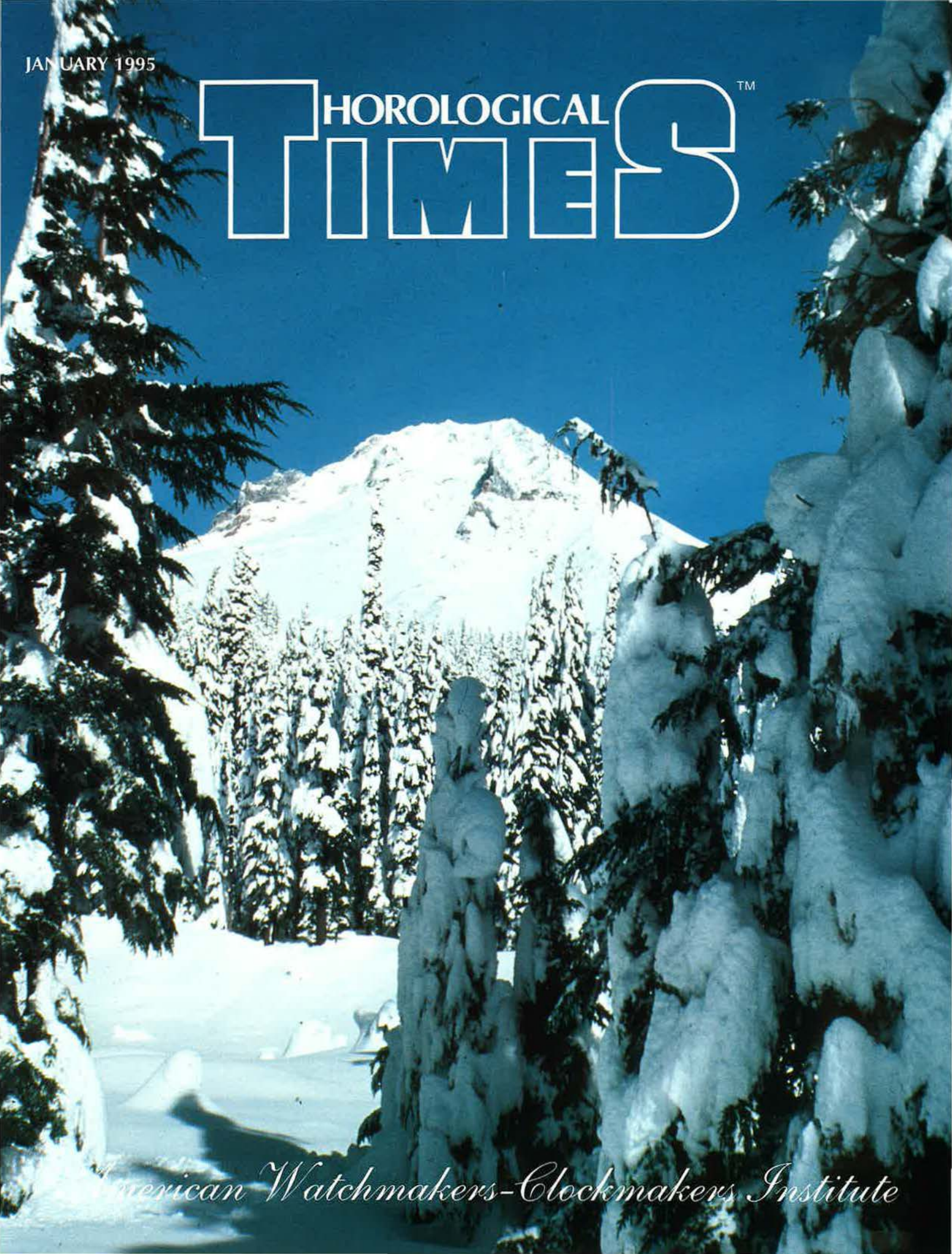
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Official Publication of the American Watchmakers-Clockmakers Institute

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HOROLOGICAL TIMES (ISSNO 145-9546) is published monthly and copyrighted by the American Watchmakers Institute, 3700 Harrison Avenue, Cincinnati, Ohio 45211, for $45.00 per year ($4.50 per copy) in the United States and $50.00 per year, $5.50 per copy outside the U.S.) Second class postage paid at Cincinnati, Ohio. POSTMASTER: Send address changes to *HOROLOGICAL TIMES*, P.O. Box 11011, Cincinnati, Ohio 45211.

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

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HOROLOGICAL TIMES™

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President's Message



As you may know, the AWI has always put the education of its members as a priority. We at AWI are very proud of our track record on education. We consistently spend up to 70% of our budget on education.

Education for our members takes many forms, such as the *Horological Times* magazine, Project Extend, individualized technical information services, one- and two-day traveling workshops, technical seminars, technical speakers at conventions, technical cassette tape/slide programs, technical videos for group programs and individual study, tutorials for individual study, correspondence course in clock repair and, of course, our excellent lending and research library.

Even with this impressive list of services, I still have members approach me asking for more when I travel around the country. We welcome this interest and are always seeking ideas for seminars, workshops and videos.

The new headquarters of AWI will feature a state-of-the-art video studio and editing room, two large classrooms, expanded research and lending library, and a history of time display.

There is a list of videos available from AWI at this time, and we are continually adding to it. Let us not forget how we got started in educational videos. It all began with the great contribution of the "Random Clock Talk Series" made by J.M. Huckabee. After noting the acceptance and usage of these videos, we concluded that it was necessary to expand the video library to provide instruction and information about a wide spectrum of horological subjects.

Each year, thoughtful consideration is given to how best allocate the money we have available for education. Our main concern is to accommodate as many members as we possibly can. When the new facility is up and running, much emphasis will be given to Project Extend classes and to technical videos.

One video currently in its beginning stages deals with Accutron watches. This may seem strange at first, to teach servicing a watch that is no longer in production. There are thousands of Accutron owners who prize their watch and will not part with it. The Accutron enjoys wide popularity among collectors. It is no longer practical to conduct formal workshops on Accutrons, but a self-study video series will accommodate those craftsmen new to the trade. Henry Frystak, who has presented several hundred Accutron courses for the Bulova Watch Company, is writing the script and will instruct in the video.

I recently spoke with Gene Kelton of the Citizen Watch Company about my idea of having a two-day workshop on Citizen products. Gene has agreed to supply eight different movements, which will be covered in the class. We will disassemble the watches, discuss distinctive features and possible peculiarities of each movement, and then we'll reassemble the movement. Proper repair procedures will be demonstrated, technical literature made available, and information on ordering spare parts will be provided. Interested members and groups should contact AWI Central regarding the course's availability.

Remember, our main job is providing education for our members; please contact us with any recommendations you may have.



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Questions & Answers



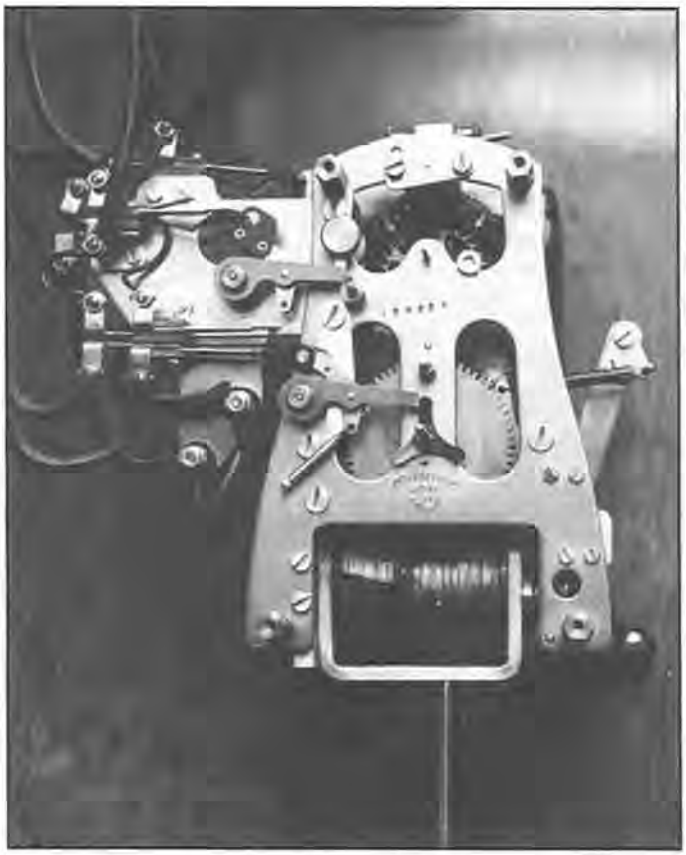
By Henry B. Fried, CMW, CMC, FAWI, FBHI, ★FNAWCC

Editor's Note:
Because of his many years with IBM, this first question was referred to J.M. Huckabee.

Q. Currently I am restoring an IBM (circa) 1940 clock (see photos below and on next page). I did not know that IBM was making clocks. This is somewhat of a mystery to me. It is an electric/mechanical movement; that is to say that a solenoid slowly winds a mainspring. It also has a second pendulum.

I would greatly appreciate any information you could provide about this clock.

John Castanias, Edmonton, Alberta, Canada



A. Indeed, I know this clock; I raised a family on the proceeds from service of this class of equipment.

Your specimen was called a "master clock," the term for an IBM regulator that supervised many types of remote clocks and other devices. It is built with the same general parts group that was used in the Mod 13, 15, 17, 19, 25, 35 and some of the 37. This one is wound by an electromagnet that is impulsed about 75 to 80 times per hour. Each impulse winds the mainspring one minute of time. The excess impulses overflow when the spring is fully wound. Pulse voltage may be 12, 24, 48, or 110 volts direct current; 24 volts was most common.

The movement is robust, excellent in quality; steel arbors and pinions are nickel plated, and all brass pieces are gold plated. The pendulum rod is of Invar and a compensated ball. One turn of the ball is approximately thirty seconds per day change; a small star wheel under the pendulum ball is about one second per month per spoke; a rate within about five to ten seconds per month can be expected.

This movement is 60 beat, as were all the listed numbers with the exception of Mod 15. It had a 36-tooth escape wheel and beat 72 per minute. Major divisions on the beat scale are degrees of arc; you should expect the swing to be in the order of 2° to 2 1/4° each way.

Two thumb screws at the movement top and between the plates are the beat adjustment. Either screw may be used. The out-rigger and spring on the right adjust the mainspring tension overflow value.

The lower two wire terminals with nuts comprise the winding magnet circuit. Contacts (from top to bottom) are:

- Rapid Impulse, closes on alternate seconds for one second
- Minute Impulse, closes on 58 second and opens on 00 second of each minute

The self-regulation circuit contacts have two sections: top section closes 59 minutes, 10 seconds; opens 59 minutes, 50 seconds of each hour. The lower section opens 49 minutes, 30 seconds; closes 59 minutes, 55 seconds of each hour.

Still another set of contacts (two sets on some models) are on the back side of the contact plate. Look through

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the hole. These are called Duration Contacts. They make and break each minute to measure an adjustable portion of every minute.

I cannot place the age. If it were American-built, I could fix the age by the serial number. It has pre-plastic wire insulation.

Now for the bad news. Your clock is incomplete. It has a remote located power supply that is wired to a terminal board in the outside case-top. It supplies winding power, and contains transformer, relays and rectifier. It is connected by about eight to ten wires.

I'll send you a letter with additional information that may help you work out the electrical problems.

J.M. Huckabee, Austin, Texas

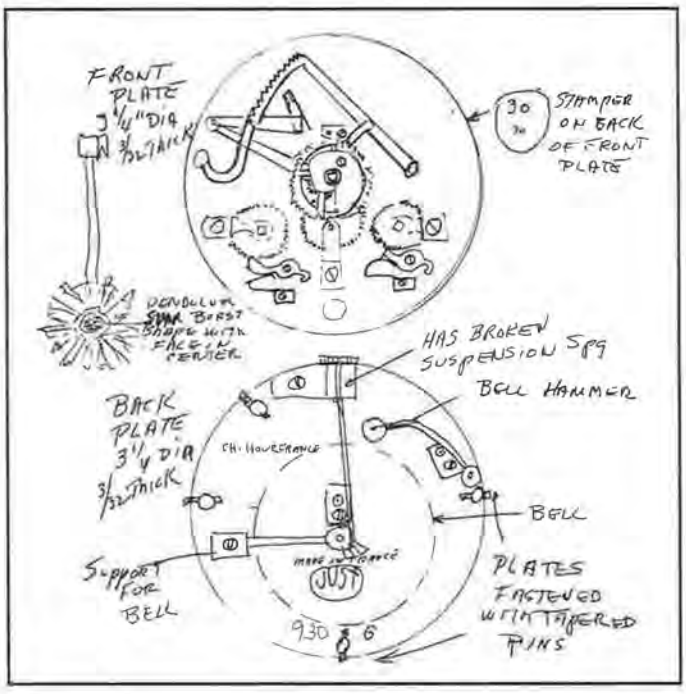
Mr. Huckabee has supplied additional technical details for AWI's Technical File. It involves wiring diagrams and specific pages from the IBM service manual for these clocks. Members needing this information can obtain it from AWI Central.

Q. I have had this clock for many years and now plan to repair it. Can you supply information pertaining to it? *Harry Eckert, Clearwater, Florida*

A. Your sketches (below) reveal a "Portico" type of French Empire clock, in the style of such clocks circa 1810-20. The movement is a rack and snail contained within the Paris calibre movement. This was the national design used by many makers about that time and into the twentieth century. The sunburst pendulum bob is of the popular design denoting Louis the XV.

The maker was CH. Hour of Paris, successor to Diette & Hour, Rue St. Anastase. I authored a detailed, illustrated article on the repair of such movements that AWI published. *Henry B. Fried*

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Rock Quarry *et tu*



By Fred S. Burckhardt

Now that the new year is here, I'm going to announce publicly that I'm really going to try to keep all resolutions I made on new year's eve.

Every year it's the same old thing, make resolutions and after a few hours or sometimes days, they are broken or forgotten altogether. This time, things will be different. I read where if you tell people about you resolutions, it will make you try harder to keep them. So here goes—

1 I resolve to work at least three days a week as long as there is nothing I would rather be doing.

2 I resolve not to make a lot of money. In order to do so would mean having to work more that three days a week, which would louse up resolution number one.

3 I resolve to always be nice to my watch and clock repair customers, even if I have to go out of my way in order to do so.

4 I resolve to amend resolution number three to read, I resolve to always be nice to some of my watch and clock repair customers.

5 I resolve to get all the repair work finished on time, even if it means putting myself out in order to please the customers. This does not included those pieces that may have parts on order, waiting for a dial refinish to come back or those that I just don't feel like fooling with.

6 I resolve to never lie to a customer unless I find it absolutely necessary in order to make myself look good.

7 I resolve to always be on time when making clock calls. This doesn't include those calls I don't care to make, especially those where the customer expects you to come back because you didn't fix it right the first call.

8 I resolve to change cleaning solutions every four weeks whether or not they need it. This doesn't include those where you can still see the bottom of the jar or tank.

9 I resolve to attend some bench courses and seminars this year as long as they don't interfere with my days off.

10 I resolve the right to amend, delete or forget altogether all of the above resolutions.

Now, I don't know about you but I feel much better in sharing these resolutions. They won't be easy to keep, but I know with your help I'll be able to pull through this coming year.

At this time, I would like to bring something special to your attention. I know there are some of you now have some spare time and would like to become involved with a meaningful hobby. After considerable study, I've come across a hobby that I feel would be enjoyed by many watchmakers and clockmakers.

I've had my attorney draw up the proper forms for establishing such a group. For a mere seventy five dollars a month, you will receive not only full membership but a newsletter about your new found hobby. If you are one of the first ten thousand people to sign up, you'll receive a special gift of the poem *Casey At The Bat.*

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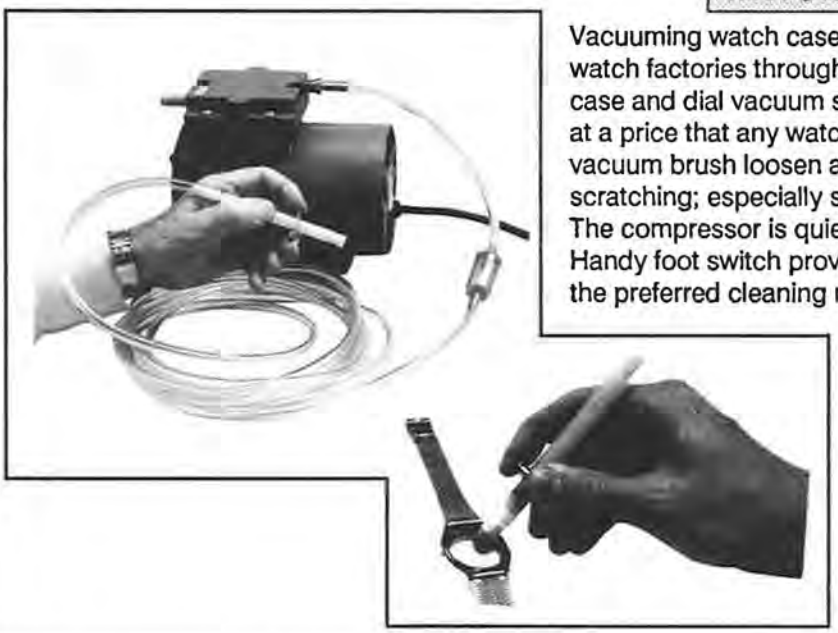
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Ask Huck



Clockmaking Bits About...

A Clockmaker's Staking Set
What Are Pin Vises For?

By J.M. Huckabee, CMC, FBHI

Question: Where can I purchase a clockmaker's staking set similar to the tool used by watchmakers?

Answer. I don't know. I've heard of this, but never have seen one. For the most part, we clockmakers have to seek an alternate method of doing our work.

The larger, ball-faced punches and larger, flat-faced punches of the watchmaker's set have some utility for clockmaking. Even so, the anvil and frame are too small for any serious work.

Some larger punches are available, but my experience shows the holes to be too shallow, there are not enough sizes, and the anvil has too few holes. Likewise, the bench blocks ordinarily available have a similar problem.

Flat-faced pin punches are available from several sources. I have a very useful set of eight in a size range of 1/16" to 5/16". I made up a group of steel punches from 1/16" to 1/4" in about forty sizes: about fifteen ball-faced and the others flat-faced. These are my most active punches.

Hollow punches with deep holes present a major problem. I'm using a group of hard brass tubes cut 3" long. The material is about 0.015" thick in telescoping sizes, and is available from hobby stores. This pretty well suits clockmaking needs.

A little quarter-ton bench-top arbor press is used with some of the punches, as is a small drill press (not ru ning).

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The bench block problem was solved by making up blocks drilled with all sizes of bits in a drill index.

From my experience, there is little hope outside of making some of these tools yourself.

Question: I see fewer and fewer taper pins used in clocks. Do you see the pin vise as an antiquated tool?

Answer: No indeed! The pin vise is a very useful tool.

I'm not surprised at the question, as I did not learn to use the tool in early years of training.

Let's examine some uses: holding a pin, or a taper pin, is obvious. We hold a bulk pin while it is being cut to a functional length; we hold a piece of wire or rod stock for cutting and finishing; we hold drill bits, screws, arbors or other small work pieces.

I have a number of these with the handles removed that I use as sub-collets for lathe work. In skilled hands you may hold an arbor and rest the opposite pivot in a filing block as a pivot polishing expedient.

Several pin vise heads have been fitted to bulk rod stock of suitable size for lathe tailstock runners. One of my lathes has a half-open tailstock for which a number of runners are fitted with pin vise heads as a drop-in tool.

Another use is to hold a lathe bit for internal turning in very small holes. The boring tool bit is made from a sewing needle, suitably ground and held in a pin vise.

