made about the depth or proportion of the thickness of the stone, so I will pass on some of my observations. If more than one stone of a given size is ordered, unless a perfect match is requested, they will be somewhat different in size. These differences will occur in the outside diameter or the length and width of a stone. The differences will also be observed in the measurements between the girdle and culet, and the girdle to the top of the table. Even the girdle thickness will vary.

I recently finished making ten settings for genuine stones; these stones were oval and emerald cut. The oval were equal size in appearance, but the measurements in length and width were slightly different as was the overall thickness of the stones. The thickness of the girdle also varied. When the length and width of oval stones varies, the curves of the oval shape also differs. There is no way to find a manufactured setting to fit; thus, settings must be hand-crafted. The emerald cut stones in this job also varied from standard sizes in length and width and girdle thickness, overall thickness, and even the cut-off corners varied in width.

In these ten stones that I made settings for even though the faceting was sharp some of the facets between the top table and the girdle from one side to the other would vary slightly. Often, if the girdle was used to set the stone level, the top table would be off level with the edges of the bezel, so these had to be hand-set and made level by eyesight so that the finished set stone looked level.

When replacing popular genuine stones, melee is the size most often required; therefore, I stock repair lots in ruby, sapphire, emerald, garnet, and opal. These give enough variation in sizes, thicknesses, and proportions so that usually a stone can be found to replace the missing one. Usually they will fit the empty setting with little or no alteration. Round genuine stones are usually available beginning with 2mm in diameter and progressing to around 8mm. The larger sizes require special ordering and a price quotation. Round stones are usually listed in even millimeters and half millimeters, along with price quotations for at least three different

grades or quality. Fancy cut stones (emerald, marquise, pear, square, oval, or heart) are listed in various sizes giving width and length measurements in millimeters. Here, too, usually three or more grades of qualities are listed. To order settings for stones, measure the length and width in millimeters or the diameter in round stones and check the catalogs for the availability in this size. If what you need is not shown as a finding, probably the stone is not a standard cut. In this case, a hand-crafted setting should be made. If you have the setting with the stone missing, if it is round, measure the diameter in millimeters; if it is a fancy shape, measure length and width, then check the listings in a stone catalog for availability. If it is a standard cut, the setting will no doubt be listed. Remember that on genuine stones, if ordered by catalog size, the stone could vary a fraction of a millimeter larger or smaller when received. Since thickness also enters in fitting a stone to a setting, if the stone to be replaced is damaged, it can be sent to a stone house for an exact match. You will be charged extra for this service since it will have to be matched for size thickness and proportion under magnification by an experienced person.

Synthetic or Simulated Stones

These are available in most all birthstone colors and many other popular varieties. Synthetic stones are man-made, usually of synthetic spinel, synthetic corundum, and in the case of green stones (May and August) they are available in soude doublets (May) and simulated peridot-spinel doublet (August). Synthetic star sapphires were first introduced in oval and round shapes with a variation of sizes followed by synthetic star ruby stones also in round and oval. Now these synthetic star stones are available in all birthstone colors and even available in limited sizes in pear and marquise shapes. Most all synthetic stones are made in standard sizes and a stone can be found to fit most any standard size and shape setting. These stones can usually be set without having to alter or change any part of the setting; however, if setting it in a used setting, the setting could need repair. Synthetic stones have very little variation in measurements in diameter, length, or width from the sizes listed, the colors are uniform, hardness and toughness is usually better than genuine stones, and they will stand heat from the torch or soldering machine. Green stones usually are tempered glass, soude doublets for May and peridot-spinel August. Doublets when heated can separate, which damages it beyond use; then it must be replaced. As a craftsman, I much prefer to work with synthetic stones than genuine, but with my boss being the customer, I must work with whatever pleases him/her.

Simulated Stones

Often referred to as "rhinestones," simulated stones are glass with a foil back. This makes them similar to the process used in making glass mirrors which

reflect light. This type of stone is used in less expensive costume jewelry. The cost of them is but a fraction of that of genuine or synthetic stones; some are prong set in stamped settings. These stones also come in various sizes, shapes, and colors, and in the less expensive costume jewelry they are set in cement. Replacement stones are frequently available from material suppliers in assortments. Since the real value of most of this type of costume jewelry is not worth the cost of repairing, the repair probably should be discouraged if it can be done diplomatically. Many times customers will insist on having these repairs made and are willing to pay the price to compensate for your time and material. If this is the case, and you feel confident that you can make a satisfactory repair, it is justified.

Altering Settings to Fit Stones

When replacing damaged or missing stones, it is often necessary to alter settings to fit stones. With prong settings for round stones, the prongs can be spread to take a larger stone or closed by bending to make a smaller stone fit. Such adjustments are limited, so make sure there is enough metal to cut a seat and prong well over the girdle of the stone. Many of the fancy cut stones are also prong set in box or other prong mountings, such as octagon (emerald cut), oval, rectangular, square marquise, or heart. The stone ordered may be slightly smaller or larger than the original because some adjustment can be made. Prongs can be filed off and new ones spaced for either larger or smaller stones within the limitations of the size of the base where the prongs are fastened. Prongs of different widths and thicknesses can be made using round wire which is available in different gauges (diameters) by hammering it flat on the steel bench block. Old ring shanks of the proper carat and color prong stock can be made into prongs by sawing and hammering to produce the shape needed. Bezels usually cannot be altered very much, but if a stone is slightly too large, sometimes enough metal can be removed with hand gravers or rotary burs in the flex-shaft tool. This will allow the stone to seat and the bezel to be burnished over the girdle of the stone.

It may be necessary too install a new bezel if the base is not of sufficient size to accommodate the stone. Manufactured bezels can be purchased; they are made in shapes and sizes to fit most any standard cut and size stone. Bezel wire is available in one-foot pieces of 14K yellow or white gold. Bezel wire is thicker on one edge than the other; the thick part makes a seat for the stone when the wire is shaped to fit the stone. It is then gold-soldered to the base and the stone can be set. Since I have a rolling mill, I usually make any bezels needing replacement. I can make the bezel stock in any thickness or width required; therefore, I don't have to carry a large inventory of bezels or bezel wire. I make it up as I need it.

(Please turn to next page)

Pearls and Half Pearls

These stones are usually measured by diameter in millimeters starting at 1mm and listed to as large as 9mm. Seed pearls (undrilled) are listed in sizes from 1mm to 2mm with 1-1/2 and 1-3/4 in between. Round cultured half drilled or full drilled pearls start at 2mm to 9mm. Call your supplier for larger sizes and/or price quotations. Full drilled are for stringing to make necklaces or bracelets, while half drilled are for mounting on peg settings and held with cement. There are pearl settings with six prongs that will hold a pearl that is not drilled, but being a perfect sphere the pearls soon become loose and turn in the setting. This turning often causes damage to the pearl. When installing one of these six-prong settings for pearls, or if one comes in for repair, I gold weld a .8mm post in the center bottom of the setting, cut it off to a length of half the diameter of the pearl, half drill the pearl, apply cement, and set the pearl. I then tighten the prongs which makes this the most secure and attractive way to set a pearl. Half pearls are dome-shaped or flat on the bottom, and are available in 1mm, 1.25mm, 1.50mm, 1.75mm, 2mm, and 2.50mm. These are found mostly in antique rings and set in a flat bottom depression in the metal with a couple of burs put over the edge with a graver. Usually when one of these rings shows up, one or more of these half pearls are missing and need to be replaced. Since I purchased a large assortment of these years ago, it is no trouble to find replacements of the proper size. Since there is no available metal to bur over the edge, I have resorted to using cement. I have been using Aron-Alpha cement, and it seems to be satisfactory.

