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HOROLOGICAL TIMESTM

American Watchmakers-Clockmakers Institute

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HOROLOGICAL TIMES™



Official Publication of the American Watchmakers-Clockmakers Institute

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President's Message

In the September issue of *Horological Times* you had a chance to see the future of AWI. In June we celebrated our 35th Anniversary and at the same time dedicated our new headquarters. We had close to 350 people at our building dedication, including Henry Fried and George Daniels as honored guests. Our new 15,000-square-foot, state-of-the-art facility reflects our commitment to the future of horology in the United States. It also is a tribute to many dedicated members and the AWI staff, past and present.

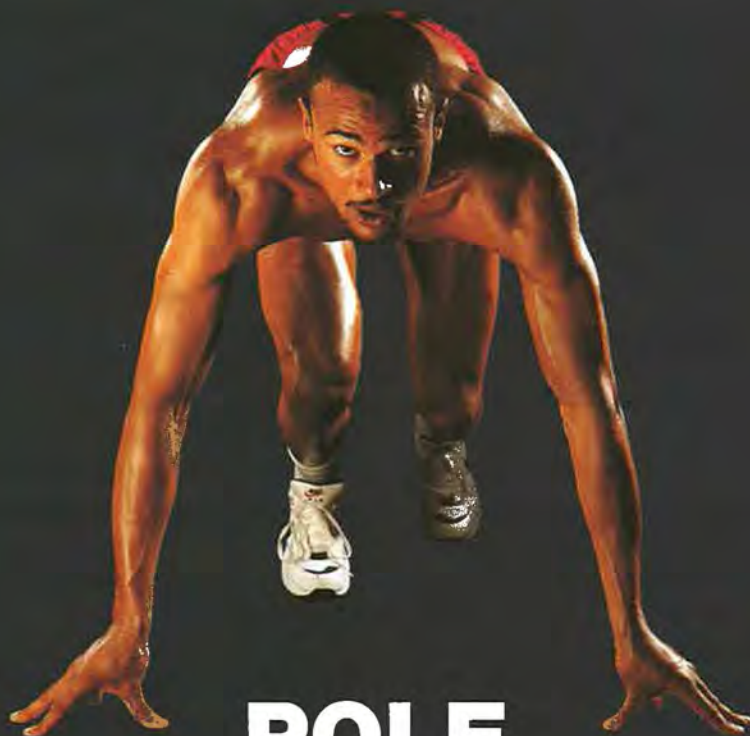
It was at this year's board meeting that our longtime Executive Secretary, Milt Stevens, announced his pending retirement from AWI. Milt will celebrate thirty years with AWI next summer. Milt has been with AWI almost from the beginning. He has served as a professional and has dedicated his heart to this fine organization. Milt is a recipient of the Fellow Award from AWI for outstanding contribution to AWI and to horology in the United States. Milt has also been the chief editor of the *Horological Times* for many years.

I have appointed a personnel committee consisting of Gerald Jaeger (chairman), James Broughton, Fred Burckhardt, Hal Herman, and myself. It is the responsibility of this committee to seek out applicants to fill the position of Executive Secretary. The committee's goal is to find a qualified administrator from our industry to continue the fine job Milt has done for so long. I hope to have this person confirmed and on board at AWI Central by next June's annual board meeting. This will allow Milt some time to work with the new executive secretary and permit a smooth transition.

Please join with me in congratulating Milt on his pending retirement. We thank you, Milt, for a job well done and an AWI career of which you can be proud.




ON THE FRONT: A Gemez Red Rock at Lake Powell, UT by Mike Butterfield of Albuquerque, NM.



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Questions & Answers



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

Q. I hope you can help me help my customer. He brought in a fusee pocket watch for cleaning and repair. I accomplished the task, but when he wanted some background information on the watch, such as age, maker, and approximate value, I was lost. Hopefully you can help me.

Enclosed are some pictures that might help you identify the watch and answer the unanswered questions.

Richard A. Decker, San Jose, California

A. I have records of a Thomas Cripps of London who operated during the 1750s. Your watch appears to be of that era.

I don't know the metallic content of your watch case, but I must assume that it is silver. If so, then it should have (by English law) a hallmark stamped on the inside back cover. These hallmarks, had you noted and included them, would have told me the exact year in which the case, at least, was made.

Due to the lack of clarity of some of the photographs, I must also assume that the watch has an outer case and is of the variety called a "pair-cased watch." The outer case should also be hallmarked.

Henry B. Fried



Figure 1. Watch in outer case.



Figure 2. Watch with crystal bezel open.

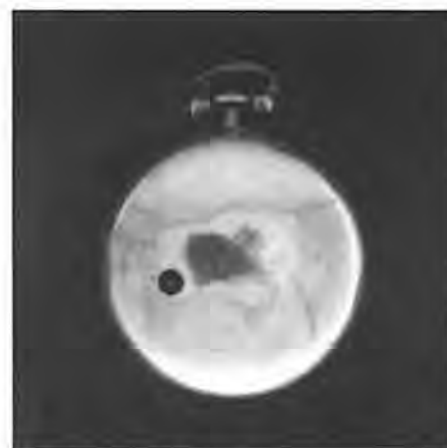


Figure 3. Back of case.



Figure 4. Outer case.



Figure 5. Outer case that holds the inside watch.



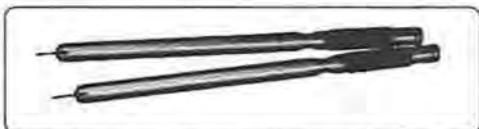
Figure 6. Movement in outer case.

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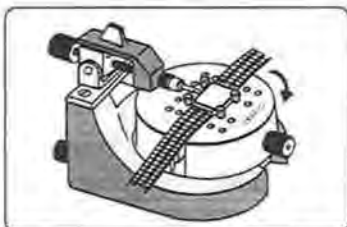
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This is the ideal instrument to oil train wheels pivots in precision watch repair. These oilers allow the correct amount of oil to be placed just where it's supposed to be. Set of 2 oilers, with tips having .004 and .005 inch hole sizes. We recommend the use Moebius synthetic oil reference OL216. Made in the USA exclusively for Borel. **OL375B \$ 16.95**

Seiko "Easy Snap" Case Opener



New design by Seiko minimizes scratched cases, scraped movements, and cut fingers. It holds the case in a vise while positioning the opening blade between the case and back. The blade is forced in with a few turns of the knob, always under control, no slipping or scratching. Instructions and a spare blade included. **COS261 \$ 96.00**

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Borel Crown Gauge

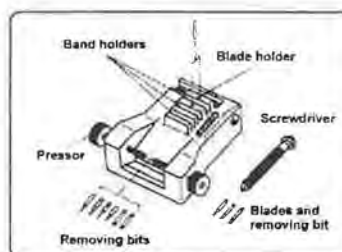


Handy gauge for measuring the thread of windings stems and crowns from .60 to 1.20mm. In addition, crown tube size, and the diameter of tubes, joints, and crowns can be measured. Various sizes of watch case lugs can also be identified. Golden anodized color with black size identification markings. Made in Switzerland. **6740 \$ 28.00**



New Witschi Cyclonic

Tests the drive train of analog quartz watches. Frees up hands that are stuck. The Cyclonic supplies a pulse to the stepping motor to check a stopped train without having to open the case. The power of the pulse can be adjusted to be much stronger than normal, restarting hands stopped by a small particle or thickened oil. The speed of the pulse can also be adjusted to be much faster than normal, cleaning or clearing the train. Swatch watches can be jump-started when otherwise they cannot be repaired. Also includes a built in battery tester. Made in Switzerland. Delivery in Dec. '95. **WIT-Cyclonic \$ 350.-**



Seiko Multiple Band Sizing Tool

Sizing of various types of bracelets, including the C-ring type which requires much more time to adjust, can be easily made with this tool. Includes instructions. US Patent #5,230,132. **S926 \$ 55.00**



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Ask Huck

Clockmaking Bits About...

Pendulum Adjustments

Problems with a Free-Standing Clock

By J.M. Huckabee, CMC, FBHI



Question: Is it possible to predict the rate change when adjusting the lower pendulum nut?

Answer: Indeed it is. This is something that is a great time saver. I've built a number of 60-beat regulators and always used a 2-56 machine screw thread on the pendulum. This thread pitch moves the pendulum ball about 0.018" per turn, which will change the pendulum rate about twenty seconds per day, or about five seconds per quarter turn.

The change is different for various other pendulum lengths. For example, a Mantle-Black clock with a 6 1/4" pendulum will change rate about two minutes per day per turn of the same thread pitch.

A pendulum table is of great utility to those who are not familiar with the calculations. In fact, it is faster than making the calculation.

The performance of a pendulum is not a linear function with length change, so it's a little cumbersome to make a mental estimate of length versus beat rate and turning rate for the adjusting nut.