Use the vise as a holder for broaches, scriber points, and as a depth gauge. A small pin is fitted snugly in the vise and pressed against the bottom of a blind hole. Depth is tip to shoulder.

Yes, the pin vise is a very useful tool!

❐

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Course in Jewelry Repair, Part 3

Sources of Heat and Their Application

By Marshall F. Richmond, CMW

Jewelry crafting and repair requires bonding of metal together with solders—heat is one of the necessary requirements. In this article, I will discuss the sources of heat and how to apply it for soldering, melting, and tempering metals.

Combustible materials are used with torches to produce this heat. Heat also can be produced by the electric current being used to produce the heat in a soldering machine.

Gases

The gases most frequently used to produce heat with torches are acetylene, propane, natural gas and oxygen. See Figure 1: a—"MC" tank for acetylene; b—"B" tank for acetylene; c—20 lb. propane tank; d—110 cu. ft. tank for oxygen; e—small oxygen tank. Figure 2 shows an acetylene pressure regulator at a, and an oxygen pressure regulator at b. Figure 3a shows a gas fitting—note groove in the hex wrench grip (indicating a left-hand thread for gases), and Figure 3b shows a fitting for oxygen or air without groove, which means a right-hand thread. In Figure 4: a—popular jeweler's torch using oxygen and acetylene; b—"hoke" jeweler's torch using oxygen and acetylene; c—torch using acetylene from tank and air from atmosphere that is suitable for much jewelry work. Figure 5 shows a "Tescom" torch with five tips using both oxygen and acetylene suitable for most jewelry work. Figure 6 shows an electric soldering machine.

Acetylene

Acetylene gas is an extremely hot-burning gas when mixed with air or oxygen. It is stored in a heavy metal cylinder under high pressure. These acetylene cylinders are available in several sizes; the most popular for jewelry use are the MC and the B size tanks. The MC tank was originally developed for use in lighting for vehicles ("MC" for "motorcycles"). The B was used on automobiles, and they were called Prest-O-Lite tanks. After gas lighting was discontinued on vehicles, these tanks became popular for use with Prest-O-Lite, using torches. If not handled properly, this gas can be dangerous. If leaked into an enclosed area, it is possible for the right mixture with air to cause a powerful explosion. All acetylene tanks must be turned on and off with a key. Because the gas is carried through pressure-reducing regulators and hoses, the tank should remain off when not in use.

Propane

Propane, or bottled gas as it is sometimes called, is a petroleum gas. It is stored in cylinders under pressure, which makes it become a liquid. When released through a pressure regulator, however, it becomes a gas. When mixed with air or oxygen, this mixture produces a hot enough torch flame to be suitable for most jewelry work, even though it is not as hot a gas as acetylene.

Natural Gas

Natural gas, where available, is piped into buildings, and can be used at the same pressure as household gas appliances. This eliminates the need for a regulator. Natural gas can be used with pressure-regulated oxygen to produce a good jeweler's torch flame.



Figure 1.

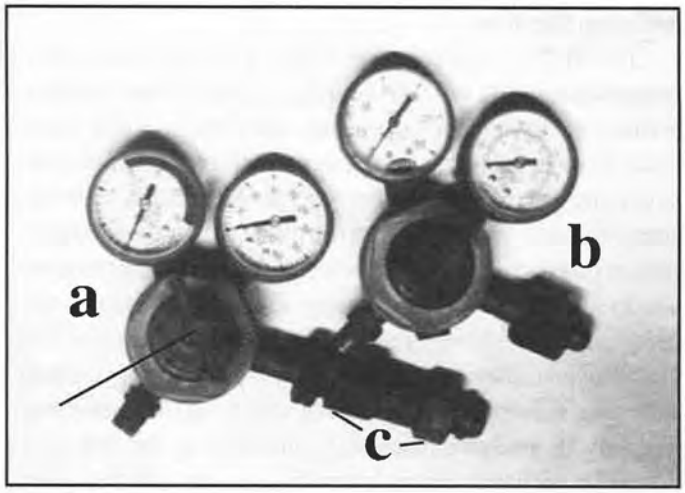


Figure 2.

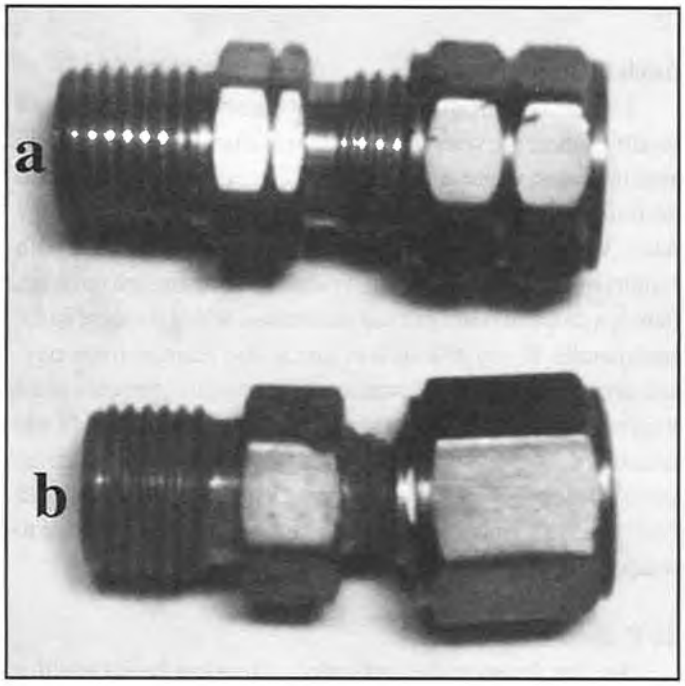


Figure 3.

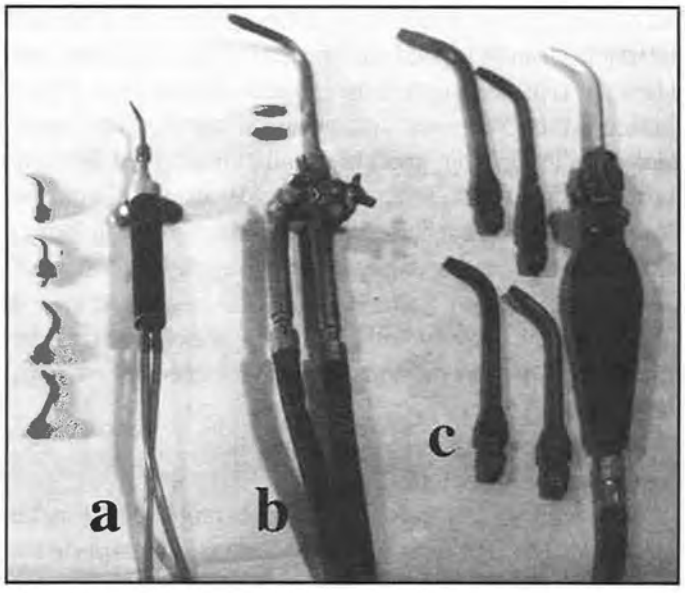


Figure 4.

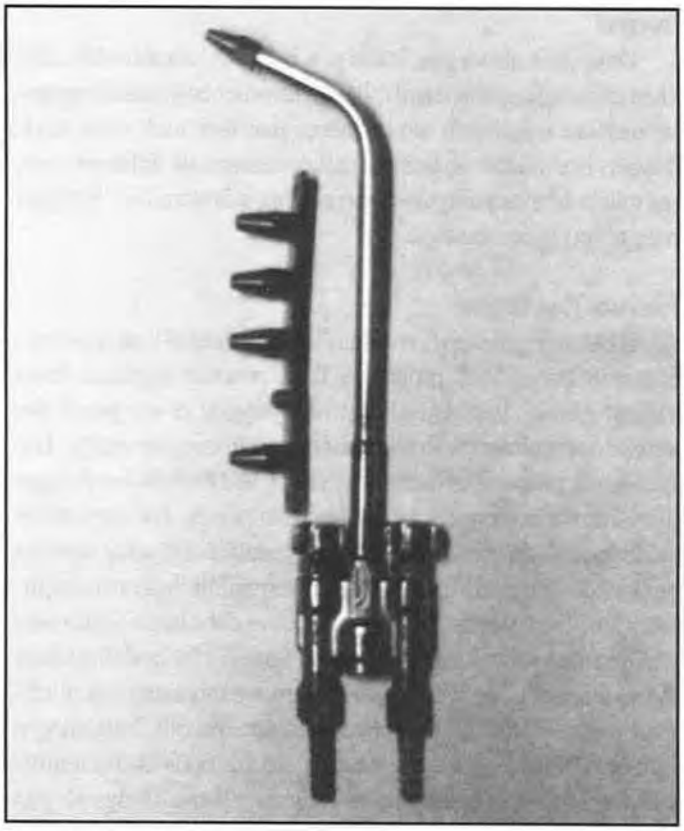


Figure 5.

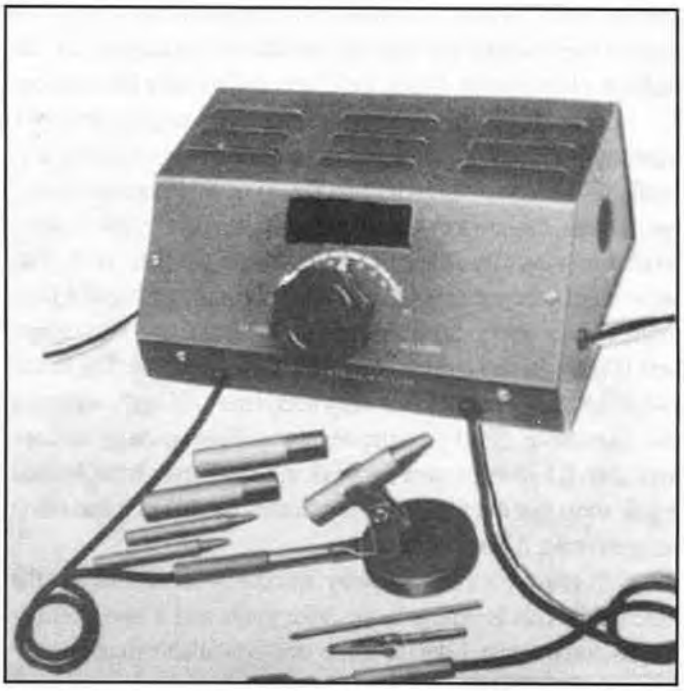


Figure 6.

Oxygen

Oxygen is also a gas, but is not, by itself, combustible. But when pressure regulated and mixed with other combustible gases, the mixture will create temperatures that will melt even steel. Oxygen is available in heavy steel containers of different sizes that will hold the extremely high pressure it is stored in. Oxygen then, supports combustion.

Pressure Regulators

Pressure regulators (see Figure 2) are essential if using acetylene or propane. With propane, a fixed pressure regulator, even without gauges, is adequate; but with oxygen or acetylene, the adjustable regulators with two gauges are almost a necessity. The right-hand gauge gives the tank pressure, and the left-hand gauge gives the reduced pressure that goes to the torch. For the torches I will discuss, the pressure should be reduced and set at three to ten pounds on the left-hand gauge. The small fittings on the regulators are where the torch hoses connect, and the large connectors attach to the tanks. The fittings (see Figure 3) for both the hoses and to the tanks for acetylene have grooves that indicate a left-hand thread. The fittings for oxygen are smooth, indicating a right-hand thread. Always use a good-fitting, open-end or adjustable wrench when tightening or loosening these fittings so you don't mar or damage them. It is important to have connections that do not leak.

Torches

Torches (see Figures 4 and 5) are:

4a. Little torch that can be used with either acetylene, propane or natural gas with oxygen. Five different sizes of tips are available. This torch outfit can be purchased as a set with the torch, hoses, two regulators, one MC tank (Figure 1a), one small oxygen tank (Figure 1e) and a metal carrying rack with handle. This will take care of ninety percent of all your torch needs for jewelry work. When these tanks are shipped to you, you will receive them empty, but they can be filled or exchanged for full tanks at a local dealer. Many auto parts outlets offer this service.

4b. The "Hoke" torch, which is the old, very popular jeweler's torch that was and is used by most manufacturing jewelers. It is available for oxygen-acetylene or for oxygen-propane or natural gas. Several tips are available. This torch can do all your jewelry work, but it uses more gas and oxygen than the little torch. The same regulators and tanks can be used with this torch as the little torch, but the size B acetylene tank (Figure 1b) and the oxygen tank (Figure 1d) are more economical if used full time. The Prest-O-Lite torch (Figure 4c) uses only acetylene, and can even use a less expensive, fixed-pressure regulator. Five or more tips are available. It will do most of the work in a small, part-time, limited repair shop, but the fine, extra-hot flames produced when using oxygen make it slower to use.

5. A jeweler's torch made by Tescom, who also makes the little torch. This is similar to the hoke torch, and it also operates on gas and oxygen. Like the hoke, one is available to use acetylene or hydrogen gas and oxygen; another is available to use natural gas or propane with oxygen.

Soldering Machine

The soldering machine (see Figure 6) is an electric transformer that converts 110 volt electricity into the proper current to produce heat for soldering. It operates with a rheostat that can be dialed for more or less heat, and a foot switch that controls the on-off current, leaving both hands to operate the contacts. This machine will produce enough heat to do the heavy, hard soldering—even on platinum—and can be adjusted to low enough temperatures to soft solder even small articles. Even though I have a soldering machine, I have rarely used it, because I learned with a torch and have always used it for every type of jewelry crafting and repair. However, having worked with a master jeweler who used only the soldering machine, I can safely say that any work that can be done with the torch can also be done with the soldering machine. This craftsman could do anything with his soldering machine that I could do with the torch.

Torch Flames

Torch Flames from gas only receive the oxygen mixture from the atmosphere so, when lit, they show a blue flame with a small cone of almost white at the torch tip. Torches using oxygen and gas must have the gas lit first, which produces an orange-yellow flame. When the oxygen is turned on, the flame turns blue with the almost-white cone at the tip. With each different size torch tip, there is a range of heats that can be attained with the valves in the torch handle. If you give it more gas, it also requires more oxygen; and with larger tips, sometimes the regulator pressure must be increased. Start with three pounds in each regulator; they should not exceed ten pounds. When turning off the torch, it is best to turn off the oxygen first. This reduces the chances of a flashback. Until you are familiar with the workings of a torch, it is wise to practice and experiment.

An Experiment

An experiment in the application of heat can be done with a piece of brass wire and a chip of easy flow silver solder (these materials are inexpensive). Hold the wire in heavy-duty tweezers, and heat the end until it starts to melt. This will give you an idea of the heat that can be applied with the torch. Next, cut off the end where it was melted, and heat the end back about an inch. With a flux brush, flux it with a borax paste solution (or batterns or flouron hard solder flux). Again, apply heat until it turns frosted. With the flux brush, apply a small chip of silver solder about 1/2" from the fluxed end. Apply heat and observe how the solder will form a small ball or sphere, but that continuing to apply heat will cause the solder to flow. As it is starting to flow, the heat can be moved toward the end, and you will observe the solder following the heat. In this way—by moving the heat—solder can be moved a limited distance.

Torch Assembly or Hook-Up

Correct torch assembly is essential for proper performance as well as safety. The first step is to connect the regulators to the tanks. Acetylene tanks larger than the MC or B tanks connect with a left-hand thread, but these two sizes connect from regula-



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tor to tank with a right-hand thread connection. Regulators are available with connectors for the MC or B tanks, but adapters are available to convert any regulator to any tank (Figure 2c shows an adapter that is B to acetylene). A caution to remember: A regulator with a B tank connector for acetylene will connect to an oxygen tank. ***Never do this***, for the oxygen tank is under much higher pressure, and will blow out the diaphragm in an acetylene regulator.

Connect the tank regulators to the tanks and turn the adjustment handle counterclockwise until it seems free, then turn on the pressure at the tank. (Figure 2d shows pressure regulator handle.) The left-hand gauge should read zero, and the right-hand gauge will give the tank pressure. Turn the tank valve off and observe the tank pressure. If it drops, there is a leak between the regulator and tank, possibly because the connecting nut is not tight enough. Tighten it more and recheck. When the pressure holds with the tank turned off, the connection is correct with no leaks. Do the same with the oxygen regulator and tank.

Now you are ready to connect the torch hoses, which should already be connected to the torch. These next connections for gas are left-hand threads, and the gas hoses are red in color, while the oxygen threads are right-hand and the hoses are usually green in color. Remember the connecting fittings are grooved for gas and smooth for oxygen. Now open the tank valves and turn the regulator pressure adjustment clockwise to about three to five pounds on the left-hand gauge. Make sure the valves at the torch are turned off, then close the valves on the tank and see if the pressure drops. If there is a drop in pressure, check all connections from regulator to torch for tightness, and if pressure still drops, use a soapy solution with a brush on the fittings to find the leak. Bubbles will appear at the leak, so correct it and you are ready to ignite the torch.

With the tank valves open and regulators set at from three to five pounds, open the gas valve on the torch about a half turn, and light the torch with a match or ignitor so the yellow flame extends out two or three inches. Then open the oxygen valve slowly until the flame turns blue with the almost-white cone at the tip. This tip can be shortened by increasing the oxygen, but if too much oxygen is injected, the torch will go out. The hottest part of the flame is at the point of the tip, which makes an "oxidizing flame," but with the blue flame, the outer half of the flame is said to be a "reducing flame."

Remember that you are dealing with materials that can be dangerous, so always put safety ahead of everything else and avoid any dangerous situations.

The first seven articles in this course are to prepare for the actual jewelry repair. They should be absorbed as completely as possible, and should be saved for reference when real practice begins.

The next article will present instructions for filing, sawing and shaping.

❐

Waterproof & Water-Resistant Watches

Part 15, A Look at Today's Modern Testers

This completes this series of articles.

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



After explaining the details and history of the forerunner of today's modern testers, we now conclude this series by taking an in-depth look at what is in the marketplace today. At present, there are a number of units on the market with various degrees of sophistication and price.

Some such testers are able to gauge a watch up to 20 ATM or about equal to 600 feet depth. Figures 81A-81D show the various testers from Vibrograf and their testing claims. Their model WPC-300A's pressure system can check a watch up to the equivalent of 10 ATM (330 feet).

Their WPV-350 vacuum method conforms to ISO 2281 and DIN International Standard. The test takes less than one minute, and safely tests up to three atmospheres—100 feet.

Another Vibrograf model, their LC-1, is a quick-check, vacuum only device. Its gauge shows the degree of the vacuum achieved. It claims a quick check with ease of operation and a complete test within a minute.

The Vibrograf VP-2000 tests both with pressure or vacuum. The vacuum testing is suggested to locate routine leaks and has its own compressor.

Should a watch reveal a leaky condition after testing, the watch is removed from the chamber and coated at the suspected spots with a silicon fluid that will bubble, since the air trapped in the watch is still greater than the normal atmosphere and will escape through the same fault through which it entered.

The Witschi ALC 2000

The services offered by Witschi are a quick test to 0.7 Bar vacuum, plus a combination test of 0.7 to 20 Bar and a vacuum-pressure test. In other words, it tests with a vacuum only or a vacuum and a pressure test combined; should the watch pass the initial vacuum test, then the pressure test could be applied.

In the vacuum and pressure tests, the pressure can test from 0.3 to 10 Bar. Its vacuum tests range from 0.3 down to 0.8 Bar. The



Figure 81A. Vibrograf WPC-300A.



Figure 81B. Vibrograf WPV-350.



Figure 81C. Vibrograf LC-1.



Figure 81D. Vibrograf VP-2000.

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Trade-Ins Taken



Figure 82. Witschi ALC 2000.



Figure 83. Sigma SM 8800 Superior Watch Service.

measurement times are from 10 to 300 seconds, depending on the degree of severity to which the watch is subjected. All makes of devices suggest a short stabilization period for the compressed air to settle to a normal temperature so that the tests can be reliable and accurate.