Findings and stone catalogs are available for the asking. Most of them contain the information needed for ordering since size is listed as well as shapes of stones. Catalogs give descriptions of the settings as well as findings. Such catalogs are well illustrated with pictures, and sometimes pictures are even in color. Stones are listed in shapes and sizes, and usually three qualities and the prices per stone are given. Settings are also well described and listed by sizes and shapes and the price for each setting. It is well worth your time to study such catalogs, for it will increase your knowledge not only for ordering, but for handling and setting. You will become familiar with hardness, toughness, reaction to heat, ultrasonic tanks, and acids.

Next month we'll discuss safety in the shop and the hazards of working with tools, chemicals, heat, and electric tools.

□

**ARE YOU USING YOUR
AWI Identification Mark?
IF NOT, YOU SHOULD BE!**

1993

OUTSTANDING WATCHMAKING STUDENT AWARD *at St. Paul Technical College*



Congratulations to Lee Sanna (right), who received the Outstanding Watchmaking Student Award from his watchmaking instructor at St. Paul Technical College, Mr. Woody Woodward. This is a most meaningful award because Lee was chosen by his fellow classmates, the watchmaking students that he worked with every day.

Each year at St. Paul Technical College, the watchmaking students choose one student to receive this award, which is based upon outstanding attitude, attendance, ability, and achievement. Not only did Lee do an excellent job in all areas of the 9-month Watch, Clock, and Jewelry Repair Course, but he was always willing to pick up parts or help someone else. Lee's name will be engraved on the trophy that remains on display in Room 305--the Watch, Clock, and Jewelry Repair Department--at the St. Paul Technical College. He also will receive a plaque for this honor.

Congratulation, Lee Sanna, on your "Attitude of Excellence," and best wishes on a long and rewarding future!

**HAVING
TECHNICAL
PROBLEMS?**



**AWI HOTLINE
(513) 661-4636**

WATCHES INSIDE & OUT

A Bad Day at the Bench



Robert D. Porter
CMW

Have you ever had a bad day at the bench? I mean a *really* bad day? When everything goes according to Murphy's Law?

Most days at the bench are fairly routine--even boring, you might say. I knew this particular day was going to be different when I looked in the mirror to shave. My hair, what was left of it, looked like I had slept in it. Breakfast was no better. My wife had burnt the toast, and when I mentioned it, she had the nerve to suggest that I learn to fix my own breakfast! Can you imagine that? After 40 years together, too! I had even considered taking her to the "Golden Arches" for dinner as a special treat.

Little did I know what lay in store for me at the bench. The first thing I noticed was that the Westminster movement on the running stand had stopped. It was hung up again! The bird in the cuckoo clock on the wall had decided to stay out all night. Oh, well. They can wait. There was an easy repivoting job waiting for me and I was anxious to start on it. This was an old 18th century fusee watch with lever escapement that had part of the seconds bit broken off the 4th wheel. A piece of cake--just chuck it up and turn a center in the end of the arbor, drill a hole, and fit a new pivot!

The watch was disassembled and the parts placed in a basket for ultrasonic cleaning.

As I flipped the switch to fire up my trusty cleaning machine, *nothing happened*. The dryer fan didn't fan, and the lights didn't light. It was going to be a great day.

Luckily, my backup unit still worked. The watch was cleaned and dried.

The pinion was chucked in the lathe and we were all set. Figure 1 shows what happened. The arbor quickly became a two-piece unit the instant my carbide graver touched it. The arbor was as brittle as rotten glass--the material had gone from martensitic to austenitic (or was it the other way around?). Oh, well, no problem. I'll just drill the pinion and fit a new arbor and pivot. The high-speed steel drill



FIGURE 1



FIGURE 2



FIGURE 3

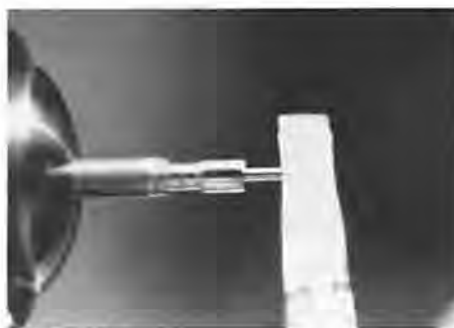


FIGURE 4



FIGURE 5



FIGURE 6

wouldn't touch the material. All attempts to temper the pinion to a softer state failed. The material appeared to have air-hardening characteristics. A new pinion would have to be made and fitted to the wheel.

Well, as luck would have it, my luck began to change. I did have a cutter in my small assortment that matched the pinion profile. At least a new cutter wouldn't have to be made. Figure 2 shows my carbide graver being sharpened on a diamond wheel. The pinion has been roughed out in Figure 3, and the upper pivot is being finished with a sapphire burnisher in Figure 4. A piece of white paper has been slipped over the pinion blank in Figure 5 to make it easier to center the milling cutter. A very light cut is being taken in Figure 6 to check the setup. The cutter was lubricated with beeswax and dropped to the full working depth in Figure 7. The hardness of the material was right on the edge of machinability, and the heat generated by the cutting action has melted the beeswax on the arbor. Soft pithwood is being used in Figure 8 to clean the beeswax off the pinion and arbor. Figure 9 is a look at the pinion after the pithwood was removed.



FIGURE 7



FIGURE 8

The rest of the pinion is being roughed out in Figure 10. Figure 11 shows the pinion after the lower seconds bit has been turned. The pinion was finished with pegwood charged with a mixture of oil and very fine steel polishing compound while supported on pithwood. The finished pinion is being tried for fit with the 3rd wheel in Figure 12. The upper plate was installed and the new pinion worked smoothly. The pinion still had to be fitted to the old wheel.

The old pinion was removed from the wheel with a balance staff remover in Figure 13. Figure 14 shows the new pinion being staked in place in the same indentations that the old pinion occupied. You all know this doesn't always work. My luck was getting better: The wheel fit perfectly and functioned as required in Figure 15.



FIGURE 9



FIGURE 10



FIGURE 11



FIGURE 12



FIGURE 13



FIGURE 14

One small problem remained. I had overlooked a broken pivot on the pallet arbor. A new arbor is being made in Figure 16. The movement was assembled, lubricated, wound, and left running in the movement holder under a glass cover.

Now that I was nearly awake, I noticed that the timer control (which had been stuck for months) on my ultrasonic cleaner was in the "off" position where it was supposed to be. Rotating the timer control to its active position, and flipping the switch to "on" caused the fan motor to run and the lights to



FIGURE 15

light. The day was getting better! This called for a celebration!

The day was getting short as I turned the lights out and left the chime clock and cuckoo in



FIGURE 16

the dark. Tomorrow was another day. My wife and I went out for a candle-lit evening at a nice Italian restaurant.

□

IMPORTANT CHANGES FOR PROJECT EXTEND & TRAVELING WORKSHOPS IN 1994

Jim Lubic, Director of Education

A number of factors have caused some important policy changes and rescheduling in AWI's education program.