Send a large, self-addressed stamped envelope to AWI and request "Huck's Pendulum Tables." This is free to the membership. These tables are dimensioned in both English and metric values. Pendulum lengths range from seconds beat (just under forty inches) down to about four inches. By knowing beat rate (from train count) you find pendulum length, or beat rate is found from known pendulum length. Each beat rate shows the length change required for a time adjustment of one minute per day.

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These tables were calculated for my own use, but were such good time savers, they were made available to our membership. Be sure to order your copy. It's a great aid to have one in your shop.

Question: What makes a large hanging wall clock called a "Regulator" keep better time than a free-standing clock: a grandfather clock for instance?

Answer: It's difficult to find agreement on the definition of the word "regulator." In general terms it is the best standard immediately available. With that thought, we may call a kitchen clock the regulator in a community of sun dials. The name is often applied to any clock of moderately good accuracy, usually a wall-mounted type of clock.

Why does the wall-mounted clock excel in accuracy over the free-standing clock? In most cases it is related to the mechanical stability of the pendulum hanger. For example, a grandfather clock free-standing on a carpeted floor has little chance of showing a stable rate.

Any form of instability in the pendulum hanger results in alteration of rate. This is the reason that many fine regulators have a large cast iron base to support the movement and pendulum.

In my years with IBM, we would occasionally get an order for a custom-built Master Time Control (regulator) built into a grandfather-style case. This may have been an idea for the lobby of a bank or hotel. What a mistake. One of those excellent movements would perform poorly in a free-standing case. It was all due to lack of stability.

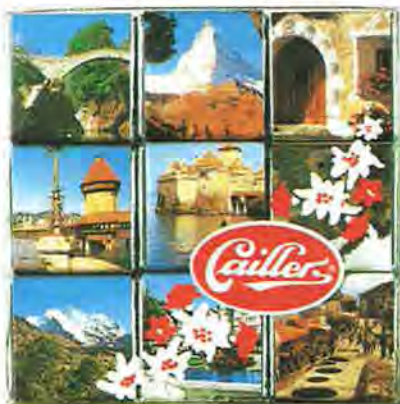
The old, English grandfather clock in my home is fastened to the wall with its feet about a half-inch above the floor. Did that solve the problem? Just helped. Recall that the movement still rests on a seat board that is not securely fixed into the case structure.

Case strength and mounting structure are very important when we begin to fret over a rate error of a few seconds per month. □

If you have any questions, please write:

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As A Clockmaker Turns

Adapting a Tool Slide Rest to the Watchmakers Lathe

Part 3

By J.M. Huckabee, CMC, FBHI



Overview

This material is the third of a four-part series relating the adaptation of a tool slide rest to a typical American-style watchmakers lathe. This is called *adaptation* because most in our trade no longer have all-new tools at our disposal. This means that we must modify, adapt, and adjust the available tools to our working needs.

Adaptation and modification are not all bad. They permit bringing together the best of whatever is available. The situation is not unique to the clockmaker. All of industry thrives on a similar mode of operation for their specialized production machinery.

In this article, we will look at the tool slide in the light of affixing measurement devices and controls that make critical work easy, and all work genuine fun.

The Dial Gauge Fixture

Parts 1 and 2 related attachment of a dial gauge to our cross slide. Figure 1 is an overall view of that setup. This gauge reads in increments of 0.001", both up and down. The thumb screw lock on our gauge bezel permits a zero-set of the gauge at any point of slide position. Now recall, the gauge measures slide motion. Here, on the cross slide, that is approximately 0.001" per division for cut depth. A cut depth of 0.001" in radius gives a work diameter change of 0.002".

I use the term of *approximate* depth cut. Your tool bit tip on, above, or below center will alter the situation slightly. Flexure of the work piece, or your machine is also a factor. However, with a very sharp tool bit on exact center, making light cuts, the value read is almost perfect. Cuts as small as 0.0002" can be made after very little practice. This gauge has a 1" range. Depth inserted into the bracket can easily bring the gauge into working range. While looking over Figure 1, observe the longitude safety stop in the top left of the illustration. I'll discuss that feature later.

In the interest of precision turning, we must have the slide rest square to the lathe bed and very securely attached to the bed. Figure 2 shows the Hammel Riglander slide rest underside. The stop-block indicated must permit slight adjustment to calibrate the index on tool top side. Its position on the tool sets the tool in range of work diameter at hand. The under surface and bed surface must be clean and the stop-block firm against the bed near-edge.

A strong draw bolt is very important. The one in Figure 3 is shop-built. Note that the bolt head is quite large and fills the T-slot of the tool. A poorly fitted bolt head is likely to break the T-slot of your slide rest.

Attachments to the Longitude Slide

The left end of our longitude slide may present a problem with an

attached bracket. Figure 4 shows the longitude feed screw left-end. This one is below the end surface. Some slides have this screw with an extension tang for power drive. In that case, the gauge bracket will differ from this work. If you have a Levis slide, a simple passageway hole in the bracket is sufficient. The smaller hole in this illustration was drilled and threaded to machine screw size #8-32-B.

The bracket of Figure 5 is fixed in place and a dowel hole drilled. The dowel is 1/16" brass rod. The completed job is shown in Figure 6. This is secured with a binder head screw, the large-head type of screw commonly used with electrical terminals.

First use of the longitude slide bracket is shown in Figure 7. This is a simple rod of 1/4" diameter used as a safety stop. For instance, set this stop so that it is impossible to run your slide under the jaws of a large chuck, or to prevent an expensive milling cutter touching a collet, etc. A crashed tool is a great loss and a shame to the worker's pride. We may also use a dial gauge in the same bracket port. A micrometer barrel stop can be used to measure a facing cut as small as 0.0001".

Dial Gauges

The bracket ports in this series are 5/16" in diameter; one of the size standards for measurement tools in this country. The gauges in Figure 8 are built to that standard. These gauges have a 1" range in ten turns of the main dial, and two turns of the small dial. Calibration is in black-upward, and red-downward. One turn of the large dial is 0.100" (about 2.54 mm). One turn of the small dial is 0.500" (about 12.7 mm).

The cross slide gauge fit-up is shown in Figure 9. This works out very nicely. However, the dial adds length to the cross slide and means that your motor may vie for the same space. If so, a distance of about 10" from lathe bed rear-edge to motor will clear gauges shown here.

The index mentioned earlier is shown in Figure 9. The stop-block shown in Figure 2 is adjusted so that zero on the index has the longitude slide parallel to the line of head and tail stock centers.

Forward

Part 4 will relate some methods of slide rest safety stops when the lathe is used for wheel work.

For those readers seeking information about the tools Mr. Huckabee uses in this project, send a self-addressed envelope (business letter size) to Huckabee Tool Information, AWI Central, 701 Enterprise Dr., Harrison, OH 45030.

Illustrations continue on page 10 and 11.



PAT MADDEN
CT Room Operator
Eveready® Watch Batteries
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Taking the pulse

"I don't know what your destiny will be, but one thing I know, the only ones among you who will be really happy are those who have sought and found how to serve —"

ALBERT SCHWEITZER

Pat Madden's special area of service contributes much to her personal happiness. Three years ago her love of the theater, coupled with a desire to be active and make new friends, led her to volunteer

to take part in an effort to revitalize Cleveland's downtown theater district. As a "Playhouse Square Volunteer", Pat frequently devotes more than 60 hours a month during the busy season working as a tour greeter, usher and planner of special events. She was recently honored for her efforts with The Mayor's Award For Volunteerism. Pat has been with Eveready® for 17 years. When she isn't at work or doing duty at Playhouse Square, she likes to travel. She has been to Europe three times, Australia once and to countless places in the U.S.



Pat Madden's second floor workplace has an interesting history. Before it became the property of Eveready® it was a showroom for new Hupmobile automobiles (circa 1930). Today its ornate columns and moldings are home to row upon row of "computer controlled test cabinets" which hold *thousands* of miniature batteries of every conceivable size and type.

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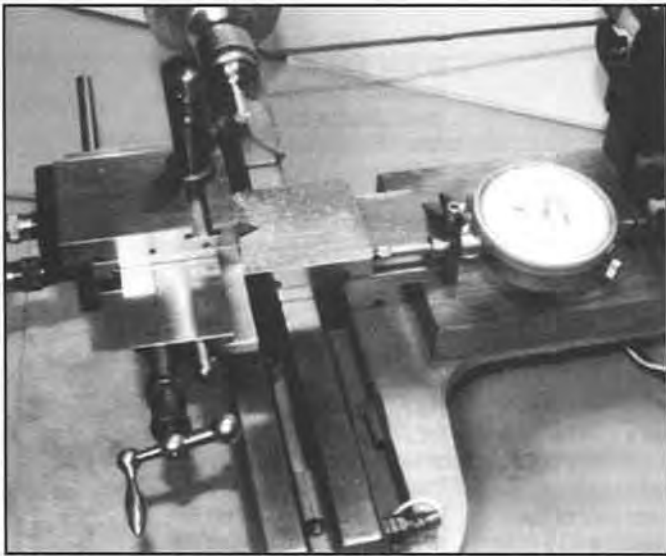


Figure 1. Cross slide with dial gauge and longitude slide with a fixed stop.