The Witschi device denotes a "good" or "poor" indication by means of two different colored light-emitting diodes. Detailed results are indicated on a back-lit liquid crystal display panel. The device uses the ISO and NIHS (Swiss and German) watch waterproof standards. The Witschi's air chamber is shut automatically by motor action. There is a printer connection available to record results for each watch. Four command buttons initiate the individual test functions. Furthermore, an individual sensor allows rapid adjustments to accommodate various case types, with or without an attached bracelet or strap.

The vacuum in the ALC 2000 model (see Figure 82) also has the necessary air reservoir. The air compressor can supply pressure to a 10 Bar equivalent.

Pressurized air will drastically change its volume when its temperature changes. Witschi's instructions include information that a 1°C change per minute during measurement can add a 50 micrograms-per-minute leak rate to an otherwise true measurement. Therefore they use a method based on air overpressure and the measuring of the changes less sensitive to temperature. A good rule of thumb is never to measure a watch's watertightness when it has just come off the wrist. It will drop to room temperature rapidly; then you can begin the test.

The SM 8800 Sigma-Superior Watch Service

The Sigma SM 8800 (see Figure 83) makes claim to be the most sophisticated waterless tester available today. Its microprocessor is specially designed to retain data even when the device is switched off. After being switched on again, it will recall the last recorded data from its memory.

The seven segments of the LED display indicates the position (8 in µmm) of the watch prior to applying pressure. Likewise, it also indicates the deformity of the watch under pressure in microns. After the stabilization time, the trend in deformation in a tenth of a micron indicates whether the watch is watertight or not. A "good" or "no good" LED indicates the test results.

Various time severity tests can be preprogrammed in ten-second increments from thirty to ninety seconds. Two test modes are available, "normal" is at 0.5 Bar. At the end of the selected testing time, the test results are displayed in one of three colors: green for watertightness, red for a failed test, flashing red to indicate a large leak.

Automatic actions adjust the watch's position on the platform. The device also tests itself for leakage in its own pressure chamber.

Longines-Wittnauer

Most of the importers and assemblers of watches who market their product in this country employ banks of these devices from various makers. Shown here are some used by Longines-Wittnauer in their Puerto Rico plant. Every watch bearing any statement of

water resistance is subjected to one of the tests. Shown in Figure 84 is Tom Parks, head of engineering, with a row of waterless testers that include the Airvidus 50, the Roxer Airfuite (with pressure capabilities up to 250µmm), and the W.R.T.-SM 8404 (a quick tester shown in two views).

Shown in Figure 85 is a special water-plus-pressure testing device that can test fourteen watches at one time. The principle is similar to the old system. This device has these watches in compartments of a sieve-like platform above the water level in the device. The transparent cover is locked hermetically while the watches are subjected at a certain air pressure (while the tested watches are still dry). Air is pumped into that visible compartment. If any of the watches are not water resistant, they also will admit the air pumped into that compartment, and their internal pressure will equal that in the compartment. The platform is then made to descend under the water level. After a short waiting period, the air above the water is slowly released. If any of the watches admitted air, that air (now under greater pressure than the water) will escape through the apertures through which they entered. This will be observed as tiny bubbles and their fault spots noted. The platform is raised above the water level, and the faulty watches are corrected. No damage has been done because the compressed air inside those watches will still be forcing its way outward and, after drying their outsides, they will be none the worse for the tests. ❐



Figure 84. Tom Parks, head of engineering, Longines-Wittnauer's Puerto Rico plant.



Figure 85. Longines-Wittnauer's water-plus-pressure testing device.



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Management

Part 9

Selling

By Fred S. Burckhardt



Now that you have become an expert on buying, let's look at the other side of the coin—selling.

What is selling? Selling is the process of exchanging goods, services or property for money or its equivalent.

A sale consists of three ingredients: buyer, seller, and goods or services. Before we can have a full understanding of selling, we must first understand why a person buys. A person buys something because he is mainly interested in himself, his own comforts, desires, happiness—all the things that will make his life more pleasant! People will buy something, not because they want that something, but because they want what that something can do for them—the *benefit* they will derive from buying that something!

For example, let's suppose a man came into your place of business to buy a diamond ring. Why does he want to buy the ring? Perhaps he is satisfying a desire he has had for years to own a nice diamond ring because now he is finally able to afford it. Or maybe he is buying it to use as a status symbol , to show his business associates so he can listen to the ooh's and ahh's as he is showing to them he has it made.

Then again, maybe he's buying it for a gift. What does this have to do with being selfish or thinking of himself if he is buying it for someone else? For the simple reason that he will derive pleasure from giving the gift knowing that each time his loved one looks at it, she will think of him. In any case, he isn't buying the diamond because it is a piece of crystallized carbon that has a certain refractive index and specific gravity. He is buying for what the diamond can do for him in terms of pleasure and enjoyment.

Another example is underarm deodorant Does a person buy it because it contains a secret ingredient—hydroexochlordiaphanine? No, they buy it for one reason—because it will make them more socially acceptable. Others won't shy away from them like they used to before they started using it

Why does a person buy a Cadillac? It will only take them and bring them back just like any other, less expensive car. The difference is the others don't have the prestige attached to them like the Cadillac does.

Why does a woman buy makeup? Only because she feels it makes her more attractive and gives her additional sex appeal.

As you can see, there is always a reason for a person buying something. You must try to find the reason or lose the sale.

The Successful Salesperson

What is a successful salesperson? A person who sells the most amount of merchandise or repair at the best price in the least amount of time This comes from first learning how to sell yourself. This is why some customers will deal only with a certain salesperson—because he has knowingly or unknowingly sold himself to such a degree, and has built up the customer's confidence to such an extent, that the customer wouldn't think of making a purchase or having a repair done without first consulting him.

Characteristics of a successful salesperson:

Enthusiasm. Have you ever walked into a store and have the salesperson act so indifferently that you left and made up your mind never to return? Some stores would be better off if they replaced their clerks with robots. In order to sell effectively, you must show some interest and excitement in your presentation. Showing enthusiasm for the item or service will help get the customer excited about it, too, because enthusiasm is contagious.

A good example of enthusiasm in selling is when you just made a good sale. Have you noticed when this happens, you can't wait to get to the next customer, and the selling becomes easier? This is because you are experiencing what enthusiasm can do. But how about the days when you can't seem to sell anything? Notice how different your attitude is—the spark is gone, and you can't wait until closing time. Customers can sense when you lack enthusiasm in your presentation.

Product Knowledge. When a person goes into a store to consider the purchase of an item with which they are not familiar, they'll ask questions and expect intelligent and knowledgeable answers. This also applies to service work as well.

Any piece of merchandise you offer for sale, or any repair work or other service you offer to your customers requires that you be well versed in the manufacture, the operation, or the reasons for the item's repair or service. This doesn't mean you should enter too deeply into the technical aspects

of the item. It means you should be able to explain, in simple terms, so the customer understands what you are talking about. Very few customers care how many oscillations a quartz crystal makes, or whether a ruby has the same refractive index as a sapphire. You should know these things, but don't bore the customer trying to impress them with your knowledge.

Confidence. Confidence means having trust and faith in yourself. If you show the customer you have confidence in yourself it will, in turn, cause the customer to have confidence in you. Confidence is shown when you take charge of the sale from beginning to end, and don't hesitate or back down when any questions arise.

Sincerity. When a customer comes into your store, it means they have a problem. They are coming to you so you can help solve their problem They deserve and should receive your honest and genuine offer to help. Here again, customers can detect if you are earnest and really care about helping them. After you have tried and the customer is ready to leave, let them know you are sincere in asking them to come back. Customers like to know they are appreciated

Honesty and Integrity. These are two things that need no long discussion. You can't last very long in this business if you don't possess these characteristics.

Never lie to a customer in order to make a sale. Never make a promise to a customer that you have no intention of keeping. If you lose a sale because you were honest, and this sometimes happens, at least you can walk around with a clear conscience. The few dollars you would have made aren't worth what you could have lost.

Professionalism. This is a word that many like to use when describing their occupation. Too few know what the word means. A professional is a person who has assured competence in a particular field or occupation, and has advanced study in his specialized field.

Those who are true professionals never stop learning. Continued education is a way of life. The difference is whether or not a person continues to hone their skills or experience to make themselves more competent.

Tact. Tact is saying the right thing at the right time without giving offense. Never tell the customer his watch or piece of jewelry is a piece of junk and not worth repairing.

Always use tact when dealing with a customer. Telling them they have poor taste in jewelry won't win you any sales. There are times when you have to make certain remarks—do it in a nice way.

Humor. We're not talking about the ho-ho type of humor that's shown by some comedian on TV; rather, we're talking about a pleasant, subtle humor that helps to put the customer at ease. A cold, unfriendly atmosphere doesn't make the best type of selling environment. A few humorous remarks are always in order—as long as they are not overdone.

Once you have developed and perfected these essential characteristics, you'll find that your sales will increase and your work will become more enjoyable.

❐

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Book Review

Early Lancashire Horological Tools and Their Makers, by Theodore R. Crom. 8 3/4 x 12", 235 pages, hard cover, 282 figures. Published 1994 by the author @ $140.00 (Rt. 2, Box 212, Hawthorne, FL 32640).

Theodore R. Crom is known in the horological world for his researches and books on horological tools and equipment. His five previous studies in this area—*Horological Wheel Cutting Engines*, *Horological Shop Tools 1700 to 1900*, *Horological and Other Shop Tools 1700 to 1900*, *Trade Catalogues 1542-1842*, and *18th Century English Brass Hardware Catalogues*—have become standard references.

Crom's latest effort is a veritable thesis on the history of Lancashire toolmaking, especially as it informs the watchmakers and clockmakers and repairers of every period up to the turn of this century.

The author uses both engravings from period catalogues and very fine photographs made on site by his son Cary, who assisted Crom. While most of the catalogues contain good engravings featuring the makers' wares, some of the engravings are a few grades below the calibre of a Hogarth or those that illustrated Diderot's or Reese's books. Nonetheless, many of the devices illustrated are accompanied by very clear, large photographs by Cary Crom.

While the book deals with the Lancashire toolmaking industry from the latter part of the 17th century to the 20th century, nearby communities such as Prescott and Taxeth Park, Rainhill, Cranon, St. Helens and Liverpool are mentioned within the same texts.

The products of John Wyke and Thomas Green, Daniel Mather, the Jones family, Whitmore, Billinge and Stubs, whose products reach into this century, are included. Theodore Griffith and Edelston were among some others who issued catalogues of their products.

The book discusses the use of "outworkers" who, with their apprentices, independently made tools in "outside" shops and supplied them to be shown in trade catalogues of larger, on-site factories. Some of the tools invented by these outworkers were sold to better-known issuers of catalogues, and wound up with the stamped identities of larger dealer-makers.

The illustrations show many tools of complex structure that could normally puzzle modern-day identification and use. Crom most often explains their use probably from his own experience—many of these tools are in his vast collection of ancient horological devices. Crom's vast knowledge of old tools has resulted in the rediscoveries that previously had puzzled others. Close-up views are used to emphasize a detail in certain tools or equipment. They also reveal the artistic inclination and fine regard of the makers for their own products.

Clock throws, bow and hand-powered lathes, poppets (small lathe headstocks), and other "turns" used to make various parts of verge watches and clocks are pictured and described. These specialized tools and machines at times were designed to perform a specific service or to make a small part of a greater unit.

The variety of tools that were made for such specialized use is amazing. It appears that each section of a watch or clock or part had its own device to ease the work of the outfit maker or specialist. Balance "turns" with numerous chucks for various sizes are shown. These are really clamps purposely designed to secure the balance blanks so that these could be hand-finished to precise concentricity, appearance and performance. These chucks were secured to a tapered extension that enabled them to perform somewhat like the later faceplate used on mandrels, or the later American watchmaker's-type lathes.

While most turns were engineered to hold objects to be turned between centers, the Prescott-Lancashire toolmakers produced "turns," in which an extended shaft could hold clamps or poppets (lathe extensions with flat fronts). It is possible that such tools provided the germ of invention to the makers of the American Waltham Watchmakers lathe, with hollow headstock and draw-in spindle and slotted chuck.

The engravings of antique jewelers' saws show virtually no change in more than 250 years.

Turnbenches appear to be portable units, with drive wheels, turns and accessories mounted in a handy boxed mount dating back to the 18th century. Some are shown in this book.

Poising tools and lead screw adjustment; 18th-century "tail vises" (hand vises or clamps); a rare, late 18th-century pallet gauge; dial-making tools; mainspring winders; elaborately made fusee notching tools; clock sectors, wheels; and cutting engines—among other interesting devices—are pictured in large, clear photos and in old engravings that take up special chapters.

The evolution of the Universal Mandrel takes up twenty-seven pages. (The dictionaries define a mandrel as a "snug-fitting cylindrical piece of metal on which a piece of work may be held and by which it is driven, as in a lathe. Also spelled mandril.") If the latter is spelled as "mandrill," it would denote a type of baboon.

The mandrel evolved into the brass Swiss mandrel with the universal faceplate. Crom devotes a whole chapter to this very versatile device. Various evolutionary types are recorded and illustrated with photos and contemporary engravings taken from old catalogues. Some of the earliest (c. 1800) are bow-driven and made by Stubs, Bowen, Barker and other Lancashire makers. Some had vestiges

Book Review

of later chuck bearing (front poppet). The uprighting tool is shown in this same chapter, and at times uses the vertically mounted faceplate for "planting" the pivoting positions. Crom suggests that the Lancashire mandrel, which is gear-driven, might have been the model for Abram Borel Jacquet's Swiss mandrel. The various devices in this and later chapters clearly show this evolution.

A final chapter is devoted to milling machines from the earliest part of the 19th century. For the most part, these were, at first, created as pinion cutters. A fine bibliography with individual comments, and a good index is followed by an appendix that lists Lancashire toolmakers, with twelve pages and twenty-four photos of representative products.

Crom has dedicated himself to the study of horological tools and equipment. This sixth book reflects his continued dedication, which should enrich those who seek information, and should serve as a record for future historians.

Henry B. Fried

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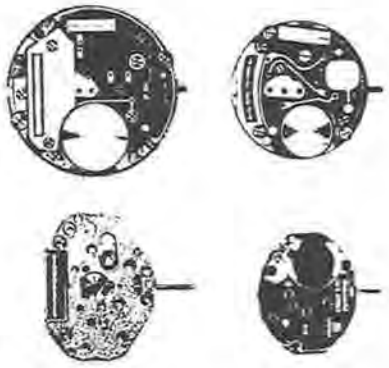
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The Novice Watchmaker

Fold-Over Buckles



By David Christianson, CMW, FBHI

Gents' fold-over buckles can be a bit of a challenge at times. It is not uncommon to need to replace a missing center hinge pin. Your assortment of paper clips will yield a pin of the correct diameter, or near enough (see Figure 1). Cut the pin a half millimeter longer than the hinge (see Figure 2). Tap one end of the pin with a hammer while the buckle is resting on a bench block (see Figure 3). If you cut the pin to length using as pair of end cutters (nippers), you raised a burr on the ends of the pin. Hammering these burred ends will result in a slightly flared end that will hold the pin in the buckle. Turn the buckle over and flare the other side also. You'll need to touch each end with a fine file to smooth the ends to keep them from snagging shirt cuffs and clothing.

A solid pin also holds the whole buckle assembly to the six o'clock side of the bracelet (see Fig-

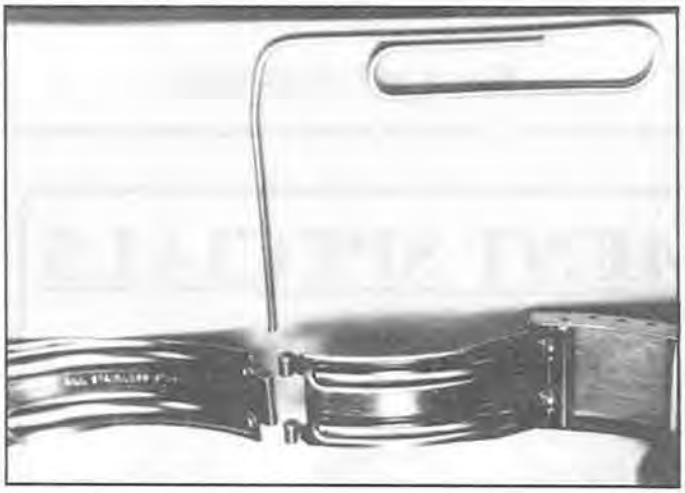


Figure 1.

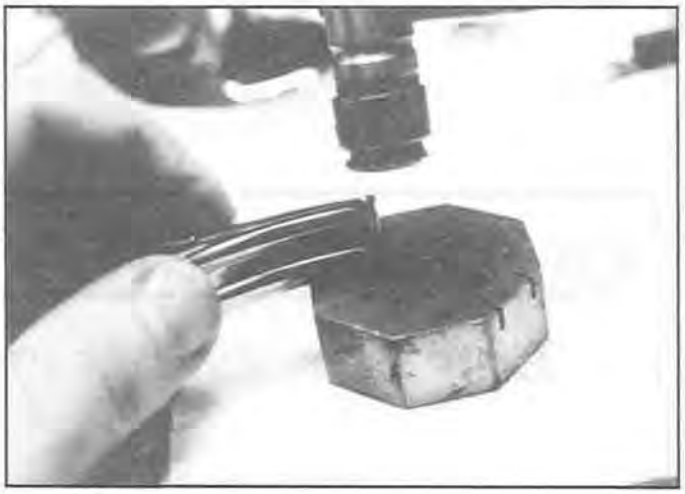


Figure 3.

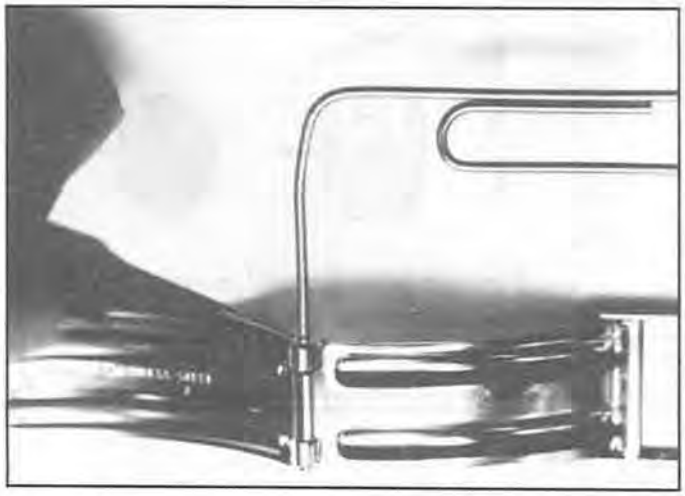


Figure 2.



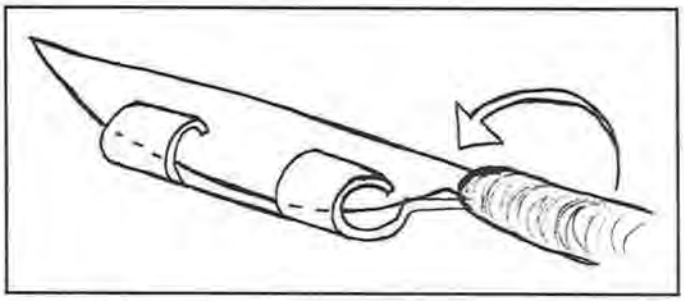
Figure 4.

ure 4). These, too, come up missing quite often, and can be replaced with one made from a paper clip in the same manner as above. If the pin is slightly smaller than the hole or tube that it fits into, the ends will need to be riveted as above. But many times, the tube will be slightly too small. This tube can be opened up on both ends with a knife blade forced into the rolled-over edge of the tube (see Figure 4 and Drawing A). This will spread open the tube just enough to lightly hammer in a new replacement pin, with no riveting required.