Beginning July 1, 1994 the registration fee for AWI classes, both Project Extend and traveling workshops, will be **\$50.00** per instruction day. This new fee structure is due to continuing increases in travel costs and meeting room and equipment rentals. The increasing demand for additional Project Extend courses is a contributing factor.

Low advanced registrations have caused the following Project Extend courses to be cancelled. They will be rescheduled after July 1, 1994.

Course		Original Schedule
Quartz I	G. Jaeger	February 7-11, 1994
Quartz II	R. Bishop	February 14-18, 1994
Quartz III	A. Carpenter	February 21-25, 1994
Clock I	J. LaChapelle	May 2-6, 1994
Clock IV	R. Iverson	May 23-27, 1994
Clock V	D. Christianson	June 6-10, 1994

ANNOUNCING A NEW OLD COURSE TAUGHT BY A SEASONED VETERAN

Fred Burckhardt will be in San Francisco, CA on March 12-13, 1994 conducting an updated seminar on management.

"Management for Watchmakers and Jewelers" is a two-day course that will help you with all the modern-day questions of running a business.

Mr. Burckhardt has more than 40 years experience in the jewelry industry as a watch/clockmaker with over 20 years in management. Mr. Burckhardt is an accomplished seminar leader and guest lecturer at Texas Christian University. A past president of AWI, Mr. Burckhardt is a Certified Gemologist (AGS) and a member of the Fort Worth Advertising Club. Don't miss this chance to learn how you can fine tune your business.

Contact AWI Central for more details concerning "Management for Watchmakers and Jewelers".

□

Making a Cylinder Balance Staff

Part I

Ron DeCorte, CMW



I recently received a ladies' ring watch in my shop for repair. Upon examination, it was obvious that the upper pivot of the cylinder staff was broken. Closer examination revealed that the cylinder was also bent.

The first order of business was to straighten the staff. After removing the tampons and tempering the cylinder to a light blue color, straightening was attempted. The cylinder broke into two pieces just before it was straight. Since the watch was only 6-1/2 lignes in size, there was an extra wheel in the train in order to get the proper ratio of power at the escape wheel. This meant that the escape wheel rotated in the opposite direction of a normal cylinder movement and that the cylinder was a mirror image of normal. A search through my parts and a few phone calls later it was obvious that a new cylinder would have to be made from scratch.

It should be noted that Henry Fried's book entitled *The Watch Escapement* will be referenced in this article. Due to the excellent drawings and information that it contains on the subject of cylinder escapements, I recommend that you study it well before starting such a project.

After obtaining the linear dimensions for the length of the cylinder, the overall length including the pivots and the location of the slot for the lips and clearance slot for the escape wheel arms, it was time to start the project.

A piece of oil-hardening tool steel was held in a collet and turned so that it just fit between the escape wheel teeth. A hole is now drilled in the cylinder so that an escape tooth just fits into it. Photo 1 shows the cylinder after turning and drilling still attached to the main piece of steel. The proper side shakes will be obtained when the outside diameter and inside diameter are ground and polished. Please refer to page 173 of Fried's *The Watch Escapement*, Figures 33 and 34.

ment, Figures 33 and 34.

The slot for the lips and clearance slot for the escape wheel arms will now be cut. In Figure 1-A, the dimension "A" is the width of the lip slot and the clearance slot combined. Note that half the "A" dimension is approximately equal to the height of the escape wheel. Choose a slitting cutter that is approximately the width of the escape wheel from top to bottom. Using your drawing for the linear dimensions, it should be easy to figure out where the slots should be located. The depth of the slots is a different matter.

The opening between the entrance and exit lips is 164 degrees. The opening for the clearance slot is 270 degrees. Figures 1-B and 1-C show the radial relationship of these slots and the proper radii of the entrance and exit lips. The formulas for obtaining the depth of cut for the two slots are as follows:

For the entrance and exit lips:
 $\frac{1}{2} \text{ diameter of cylinder}$
 $(\sin 8 \text{ degrees} \times \frac{1}{2} \text{ diameter of cylinder})$
 $= \text{depth of cut for lip slot}$

For the clearance slot:
 $\frac{1}{2} \text{ diameter of cylinder} +$
 $(\sin 45 \text{ degrees} \times \frac{1}{2} \text{ the diameter of cylinder})$
 $= \text{depth of cut for clearance of escape wheel arms}$

You shouldn't make the slot for the lips quite as deep as the numbers would indicate so that you leave a small amount of

Figure 1

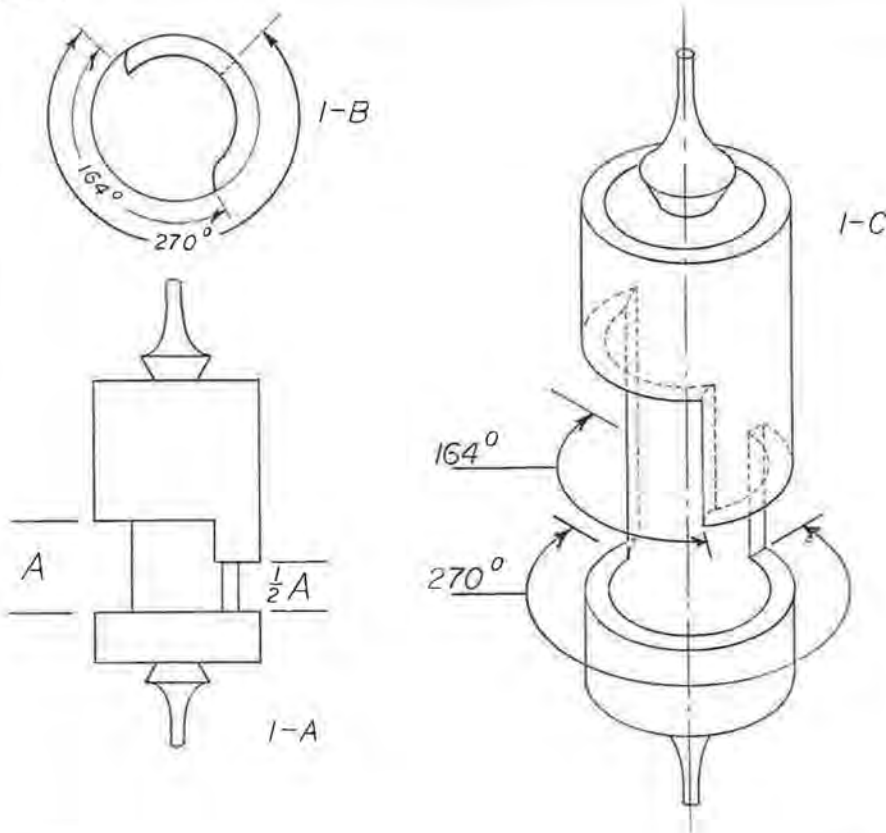




Photo 1. Making a cylinder balance staff.



Photo 2



Photo 3



Photo 4



Photo 5



Photo 6

material on the lips for finishing. The slot for clearance can be cut to full depth.

Since the two slots share a common edge, it will be necessary to rotate the work between cutting the lip slot and the clearance slot. Using the figures above (164° and 270°), the amount of rotation will be 53° .

Photo 2 is a close-up view of the slot cutting operation, and Photo 3 shows a more general view of the same. Be sure that you rotate the work in the proper direction.