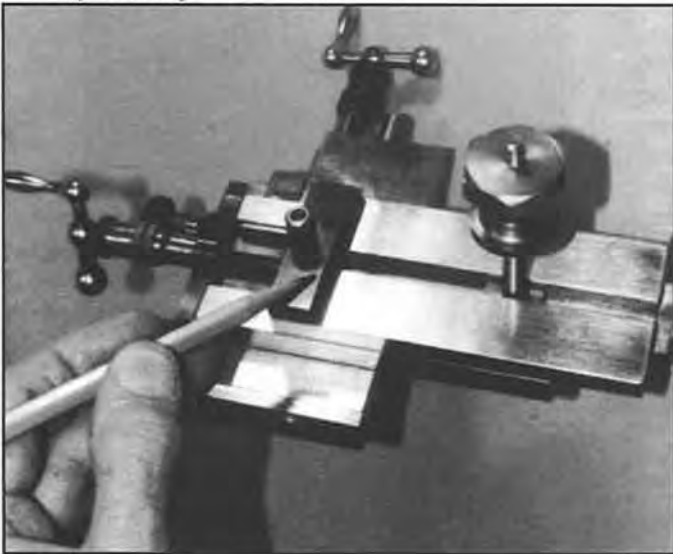


Figure 2. Underview of slide rest. This stop-block squares the tool to the lathe bed.

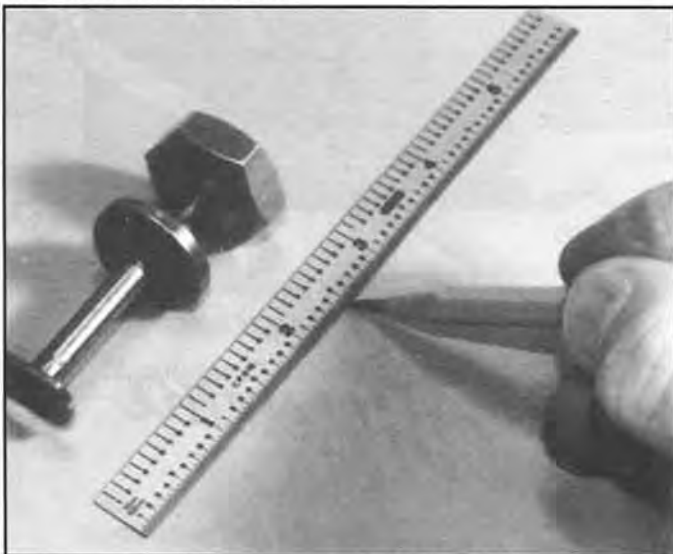


Figure 3. A strong draw bolt is needed to fix the slide rest to the lathe bed.

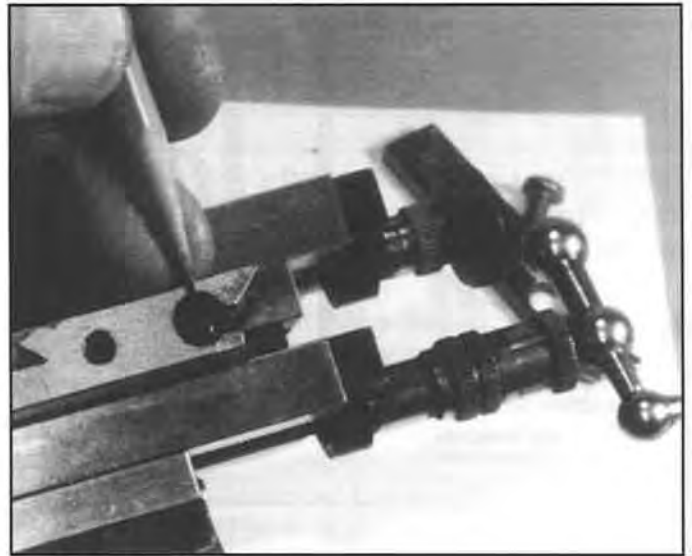


Figure 4. End of longitude feed screw. Length of this screw may alter method of added fixtures to this slide.

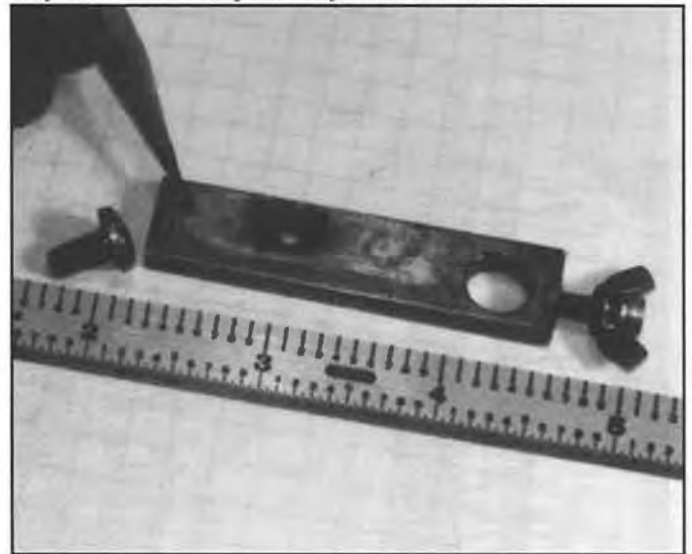


Figure 5. Dowel pin and screw will fix this bracket to slide-end shown in Figure 4.

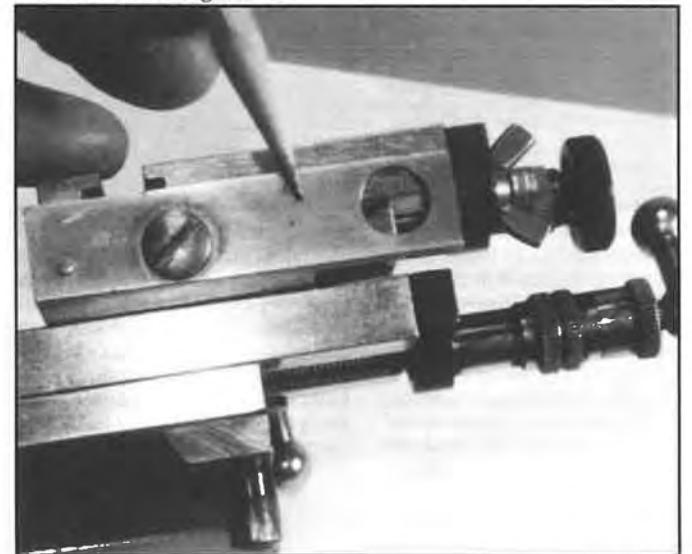


Figure 6. Added bracket holds dial gauge, micrometer stop, or a safety stop.



Figure 7. Safety stop to limit longitude slide range.



Figure 8. Dial gauges used with the modified tool slide rest. Divisions are 0.001" slide motion.



Figure 9. Dial gauge fit-up on the Hammel Riglander tool slide rest. This is the cross slide.

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1195

The Hanging (Suspended) Barrel

Part II

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

The most frequently encountered type of hanging barrel is shown in Figure 1. To dismantle the barrel from its bridge, the ratchet cover (D) may be removed, giving a better access for a key or pinvise in grasping the square to let down the power in the mainspring. To separate the barrel from the bridge, the barrel cover is removed (should there be a stopworks system, remove this as explained in previous text).

In many such types, where economy is evident, the barrel arbor collar has no apparent means of becoming separated from the main body of the barrel arbor (A). Yet it should be obvious that since the collar (C) provides the clamping action for the barrel to the bridge, it must come off somehow.

Because it has no spanner holes nor does it show any evidence of being pinned as in type, the collar (C) must be threaded (see Figure 2). The view to the left shows how a long-nosed plier grasps the collar while the arbor's upper square is secured in a pinvise. Twisting the pinvise or the pliers counterclockwise will loosen and allow removal of the threaded collar. Actually, little exertion is needed to perform this as the collars on such types are seldom, if ever, dead tight. In dismantling bridges with hook-type clicks (B), these types of clicks may remain assembled to their bridges if desired.