The two ends of the band are attached to the buckle with a special spring bar and/or solid pin. The special spring bars are of the double flange style, with the end pins shortened so that they do not protrude beyond the outside edges of the buckle (see Figure 5). The solid pins commonly found on the six o'clock side of the buckle can be made from a paper clip wire whose ends are turned down to fit into the buckle holes (see Figure 6). Select a diameter of wire that slips entirely through the end tube of the bracelet. Place the wire into the lathe and turn down both ends to the diameter of the buckle holes, but no longer than the thickness of the buckle wall. The shoulders of the pin should be the same distance apart as the inside width of the buckle.

A replacement for a missing buckle spring bar can be made from a paper clip in the same way. That is, if a suitable spring bar is not available. Often times a regular spring bar with its two ends shortened so they don't extend beyond the outside walls of the buckle will work just fine. But there are occasions when the holes in the buckle are too large to even use a 1.8mm (standard double shoulder) spring bar. In this event, make a replacement from a paper clip wire as you would for the solid buckle pin mentioned previously. To insert, place one end of the replacement pin into the appropriate hole of the buckle, and flex the opposite wall of the buckle enough to slip the other end of the pin into the opposite hole (without distorting the buckle walls). See Drawing B.

Other fold-over buckles, primarily for lady's bracelets, are shown in Figure 7 (on page 26), and are available from your material distributor. The two on the right are simply replaced with a screw or with a solid pin riveted on its ends. The one in the middle fits on a pin by rolling the open end over the pin (see Drawing C on page 26). This is accomplished by grasping the open end with a pair of needle-nosed pliers and rolling or closing the end around the pin with a rotating motion of the pliers in the direction of the arrow. The top or locking portion of the clasp will then need to be bent or formed inward slightly,



Drawing A.

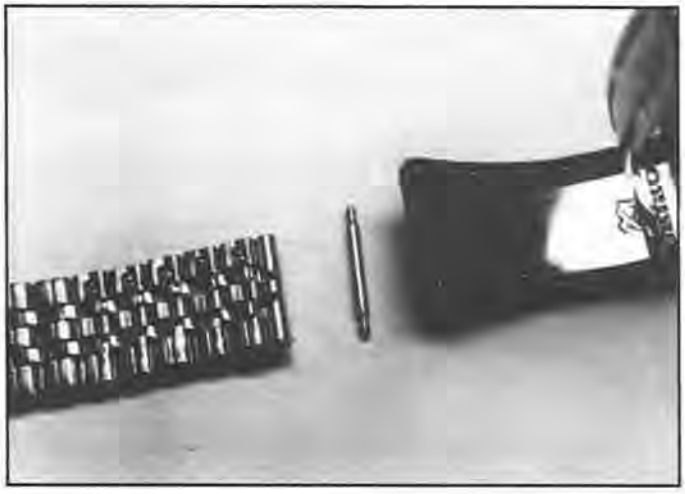
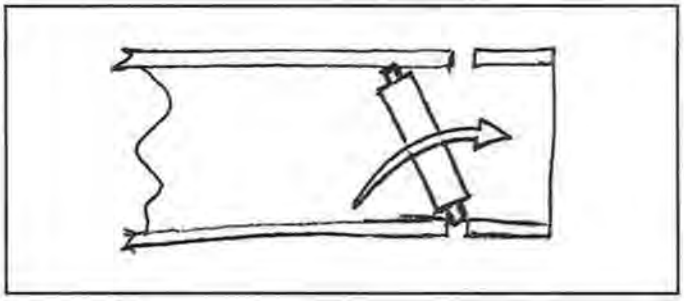


Figure 5.



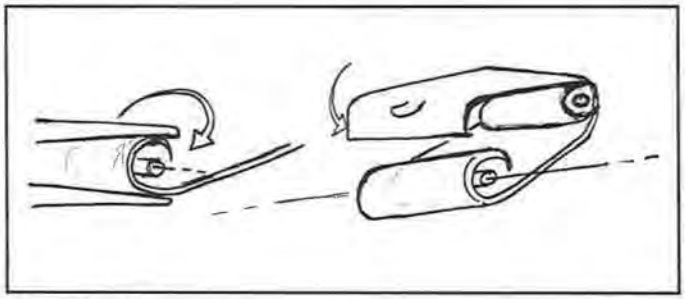
Figure 6.



Drawing B.



Figure 7.



Drawing C.

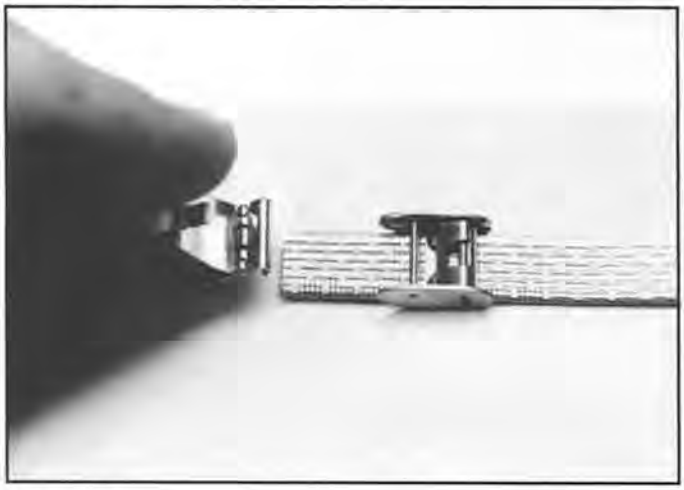


Figure 8.



Figure 9.

so that it will snap down on the rolled end of the clasp and lock into position.

The top left clasp in Figure 7 is also illustrated in Figures 8 and 9. The sliding portion can be replaced. The locking portion (right half in Figure 7), can be replaced only by spot welding or hard soldering, a skill you probably will not possess.

If you encounter a broken or missing clasp of this kind, suggest replacing it with the clasp shown in the lower left of Figure 7. Doing so has three advantages:

1. It provides an easy replacement.
2. It provides a clasp with a safety chain (a good selling point).
3. It eliminates the "tail" of the band that the clasp in Figure 9 necessitates, and makes for a much more tailored appearance.

To replace this kind of clasp, and any other on a mesh band for that matter, choose the appropriate width replacement clasp from the #200 Japanese-style clasp assortment (available from your material house). Lay the watch and band around the client's wrist, and place the replacement clasp in position on the wrist. Mark the ends to be cut off (inner length) with a pointed felt marker (see Figure 10). After measuring, cut your customer's bracelet with a cutting disc in your flexible shaft machine or your Dremel® tool, leaving enough band to insert into each side of the clasp (see Figure 11). With your cutting disc, cut a slit into the underside of each end of the bracelet, about 1/4" in from the end and about half way into the mesh in the center (see Figure 12). Make this slit with the deepest part of the cut in the center, tapering up near the edges so the slit does *not* extend the full depth across the bracelet. This slit on the watchband provides a recess for the jaws of the new clasp to bite into the band and secure the clasp to the bracelet (see Figure 13 and Drawing D). ❐

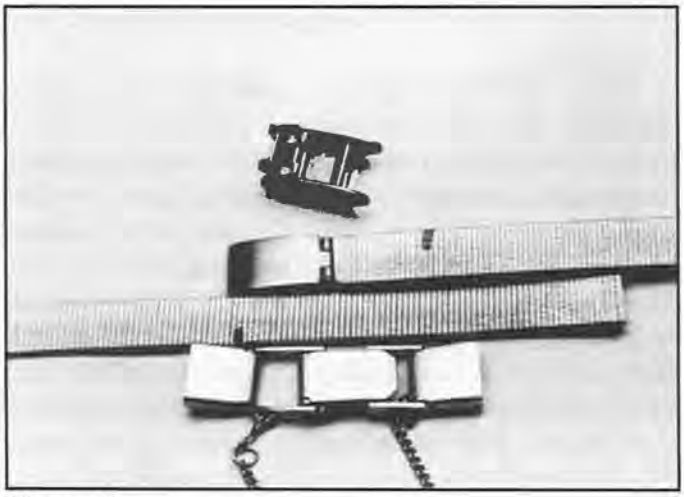


Figure 10.



Figure 11.

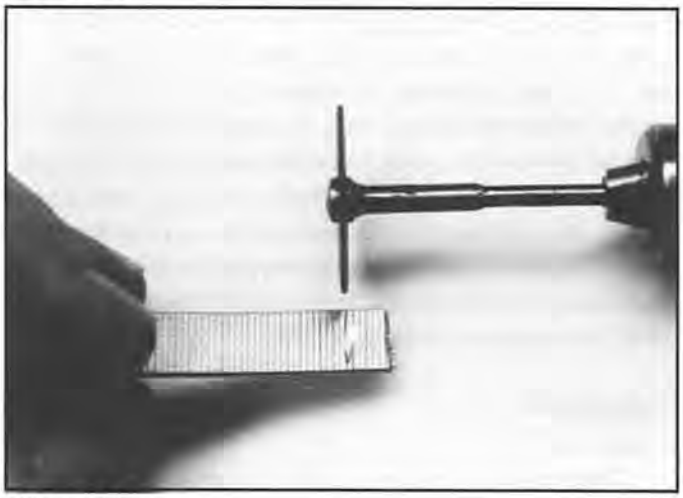


Figure 12.

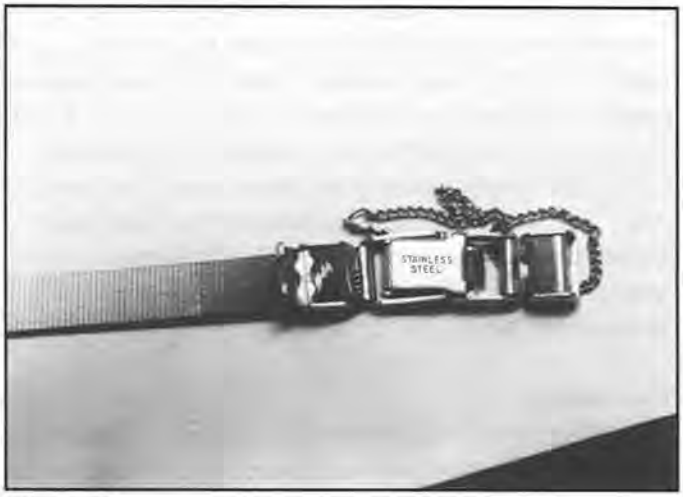
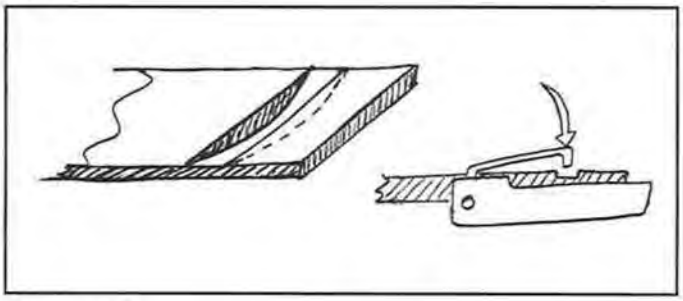


Figure 13.



Drawing D.

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The Apprentice Clockmaker



Clock Movement Maintenance

Unit Repairs, Pinion Repair

By John P. Kenyon

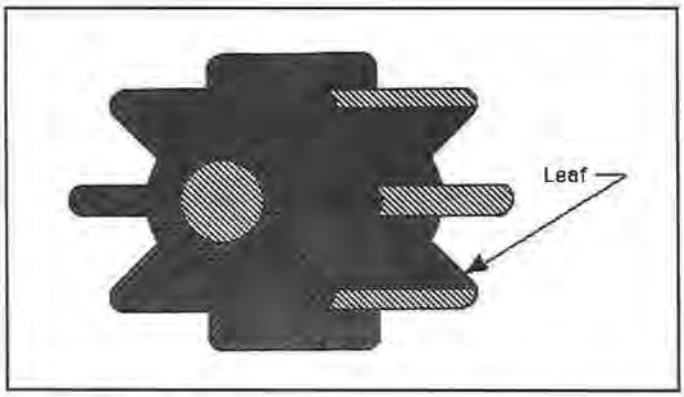


Figure 1. Solid pinion.

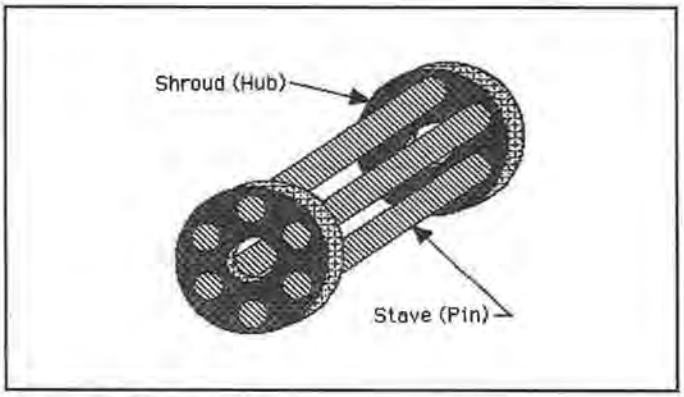


Figure 2. Lantern pinion.

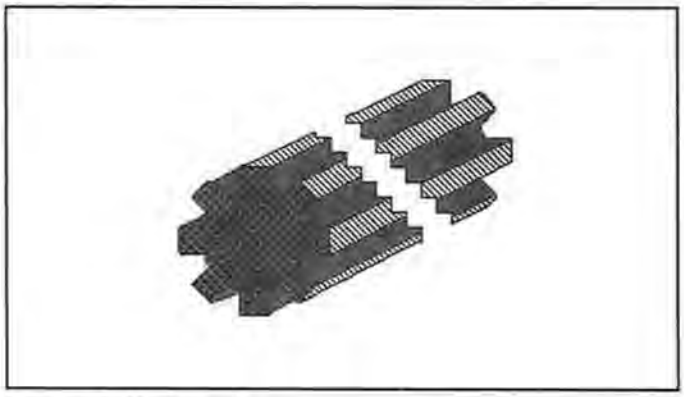


Figure 3. Pinion wire.

Pinions are small gears that are used in clock movements with large gears, called "wheels," to transfer power through a gear train. Unlike the gear trains in automobiles and traditional machinery, the pinions in clock movements are driven gears, except in the motion work where they are used as the drivers. Two types of pinions are found in clock gear trains: solid pinions and lantern pinions. These are illustrated in Figures 1 and 2. Solid pinions are usually found in movements of high-grade clocks such as French clocks, Vienna Regulators and carriage clocks. They are also found in most English and German movements, old and modern. Lantern pinions were used in most early American clock movements, and are used today in many of the clock movements imported from Asia.

Solid Pinions

Pinion Wire

Some solid pinions were made from steel pinion wire that was manufactured by drawing a length of soft round steel wire through hardened steel drawplates to extrude a configuration of wire with the correct profile of the pinion. Pinion wire, as illustrated in Figure 3, was available in ten- or fifteen-centimeter lengths, in assorted sizes, numbers of teeth and profiles. It could be set up in a lathe and the excess material machined away to form a shaft or arbor, leaving the pinion intact, as a part of the arbor. Then, the pinion itself required some final hand finishing. Usually the pinion and arbor were hardened, tempered and polished as a final step. To the best of my knowledge, pinion wire is no longer available.

Cut Pinions

Another type of solid pinion is the cut pinion. It is also made from steel. The leaves (teeth) are formed by cutting away material from a steel rod using a wheel and pinion cutting engine to form the desired profile. Also, it can be done on a small scale with a wheel and pinion cuffing attachment on a lathe. It is then hardened, tempered and polished.

Repairing Solid Pinions

Solid pinions may exhibit some wear after many years of use, or they may have leaves bent or broken by a reverse power surge such as that which occurs when a mainspring breaks. They can also be damaged by opening the plates without letting down power, by dropping, or by some other accident.

A bent tooth on a solid pinion can *rarely* be straightened, but it might be worth a try. One method is to hold the pinion in the protected jaws of a vise, and tap the bent leaf with a punch that has been shaped to fit the contour of the tooth (see Figure 4). The punch is tapped lightly with a hammer. Remember, several light taps are preferred to one or two hard ones. The punch can be made from brass or soft steel, depending on the hardness of the pinion. Prior to the effort, the pinion should be checked for hardness with a file and annealed, if necessary. After straightening, be sure to harden and temper it again, to a deep bluish purple, then polish it.

It is difficult to successfully replace a broken leaf on a solid pinion. Some of the literature suggests repairing a broken leaf by removing the remnants, silver soldering a piece of steel to the shaft, then shaping the profile of the leaf. This technique will produce a satisfactory repair on brass wheels, where tooth plugs can be dovetailed and soft soldered deeply into the rim of the wheel; but with a broken pinion leaf, a deep-seated plug for a base is impractical. Replacement of the entire pinion is the best solution. Replacements can sometimes be found in your spare parts box. If a matching pinion is located on a shaft, but the shaft is different, sometimes the arbor and/or pivots can be modified to fit. Also, pinions can be ordered from material suppliers or from machine shops that specialize in cutting wheels and pinions for clocks.

Lantern Pinions

Lantern pinions are made up of end caps called "shrouds," and a series of pins called "trundles" or "staves." The shrouds serve as friction-fitted hubs, drilled and positioned to hold the trundles securely, parallel to the arbor. In some instances, one shroud is fitted tightly to the side of a wheel to block the trundle hole ends. In others, one shroud may be drilled all the way through, and the mate drilled partially through (blind holes). Some may have both shrouds drilled all the way through. The shroud end or ends might be secured with a thin brass disk, pressed onto the arbor and fitted tightly to the shroud to hold the pins in their respective holes, or the ends may be burred over with a punch to hold the trundles in. *Never solder* the ends closed. This leaves a quandary for the next person who has to repair the pinion.

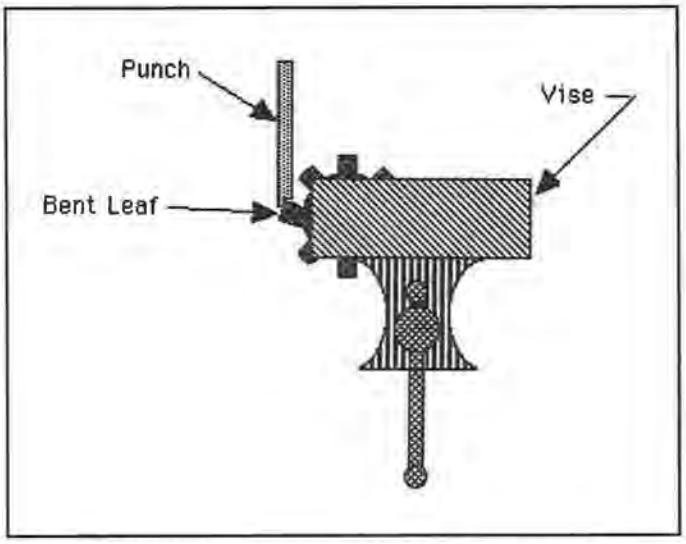


Figure 4. Straightening a bent leaf on a cut pinion.

Some lantern pinions are made with the pins tightly fitted into the hub holes. Others, called rolling pinions (see Figure 5), are intentionally left loose to rotate in their holes to reduce friction. An example of this type can be found in the old Birge and Mallory strap movement. After years of running, they show very little wear. The wear that occurs is around the pin, rather than on one side of it, as in the case of the stationary pins.

Lantern pinions operate with much less friction than cut pinions.

Repairing Lantern Pinions

Lantern pinions are more fragile than cut pinions. Several pins of one or more lantern pinions can be wiped out by a sudden reverse surge of power. Wear is common in these pinions. It is to some extent responsible for the "growl" that occurs in some of the old American kitchen clock strike trains. In fact, these clocks are sometimes referred to as "groaners."