Leave the cylinder attached to the main piece of steel and fit into a pin vise or similar holding tool. Using fine files and needles charged with grinding paste, rough- and semi-finish the shape of the entrance and exit lips. Pay careful attention as to the shape of each lip and direction that it takes in relation to the rotation of the escape wheel teeth. Photo 4 shows some of the small tools required to accomplish this task. Note the finished cylinder at the center of this photo.

The cylinder can now be cut off from the main piece of steel to the proper length. A graver should be used for this purpose to assure a square end.

At the end of a piece of steel rod, turn a section down so that the cylinder just slides on with a slight amount of friction. This rod should be at least 75mm long since it will be used as a handle for holding the cylinder during the hardening process. Be very careful when fitting the cylinder

onto the rod or you may bend or break it, and be sure that the whole length of the cylinder is over the steel rod.

Heat the end of the rod with the cylinder attached to a cherry red and plunge into the proper quenching liquid for the type of steel that you are using. Mount the rod in the lathe or turns and brighten the outside of the cylinder with emery or similar abrasive.

Remove the cylinder from the steel rod and turn a short piece of brass so that it just fits into either end of the cylinder. This piece of brass should enter the cylinder the same distance that the tampons will enter, and should extend about 25mm out from the end. Heat the exposed end of the brass rod slowly over a spirit lamp until the area of the cylinder that contacts the brass turns dark blue. This process will leave the middle section that contains the entrance and exit lips straw color. Repeat the same process with the opposite end of the cylinder. The cylinder has now been tempered and is ready for final finish.

Once again, turn a section at the end of a steel rod so that the cylinder just slips on and is held securely. Grind and polish the outside of the cylinder to a mirror finish. The ends of the cylinder should also be polished at this time.

Remove the cylinder and turn the rod to a size that allows the cylinder to just slip over it and is about three times longer than the cylinder. This section of steel

should be dead soft and have no taper in it. Roughen this section of the rod with a clean file and charge with grinding paste. The rod is left in the lathe or turns, and the cylinder is slipped over it. With the rod turning at a slow speed, the cylinder is held with the fingers and moved along the rod so that the inside is ground smooth. This process is repeated with finer compounds until a mirror finish is obtained.

A brass rod is now turned so that the cylinder fits on with enough friction to hold it firmly in place. Remove the cylinder and file the rod flat on one side about halfway to the center. Insert the cylinder onto the rod so that one of the lips is directly over the hollow section and secure.

Hold the brass rod in a pin vise or the lathe. Grind and polish the lip that is exposed over the hollow. Repeat this process for the other lip. The brass rod not only makes a fine handle for holding the part, but also protects the inside from being marked during the lip grinding and polishing operations.

Photo 5 shows the finished cylinder in relation to the size of an ordinary pencil. The length of this cylinder was 1.3mm. The outside diameter measured 0.61mm, and the inside diameter 0.38mm.

The cylinder is now ready to be fit with tampons, and the pivots finished to length and size.

(Continued on page 43)

Affiliate Chapter Column

Affiliate Chapters & Addresses

By Greg Hostetter, CC

Being a part of an Affiliate Chapter is a great complement to your AWI membership. The local chapters offer you an opportunity to meet with others in your area to share experiences, get answers to questions, learn new information, and meet in a pleasant social atmosphere. Below is the list of the

AWI Affiliate Chapters. Contact them about how you can be more involved with the horologists in your area.

Don't see a chapter in your area? Contact New Guild Liaison Committee Chairman, Dennis Warner, 1635 S. Plaza Ave., Springfield, MO 65804.

Arizona Clockmakers & Watchmakers Guild
Robert P. Richard
202 East Northern Ave.
Phoenix, AZ 85020

Arizona Watchmakers, Clockmakers & Jewelers
Bill Walkling
7020 E. Broadway #200
Tucson, AZ 85710

Watchmakers Guild of Australia
Queensland Branch
Sue Timms
P.O. Box 478
Ferny Hills, QLD. 4055
Australia

Horological Association of California
Charles Clark
427 N. Canon
Suite 105
Beverly Hills, CA 90210

Sacramento Watchmakers Association
Eldon R. Janzen, Sr.
1254 E Street
Livingston, CA 95334

San Diego Horological Society
Carl Goldberg
8736 Lake Murray Blvd.
Suite 110
San Diego, CA 92159

The Ontario Watchmakers Association
William A. Basztyk
260 Adelaide Street East #177
Toronto, Ontario
Canada M5A 1N0

Colorado Clock & Watchmakers Guild
Jeff Miller
2217 So. Decatur
Denver, CO 80219

Florida State Watchmakers Association
George Cordes
13465 SW 16th Drive
Okeechobee, FL 34974

Georgia Watchmakers Association
Richard Mazza
P.O. Box 33806
Decatur, GA 30033

Horological Association of Indiana, Inc.
Dale Huntington
1917 N. Greensburg Crossing
Greensburg, IN 47240

Indianapolis Horological Association
Bill Moore
1586 E. 400 South
Lebanon, IN 46052

Central Illinois Watchmakers
Deb Charlier-Carr
122 N. Elm Street
Minonk, IL 61760

Iowa Jewelers Association
Sharon Blair
P.O. Box 70027
Overland Park, KS 66207

Kansas Jewelers Association
Sharon Blair
P.O. Box 70027
Overland Park, KS 66207

Horological Association of Maryland
Gerald D. Kincaid
4113 Lochlomond Drive
Baltimore, MD 21236

Massachusetts Watchmakers Association
John Kurdzionak
6 Congress Street
Stoneham, MA 02180

Metro St. Louis Watchmakers Association
Donald Bright
1380 Deerfield Estate Drive
O'Fallon, MO 63366

Minnesota Watch & Clockmakers Association
Rose O'Fallon
7409 Isaak Ave., NW
Annandale, MN 55302

Missouri Jewelers & Watchmakers Association
Sharon Blair
P.O. Box 70027
Overland Park, KS 66207

Nebraska & South Dakota Jewelers Association
Sharon Blair
P.O. Box 70027
Overland Park, KS 66207

Watchmakers Association of New Jersey
John Sokol
2236 Victory Blvd.
Staten Island, NY 10314

Horological Society of New York
Ben Matz
32-08 168th Street
Flushing, NY 11358

New Mexico Watchmakers Association
Karl Buttner
800 W. Juan Tabo, NE
Albuquerque, NM 87123

New York State Watchmakers Association
Paul Wadsworth
64 South Avenue
Hilton, NY 14468

New Zealand Horological Institute
Brian Wheeler
P.O. Box 10204
Wellington, New Zealand

North Carolina Watchmakers Association
Alice Carpenter
P.O. Box 147
Tarboro, NC 27886

North Dakota Jewelers & Watchmakers Assn.
Michelle M. Martin
P.O. Box 9931
Fargo, ND 58106

Watchmakers Association of Ohio
Jacob Montgomery
7660 S. Rangeline
Union, OH 45322

Central Pennsylvania Watchmakers Guild
James K. Zimmerman
1940 W. Market Street
York, PA 17404

Watchmakers Association of Pennsylvania
Joe Ferraro
5209 Woodland Drive
W. Mifflin, PA 15122

Rhode Island Watchmakers Association
Lora Clemence
485 Greenville Avenue
Johnston, RI 02919

South Carolina Watchmakers Association
Jorge N. da Silva
119 North Church Street
Spartanburg, SC 29306

Texas Watchmakers Association
Sue Ann Wysong
11900 Garden Meadow Road
Austin, TX 78725

Horological Association of Virginia
Stan Palen
11 Oakwood Drive
King Grove, VA 22485

Washington State Watchmakers Association
Robert Alley
5528 North 45th Street
Tacoma, WA 98407

Wisconsin Horological Society
Joseph Smith
3701 Durand
Racine, WI 53405

Association News

CALIFORNIA

The San Diego Horological Society met on October 26, 1993. Doors were open for members to buy, sell, or trade any items. Coffee and donuts were served. The meeting was called to order at 7:30 p.m. by Carl Goldberg, president.