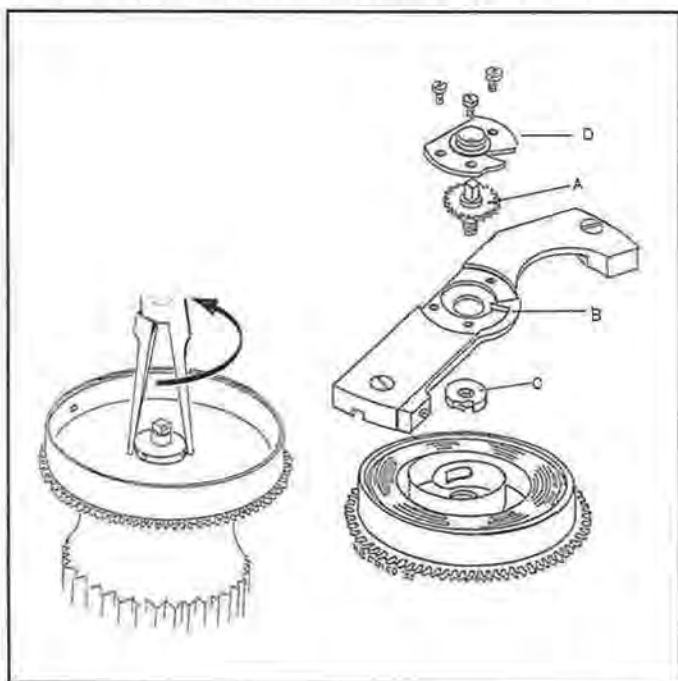


Figure 1.

Pinned-in Arbor Collars

Figure 2 covers a type of economically-made hanging barrel movement. In this type of suspended barrel, after removing the barrel cover, you will notice that the barrel collar also has no spanner holes but the collar has semicircular indentations diametrically opposed. Emerging from each are parts of what appears to be a steel taper pin. The thin end of this pin is fashioned into a barrel arbor hook and emerges to what would be the circular edge of the collar. The opposite cutout shows the heavier part of the taper pin but not so far as to reach the circumference of the collar.

Figure 2 (E, F, G, H) illustrates how this unthreaded arbor-collar is secured to the arbor-ratchet. When the collar (G) is perfectly positioned onto the slightly tapered arbor post, the arbor post's hole will be perfectly aligned to take the pin (F) and tightly secure the collar (G) to the arbor.

In order for the barrel arbor to be separated from the barrel bridge, the collar (G) will have to be removed. This can easily be done by using the jaws of a small flat-nosed plier across the two ends of the taper pin (F). A slight pressure on the plier will contact the longer hook-end of the taper pin and loosen it. The tweezers can then easily remove the taper pin. A slight tap on the lower square end will loosen the collar (G) from its tapered post. The combination arbor post-ratchet wheel will become loose, freeing the barrel bridge. Servicing this type is very much the same as the preceding types, lubricating the same friction-bearing surfaces.

When reassembling such units, the collar (G) may be positioned on the taper post (E), making certain that the crescents (G) and the hole (E) are perfectly aligned. Note that the two views of the collar and hook-pin are placed in opposite directions. This is to call attention to the fact that the pin (F), when replaced with the barrel teeth down flat on the bench, must have its hook as shown in the figure at the lower right. The initialed view to its left is an extension view when the teeth are upwards as in the exploded view.

Our last type of hanging barrel system is one that is used in the very high-grade watches. These are found in watches made well into the twentieth century. The popularity of this system is shown in the recent catalogue of the Joseph Bell Collection of Precision Watches in the Binghampton, New York's Roberson Museum and Science Center. Of the ninety watches covered in that catalogue, over twenty-five obviously

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are with hanging barrels. Patek Philippe used the same system in watches into the last half of the twentieth century.

Our model is a Henry Capt, a very well-known maker of the late nineteenth century. This model is shown in our exploded view (see Figure 3). Many such models also used four ratchet screws to secure it to the barrel arbor (F). While our model had an extension for its square (E), in later models the square was flush with the ratchet wheel.

Since this latter type is found in high-grade watches, greater care should be exercised. These types are quickly recognized by the manner in which the ratchet is secured. It is obvious that the ratchet wheel is always mounted on the barrel arbor. In these types, the radius of the three or four screws indicate that the barrel arbor into which these are secured must have a corresponding wide surface to accommodate these screws.

To dismantle this type of unit, with control, let down the mainspring power. Remember though, that there is still some residual power in the mainspring stored by the stopworks on the barrel cover, almost always found in such high-grade watches.

Removing the dial and hands reveals the barrel cover. In many such watches, a porcelain dial is found with no legs to secure it to the dial plate. Instead, some models have the dial set into a snap ring or bezel that fits over the rim of the mainplate. To avoid cracking the dial or creating hairline fis-

tures, ease the bezel ring gradually around the dial until it feels free enough to be lifted by the fingers.

The bottom of the barrel will reveal the stopworks which can be removed as in other models. Remembering the residual power stored by it, note its amount for future reference when reassembly takes place. If done carefully, the removal of the ratchet wheel can follow, releasing the barrel from its bridge. Next the barrel cover is removed, noting if there are any indexing notches in the barrel and cover. The barrel arbor collar (O) can then be unscrewed, repairs and servicing can proceed as with other fine watches.

Assembling

Replace the mainspring, lubricating it. Before replacing the barrel arbor into the barrel, lubricate the shoulder (H) and the barrel boss lightly (M). Replace the collar (O) so that its hook will engage the mainspring's innermost coil, securing it, but not too tightly as the force of the mainspring will also exert a tightening force. Test the freedom of the barrel.

Replace the barrel cover, positioning it so that its matching position marks, if any, (N) are paired. Lubricate the junction of the arbor (K) with its bearing hole (P). Test for freedom of the assembled barrel.

Before assembling the barrel unit to the barrel bridge, lubricate the surface (G) of the arbor as it has bearing against the underside of a light recess under the barrel bridge, not

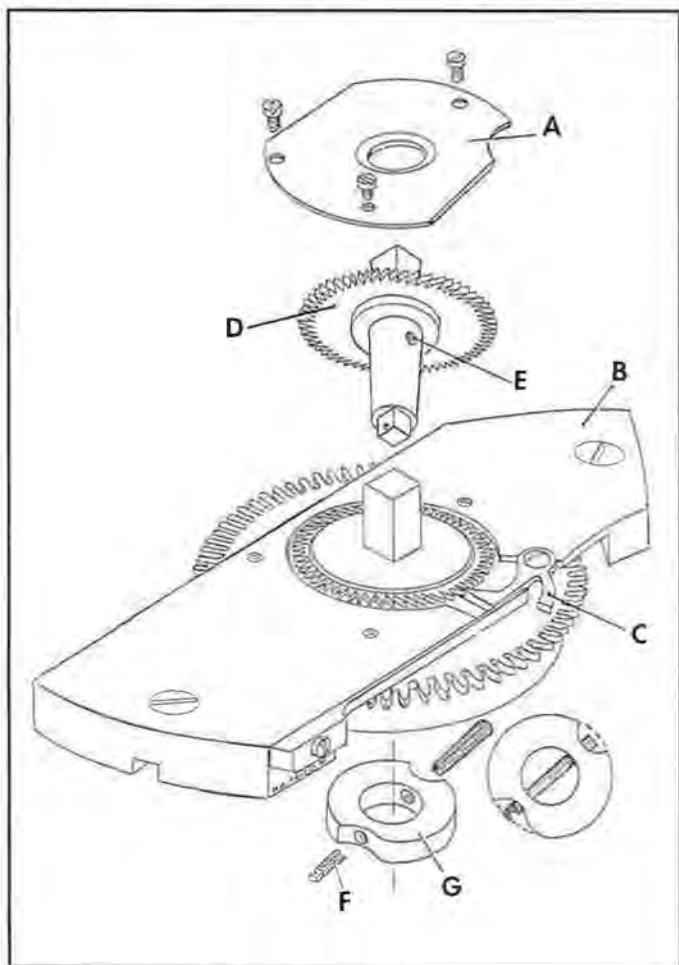


Figure 2.