Worn and broken pins can be extracted by removing the end cap, or by opening the appropriate hole in the end of the shroud. I do this task with a dentist's drill that I acquired at a mart some years ago and installed on my bench. My friendly dentist saves me several sizes and kinds of burrs. A bent pin can sometimes be straightened by setting it up in the lathe (not running) in the appropriate size chuck, and bending it carefully with a hollow brass punch. Broken and worn pins can be replaced with new ones that are made from blue tempered steel pivot wire. Replacement pins should be the same length and diameter as the old ones. Special tools called "lantern pinion tools" are available to assist you in cutting wires that will be all of the same length. After placing the pins into shroud holes, close the holes with a prick punch or a burnisher. Don't worry about whether the pins are tight or loose in the holes, as most experts agree that either way is acceptable. Remember, *never* use solder to close the holes.

A shroud or shroud cap can be tightened on an arbor by placing it on a flat bench block and reducing the size of the hole opening with a round punch (or a round hole closing punch) that is larger than the shroud hole. Tap the punch carefully until the size is reduced enough to fit tightly on the arbor. The shroud is then driven onto the arbor with a hollow punch and a stump from a clock staking tool set.

Next time, we will study some clock cleaning techniques. ❐

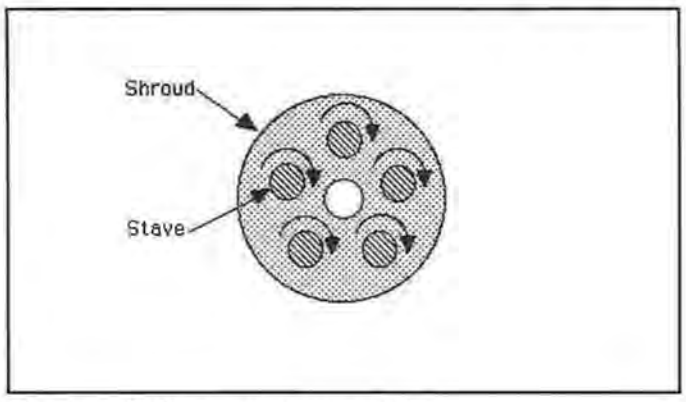


Figure 5. Roller type lantern pinion.

Technically Watches



Antique Watch Restoration, Part CVIV

Making Roller Tables for Lever Watches

By Archie B. Perkins, CMW, FNAWCC, MBHI

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Roller tables for lever watches are classified as single roller type or double roller type. Figure 1 shows these two types. View A shows the single roller type. This type of roller table was used in watches made before 1900. This roller table contains the roller jewel as well as a crescent in its edge for the guard pin to act in. In this case, the guard pin is planted in the pallet fork so it extends vertically from the top of the pallet fork.

Figure 1, view B shows the second type of roller table. This is a one-piece double roller. The double roller has been used since about 1900. This type has a large roller for the roller jewel and a smaller roller table to act with the guard pin. The large roller is called the impulse roller, and the smaller roller is called the safety roller. The guard pin is planted in the pallet fork in a horizontal position.

Figure 2 shows two other styles of double rollers. These are called two-piece double rollers. View A shows a two-piece double roller that has a pipe on the safety roller. Both the safety roller and the impulse roller fit onto the same roller shoulder on the balance staff. First, the impulse roller is pressed onto the roller shoulder and seated against the hub of the staff. Then, the safety roller is pressed onto the same shoulder. Before pressing the safety roller, its crescent must be aligned with the roller jewel in the impulse roller table.

Figure 2, view B shows a two-piece double roller that does not have a pipe on the safety roller. There is a larger hole in the impulse roller than in the safety roller; therefore, these two tables fit onto separate shoulders on the balance staff. This type of two-piece double roller is used

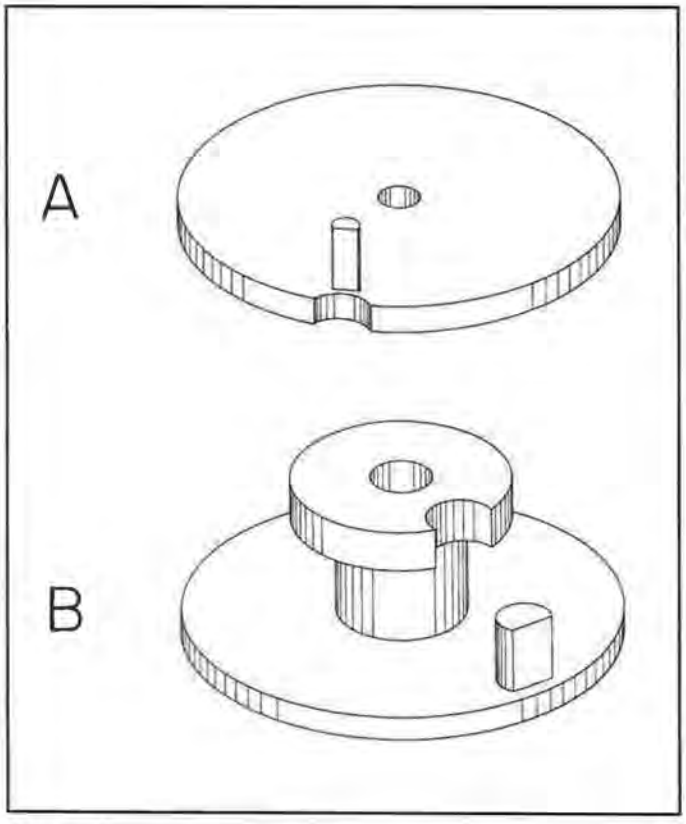


Figure 1.

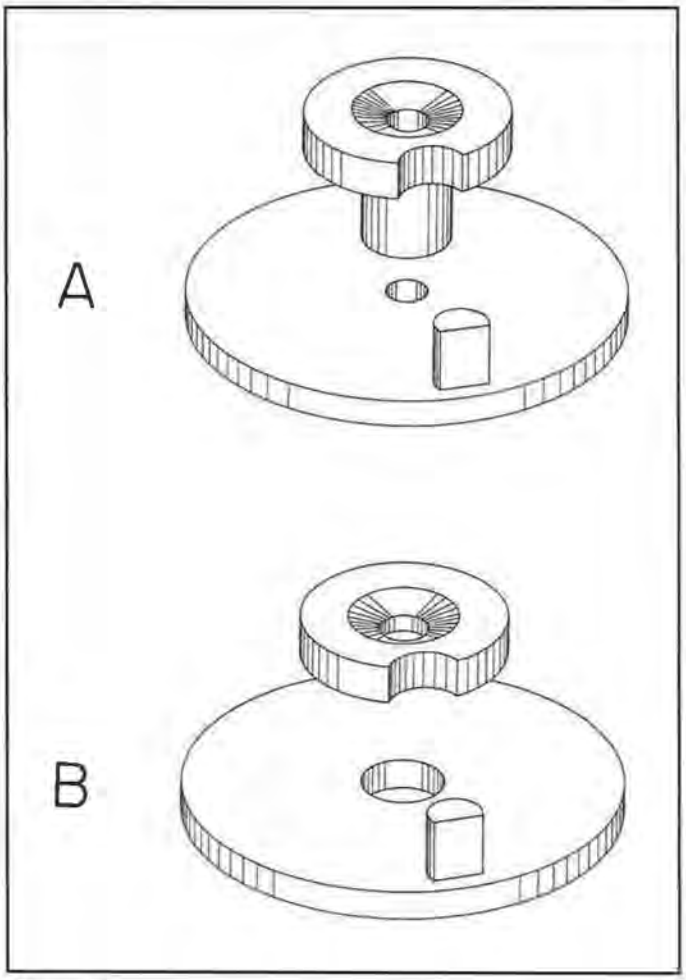


Figure 2.

mainly on the higher grade watches such as the American railroad watches.

Styles of Roller Jewels

Figure 3 shows three early styles of roller jewels. View A shows the round roller jewel. The round roller jewel had the disadvantage of needing considerable space to pass out of the fork slot, which necessitated a wide angular motion to the lever. This created excessive slide on the escapement, which was wasted motion with no mechanical advantage.

Figure 3, view B shows the oval-shaped roller jewel. This style of jewel was an improvement over the round roller jewel because it needed less space in entering and leaving the fork slot. Therefore, the bankings could be closed up more, cutting down on the angular motion of the pallet fork. This allowed for a light drop lock, and a much smaller amount of slide than the round roller jewel required.

Figure 3, view C shows a square roller jewel. Not many of these were used. This style of roller jewel was used by one American watch factory. This roller jewel required that the sides of the fork slot be pointed where they contact the sides of the roller jewel. This was done by drilling a hole in the center of the fork, in back of the fork horns, to form the points to act as a fork slot. This jewel required a loose fit between the two points to allow the jewel to enter and leave the pallet fork. This style of roller jewel was soon abandoned.

Two other styles of roller jewels are shown in Figure 4. These are more modern styles of roller jewels. View A shows the triangular shaped jewel. One advantage of this shape of jewel is that it reduced the area of contact between the jewel and the fork slot. This reduced the friction of the jewel in the fork slot. This shape of jewel was used in some American and Swiss watches. These jewels sometimes were made with convexed faces instead of flat faces. They discontinued these jewels because of the higher cost of making them compared to the making of the present day D-shaped jewel. Also, the triangular shaped jewel did not offer much advantage over the D-shaped jewel.

Figure 4, view B shows the D-shaped jewel with a curved face. This style of jewel was used in many of the high-grade American watches. The curved face allows the escapement to be set up very close. The space between the corner of the fork slot and the face of the jewel remains equal as the jewel is passing the corner of the fork slot. The D-shaped jewel with a flat face that is shown in Figures 1 and 2 has more freedom between the corner of the fork slot as the center of the flat face of the jewel is passing the corner of the fork slot. If the watch gets a jolt at this time, there is danger of the escapement unlocking prematurely if the lock is set up very lightly. This should not occur when the face of the jewel is curved.

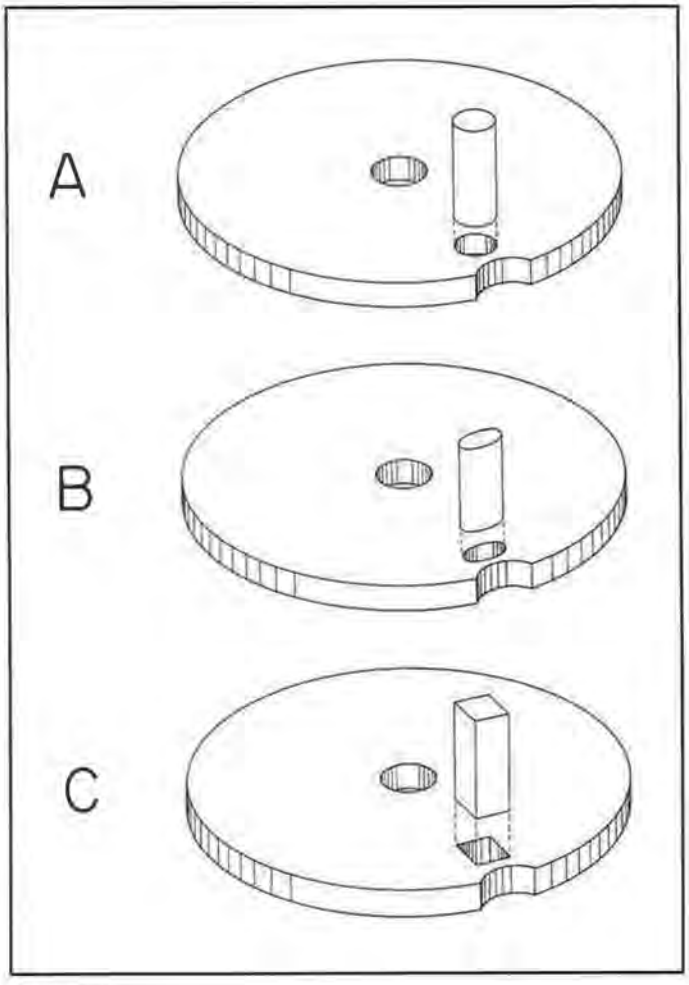


Figure 3.

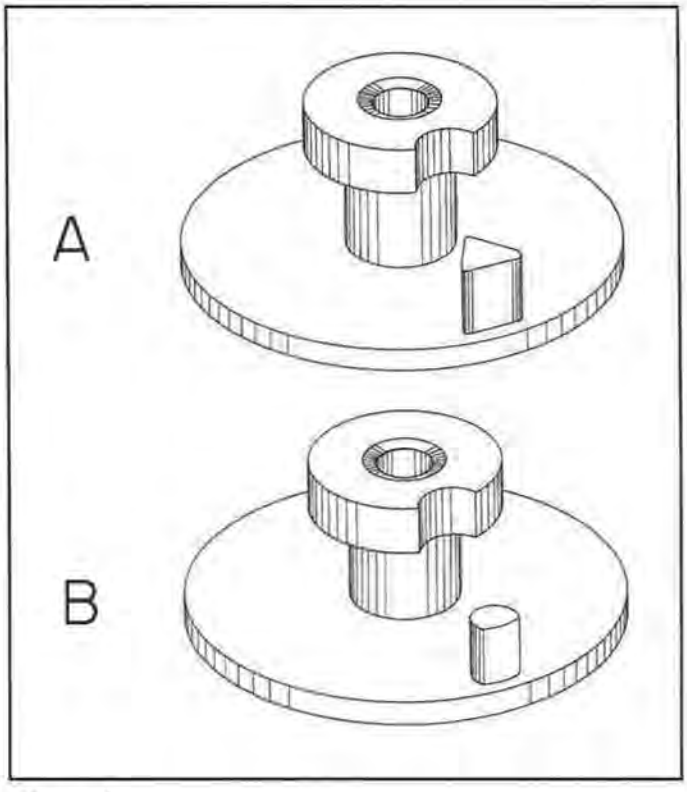


Figure 4.

Single Style Roller Tables

Figure 5 shows three different styles of single roller tables. View A shows the square-edged roller table. When this style of table is used, its edge is made square with the two flat sides of the table. The edge of the table is given a burnished and polished finish. Note that the guard pin for this style of table has a curved shape.

Figure 5, view B shows a single roller table that has a rounded edge. The edge of the table is rounded, burnished, and polished. Note that the guard pin is straight and vertical from the top of the fork. This is the most common style of single roller table.

Figure 5, view C shows a single roller table that has a beveled edge. The purpose of the beveled edge is to reduce the amount of surface contact of the guard pin against the edge of the roller table in case the guard pin goes against it. This can happen if the watch gets bumped. The bevel can be polished flat by the use of a lap on the grinder-pivot polisher tool. This style of roller table was used mostly in European watches.

Making a Single Type Roller Table

Figure 6 shows how a rounded edge single roller table is made. To make the table, a piece of high carbon water hardening steel rod is selected. The diameter of the rod should be at least .1mm larger than the finished roller table is to be. The rod is chucked true in the lathe and then faced off flat on its end. Then, a cut-off or parting tool is used to lay off a disc at the end of the rod for the roller table. The disc should be thicker than the table is to be, leaving enough thickness to allow for finishing the sides of the table. Then, a center is spotted and the center hole is drilled. The hole should be made slightly smaller than the shoulder on the balance staff where the table fits. Next, a graver is used to round off the edge of the disc. This is shown in Figure 6, view A. Leave enough extra on the diameter to allow for finishing the edge of the disc.

Figure 6, view B shows how grinding slips and a steel burnisher are used underneath the disc when finishing the edge of the disc. The grinding and polishing tools are moved back and forth endwise on the edge of the disc and, at the same time, the tools are swung back and forth on the edge of the disc as shown in Figure 6, view C. After the edge of the disc has been finished, the disc is removed from the rod so the roller table can be completed.

If a roller table that requires a square edge is being made, a different method is used to maintain the square edge on the disc. The square polished finish is obtained with the aid of the adjustable rest that is shown in Figure 8, view A. The rest fits in the tailstock spindle of the lathe, and has an adjusting screw to level the grinding slips and/or burnisher so they will rest flat and square on the edge of the roller table being finished. Usually a hard steel burnisher is used to smooth the edge of the table. Then, a flat boxwood slip with diamantine is used to polish the edge of the table.

Making the Hole for the Roller Jewel

If a round hole is needed for a round roller jewel, it is just a matter of selecting the proper size drill for the jewel, then locating where the hole should be made in the table, and drilling the hole.

If the hole for the jewel is required to have a D-shape for a D-shaped jewel, it can be made in one of

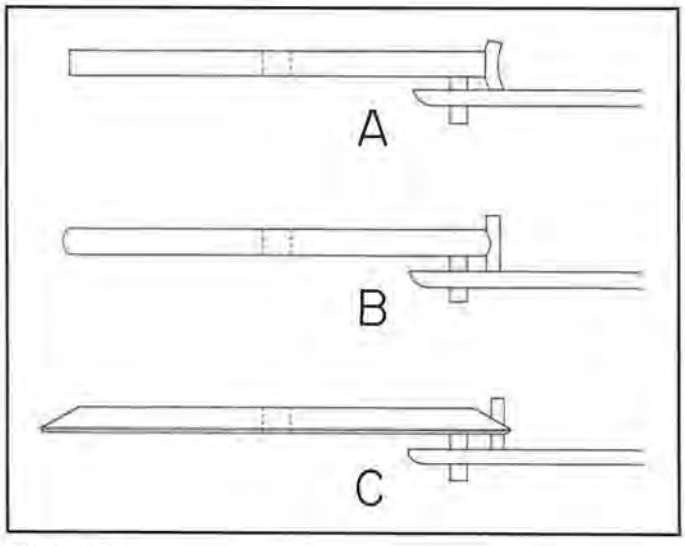


Figure 5.

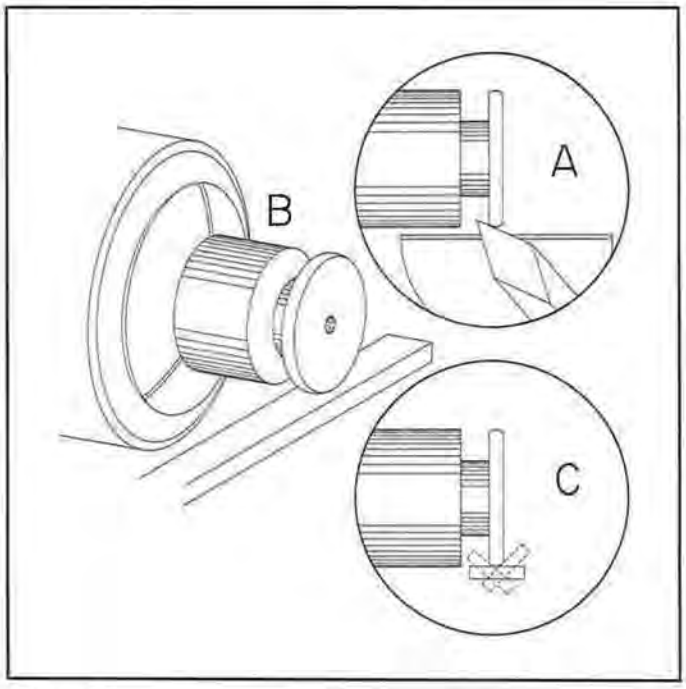


Figure 6.

two ways. One way is to swage the shape of the hole. The other way is to punch the shape of the hole with a D-shaped punch.

Figure 7 shows the swaging method of forming a D-shaped hole. First, a round hole is drilled in the table at the correct location for the roller jewel. The diameter of the drill should be equal to the diameter of the roller jewel. Next, a steel form is made up to the same diameter and shape as the roller jewel. After being made, the form is hardened and tempered to blue. The roller table is held tightly in a small vise which can be rested on the die plate of the staking tool (see Figure 7, view A). The hole to be swaged is placed absolutely upright in the vise as shown. The form is placed in the hole in the roller table so the flat side of the form is square with the front of the hole. A round-faced peening punch is used to close the front of the hole down onto the steel form as shown in Figure 7, view B. At the same time the hole is being swaged, a crescent is also being formed in the edge of the roller table.