Buford E. Lane, master clockmaker, gave a demonstration with a homemade clock bushing machine and Keystone spring winder.

San Diego Horological Society holds their monthly meetings on the last Tuesday of each month at 7:30 p.m. at Howard Johnson, 4545 Waring Road, San Diego, CA 92120. For additional information contact Carl Goldberg at (619) 461-7046.



Members of the San Diego Horological Society take part in the homemade clock bushing machine demonstration given by Buford E. Lane.

Photo by Carl Goldberg

COLORADO

The Colorado Clock & Watchmakers Guild held a meeting on September 14, 1993 at the Emily Griffith Opportunity School. Archie Perkins gave a lecture along with drawings and a hands-on demonstration showing the tools and methods used to bezel set jewels and make the settings. Since time ran out, Mr. Perkins continued his jewelery demonstration at the next meeting which was held on November 9, 1993.

MISSOURI

The Missouri Jewelers & Watchmakers Association will hold their 88th annual convention April 29, 30, and May 1, 1994 at the Lodge of the Ozarks in Branson, Missouri. For more information, contact Sharon Blair, P.O. Box 70027, Shawnee Mission, KS 66207; phone (913) 661-0084; fax (913) 661-9939.

NEW YORK

On September 13th at the Horological Society of New York, Inc. meeting, Harry Blair, a prominent horological lecturer, gave an illustrated talk on Henry Fried's horological tour through Great Britain. Acting as an associate and photographer for Mr. Fried, Mr. Blair described the sights and experiences with great authority.

TEXAS

The Metroplex Watchmakers & Clockmakers Guild (Dallas/Ft. Worth) held their monthly meeting recently in Arlington, TX. President David Steele gave a presentation on "Adjusting Rolex Calendar Mechanisms".

For more information about the Metroplex Guild, contact Fred Burckhardt at (817) 763-0441.



Shop Talk

December Sales



Wes Door, CMW

MILLION DOLLAR JEWELRY SALE

Starts Saturday for Preferred Customers

No Payment & No Interest Until February of Next Year

30% - 40% - 50% Off

These are some of the words used by one of the chain stores to describe their upcoming sale. This is some of our competition, so what do we do about it? Most of us don't have a million dollars worth of merchandise to put on sale. Or do we? I guess we could include that vast amount of merchandise contained in our catalogs that is available to us on memo or we can purchase. This could add up to one million, so maybe we could say we *also* have this huge amount of merchandise, even though it really is not in our stock. After all, we could get it. Besides, who really knows what a million dollars worth of jewelry looks like.

How about "No Payment Until February and No Interest"? Can we match those terms? I guess we could if we wanted to, but this is not our policy. Should we really do this just to keep up with the Jones? Also, can all of us afford to publish a 20-page, full color booklet showing this sale merchandise and distribute it throughout our areas? Probably not. Then how are we going to compete with these other businesses who run those powerful ad campaigns with a full-color 20-page booklet?

DOING OUR OWN THING

Our first thought might be to fight fire with fire and attempt to keep up with the Jones. If we don't have the capital to do this, we need to stay in our own league and do our own thing. After all, our business was and is built on us doing our own thing.

We know that a large portion of our business happens in December, so we probably already do more advertising during this month. Some might contend that since we know we will have more sales this month, why advertise? If this is our thought, then we must wonder why this is the season that those with the big bucks spend a large amount on advertising. I think this logic has been well established and it does make sense to advertise more during busy seasons.

So, what do we say in our ads to entice our customers to continue to buy from us, and what do we say to lure new customers to our place of business?

OUR SERVICES

Let's start with our services and be sure to include those that may be different than others. Note: We are not writing an ad yet, but just making a list of what we do and can do for our customers. Some of these things may be too trivial to even consider in an ad. They may just be good copy for our over-the-counter discussions or sales presentations. In using my business as an example, I will list and explain some of our services and points of interest that may or may not be transmitted into an ad. This is just one method of recalling things we do. So here goes:

WE SERVICE WHAT WE SELL. Most AWI members probably do this, but many who run the big ads don't.

ALL WORK DONE IN OUR STORE. Some do this and some send jobs out. If we do service jobs in our own shop, maybe we should make an issue of it.

So let's list our services:

DIAMOND SETTING - Yes, we do our own gemstone setting on all types of stones. The magic word here is *diamond*, so we will probably stress the words *diamond setting* to our customers. If a customer asks about setting a ruby, of course we do that too, as well as all stones. If we are selling a customer a new mounting for their diamond, it is very important for them to know that we will set their diamond in our store. It cannot get lost in the mail because we do not send it out.

INSIDE RING ENGRAVING - This is another in-store service that we do, so we need to point this out to a potential customer. This is a free service on all rings we sell. Several months ago I attended a convention; the seminar speaker spoke about services that we have that someone else may not have. He said to use these services in advertising whenever possible. He asked how many did inside ring engraving. I raised my hand. Then he asked how many advertise this service. I did not raise my hand. You see, I sort of forgot about this service. I

generally think about it after the sale is made, but how many more sales would be made if we could use this service as a sales tool? Sometimes it's that little extra that can close the sale.

RING SIZING - Yes, we can size your ring. We do all work in our own shop and it's a free service on all rings we sell. I used to think all stores that sell rings would size them free and I was surprised to discover that many stores add a fee for this service, even on items they have sold.

ENGRAVING ON I.D. BRACELETS, WATCH CASE BACKS, ETC. - We engrave free on all items we sell, so we should stress this sale-closing feature. I know that many of you will engrave watch case backs free since a watch sale amounts to enough money to warrant doing this. But on smaller dollar items there will be a charge added. Or maybe on an I.D. bracelet one may choose to just engrave the name free and charge for any other copy desired by the customer. We used to do this but found it was such a plus to just engrave the whole item free. After all, how many additional letters can you crowd onto these items? I realize there are two schools of thought on this type of extended service.

NECKLACE CHAINS - This seems like a very small point to talk about, but we purchase necklace chains from a company who supplies us with 5.5 millimeter spring rings and matching jump rings on all chains we purchase from them. Our customers appreciate these larger spring rings and jump rings because they are easier to use.

EARRINGS - As you know, earrings come with very light friction nuts. We change these to heavy friction earring nuts and, of course, adjust the price upward to allow for this change. We find it is easy to sell quality when it is explained to our customers, especially if they have lost earrings in the past because of light friction nuts. We may not use this in a commercial, but we sure explain the difference when we are trying to close a nice sale, especially on our diamond earrings.

NEW WATCHES - We try to take care of watch sales service in our store. It might be that new watch we sold not very long ago and the cell (battery) needs replacing. It's another free service. If we sold the watch and it needs a stem, crown, or crystal, we try to give very fast service and with a fair price.