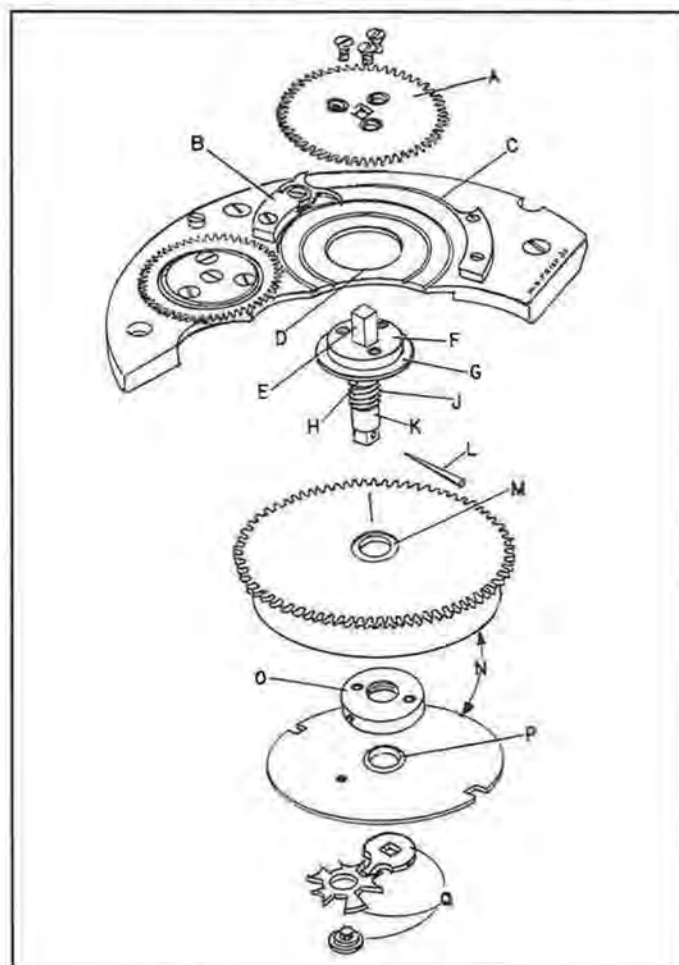


Figure 3.

available after assembling. Place the barrel unit into the bridge, lubricating the junction of the arbor's bearing (F) with that of the bridge at (D).

The ratchet wheel and screws may be secured. In our model, the screw holes of the ratchet and those of the arbor were not universally paired. Therefore, do not attempt to replace any of the screws until you are certain that all holes in the ratchet and arbor are aligned.

Restore the same amount of power to the mainspring as noted in the stopworks' residual power. Now we can turn our attention to the stopworks, lubricating its bearing junction with the cover as this will be concealed after the stopworks index is secured. Before replacing the index, wind the ratchet so that the bottom square's hole is at right angles to a direct line towards the center of the Maltese cross's pivoting center. This will allow the index to fit into the select space between the convex wing and the next wing which will allow a *full winding of the ratchet*. If done incorrectly, you may not be able to wind the watch. No need to replace the residual power as this was done if the instructions in assembling the ratchet were carried out properly.

Replace the small taper pin which secures the index to the square arbor below (K). Oil the pivoting bearing under the screw of the click (B). Very lightly oil the point where the clickspring encounters the click. Test the winding and ease of barrel action. This should cover the various types of hanging barrel arrangements. The final cross sectional view is provided to give a better overall projection of this system.

Cross-Sectional View of a Hanging Barrel

This view in Figure 4 illustrates the method by which the barrel is journaled onto the barrel bridge. It also shows the precise endshakes allowing it to revolve freely. Numerals in this view refer only to the one-piece barrel arbor with the sole exception of the threaded ring (5). All other parts are illustrated and referred to by letters of the alphabet.

1. The barrel arbor squares in some older watches are longer to accommodate a key.
2. The arbor shoulder. This fits closely but not tightly into the barrel bridge journal hole. The ratchet wheel is secured to this part with precise freedom so that the ratchet does not rub against the barrel bridge. It also controls the up and down shake.
3. The barrel arbor flange. This widest part of the arbor supplies the security of the assembled unit and with the ratchet wheel controls the endshake.
4. The threaded post of the arbor. Upon this threaded post is the arbor ring nut (5).
5. The arbor ring nut. This threaded nut secures the barrel to the arbor, yet allows a precise amount of endshake between the upper, raised boss of the barrel and the arbor flange (4). The hook is positioned so that the normal pull of the mainspring is in the thread-tightening direction.
6. The lowest square of the arbor. Upon this square is situated the stopworks index (F). Notice the hole in the square

into which the taper pin (H) is inserted, resting in the outer groove of the stopworks index (F).

Barrel parts

- A) The ratchet. Generally with three or four screws to secure it to the arbor shoulder (2). The ratchet wheel also supplies the security of the barrel to the bridge while still allowing freedom of movement.
- B) The barrel bridge. Its recess for the ratchet wheel often contains raised ridges to diminish friction between it and the underside of the barrel bridge.
- C) The barrel. In this view the barrel has a boss at its center bearing for the barrel arbor. This has a small but precise clearance from the underside of the flange (3).
- D) The barrel cover. The cover is sturdy but recessed to accommodate the stopworks unit.
- E) The Maltese cross of the stopworks unit. This is shown in two views.
- F) The stopworks index. This is mounted on the square (G) of the barrel arbor and turns with it, indexing the Maltese cross until the large, longer section prevents further winding or prevents complete unwinding.
- G) The Maltese cross. With five sections, one of which is convex curved.
- H) The taper pin. This fits into the hole of the square (6) and secures the index to the square (G).

An examination of this view shows that the barrel is secured to the bridge via the barrel arbor. The freedom of the barrel is due to the precise endshakes between the flange and the ratchet wheel. The barrel's freedom to turn independent of the barrel arbor is by the endshake between its boss and the bottom the widest part of the arbor, its flange. Side shakes are controlled by the freedom in its upper bearing (boss) with the arbor shoulder and the same with the barrel cover's fit to the lower shoulder of the arbor.

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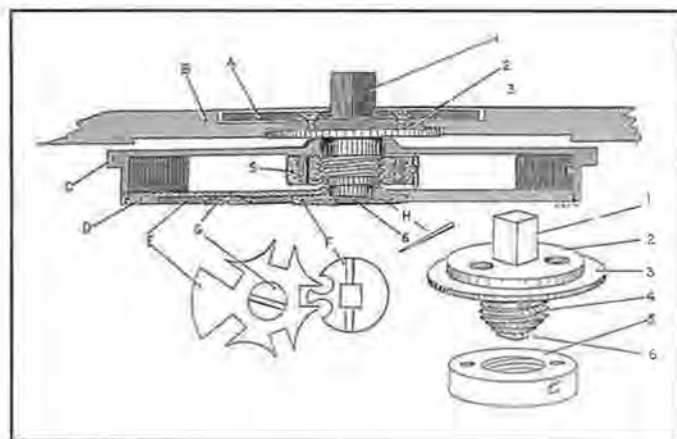


Figure 4.

Pickle Barrel

Course in Jewelry Repair, Part 13

Repairing Gold-Filled Watch Cases

By Marshall F. Richmond, CMW



One of our members, Tom Gref, has asked for information on repairing gold-filled watch cases. Many others might be able to benefit from this article so I will try to relate what I have learned from many years of experience. Although it could be possible to do a restoration on a badly worn gold-filled case, it would hardly be practical as the cost in time and materials would be much greater than the value of the case when finished.

First of all it might be well to discuss "gold-filled" to get a better understanding of the problems that might develop to make repair necessary, and what might be required for repair. There are several markings that identify gold-filled. One of the most common is 1/20-12 karat gold filled, which means 1/20th of the total thickness is 12 karat gold. This means that a sheet of gold is fused on a sheet of base metal so 1/19th of the thickness is base metal and 1/20th is gold.

Gold-filled watch cases used in old pocket watches were often labeled 25-year, 20-year, and even 10-year cases. Often this meant a guarantee that the gold would not wear through in less than the number of years they were marked. The 25-year and 20-year cases were considered gold-filled and the 10-year were considered, and often marked, rolled gold plate. I have found on some old pocket watches marked 14K gold that they were actually heavy gold-filled cases that were marked as solid gold before the gold marking laws were in effect.

On many of the old pocket watches that were gold-filled or rolled gold plate, when subjected to extreme wear, the gold would wear off down to the base metal in places. The base metal, being brass, would hardly be noticeable because the watch was continually being taken out of the pocket and returned causing a polishing effect. If laid away and exposed to air, the brass would tarnish and the surrounding gold would not, making the wear noticeable. This part of the case can be polished with tripoli and rouge so it makes the brass and the gold look the same. To keep it looking this way, a coating of wax can be applied and then rubbed with a soft cotton cloth. If the watch is a keepsake and not worn, the wax will keep it looking fine for some time. If worn continuously, the wax will wear off in a short time but continued use will keep it polished indefinitely.

Another way to cover up the worn places is by elec-

troplating, sometimes referred to as anodizing. Many jewelry shops are set up with the equipment and have the know-how to do electroplating. Before electroplating, the work must be polished so that the worn places do not show. Then it should be cleaned (really cleaned) as one learns in doing electroplating. The case then can be electroplated in matching gold, silver, nickel, copper, or rhodium. Not being an expert at electroplating, I hesitate to do any detailed writing about it. The people who sell the equipment and supplies will also supply information on how to electroplate. Gold plating usually leaves a very thin coating of gold on the plated surface and when subjected to any extensive usage, will again wear through to the base metal. Electroplating today is much advanced over what it used to be so that much heavier coatings can be obtained which should wear longer. These methods, I would consider repair methods and not a restoration.