After the jewel hole has been swaged to the proper D-shape, the form is removed from the hole. Next, the crescent is shaped and finished. The roller table can be held in the jaws of a swing tool while shaping and finishing the crescent. After the crescent has been finished, the roller table is then ground flat on both sides by rubbing it on a ground glass which has oilstone paste on its surface. Then, the roller table is hardened and tempered to a purplish-blue color. After the roller table has been hardened and tempered, the crescent is polished. Next, the roller table is held on a small arbor in the lathe while its edge is polished. Then, the two sides of the table are given a flat polish on a tin lap with diamantine.

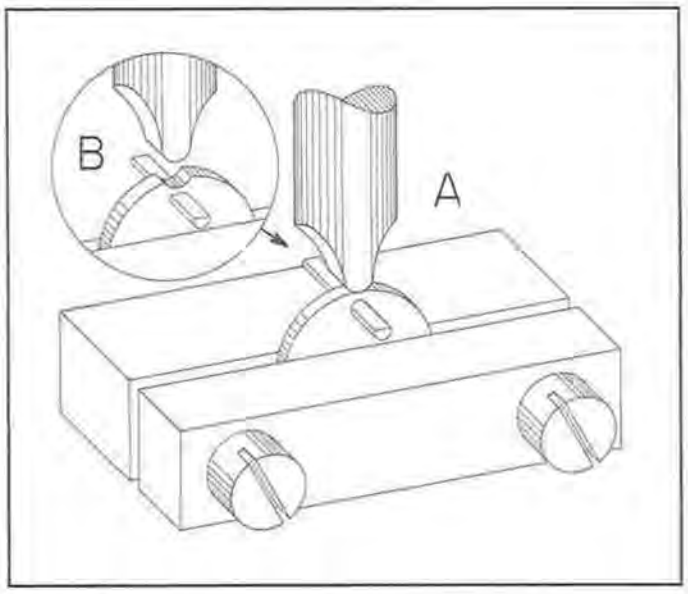


Figure 7.

Making a One-Piece Double Roller

Figure 8, view B shows how a one-piece double roller is formed on the end of a rod. This illustration also shows how the special adjustable rest is used to level the grinding and polishing tools for obtaining a square flat finish on the safety roller. The leveling screw in the rest is adjusted until the grinding and polishing tools are level on the safety roller. The safety roller should be finished before the crescent is made.

Making the Crescent in the Safety Roller

Figure 9 shows the crescent being made in the safety roller. The crescent should be made before the roller table is removed from the rod. The small milling cutter used for making the crescent is held in the spindle of the milling attachment. The milling attachment is mounted on top of the slide rest. The spindle of the milling attachment is set so the milling cutter head is parallel to and in line with the lathe bed. The cutter must also be set on center with the lathe center.

To mill the crescent, the cutter is gradually lowered into the safety roller. Care must be used when milling the crescent to avoid making the crescent too wide. If the crescent is made too wide, the guard pin will enter the crescent too soon, taking away the safety action of the guard pin. After the crescent has been milled, it can be ground and polished by using small tools in the milling attachment spindle the same way as using the milling cutter.

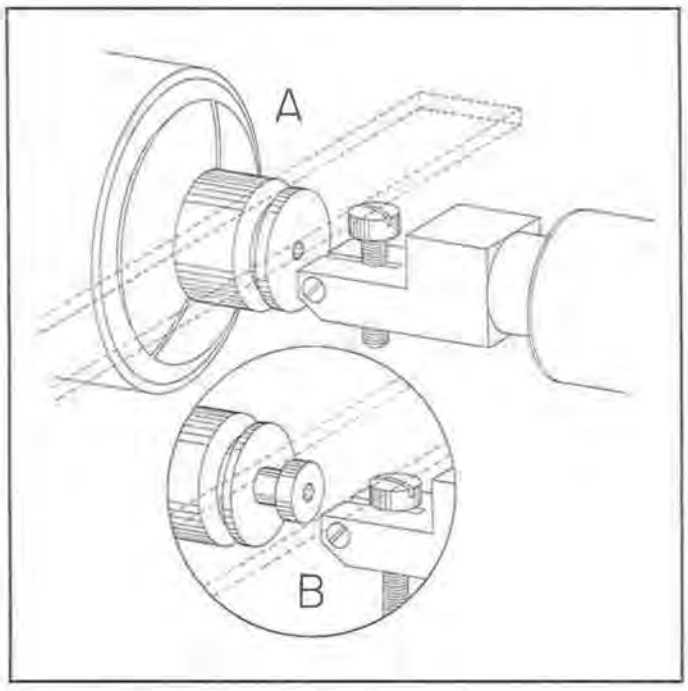


Figure 8.

Punching the Hole for the Roller Jewel

Figure 10 shows how the hole is punched for the roller jewel. The punch shown is for a D-shaped hole; however, a punch can be made up for a triangle hole, oval hole, square hole, or a D-shaped hole with a curved front. The punch can be a sub punch that fits into a staking tool punch. The working end of the punch should be turned down with a slight back taper. The diameter of the end of the punch should equal the major diameter of the roller jewel. A conical shoulder design on the punch increases the strength of the punch over a square shoulder design.

After the diameter of the punch has been made, the punch is hardened and tempered to a pale straw color. Then, the punch is shaped by grinding it on a fine India wheel. The punch can be chucked in a chuck-holding device and held on top of a saw table while grinding the flat surfaces on the punch. A square chuck-holding device is used for a D-shaped or square punch. A hexagon-shaped chuck-holding device is used for grinding a triangle-shaped punch.

To punch the hole for the roller jewel, first, a hole is drilled in the impulse roller that has a diameter equal to the minor diameter of the roller jewel. This hole must be drilled at the proper location for the jewel and on a center line running through the center of the crescent in the safety roller. The roller table is supported on the die plate of the staking tool as shown. The hole selected in the die plate is centered with the punch. This hole should be just large enough to adequately clear the end of the punch so there would be no danger of the punch touching the die plate. The punch face must be lined up with the edge of the roller table and centered with the roller jewel hole. The punch is tapped with a small brass hammer to punch the hole. After the hole has been punched, the burr is removed from around the hole. Next, the roller table is hardened, tempered, and finished. Note: Roller tables can also be made of brass. In this case, the table would not need to be hardened and tempered.

"Antique Watch Restoration" will continue next month.

❐

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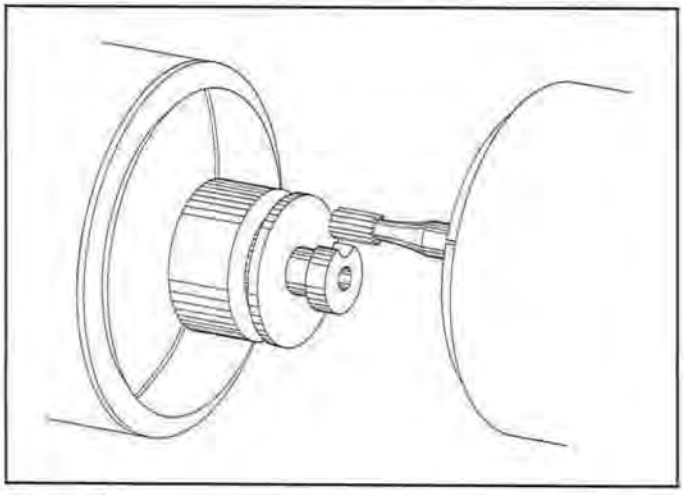


Figure 9.

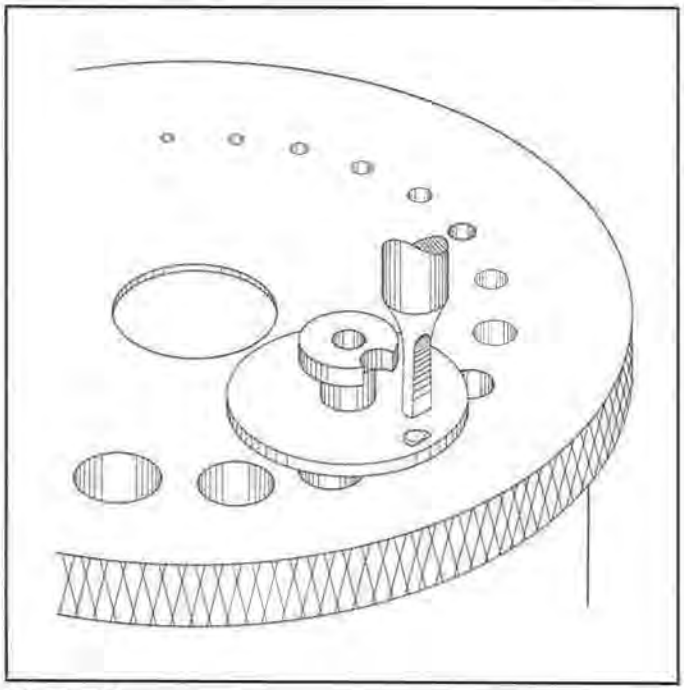


Figure 10.

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Bring customers into your shop during this special promotion at a time when the important gift-giving season is approaching. Your customer will have an opportunity to observe the professionalism of your staff and well-equipped service department.

Inspect the watch for wear, leakage, appearance, and band safety. If the watch or case is too worn and not repairable, you might suggest the purchase of a new timepiece.

While your service staff is completing the inspection, your customer will have time to browse and look at the merchandise you have on display in anticipation of the gift-giving season.

Select merchandise that will be saleable but not frequently found in competing stores. This will set you apart.

Your staff will have an opportunity to talk to the customers about your service and merchandise and why they should come to you for professional advice.

To take advantage of this promotion, contact AWI Central for your FREE Watch Inspection Promotion Kit!

The Kit includes:

- ✓ **A placard for your window or shop counter**
- ✓ **Two radio scripts promoting a free watch inspection (30 seconds each)**
- ✓ **Small newspaper ads**
- ✓ **A proof to print direct mail announcements**

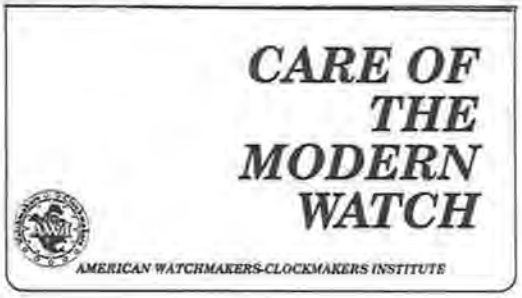
A Perfect Addition for Watch Inspection Time

The perfect addition to your Watch Inspection Time public relations material is the "Care of the Modern Watch" brochure. These brochures are a terrific handout for the customers you see during Watch Inspection Time, April 3-9, 1995.

Brochures are only $5.00 per 100, postage paid (100 minimum). Space is provided for you to stamp your name and address on each brochure.

Go one step further and get your name, address, and phone number preprinted on the back of each brochure for a small additional charge. Call AWI Central for a price quote. All orders must be prepaid.

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A Fusee Lever Watch by Ja's Ritchie and Son, Edinburgh, Scotland



By Robert D. Porter, CMW
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Figure 1.



Figure 2.

Figures 1 and 2 picture an interesting watch by Ja's Ritchie and Son from Edinburgh, Scotland. The case has been swung open in Figure 3. The two holes in the back dome that allow winding and setting the movement from the back with a key can be seen. According to Donald De Carle's *Watch & Clock Encyclopedia*, the 18K case in Figure 4 carries a hallmark for the years 1874-5. This watch came in with the complaint that it could not be wound and would not run.

The tapered hinge pin holding the movement in the case is being pushed out in Figure 5. Watch tissue is used to protect the engraved metal dial as the

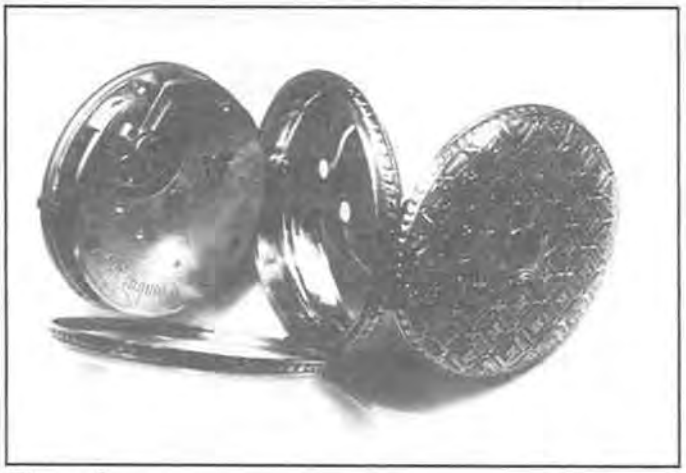


Figure 3.



Figure 4.



Figure 5.



Figure 6.

hands are pulled in Figure 6. The movement was then lifted from the case. The screws holding the hairspring stud and balance bridge in place are being removed in Figures 7 and 8. Figures 9 and 10 are views of the English style ratchet toothed escape wheel and lever in this fine watch. As a point of interest, the impulse is on the pallets only and is not divided between the escape wheel and pallets as is found in more modern watches.

A screwdriver is being used in Figure 11 to lever out one of the tapered pins holding the dial in place. Figure 12 is a view of the hour and minute wheels and other components under the dial. The small ratchet wheel is attached to the mainspring barrel arbor and is used to take up slack in the fusee chain and to preload the mainspring slightly. It does not rotate when the watch is wound. The hour, minute, and ratchet wheels have been removed in

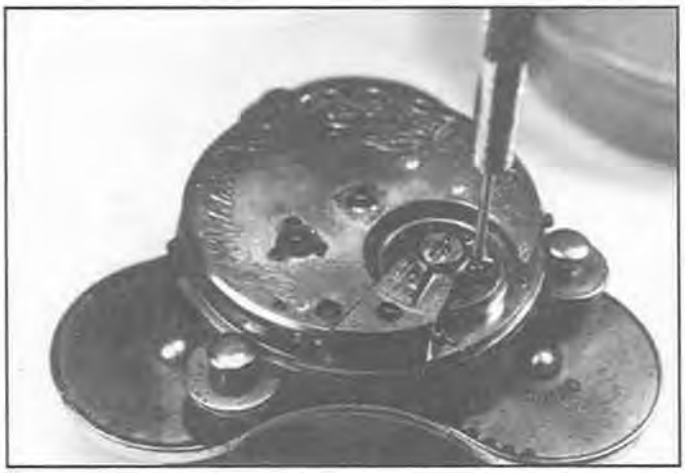


Figure 7.

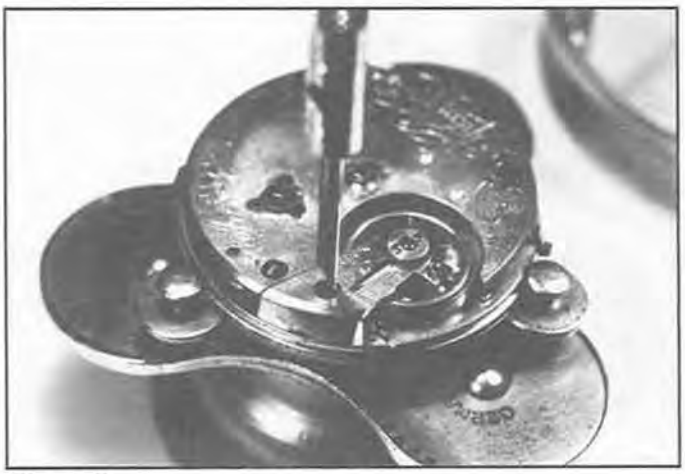


Figure 8.



Figure 9.



Figure 10.

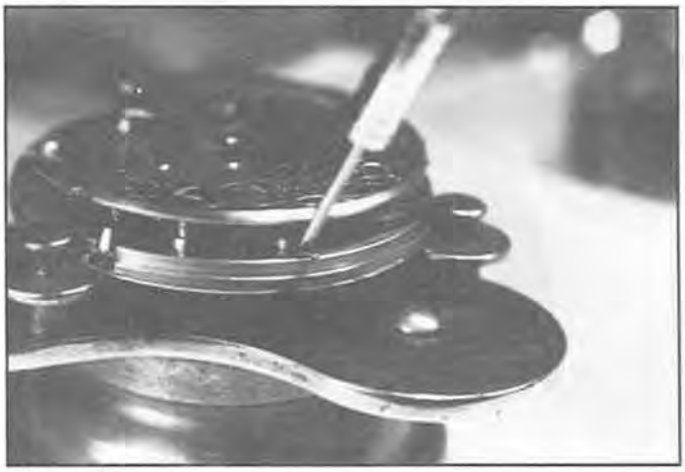


Figure 11.

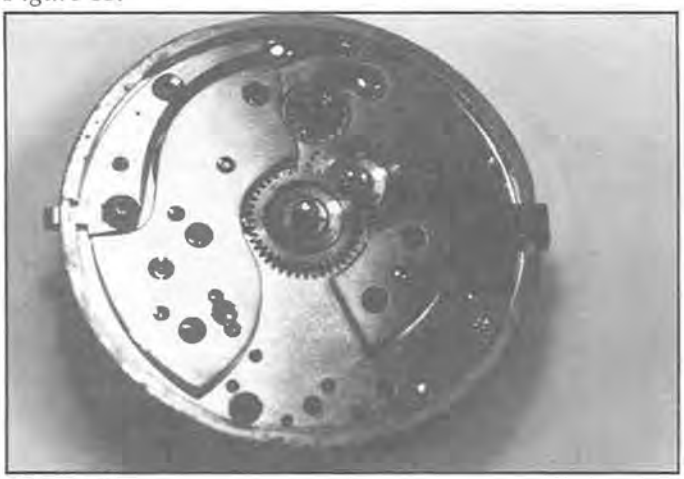


Figure 12.

Figure 13, and a small punch is being used to push the tapered pin that provides friction between the center wheel and cannon pinion, out of the cannon pinion. The movement has been turned over in Figure 14 and the tapered pin is being removed from the hollow center wheel. The square part of the pin being held with tweezers is the setting square used to set the watch with a key. The remaining screws holding the top plate in place were removed. Figure 15 is a view of the underside of the top plate where the fusee iron, which prevents the watch from being overwound, and its spring are shown on the left side of the movement. The spring-loaded fusee iron rides up with the chain as the fusee is wound, and intercepts the steel stop piece on top of the fusee, clearly shown in Figure 16. Please notice the fusee chain hanging loose inside the movement, the result of ratchet failure inside the conical fusee assembly.

The mainspring barrel and its cover, as well as the fusee and chain, are shown in Figure 17. It was necessary to drill out (Figure 18) the brass pin holding the fusee collet in place. An old brass poising



Figure 13.



Figure 14.

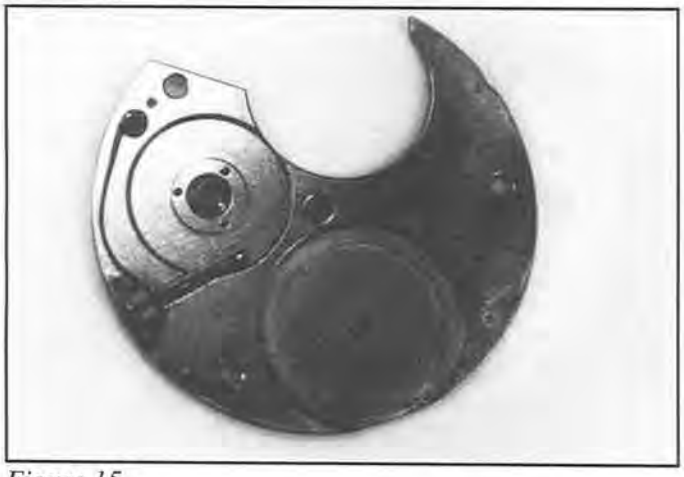


Figure 15.