WATCH BANDS - We give immediate service on all watch bands that we sell. This is just good business, and I'm sure everyone who has a service department does the same. Even if our competition does have an in-store service department, we need to mention ours.

STRESS WHAT WE HAVE THAT IS DIFFERENT OR BETTER THAN OTHERS. This is the main rule in deciding what to say and what not to say in advertising during this busy season. We should keep our thoughts positive; that is, do not say negative things about our competition, just present all of the positive services we do.

Have a prosperous December, a Merry Christmas, and a Happy New Year! ☐

AWI MATERIAL SEARCH NETWORK

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

- RR2** E. Howard 18s, series 7 escape wheel s/s pivots and a pair of either black or blue hands.
- RR7** Seth Thomas Sangamo electric motor, patent #1933951 or #1935208 and 761 or 767 are on the back of the clock motor.
- RR8** Escape wheel for Ansonia clock with exposed escapement. I.D. on movement "4-1/2" patented 6-18-1882.

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

MAKING A CYLINDER BALANCE STAFF (Continued from page 39)

Photo 6 shows the cylinder installed in the watch and running. The 5¢ piece is for size comparison only.

Before finishing any cylinder escapement work, it is always a good idea to polish the escape wheel teeth. This operation is detailed in Henry Fried's previously mentioned book on pages 180-183.

We will continue with Part II in next month's issue. ☐

Support The AWI-ELM TRUST SCHOLARSHIP PROGRAM

BY SENDING YOUR
OLD WATCH BATTERIES
TO THE

**AMERICAN WATCHMAKERS-
CLOCKMAKERS INSTITUTE**
3700 Harrison Avenue
Cincinnati, OH 45211



PARTS CATALOGUE/TECHNICAL GUIDE

CAL. 7009A

Supplement

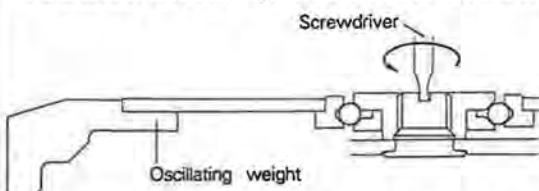
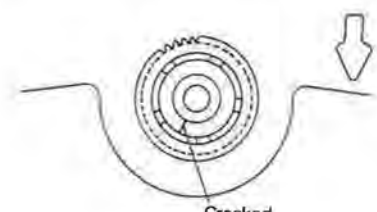
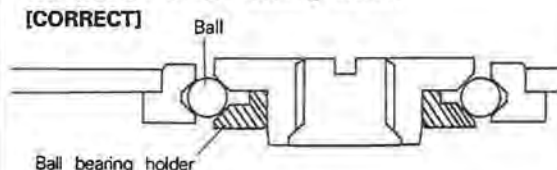
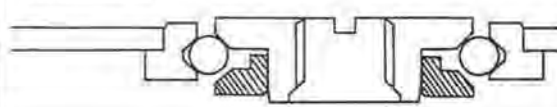
Points of Repairing Cal. 7009A

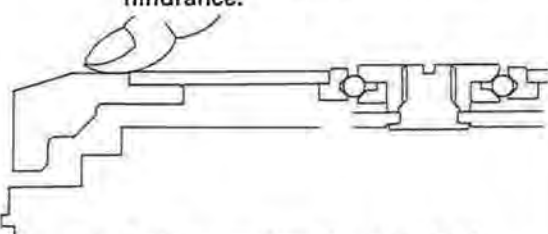
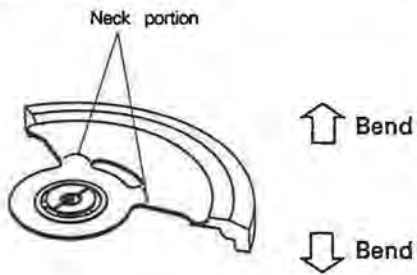
Certain problems have occurred in Seiko Calibre 7009A due to the watch being adjusted improperly or insufficiently during repair. The supplement to Parts Catalogue/Technical Guide Cal. 7009A has been prepared so that you may deal with the problems of stoppage, time loss, time gain, etc. This supplement is edited in the style that shows the checking points and their remedies according to various symptom.

I. PROBLEMS AND CHECKING POINTS

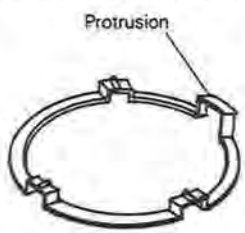
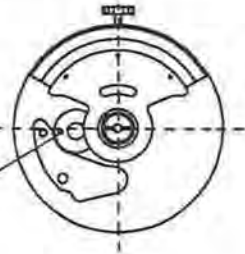
1. Automatic winding mechanism

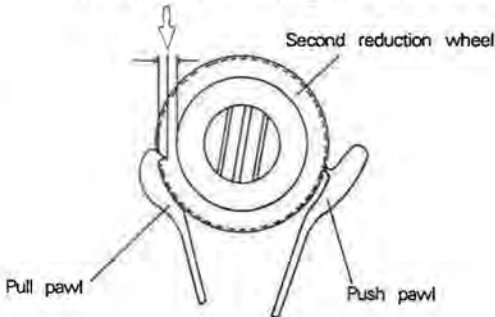
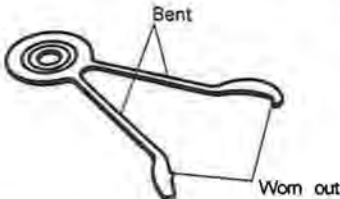
- (1) A rattling or scratching noise is heard when the watch is shaken.

ITEMS	CHECKING POINTS	REMEDIES
AUTOMATIC WINDING MECHANISM	1. Check if the inside screw of the oscillating weight is loose.	If the screw is loose, tighten it with a screwdriver.  Oscillating weight Refer to " (25) Oscillating weight with ball-bearing" in "PARTS CATALOGUE/TECHNICAL GUIDE Cal. 7009A".
	2. Check if there is any crack in the ball bearing holder of the oscillating weight, or if the ball bearing is not held tightly by the holder.  Cracked The position of ball bearing holder: [CORRECT]  Ball Ball bearing holder [INCORRECT] 	If you find any crack or that the ball bearing is loose, replace the oscillating weight with a new one. Refer to " (25) Oscillating weight with ball-bearing" in "PARTS CATALOGUE/TECHNICAL GUIDE Cal. 7009A".

ITEMS	CHECKING POINTS	REMEDIES
AUTOMATIC WINDING MECHANISM	3. Check if the oscillating weight rubs against other parts. [1] Rubbing against the main plate When turning the oscillating weight lightly with a finger, you will feel some hindrance.  [2] Rubbing against the case back When shaking the complete watch, a different noise from the normal spring winding sound is heard.	If hindrance or an unusual noise occurs, remove the oscillating weight from the movement and bend it slightly at the neck portion indicated in the illustration below using tweezers. If the oscillating weight still rubs against the main plate or case back, replace the oscillating weight with a new one. 

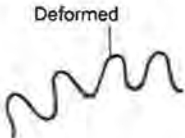
- (2) When shaken, the watch does not produce the noise that should be heard when the spring is wound up.