Wrist watch cases are subject to a different type of exposure and wear than pocket watch cases because being worn on the wrist, they are subject to continuous wear. This is especially evident on the edges, or corners. When the gold is worn through, the base metal is attacked by body acids and perspiration salts. These eat into this base metal leaving pits and sometimes holes which will allow moisture and/or dirt to get into the movement. These cases should be replaced. However, after a watch is ten years old, replacement cases are rarely available so the only choice is to repair them. Sometimes it is possible to flow gold solder into these places. To do so, the place where the gold solder is to be flowed must be ultra clean or the solder will not flow. If and when the solder is flowed, it is next to impossible to polish it out so that it will not show. If there is a hole clear through, regardless of how small the hole is, gold solder will hardly flow and fill the hole.

If a small hole must be filled, a small flake of karat gold can be laid on the bench heat pad, fluxed, then melted which will form a small sphere or ball. Then if a fluxed chip of gold solder is placed on top of it and heat is applied, the solder will flow around the gold ball making a larger ball which can then be applied to the hole in the case after it has been fluxed. When heat is applied, the solder will flow and the gold will fill the hole in the case. This can usually be applied from inside the case. Since

the hole is filled solder, it then can be flowed on the outside of the case. These holes usually show up in the corners of a square or rectangular case. The outside of the case should have solder flowed over the worn spots before polishing.

Often on any shaped gold-filled back, the gold wears through along the edges where the case back makes contact with the wrist. This leaves a line along the edge, which wears through leaving a crack clear through the case. Solder will rarely flow to fill the crack because it tends to flow to the two sides. This can be overcome by cutting a sliver of karat gold from a thin piece of gold and placing it along the crack on the inside of the case. This piece of gold should be long enough to cover the entire length of the crack. The item is then fluxed and a few small chips of fluxed solder placed on top of the sliver of gold. When heat is applied and the solder flows, it should cover the sliver which will fill the crack. Then, if needed, solder can be flowed to the outside to protect the base metal which will be attacked by perspiration salts and body acids. Gold, even karat gold, is rarely affected by body salts or acids. Inspect the inside of the case back at this time and see if the solder has flowed only in the corner which is formed where the bottom meets the sides. It should not be enough to keep the movement from functioning properly. Next, turn the case back over and see if base metal is showing around the edges. If so, often gold solder can be flowed

into these places then polished smooth. It may not be possible to make a perfect job when dressed out and finished. This is because in polishing the gold surrounding the solder it may be possible to polish through, exposing the base metal.

One can choose to have a short-lived, good-looking job by removing the high places in the solder through filing or use of abrasives which will leave the gold thin and probably wear through in a short time. The other choice is to leave the high places and only finish it by polishing off any unsightly high places possibly leaving wavy places on the case back which can only be seen when the watch is off the wrist. This job can last a long time. Usually this type of wear is caused by acid or salty perspiration and some people seem to have an excess while other people hardly perspire at all. Usually a stainless steel case will overcome this problem and even a stainless steel case back eliminates most of this problem. However, if the bezel is gold-filled, especially on water-resistant screw back cases, the threads in the bezel can be eaten away with this type of corrosion.

A good example of the gold-filled, water-resistant case was one particular series of 218 Accutrons, many of which were given as award watches or given for a number of years of service. These had gold-filled cases and backs. Many of the backs were machine engraved and the layer of gold was very thin at the bottom of the letters. I have

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seen cases where the perspiration corrosion has eaten through the case leaving a very small hole. These holes were usually small enough that a small chip of gold solder could be flowed to fill the hole from the outside of the case. Others I have seen have the edge of the case bezel eaten away so the threaded ring that holds the back in place would have no threads to screw into, thus it would not tighten. I found no way to repair this problem, so it would require a new case.

Gold-filled cases with both the back and the bezel gold-filled were usually found on better-grade watches like Longines, LeCoultre, Omega, and the higher-priced Bulova, Elgin, and Hamilton. Although most of these cases are of a better quality than the ones used on less expensive watches, they also wear through occasionally, especially when they are worn by people who have highly corrosive body secretions. These can be repaired by the same method as was previously explained, using gold solder.

For any of them, there is a much easier and less expensive way to repair; that is with the use of soft solder. As soft solder flows at a much lower temperature than gold solder, it can be applied with a soldering iron, soldering gun, or a torch using a very small flame. Soft solder flows at from 250 to 300 degrees where hard solders flow at anywhere from 1000 degrees to the melting point of different metals depending on the alloys used. Easy-flow 14K gold solder will flow at 1100 to 1300 degrees. Flowing lead solder on gold or gold-filled makes it almost impossible to remove. This kind of repair should only be used to try to get more service from a good movement where a replacement case can not be found. Soft solder is usually made of a lead base and is white in color, but I have heard that yellow soft solder is available from some sources. I have yet to locate any of them. There are ways

of covering these repairs with electroplating but often a plating of copper or nickel must be applied first before the gold will cover adequately.

Other case repairs that need to be made are loop ends on ladies watch cases; lugs where the spring bars go sometimes are broken off or worn so badly that they will not hold a spring bar; pocket watch pendants where the bow clamps into the hinge gets worn so it needs repair. Watch cases with hinged lids or backs have the hinge damaged and need repair. I will try to address each with a solution for repairing them. Please bear in mind that what I explain is how I make these repairs and there are probably many other methods and procedures as good or better than mine, so use what is comfortable for you because a job well done is our goal.

Figure 1 shows a ladies case bezel; (A) and (B) show two methods of repairing worn end loops where the band attaches. The lower lug on (A) shows a piece of tubing inserted with two chips of solder in place. After fluxing, this is ready to apply heat and flow the solder between the tube and the worn loop. After the solder has flowed sometimes the bezel must be turned over and solder applied on the underside to make a fully flowed solder joint. After this, the tubing can be cut off flush with the sides of the loop to look like (B) at the bottom. The top of (A) shows a piece of half-round metal in place and ready to solder. The same procedure for soldering should be used as for the bottom loop. When both loops have been repaired they can be shaped by filing, then polished with tripoli and rouge, then cleaned in the ultrasonic tank, or by washing with a washout or old toothbrush, or even boiled. For this cleaning, a solution of detergent or soap and ammonia can be used. In doing these repairs, I often use the third-hand tool to hold them in position while applying heat for sol-

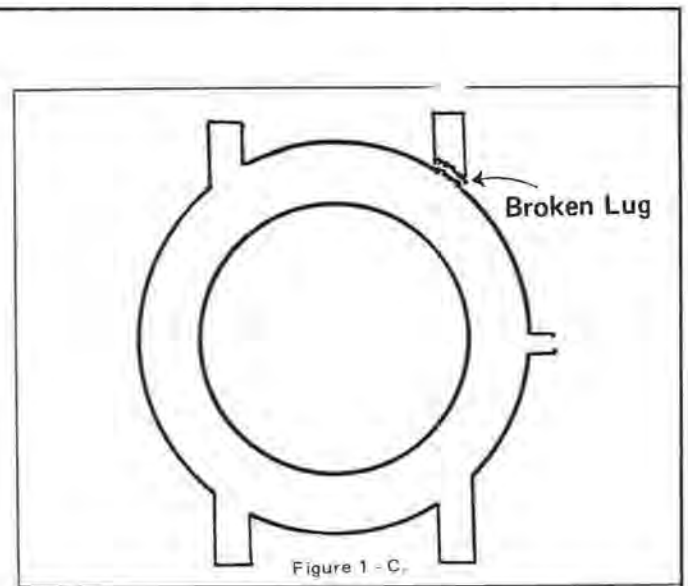
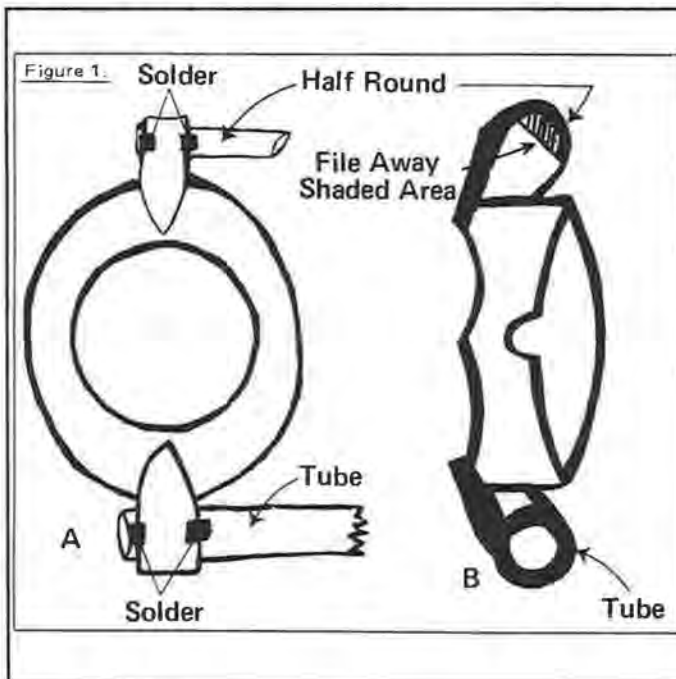


Figure 1.

dering. For setting up work for soldering you must use your ingenuity because almost every job will be different and require a different type of setup.