Figure 16.



Figure 17.



Figure 18.

tool with the steel jaws removed was used as a vise during this operation. Once the collet pin was removed, the fusee components could be disassembled, as shown in Figure 19. The ratchet wheel inside the fusee cone is shown on the right. One of the ratchet clicks in the large wheel in the center of the picture was found to be stuck out of the active position, and the beak of the other click was worn. This obviously was the cause of the winding problem. The large wheel on the far left of Figure 19 contains the maintaining power spring, and is the gear on the bottom of the fusee that meshes with the center wheel pinion. The maintaining spring provides power to the movement while the watch is being wound. The ratchet click was removed from the wheel and is being reworked in Figure 20. Both clicks have been repaired and are back in place in Figure 21. The fusee components were cleaned and lubricated. A new brass pin was made and the fusee reassembled.

The watch was cleaned ultrasonically and is being reassembled in Figure 22. Figure 23 shows the repaired fusee, and shows that the mainspring has

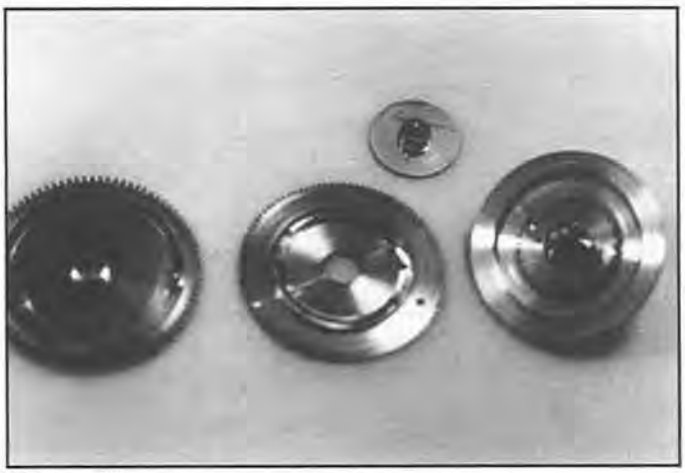


Figure 19.



Figure 20.



Figure 21.

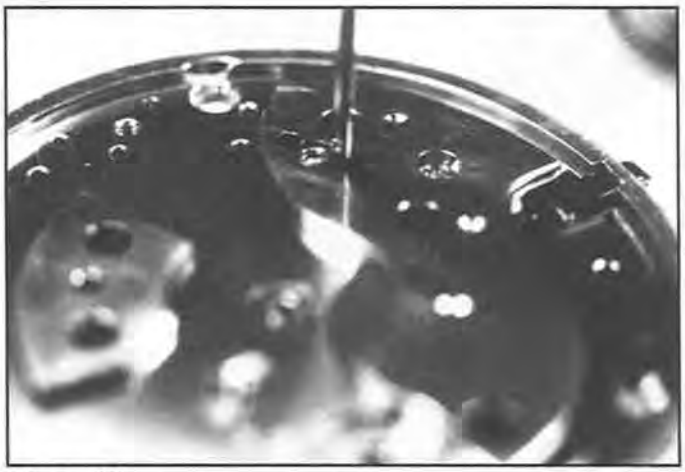


Figure 22.



Figure 23.



Figure 24.

been lubricated and wound into the barrel. In Figure 24, the fusee chain has been cleaned and is being lubricated by drawing the chain through clock oil applied to watch tissue. Figure 25 shows the fusee chain being wound onto the mainspring barrel by turning the barrel with a screwdriver in the cover slot while holding a thumb against the chain to keep it in place on the barrel until it is fully wound. A piece of Rodico™ is used to hold the chain in place on the barrel in Figure 26. Figures 27 and 28 show how the end of the fusee chain hooks onto a pin in the lowest groove of the fusee. The fusee ratchet and its pawl are also shown.

Figure 29 is another view of the fusee iron and its spring on the underside of the top plate, being installed in Figure 30. The next step is to put the ratchet on the square of the mainspring barrel arbor as pictured in Figure 31. The ratchet is rotated with tweezers until the slack is out of the fusee chain, plus about a half turn past that to set up the preload on the mainspring. The ratchet is then locked in place by tightening the click screw as shown.



Figure 25.



Figure 26.



Figure 27.



Figure 28.



Figure 29.



Figure 30.

Another problem then presented itself. The watch owner told me that the watch did not keep very good time when it did run. Figure 32 shows the gold balance wheel and its hairspring. Figure 33 is a view of the underside of the balance wheel. The reason the watch did not keep time became obvious. Some soft soldering son of a gun had lavishly applied lead to the underside of the balance wheel! The hairspring had, perhaps, broken off, and the lead was an attempt to bring the balance to time. Restoring the watch would require the removal of the lead and vibrating a new hairspring. The old hairspring was removed, and the balance wheel chucked in a wheel chuck in Figure 34. Removing the lead from the underside of the balance wheel with a carbide graver with the lathe turning slowly was high adventure, and might be compared to crossing the Amazon river by stepping on the backs of snapping crocodiles. One slip in either case could be disastrous! Fortunately, the operation was a success. The balance was poised (Figure 35) by carefully stoning the underside of the wheel until it was in poise.

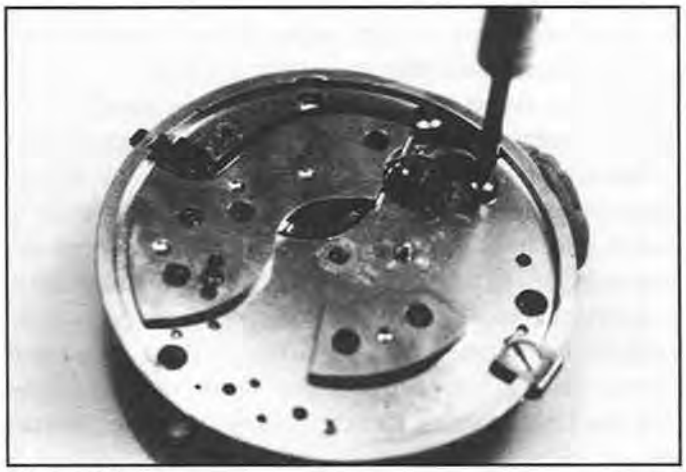


Figure 31.

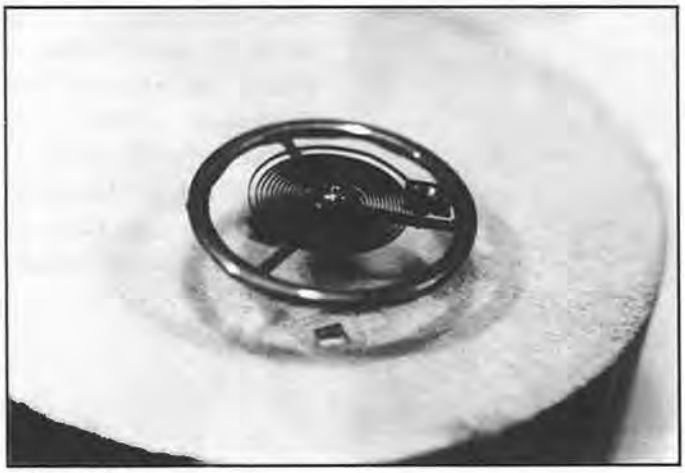


Figure 32.

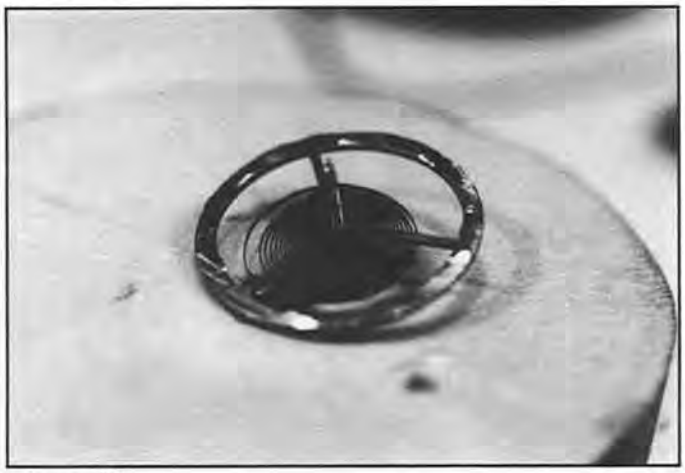


Figure 33.

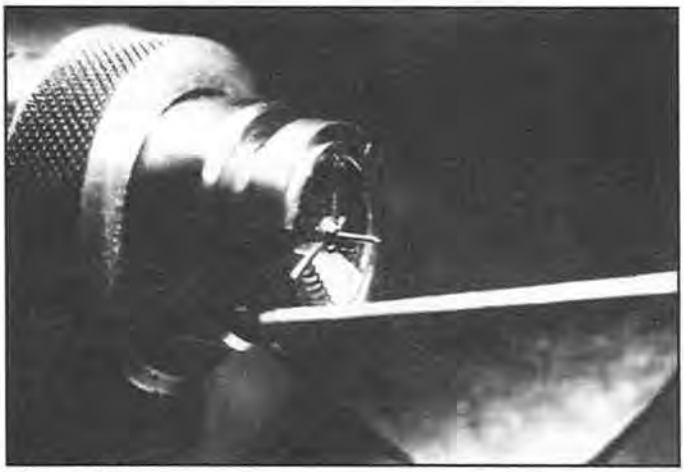


Figure 34.



Figure 35.



Figure 36.

The old hairspring was measured and found to be 0.0020" (0.05mm) thick. Although I have a good assortment of hairsprings, none were found that were close to the size needed. I looked into having a spring vibrated, but then decided to see if I could buy or swap for some springs locally. Luckily, watchmaking friend Kenneth Neff came to the rescue with an assortment to try. The package containing the antimagnetic, spiral, flat hairspring with collet shown in Figure 36 proved to be the right size for this watch. The spring was laid on top of the balance bridge as pictured in Figure 37 to see which coil would pass through the regulating pins as a starting point. The hairspring collet was held in the tailstock chuck of my lathe as shown in Figure 38, and drilled slightly smaller than the hairspring shoulder on the balance staff

The train of the watch was counted to determine the vibrations per hour (VPH) the balance wheel must make to keep time:

$$\frac{C64 \times 3RD\ 60 \times 4TH\ 63 \times E\ 15 \times 2}{3P\ 8 \times 4P\ 8 \times EP\ 7} = \frac{7{,}257{,}600}{448} = 16{,}200\ VPH$$

Where,

	Wheel	Pinion
Center	64	not considered
Third	60	8
Fourth	63	8
Escape	15	7



Figure 37.



Figure 38.

Number of impulses to balance wheel per tooth of escape wheel = 2

Dividing 16,200 VPH by 60 gives us 270 vibrations per minute.

Since we will only count each alternate vibration, at the instant the balance arm stops to begin moving in the opposite direction, we divide 270 by 2 to get 135 half vibrations per minute.

The new hairspring has been pressed onto the balance wheel in Figure 39. The extra coils of the hairspring were then cut off and the spring pinned to the stud, also making sure the balance was in beat by lining up the roller jewel with the pallet arbor. The watch was wound to start it going. Figure 40 shows a stopwatch being used to determine the time it takes to count 135 (half) vibrations. A stopwatch is used so I can totally concentrate on counting the vibrations. If it takes longer than a minute to count 135 vibrations, we know the spring is pinned too long, and vice versa. The movement is on its side on the bench and is adjusted so that a flash of light from the bench lamp will reflect off the balance arm at the instant it stops to begin its return vibration. The spring usually must be unpinned, adjusted, put back in beat, repinned, and retried several times before we achieve 135 vibrations in exactly one minute. Once we have the count down pat, we can complete the trimming and truing of the hairspring in the round and flat. The concentration required to vibrate hairsprings probably matches that of a master's chess game. Remember, if someone else did it, you can too!



Figure 39.

The newly restored and running watch is pictured in Figure 41. Figure 42 shows the ornately engraved dial. The movement is back in its cleaned and polished case in Figure 43. Mr. Ritchie and his son would be proud to know their fine watch is running again. ❐



Figure 40.



Figure 41.

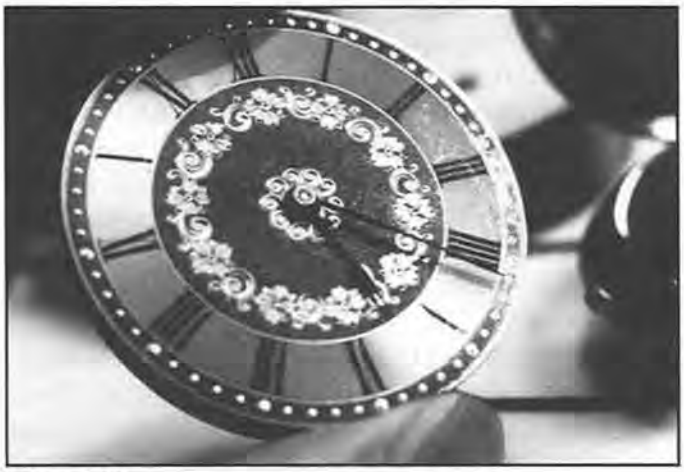


Figure 42.



Figure 43.

Recommended reading:

Watch & Clock Encyclopedia, by Donald De Carle, F.B.H.I. (N.A.G. Press, Ltd.). Contains much useful information about hairsprings and many other subjects.

Modern Methods In Horology, by Grant Hood, (Bradley Polytechnic Institute). Contains much useful information for the watch restorer. Published in the 1920s. Probably available from the AWI Library.

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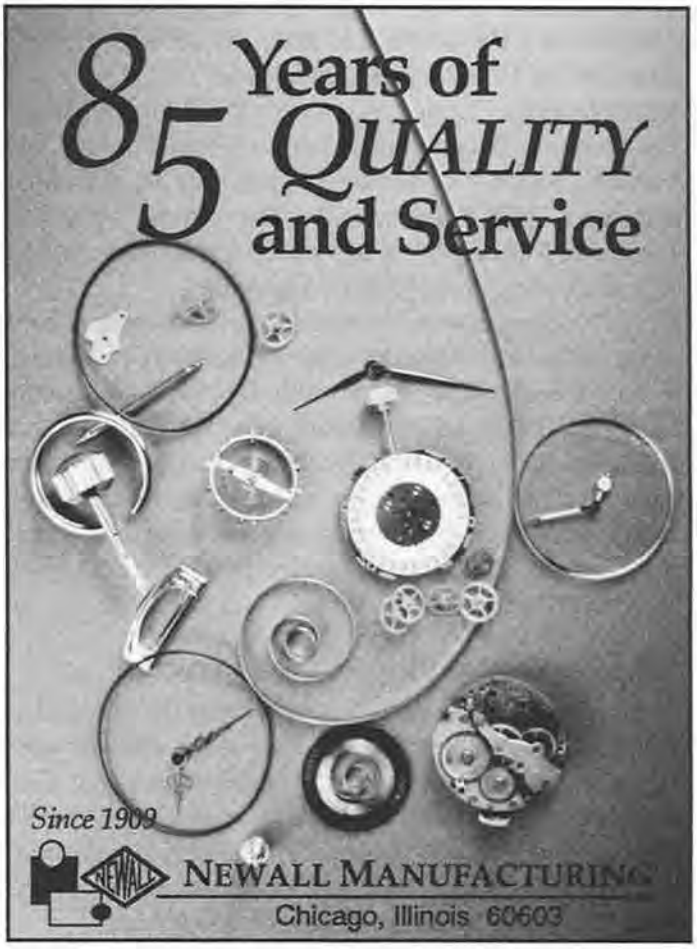
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Bulletin Board

A. NEW REQUESTS

AMERICAN CLOCK MANUFACTURER: KILBURG GEOCHRON

Joan Stemp, secretary at the British Horological Federation in London, has written on behalf of a client. This client is anxious to get in touch with a World Clock Manufacturer of America. The name they are trying to trace is KILBURG GEOCHRON.

AWI has no references for this firm; if anyone can supply information, we will forward it to Ms. Stemp.

B. RESPONSES

GERMAN WOLF-JAHN WW-TYPE LATHE

Richard Zimmerman, Tonawanda, NY, has sent a manual containing the information on this lathe for Eddie Robertshaw, Dunedin, New Zealand.

GRANDPA TIME, HOMESTAR INTERNATIONAL CLOCK MADE IN CHINA

We have just received information on this clock from a member who has one just like it. He advises Ray Baker, Hernando, FL, that his clock does not have a capacitor designated as C48; therefore, it is assumed that the circuit board was used for other clock models that did require a capacitor.

GREINER CHRONOGRAPHIC "SUPER" TIMING MACHINE OPERATORS MANUAL

Bill Schroeder, Chicago, IL, sent a copy of his manual for the Greiner Chronographic timer. While this isn't the Greiner "Super," we are forwarding it to John Warren, Baltimore, MD, in the hope that the information in this manual will be helpful. If anyone can supply it, we would still like a copy of the "Super" manual.

Schroeder reports that paper for this machine is hard to get, so he has been using adding machine rolls of paper that have been cut to 36mm width. He cuts the rolls on a band saw. Bill reports that Greiner also made a timer that looks similar to the chronographic, but instead of an ink roller, the time tracing is literally burned into the paper with a spark device of some kind. He has not tried it, but has been told that adding machine paper does not work well on this particular machine.

BOLEY F1 HIGH-PRECISION LATHE

A member was seeking information about the availability and price of the Boley F1 High-Precision Lathe. We contacted Citizen Machinery Europe GmbH in Esslingen, Germany. They manufactured this lathe at one time, but advise that they no longer manufacture it. They suggest contacting Pratecma, D73630 Remshalden, Germany. Fax: 7151 74910. They manufacture a similar product.

C. ITEMS STILL NEEDED

CHINA—WILSON SPORTS QUARTZ WATCH

Jim Stanley, Fort Wayne, IN writes:

We have a LCD watch with no manufacturer ID other than China and Wilson Sports. It may have been a Wilson Sports Equipment promotional item, but we really don't know that. If anyone knows the source of manufacturing, or parts, we would appreciate knowing.

SEIKO QT99 INSTRUCTIONAL MANUAL

Irv Bard, Milwaukee, WI is seeking an instruction manual for the Seiko QT99.

SWARTCHILD & COMPANY "UNIVERSAL" BALANCE STAFF ASSORTMENT CHART

Clark Donley, Richmond, VA is seeking a copy of a chart for a 1925 Swartchild & Company "Universal" balance staff assortment. The staffs are in bottles; the last bottle number is #891.

SUNDIALS

Jay Asbrock, Orange County, CA is seeking a catalog or source for sundials. He wants to donate one to a local school; the size should be about 14" in diameter. We have seen these at various times in catalogs, but now that we want to make a referral, we can't.

SEIKO'S QT-10 TIMER USER'S MANUAL

Nicholas Derczo, Chandler, AZ is seeking a copy of the user's manual for Seiko's QT-10 Timer. When Seiko was contacted, they replied that the QT-10 is very old, and the manual is no longer available.

SCHEMATIC FOR L & R MODEL 320 ULTRASONIC TANK

Ken Setser, Potsdam, OH needs a copy of the schematic for the L & R model 320 Ultrasonic Tank.

SCHEMATIC FOR SONIX ULTRASONIC CLEANER

Charles Goad, Independence, KS seeks a schematic for a Sonix 4 Ultrasonic cleaner model SS101.

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Museum Donations and Wish List

We are pleased to report the donation of an E. Howard Tower Clock for the soon-to-be-expanded Orville R. Hagans Museum. As we reported last month, several nice donations already have been received for the Trust's expanded facility.