ITEMS	CHECKING POINTS	REMEDIES
AUTOMATIC WINDING MECHANISM	1. Check if the case ring is out of position.  Normal position: The large protrusion of the case ring should be at the position of the crown.	If out of position, set the case ring in position. If it is deformed, replace it with a new one. Be sure to install the case ring after setting the crown.
	2. Check if the oscillating weight is out of position.  Normal position: The hole of the first reduction wheel should be at a right angle to the crown.	If out of position, set the oscillating weight and the first reduction wheel correctly following the procedure described in " (25) Oscillating weight with ball-bearing" in "PARTS CATALOGUE/ TECHNICAL GUIDE Cal. 7009A".

ITEMS	CHECKING POINTS	REMEDIES
AUTOMATIC WINDING MECHANISM	3. Check if the lever and the second reduction wheel are securely engaged by following the procedure below. How to check the pawl lever's strength is sufficient to hold the second reduction wheel securely: 1) Set the push pawl of the pawl lever so that it engages the second reduction wheel, and the pull pawl so that it is disengaged from the wheel. 2) As illustrated below, the tip of the pull pawl should come more than half the width of the outer ring inside the rim of the second reduction wheel. If it does not, the strength is insufficient. 	If the pawl lever does not hold the second reduction wheel securely enough as specified, replace the pawl lever with a new one.
	4. Check if the pawl lever is deformed or worn out. 	When the pawl is bent or worn out, replace the pawl lever with a new one.

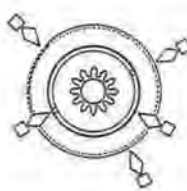
2. Calendar mechanism

The date will not change by turning the hands or the date will not advance to the next day after 24 hours have elapsed.

ITEMS	CHECKING POINTS	REMEDIES
CALENDAR MECHANISM	1. Check if the intermediate date wheel is damaged. 	When a tooth of the intermediate date wheel is damaged, cracked or deformed, replace the intermediate date wheel with a new one.

II. LUBRICATION

Proper lubrication to the following portions is very important in maintaining the accuracy of the watch. When lubricating, therefore, apply the proper types of oil in the specified quantity according to "PARTS CATALOGUE/ TECHNICAL GUIDE Cal. 7009A".

Automatic winding mechanism		Lubrication: Types of oil	Oil quantity
• Ball bearing		● Moebius A	○ Normal quantity
• First reduction wheel		◇ SEIKO Watch Oil S-4	○ Extremely small
• Second reduction wheel			
Escapement • Jewels of pallets • Top and bottom of the pallet staff			
			

Lubricate 2 to 3 portions of the ball bearing. In doing so, use a microscope to apply the oil securely.

After cleaning the parts, be sure to lubricate the jewels of pallets.

III. MEASURING ACCURACY AND FINAL CHECK

After repairing, check if the watch operates normally following the procedure below.

Give the ratchet wheel about eight slow turns using a screwdriver. Then, install the second reduction wheel and the oscillating weight, and measure the time accuracy for the movement.

Before returning it to the user, check that the watch operates more than 36 hours.

Members' Mailbag

Three or four years ago you sold a watch for about \$2 x 10⁶ and said the interest off the money realized in investments would help keep dues low. It doesn't look that way now. You are probably spending too much on "overhead," which is a big hole. Just because the money is there doesn't mean it has to be spent.

J.W. Broad
Portland, OR

Thank you for taking time to share your questions and concerns regarding AWI's use of members' dues and the money from the sale of the Packard watches. As a member, you have a right to know where our money is spent.

Each June at our annual meeting, Affiliate Chapter delegates and members attending our annual meeting receive detailed information showing what AWI has done over the past year and what our plans are for the future. The delegates take this information back to their chapter as our spokesperson. Unfortunately, we don't have an affiliate chapter in your area that you could join.

Let me share some information with you about AWI's recent developments and future plans. During our fiscal year July 1, 1992 to June 30, 1993, we conducted 28 Bench Courses throughout the country and 18 week-long courses at Project Extend here in Cincinnati. The current fiscal year includes 38 Bench Courses and 23 courses at Project Extend.

AWI spends \$3.00 for every \$1.00 it receives to conduct these courses for our members. The addition of so many courses this year, as requested by our members, has required AWI to purchase additional equipment and supplies. According to the Associations' Operating Ratio Report published by the American Society of Association Executives (ASAE), the national average spent by associations on educational programs is 7.1% of their annual budget. Last year, AWI spent 50.1% of its annual budget on educational programs for its members. We are extremely proud to be able to give so much directly back to our members.

Regarding our "overhead," we again checked with ASAE to see where AWI stands compared to the rest of the country. The national average spent annually on personnel salaries is 29.5% of the budget. Last year, AWI spent 24.9% of its budget on salaries. Without these people, most of our membership benefits could not exist, especially the educational services.

Future benefits that we are working on include the AWI Academy for Advanced Watchmaker Study and the production of many new high-quality training videos for our members' use. The Academy was described in the September issue of the "Horological Times." The videos we will be producing will

include many of the courses taught at Project Extend and will permit all members to have access to these valuable programs. Purchasing the necessary equipment for such a project is very expensive. We are confident that the long-term benefits we will provide to so many more of our members make this an excellent use of AWI funds.

You mentioned the Packard watches which were sold in 1989. The proceeds of the sale were invested in U.S. Treasury securities, and their interest rate is guaranteed until 2009. We receive the interest twice a year. As defined in our by-laws, AWI cannot touch the principal amount. The interest income is fixed and so does not allow for inflation. It is only because of the interest income from these investments that we're able to develop the Project Extend education program. Last year, the total interest from the bonds only covered 84% of our education expenses. This year it will pay for much less than that.

As AWI works to provide more and better benefits to its members, the challenge to do so on what is for the most part a fixed income is more difficult each year. Our commitment has always been and will always be to provide outstanding educational and technical support to our members. I can assure you that we will continue working with that objective in mind in the future.

Thank you again for sharing your thoughts with us. We are your organization and always welcome input from the people we serve.

David LaFleche
General Manager

ALLEGHENY GUILD RESPONDS TO HUMANITARIAN REQUEST

In response to the news item on page 6 of the August '93 issue of *Horological Times* indicating the need for sweep second mechanical watches for use by medical personnel in El Salvador, our guild accepted this need as a group project.

Our members contributed 15 such watches for use in the DOW Project. We hope they will be of help in their important work.

Ralph Henning, President
Allegheny Watchmakers Guild
West Mifflin, PA

Thank you to the members of AWI! The item requesting donations of watches for Doctors of the World's El Salvador Project which you printed in your August issue brought a great response from readers. We have received many individual donations of watches for our rural health promoters, as well as a collective donation from the Allegheny Watchmakers Guild. Many thanks to you all for your generosity!

Karen Cowgill
Doctors of the World

AWI Welcomes Philippe Dufour

The week of October 25-29 was an exceptional opportunity for participants at AWI's Project Extend Education Center in Cincinnati, OH. Their instructor was Philippe Dufour from LeSentier, Switzerland.

Mr. Dufour explained in detail the workings of a minute repeater, clock-watch, and perpetual calendar mechanism. The students were able to inspect the clock-watches that Mr. Dufour made himself. First he produced it in pocket watch size, and then reproduced it in wristwatch size.