Figure 1 at (C) shows a gents round case bezel with a broken lug. If the broken lug is not lost it can be gold soldered back by cleaning the place on the case and the broken lug. There are many ways this can be set up to hard solder it back into place. The quickest and (usually) easiest for me is to hold the lug in tweezers and flux the part to attach to the case. Then place a chip of hard solder on the broken end and heat until it flows on this end. Since I have had enough practice and my hands are steady, I can hold the piece in place with the tweezers and heat until the solder flows. Then by using a slight pressure the piece will go tight against the bezel as the solder flows. The heat should be removed as quickly as possible. When it cools a few degrees it will be solidly in place and ready to file away any excess solder if necessary, then polish. If you do not feel steady enough to use this method, it can be set up on a heat pad using the third-hand tool to hold the broken lug after aligning it in place. Remember that after placing the chip of hard solder on the fluxed joint it must be making contact with the bezel, for if there is a crack the solder will flow to one side or the other.

In case the lug is missing there are still three that can be used for a pattern. This can be made from karat gold, or brass, or nickel silver to match the metal color of the case. If brass or nickel silver is used on a gold-filled case, the whole case can be electroplated to make a perfectly matched job. Rhodium can be used on white cases which will make a tough coating that will wear well.

Pocket watch pendants (where the bow attaches) often get worn and the bow ends become worn to a point where a small jerk will cause the bow to come out of the pendant. A new bow is a must because the ends are a square shoulder. If the pendant is not too badly worn, the ends can be filed square then drilled in each end deep enough, and with the proper diameter drill, that the new bow, when installed and tightened with bow pliers, will be a snug enough fit to last a long time. Another way is to fill the depression with hard solder and file the end square, then drill. When worn too badly for this a piece of base metal can be hard soldered to the worn end or both ends, then filed to shape, and then drilled. A caution: when hard soldering the pendant, care must be taken not to get it too hot where it fits into the case because the pendant is hard soldered in the case base. Also, before heating this pendant, make sure it is stripped of stem and sleeve because heat can damage them.

Case hinges will be explained in a future article dealing with hinges and case springs found in hunting cases. In fact it is scheduled for the next article.

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A Practical Course In Clock Repair

Nomenclature of Clock Parts, Unit 1

By J. P. Kenyon, CMC



Identification of clock parts can be mystifying. There is no standard nomenclature. Often, the same part is identified by several names. In some cases, colloquial language has been adapted to designate each piece. As you read the various texts on clock repair, you will become familiar with the names used by different authors for the same part. Eventually you will be able to correlate them according to function.

Our intent is to identify the parts of an 8-day single train (time only) clock movement, and to develop an understanding of how each one fits into the total mechanism. The definitions and clock terms used below are for reference purposes in this and future articles in the series.

Definitions

Refer to Figure 1.

1. **Barrel**—The circular box in which a mainspring is held.
2. **Barrel arbor**—The axis of the barrel around which the mainspring is wound.
3. **Cannon pinion**—A pinion friction-fitted to the center wheel arbor that drives the minute wheel.
4. **Center wheel**—A wheel located in the center of the movement with a long arbor that projects through the front plate and carries the cannon pinion.
5. **Click**—The pawl that locks the teeth of the ratchet wheel, allowing the arbor to turn in the winding direction, and prevents it from turning backwards. (It is also referred to as the ratchet.)
6. **Click spring**—A spring that exerts force against the click to keep it engaged with the ratchet wheel.
7. **Crutch**—An arm that transmits power from the escapement to the pendulum rod.
8. **Escape wheel**—A wheel, that in conjunction with the pallet, allows power to escape at a controlled rate to deliver an impulse to the pendulum.
9. **First wheel**—The teeth of this wheel make up the outer edge of the barrel. (It is also referred to as the main wheel or great wheel.)
10. **Minute wheel and pinion**—The wheel driven by the cannon pinion. The attached pinion drives the hour wheel.
11. **Hour wheel**—A wheel driven by the minute pinion,

with a long pipe attached, that fits over the cannon pinion and carries the hour hand.

12. **Fourth wheel**—A wheel that transfers power from the center wheel to the escape wheel pinion.
13. **Intermediate wheel**—A wheel that transfers power from the first wheel to the center wheel pinion. (It is also referred to as the second wheel.)
14. **Minute wheel post**—A short post attached to the plate on which the minute wheel and pinion turn.
15. **Verge**—The part of the escapement where impulses are picked up and transmitted through the crutch to the pendulum.
16. **Pendulum rod**—A rod attached to the suspension spring, carrying the pendulum bob on the opposite end. It is motivated by the crutch.
17. **Pillar post**—The spacing rod(s) that separate the plates.
18. **Plate(s)**—The main structure(s) (front and back) of a movement between which the gear train is contained.
19. **Ratchet wheel**—A wheel attached to the first wheel arbor that meshes with the ratchet (click) to retain the power in the mainspring.
20. **Suspension spring**—A flat spring attached to a block on the top of the back plate from which the pendulum hangs.

A clock movement can be divided into four major components: power, transmission, escapement, and motion work. These are discussed below.

Power

In our 8-day movement, the power or motive force is provided by a mainspring that is made from a ribbon of tempered steel. The end of the inner coil has an eye that fastens to a hook on the winding arbor. The outer end is attached to the inner rim of the barrel. With this arrangement, the winding arbor is designed to turn independently of the barrel, when the mainspring is being wound. A ratchet wheel (19) is secured to the winding arbor and held in place by a bridge that is secured to the front plate. A pawl or click (5), is held against the ratchet by the force of the click spring (6). When winding the mainspring, the barrel remains stationary while the winding arbor is being turned with a key in the direction permitted by the design of the pawl and ratchet wheel. This arrangement allows