The E. Howard Tower Clock is a gift of John P. (Jack) Kenyon of Columbus, Ohio. The clock, shown here, has been completely restored by Kenyon to its original condition. It probably was produced before 1900. It was designed to run with one dial; however, it could be modified to run with four dials. The clock we have has one dial with it.





All gifts to the museum are tax deductible. In addition to the donations, the trustees seek the loan of collections or specific items for a specified period of time.

Last month we published items from two categories of the trustee's "wish list," namely: items for the "History of Time Display," and "Specialty Items." The tower clock fits into the latter category. This month we are publishing just one category because of the length of the list.

The American Horology Display

Since we are the American Watchmakers Institute, a large part of our display should deal with America's role in horology. An important part of this display will deal with American-made watches. Here are some of the American watches we would like to display.

Abbott Watch Co. 1908-1912
Adams & Perry Watch Co. 1874-1877, Lancaster, PA
American Watch Co. 1859-1885, Waltham, MA
American Waltham Watch Co. 1885-1960, Waltham, MA
Ansonia Watch Co. 1873-1930, Brooklyn, NY
Auburndale Watch Co. 1879-1883, Auburndale, MA
Ball Watch Co. 1879-1969, Cleveland, OH
Bowman Watch Co. 1877-1882, Lancaster, PA
Cheshire Watch Co. 1883-1893, Cheshire, CT
Chicago Watch Co. 1898, Chicago, IL
Cornell Watch Co. 1870-1876, Chicago & San Francisco
Dudley Watch Co. 1920-1925, Lancaster, PA
E. Howard & Co. 1857-1903, Boston, MA
Illinois Watch Co. 1869-1927, Springfield, IL
E. Ingraham Co. 1912-1968, Bristol, CT
Keystone Std. Watch Co. 1886-1890, Lancaster, PA
Manhattan Watch Co. 1883-1891, New York, NY
Manistee Watch Co. 1908-1912, Manistee, MI
Marion Watch Co. 1873-1875, Marion, NJ
Melrose Watch Co. 1866-1868, Melrose, MA
Mozart Watch Co. 1864-1870, Providence, RI & Ann Arbor, MI
Nashua Watch Co. 1859-1862, Nashua, NH
Newark Watch Co. 1863-1870, Newark, NJ
New England Watch Co. 1898-1914, Waterbury, CT
New Haven Watch Co. 1853-1956, New Haven, CT
New York Watch Co. 1866-1876, Springfield, MA
Philadelphia Watch Co. 1874-1886, Philadelphia, PA
United States Watch Co. 1864-1872, Marion, NJ
Waterbury Watch Co. 1879-1898, Waterbury, CT
Westclox 1899-present, Athens, GA (Gen. Time Corp.)

❐

SOVIET SUBMARINE CLOCK



A COLD WAR TESTAMENT

This clock was standard issue on soviet nuclear attack subs. The twelve jewel movement & six pound weight are proof of the Russian mania for rugged top quality. The clock is gasket sealed & housed in a waterproof aluminum alloy case with fine chrome trim. Good looking large dial displays a double fluke anchor, silhouette of a sub conning tower, large red star, & Cyrillic script. The spring wind mechanism & ingenious hatch cover utilize the same key. Here is living proof that times have changed. A bona fide showpiece. Case diameter: 8", dial: 6", eight day twelve-jewel movement. New, Russian manufactured never commissioned Soviet sub clock in top working condition comes with: easy wall mounting plate, certificate, warranty. Be advised-this is a real find. We don't have many to sell. Order #SUB, $80.00 add $7.50 shipping. Order 3 for $62.00 each ($186.00) and $10.00 shipping.

Order by mail from: **DutchGuard, Dept HT, PO Box 411687, Kansas City, MO 64141** ***MC/Visa Order Toll Free 800-821-5157***

News of the Trade

TOLEDO JEWELERS TO GIVE AWAY A 1957 CHEVY

As part of a year-long promotion, Toledo Jewelers is offering their customers, and those who visit any of the trade shows attended by Toledo Jewelers, a chance to win a 1957 Chevy. Every existing customer of Toledo Jewelers will automatically get one ticket to the drawing to be held in January 1996. Non-customers may qualify for the drawing by opening an account with Toledo Jewelers.

Toledo Jewelers is a wholesale supplier of loose diamonds, diamond jewelry, tools, batteries, watch parts and other jewelry merchandise. They are at 245 23rd Street, Toledo, Ohio 43620; (419) 241-4181.

The drawing for the car, which will be certified by Toledo Jewelers' CPA firm, will be held at a gala reception sometime during January of 1996. The winner need not be present at the reception to claim the prize. Gail Sterling, vice president of Toledo Jewelers, said, "We wanted to do something to reward our customers for their continued loyalty and patronage, and to attract new customers. Because so many of our customers are part of the baby boom generation, we thought the '57 Chevy would have a lot of appeal to a broad spectrum of the retail jewelers we service."

The dark blue and white 1957 Chevy will be on display at the Michigan Jewelry Show in Dearborn, Michigan and the Mid-America Jewelry Show in Columbus, Ohio. A ticket for the drawing can be obtained by visiting the Toledo Jewelers booth at either of these shows, or at booth #1555 at the Las Vegas show.

AMERICAN CLOCK & WATCH MUSEUM SUPPORTED BY AWA

Recently, members of the American Watch Association concluded their annual sports outing by participating in a reception at the American Clock & Watch Museum, Bristol, Connecticut. One of the highlights of the event was the opening of a time capsule by Simon Critchell, newly elected president.

The time capsule of clocks and watches was sealed in 1938 by Edward Ingraham. Mr. Ingraham was president of one of America's largest clock producers, and founder and benefactor of the American Clock and Watch Museum. The capsule concept was created with the thought that one day there would be a museum devoted to clocks and watches for the benefit of the industry. Bertram Kalisher, Executive Chairman of the Industry Committee for the museum and Roland Puton, president of Rolex Watch Co. assisted in the ceremony. AWA appealed to their members to support the museum.

The American Clock & Watch Museum is approximately a two-hour drive from New York City and Boston, thirty to forty minutes from Hartford and New Haven, Connecticut. It is open seven days a week, and is located at 100 Maple Street, Bristol, CT 06010; (203) 583-6070.

BASEL 95 DEVELOPS A NEW SHOW CONCEPT

The Basel 95 show has assumed the new name "World Watch, Clock and Jewelry Show" to replace its former name "European Watch, Clock and Jewelry Fair." This was done because the show has attracted over 2,000 exhibitors from twenty-five countries around the world, as well as trade buyers and visitors, two-thirds of them being from abroad. Basel 95 will be held April 26 to May 3, 1995. The newly created Basel show logo is shown here.



LOCTITE CORPORATION HAS NEW ADDRESS

The Loctite Corporation North American Group's new address is: 1001 Trout Brook Crossing, Rocky Hill, CT 06067-3910, exit 23 off I-91. Phone: (203) 571-5100; Fax: (203) 571-5465.

GIA REPORTS: FILLING IN DIAMONDS NOT PERMANENT, CAN BE IDENTIFIED

Fracture-filled diamonds have durability problems, but almost all filled diamonds can be identified with standard gemological instruments, according to new findings by a Gemological Institute of America (GIA) research team.

"Basically, any improvement in the appearance of a fracture-filled stone should be considered temporary," said Robert C. Kammerling, team leader and director of identification and research for the CIA Gem Trade Laboratory. "We examined the latest fracture-filled diamonds from the three top producers. All of the treatments improved the apparent clarity of most samples, but some filled dia-

News of the Trade

monds were damaged by direct heating and repolishing facets. Standard cleaning procedures—and even conditions duplicating sunlight exposure—also damaged some stones."

Calming fears in the jewelry industry, the researchers also concluded that identifying flash effects were observable in all of the stones examined. Yet, the seven-member team cautioned against relying on just one diagnostic feature for positive identification, and instead proposed a suite of tests which are detailed in "An Update on Filled Diamonds: Identification and Durability," in the Fall 1994 issue of *Gems & Gemology*, GIA's quarterly journal.

Because of the topic's importance and complexity, more than half of the issue—and sixty-four full-color photographs—are devoted to this article, the most comprehensive published to date on this controversial treatment.

Although advanced instrumentation techniques (such as X-radiography and EDXRF spectrometry) may be helpful, the researchers found that examination with a gemological microscope in conjunction with different lighting techniques is sufficient to detect the treatment. They warn that a 10x jeweler's loupe will not be adequate to spot filled fractures in all cases.

Treated diamonds examined for the article were obtained—directly and through third parties—from Yehuda/ Diascience; Koss & Shechter; and Clarity Enhanced Diamond House, a Goldman Oved Diamond Company subsidiary.

To subscribe to *Gems & Gemology*—or for a copy of the fall issue—contact the subscriptions department toll-free in the US at (800) 421-7250 ext. 201. Outside the US, call (310) 829-2991 ext. 201. Fax (310) 453-4478. Or write *Gems & Gemology* Subscriptions, Dept. PR46K, P.O. Box 2110, Santa Monica, CA 90407-2110.

AWI members who are interested in knowing more about fracture-filled diamonds may borrow from the AWI Video Library a videotape on the subject. Contact AWI Video Library, AWI Central.

❐

HAVING TECHNICAL PROBLEMS?

CALL THE AWI HOTLINE (513) 661-4636

A Report on AWI's Building Project

By Charles Cleves, Building Committee Chairman

In spite of executive director Milt Stevens' inexperience as a driver of heavy equipment, the building is progressing at a good pace. By December 1, the footings and foundation were poured. In fact, you can see the entire outline of the museum in the center, and the various sections of the building as they are outlined by the concrete footers. By the end of December, the whole slab will be poured. At this time, they are installing the plumbing and conduit underground in preparation of the slab.

Due to the addition of the Foucault pendulum, there was a delay in designing the steel support system for the walls and roof of the museum. This delayed ordering the steel. The steel is scheduled to arrive in mid-January.

The clock tower is presently under construction. The pit has already been dug and lined with concrete. Because there is no steel in the construction of the tower clock, the work will proceed ahead of the main building.

A new sign incorporating our new logo has been designed and will be ordered. The building committee approved a lighting system that will allow us to light and highlight displays in the museum. The design was drawn up by our consultant, Diane Caldwell of Caldwell Design Concepts. At the present time, we are moving along within the financial constraints of our budget.

❐



Association News

ARIZONA

The *Arizona Watchmakers, Clockmakers & Jewelers Guild Newsletter* reported on the events of the Guild's Educational Conference that was held in September.

AWI instructor John Nagle presented his "Striking Clocks" program, and Alice Carpenter (AWI instructor) presented a workshop on "Basic Pocket Watch Repair." At the banquet, Alice Carpenter spoke on "What Watchmaking is Coming To." During the talk, Mrs. Carpenter reviewed the history of the watchmaking profession. She challenged those attending to "Give something back to the profession," either by taking an apprentice or by teaching courses.

The AWC&JG held election of officers for the coming year on the same day we held national elections, November 8. We all know the results of the national election; we'll have to wait for the next newsletter to know the results of the Arizona Guild's election.

CALIFORNIA

The San Diego Horological Society had Scott Chou, director of service and production planning of the Seiko Watch Corporation, present a workshop for fifteen of their members in October. The one-day workshop dealt with new model calibre 8M35AQ. Both Scott Chou and Tom Vetlesen, Seiko representative in the area, were presented plaques to recognize the contribution they had made to the guild.



(left to right) Carl Goldberg, president; Scott Chou; Tom Vetlesen.

MINNESOTA

The Minnesota Clockmakers Guild held their First Annual Horological Symposium on November 5, 1994. The Saturday session followed John Nagle's two-day AWI Bench Course, "Striking Clocks."

The all-day symposium featured:

1. John Nagle showing slides and talking about a CLOCKMAKER'S workshop.
2. Harvey Glommen demonstrated the effects of different types of pallets on his escapement model, which is ten times normal size. Using this size model, Harvey's explanations were readily seen by the forty-six attendees who then could easily grasp the effect of different pallets.
3. Mike Mishou, CC demonstrated his experience of making a brass clock dial by means of etching and then silvering the chapter ring.
4. Milo Bresely demonstrated hard soldering and brazing. He showed examples of his work, which ranged from butt brazing a tiny clock hand together to doing the same thing with 1/4" wrought iron rod using only a jeweler's torch.

Because of the symposium, the MCG grew by thirteen members.

John Nagle presented the guild with their AWI Affiliate Chapter Charter. The guild became affiliated with AWI this past year.

NEW YORK

The Horological Society of New York was treated to a fascinating talk on retrofitting by Ralph Kalichman. Mr. Kalichman has an all-encompassing background in the watch field. He had been production manager for Wyler Watch Co., and later performed the same function for Helbros. In the meantime, he has held important positions with JIDA (formerly WMJDA) and the AWI. Most recently, he owned a company that imported quartz movements.

His presentation was extraordinary and included a listing of quartz manufacturers, interchangeability information, and invaluable hints for retrofitting. The talk was concluded with a question-and-answer period and the distribution of technical sheets and sample movements. (Contributed by Ben Matz.)

NORTH CAROLINA

The 1994 convention of the NCWA enjoyed great success. On Friday evening, S. LaRose, Inc. donated many items for the annual tool auction, and a national watch company sponsored hors d'oeuvres during the auction.

On Saturday morning, Johanna Cornell gave an excellent and innovative lecture on "Repairing Porcelain Dials." Henry Scholl demonstrated his crystal cutting machine. Lee Yelvington of Cary, North Carolina brought in several long case clocks. Information sheets were provided on how to evaluate a clock; these were used in his lecture on "Evaluating Grandfather Clocks." At the afternoon lecture, August Cornell demonstrated tips on watch band and jewelry repair. Also presented was information regarding the legal problems defining treated, filled, cultured and drilled gems.

On Sunday, a national watch company sponsored a continental breakfast for the members. Dan Fenwick of the Swiss Watch Technical Center lectured on the technical aspects of servicing Swiss watches.

All who attended the convention benefited from the fraternization with friends and members and from the sharing of ideas and information.

OHIO

Watchmakers Association of Ohio members were saddened to learn of the death of their longtime friend and supporter, William R. Werkhaven. He was the owner of William Werkhaven & Son, a material supply house that many midwest watchmakers grew to depend on. Werkhaven was active in many civic, fraternal and religious organizations. He served in the Army during W.W.II and was awarded Medal of Honor.

VIRGINIA

The Horological Association of Virginia awarded lifetime memberships to two of its very active members. Honored for their many contributions to the HAV, their local guilds and to the profession were, S.T. "Skee" Jenssen and Garland E. Reedy. These very special individuals were critiqued and honored as nominees by their respective guilds at the HAV Board of Directors meeting in August. A unanimous vote by the BOD added these gentlemen to the HAV Hall of Fame of Lifetime Members. ❐

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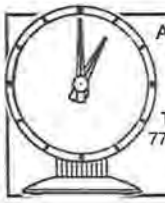
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AWI MATERIAL SEARCH NETWORK

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 directly.

1A1 A. Schild 690, 8-day, Crown Wheel.

1A2 Wittnauer/Agassiz 800, Cannon Pinion and Hour Wheel.

1A4 Wittnauer 90, 20 ligne aircraft clock, sweep second 4th wheel

1A6 Vachereon Constantin 499, Upper Auto Bridge Assembly

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

DATES SET FOR HISTORIC AWI MEETING

AWI's 35th Anniversary Annual Board Meeting will be held at the Drawbridge Estates from June 22-25, 1995. The preliminary schedule is below. Watch for more information in coming issues of the *Horological Times*. This will be the biggest and most exciting annual meeting ever! Make your plans now to be here.

Thursday, June 22	Affiliate Chapter Delegate Reception & Round Table
Friday, June 23	Affiliate Chapter Meeting Riverboat Cruise Luncheon (spouses & families) AWI Headquarters Building Dedication & Grand Opening Celebration
Saturday, June 24	35th Annual Board of Directors Meeting Shopping Trip to Florence Mall (spouses & families) 35th Anniversary Dinner & Awards Banquet
Sunday, June 25	Board of Directors Meeting Concludes

Don't let this once-in-a-lifetime opportunity pass you by.

Contact AWI Central now for a schedule of events and a no-obligation preregistration packet.

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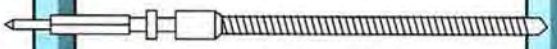
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FEBRUARY 1995

10-13	Lathe Course (Phase III)	Austin, TX
11-12	Repair of the Atmos Clock	Phoenix, AZ
12	Introduction to Quartz Watch Repair	San Francisco, CA
25-26	400-Day Clock Repair	Baltimore, MD

MARCH 1995

4-5	Advanced Quartz Watch Repair	San Francisco, CA
5	Introduction to Quartz Watch Repair	Raleigh, NC
10-13	Lathe Course (Phase III)	Denver, CO
11-12	Basic Pocket Watch Repair	Austin, TX
25-26	Hairspring Vibrating	Springfield, IL
25-26	Introduction to Clock Repair	Raleigh, NC

APRIL 1995

1-2	Basic Pocket Watch Repair	Raleigh, NC
22-23	Cuckoo Clock Repair	Raleigh, NC
22-23	400-Day Clock Repair	Savannah, GA
29-30	Repair of the Atmos Clock	Sault Ste. Marie, MI

MAY 1995

6-7	Hairspring Vibrating	Philadelphia, PA
12-14	Mechanical Watch Repair	Denver, CO

JUNE 1995

3-4	Cuckoo Clock Repair	Minneapolis, MN

* *Held in conjunction with a convention*

COURSES & INSTRUCTORS

Advanced Clock Repair
Roland Iverson, CMC

Advanced Quartz Watch Repair
Robert Bishop, CMEW

Basic Pocket Watch
Alice Carpenter, CMW, CMEW

Cuckoo Clock Repair
James Williams, CC

400-Day Clock Repair
John Nagle

Hairspring Vibrating
Joseph Cerullo, CMW, CMC

Introduction to Clock Repair
Buddy Carpenter, CMC, CMEW

Introduction to Quartz Watch Repair
Buddy Carpenter, CMC, CMEW

Mechanical Chronographs
James Lubic

Mechanical Watch Repair
James Lubic

Modern Mechanical Chronographs
Remy Waelchli

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

Servicing ETA Quartz Chronographs
James Broughton, CMEW, FAWI

Striking Clocks
John Nagle

The Watch/Clockmakers Lathe Course
Roy Hovey

- **Phase I: Basic Theory, Tools and Accessories for the Watch/Clockmakers Lathe**
- **Phase II: Making Wheels, Function Control Arbors and Lantern Pinions**
- **Phase III: Making Staffs, Jewel Settings for Watches and Marine Chronometers, Turning Between Centers, and the Jacot Tool**
- **Phase IV: Making Wheels/Pinions and Use of the Pivot Polishing Accessory**

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Project Extend classes are held in Cincinnati, OH. To register for these courses, please send with your request a registration fee of **$50.00 per instruction day** (AWI members) to: **AWI Central, 3700 Harrison Avenue, P.O. Box 11011, Cincinnati, OH 45211.** You may register by fax if you wish; if so, please include your Visa or MasterCard number, card expiration date, signature, and phone number. **FAX (513) 661-3131 -- INFORMATION (513) 661-3838**

FEBRUARY 1995

6-10	Beginning Horology	James Lubic
13-17	Machine Shop Practices	Ron DeCorte

MARCH 1995

20-Apr. 1	Lathe Course (12 days)	Roy Hovey

APRIL 1995

24-28	Watch I (American Pocket Watches)	Alice Carpenter

MAY 1995

1-5	Watch II (Staffing & Lever Escapement)	James Lubic
8-12	Clock I (Beginning Clock Repair)	Jim LaChapelle
15-19	Clock Case Repair	Jim Williams

JUNE 1995

5-9	Quartz I (Meter Reading, etc.)	Gerald Jaeger
12-16	Quartz II (Advanced Quartz)	Bob Bishop