The wristwatch is one of the most complicated wristwatches ever made. This watch is a minute repeater with grande and petite sonnerie. A push button activates the minute repeater mechanism. The minute repeater portion of the watch will strike the time of day to the closest minute upon demand, and is activated by a push button located in the middle of the winding crown. This arrangement is different from most minute repeater mechanisms in that you do not have to slide a lever along the side of the watch

in order to wind and activate the repeater. The sonnerie portion of the watch is controlled by two small slides (switches) located to either side of the crown. One of the slides chooses between silence or strike, and the other between grande or petite strike. When strike is selected, the watch will automatically strike the hours and quarters for the grande setting or just the hours for the petite setting.

The perpetual calendar is becoming a popular complication on watches today. Mr. Dufour explained and demonstrated the perpetual calendar mechanism that he designed and built for the firm of Daniel Roth.

In addition to the design/theory portion of the course, the students spent much time learning the skills needed to properly finish the many different springs and levers in complicated mechanisms. Philippe Dufour is one of the world's most accomplished finishers. He demonstrated his techniques in detail and was willing to share his vast knowledge with everyone.



Philippe Dufour (photo courtesy Revue Switzerland: 12/90).

Hopefully Philippe Dufour will return to the U.S. to present additional courses for American watchmakers. □



Philippe Dufour discusses individual projects with students.



Attendees of the seminar, left to right: Ron deCorte, Mark Heist, Don Ross, Larry Blanchard, David Chandler, Andy Guentert, Cameron Spicknall, Jon Alexander, Bernhard Stoeber, Robert Porter, Dean Sarnell, instructor Philippe Dufour, Joe Cerullo, Tony Knorr.



Minute repeater with grande and petite sonnerie made by Philippe Dufour.

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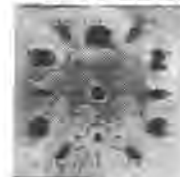
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Classifieds continued on Page 54

Dates to Remember

Ad Index

JANUARY 1994

15-16--Hairspring Vibrating Bench Course (AWI); Joseph Cerullo, instructor; Baltimore, MD.*

21-23--AWI Board of Directors Mid-Year Meeting & Regional, Embassy Suites Hotel, 900 East Birch St., Brea, CA 92621. For reservations: (714) 990-6000, fax (714) 990-1653, or 1-800-EMBASSY.*

FEBRUARY 1994

11-14--Lathe Bench Course, Phase 3 (AWI); Roy Hovey, instructor; Orange County, CA.*

19--Servicing ETA Quartz Chronographs Bench Course (AWI); James Broughton, instructor; Phoenix, AZ.* Held in conjunction with the Arizona Clockmakers & Watchmakers Guild Annual Convention.

19-21--Advanced Clock Repair Bench Course (AWI); Roland Iverson, instructor; Phoenix, AZ.* Held in conjunction with the Arizona Clockmakers & Watchmakers Guild Annual Convention.

MARCH 1994

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

12-13--400-Day Clock Repair Bench Course (AWI); John Nagle, instructor; Salt Lake City, UT.*

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

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

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

APRIL 1994

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

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

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

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

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

MAY 1994

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

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

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

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40-1250	40	12.50	13.30	60-3380	60	33.80	35.00	80-2760	80	27.60	29.20
40-1400	40	14.00	14.80	70-1740	70	17.40	18.80	80-2840	80	28.40	30.00
40-1500	40	15.00	15.80	70-1850	70	18.50	19.90	80-2900	80	29.00	30.60
40-1600	40	16.00	16.80	70-1890	70	18.90	20.30	80-2915	80	29.15	30.75
40-1700	40	17.00	17.80	70-1925	70	19.25	20.65	80-2930	80	29.30	30.90
40-1900	40	19.00	19.80	70-1960	70	19.60	21.00	80-2960	80	29.60	31.20
40-2300	40	23.00	23.80	70-1980	70	19.80	22.20	80-3000	80	30.00	31.60
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40-2780	40	27.80	28.60	70-2130	70	21.30	22.70	80-3070	80	30.70	32.30
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50-2400	50	24.00	25.00	70-2980	70	29.80	31.20	90-2130	90	21.30	23.10
50-2500	50	25.00	26.00	70-3000	70	30.00	31.40	90-2220	90	22.20	24.00
50-2600	50	26.00	27.00	70-3020	70	30.20	31.60	90-2510	90	25.10	26.90
50-2700	50	27.00	28.00	70-3060	70	30.60	32.00	90-2840	90	28.40	30.20
50-2800	50	28.00	29.00	70-3140	70	31.40	32.80	90-2860	90	28.60	30.40
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50-3200	50	32.00	33.00	75-2300	75	23.00	24.50	90-3100	90	31.00	32.80
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60-2165	60	21.65	22.85	75-2970	75	29.70	31.20	100-2975	1.00	29.75	31.75
60-2450	60	24.50	25.70	75-3000	75	30.00	31.50	100-3000	1.00	30.00	32.00
60-2500	60	25.00	26.20	75-3065	75	30.65	32.15	100-3060	1.00	30.60	32.60
60-2700	60	27.00	28.20	75-3100	75	31.00	32.50	100-3075	1.00	30.75	32.75
60-2890	60	28.90	30.10	75-3130	75	31.30	32.80	100-3175	1.00	31.75	33.75
60-2950	60	29.50	30.70	80-1650	80	16.50	18.10	100-3200	1.00	32.00	34.00
60-3000	60	30.00	31.20	80-1675	80	16.75	18.35	100-3250	1.00	32.50	34.50
60-3080	60	30.80	32.00	80-1870	80	18.70	20.30				
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15-16--Hairspring Vibrating--Baltimore, MD
21-23--Mid-Year Meeting & Regional--Anaheim, CA

FEBRUARY 1994

11-14--Lathe Course (Phase 3)--Orange County, CA
19--Servicing ETA Quartz Chronographs--Phoenix, AZ*
19-21--Advanced Clock Repair--Phoenix, AZ*

MARCH 1994

12-13--Repair of the Atmos Clock--Orlando, FL
12-13--400-Day Clock Repair--Salt Lake City, UT
19-20--Advanced Quartz Watch Repair--Birmingham, AL
20--Introduction to Quartz Watch Repair--NY
20--Basic Pocket Watch--Sacramento, CA

APRIL 1994

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

MAY 1994

15--Servicing ETA Quartz Chronos--Birmingham, AL
21-22--Advanced Quartz Watch Repair--NY
21-22--Introduction to Clock Repair--Boston, MA

JUNE 1994

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

(*) In conjunction with a convention

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Basic Pocket Watch

Alice Carpenter, CMW, CMEW

Introduction to Clock Repair

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The Watch/Clockmakers Lathe Course

Roy Hovey

Phase I: Basic Lathe & Accessories

Phase II: Mounting Wheels, Arbors, & Staff Blanks

Phase III: Staffs, Repivoting, Jewel Setting; Bushings, Lantern Pinions, & the Jacot Tool

(Please contact AWI Central for more detailed course outline.)

PROJECT EXTEND CLASSES 1994

FEBRUARY 1994

7-11--Quartz I--Jaeger
14-18--Quartz II--Bishop
21-25--Quartz III--Carpenter
28-Mar. 4--Watch I--Carpenter

MARCH 1994

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

APRIL 1994

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

MAY 1994

2-6--Clock I--LaChapelle
9-13--Clock II--Nagle
16-20--Clock III--Nagle
23-27--Clock IV--Iverson

JUNE 1994

6-10--Clock V--Christianson
13-17--Watch V--DeCorte

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

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