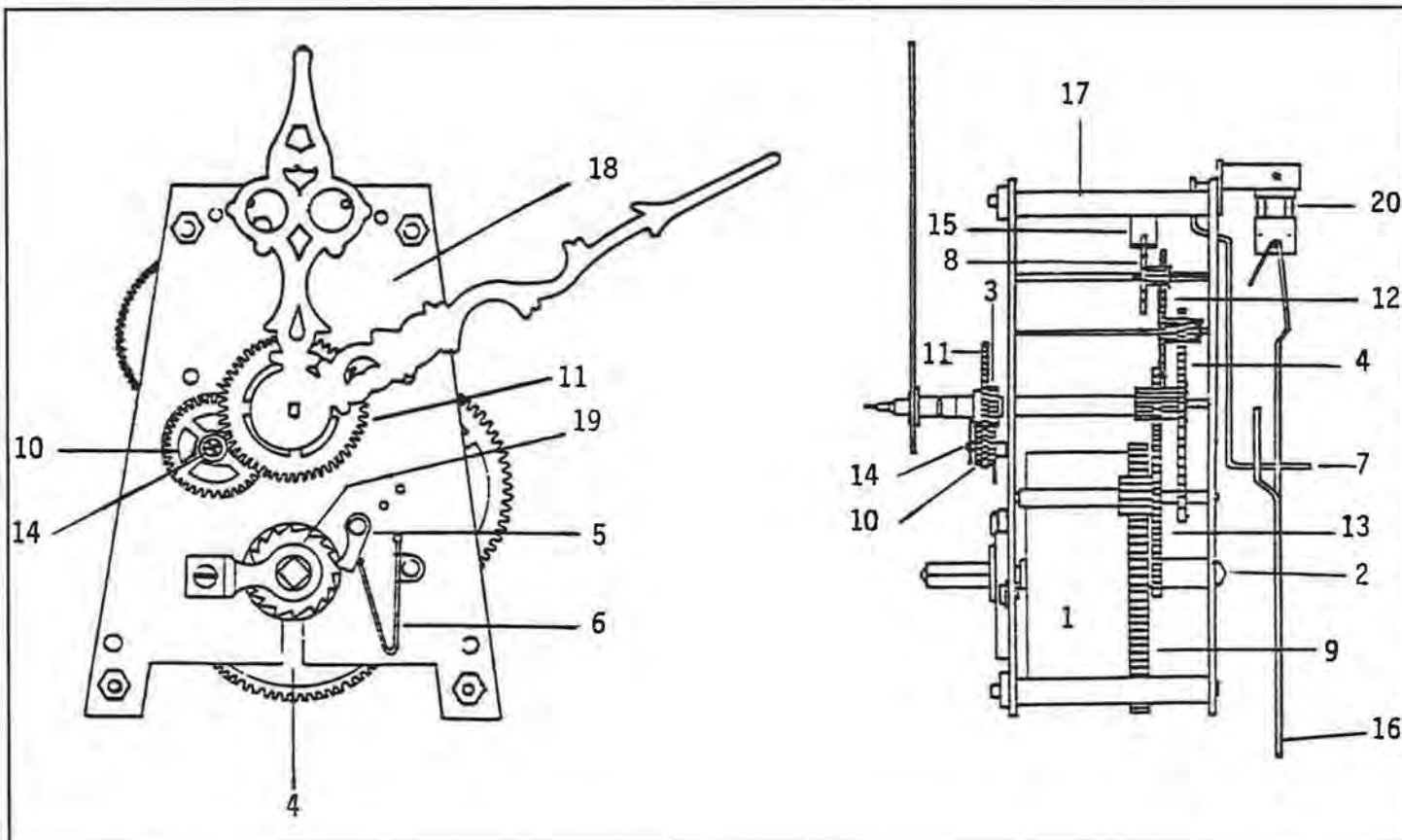


Figure 1. Eight-day single-train clock movement.

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the pawl to slide over a ratchet wheel tooth, dropping under the force of the click spring into the next tooth, and then to the next, and so on until the spring has been fully wound. When winding is completed, the pawl (attached to a front plate) and the ratchet wheel (secured to the winding arbor) mesh to prevent the arbor from turning backwards. This engagement also permits the energy of the mainspring to turn the barrel in the direction opposite to the winding action.

Some clock movements do not have a mainspring barrel (refer to Figure 2). Instead, the power or motive force is provided by an open mainspring that has an eye on the end of the inner coil that fastens over a hook on the winding arbor. The outer end of the mainspring is formed into a loop, which is fitted over a pillar post. A ratchet wheel (1), which is secured to the winding arbor (2), is held tightly against the main wheel by friction from a spring washer (3), located on the opposite side of the main wheel and held against the wheel by a riveted shoulder. The pawl or click (4), that is free to rotate on a post attached to one of the spokes of the main wheel, is pressed against the ratchet by a click spring. When winding the mainspring, the main wheel remains stationary while the winding arbor is being turned with a key in the direction allowed by the design of the pawl and ratchet wheel. This arrangement allows the pawl to slide over a ratchet wheel tooth, dropping under the force of the click spring in between the teeth repeatedly, until the mainspring has been fully wound. When winding is completed, the pawl (attached to a spoke of the main wheel) and the ratchet wheel (secured to the arbor) mesh to turn the main wheel so that energy can be transmitted through the train. Energy from the wound mainspring will cause the arbor to turn in the direction opposite to the winding action.

Transmission

Transmission refers to the transfer of power from the mainspring to the escape wheel. In this movement, the

main wheel (9) gears into the second pinion on which the second or intermediate wheel (13) is fixed. In reality, this is the first pinion of the train, but in clockwork, for simplicity, a pinion carries the same number as that of the wheel fixed to that arbor.

The intermediate wheel engages with the third pinion that is attached to the center arbor and turns the center wheel (4). The center arbor is fitted with a clutch assembly so that the minute hand, which is attached to the center arbor, can be turned independently of the center wheel and pinion, allowing the hands to be moved while the center wheel and pinion remain motionless. This is accomplished by using a spring to hold the center wheel friction tight to a shoulder on the center arbor. The friction is loose enough so that the hands can be set, but tight enough so that the center wheel and pinion will turn with the arbor to move the hands. If the clutch is too tight, the minute hand will be bent or broken when setting. If the clutch is too loose, the hands will not turn with the center wheel when the clock is running.

The train is designed to turn the center arbor one revolution per hour. The center wheel meshes with the fourth pinion on the arbor to which the fourth wheel (12) is fixed. The fourth wheel engages with the fifth pinion on the arbor to which the escape wheel (8) is attached, and rotates it to transfer power from the mainspring to the pendulum.

Escapement

The escapement transfers the energy in impulses from the mainspring to the pendulum. It consists of a verge (15) and an escape wheel (8) designed to allow power to escape at a controlled rate, while the hands advance with the passage of time.

The escape wheel has ratcheted teeth that are arranged to operate against the angular ends of a pivoted lever called a verge. While one tooth of the escape wheel forces the end of the verge, called a pallet, to escape from the wheel, the other pallet at the opposite end of the verge moves in

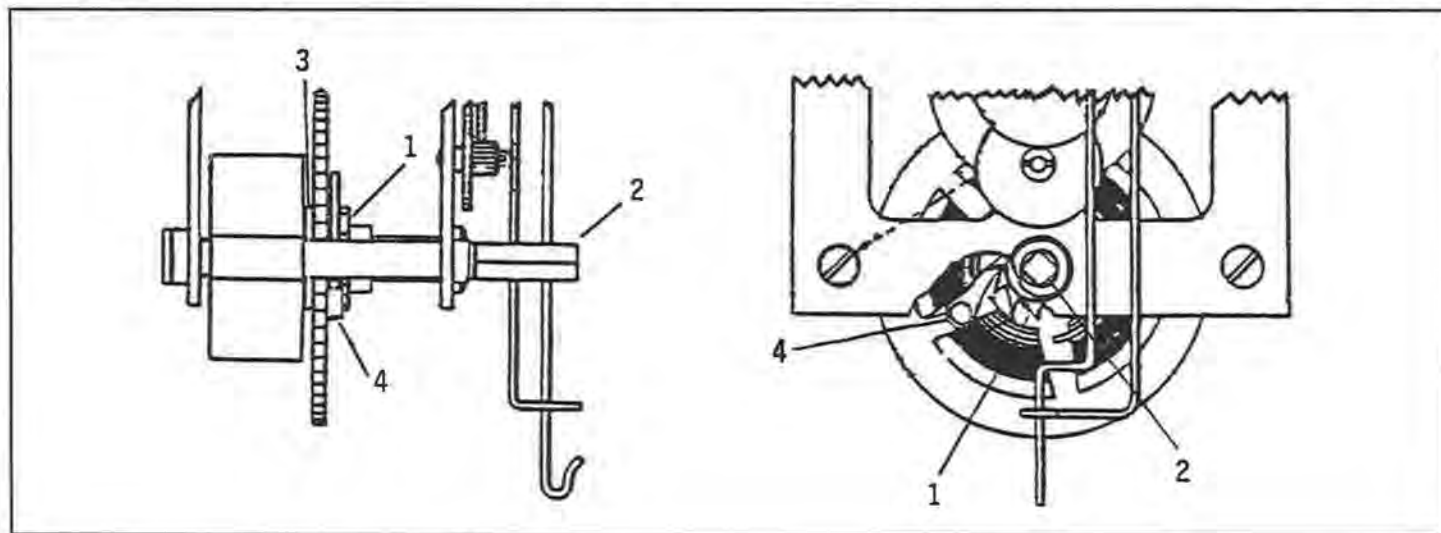


Figure 2. Ratchet assembly on an open-end mainspring (loop end).

between two teeth of the escape wheel. This action interrupts the progress of the wheel until the pendulum (16), which is connected to the verge by a crutch (7), completes a swing in one direction and begins to swing in the other. Hence, an impulse is delivered to the pendulum. The action of the escape wheel is the same on both pallets of the verge. Impulses are delivered to the pendulum in opposite directions, resulting in the pendulum oscillating with uniform motion, as long as adequate motive force is delivered to the mechanism.

Motion work

The movement is designed with the minute hand affixed to the center arbor, which turns once per hour. In operation, the hour hand is required to turn one-twelfth of a revolution per hour. To accomplish this, another train of wheels and pinions is used. It is designated as the motion work and has a gear ratio of twelve to one. The cannon pinion (3) is friction-fitted to the center arbor and drives the minute wheel (10), with the minute pinion attached, which turns on the minute wheel post (14), fixed to the front plate. The minute pinion, in turn, drives the hour wheel (11) which has a pipe attached, that turns loosely on the center shaft. The hour hand is fitted to the pipe of the hour wheel. This step-down gearing arrangement, with a ratio of twelve to one, regulates the proportionate turn of the hour hand to show the correct time.

The motion work, also referred to as the dial train, differs from the time train, in that by design the pinions are the drivers and the wheels are driven. The train can be formed by many different combinations as long as the combined gear ratio equals twelve.

Conclusion

If you are just beginning to do clock repair and are not familiar with the terminology, it would be helpful for you to reread this information while examining a movement. An understanding of this nomenclature will be very helpful in the comprehension of information to be covered later in this series. □

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Case And Band Refinishing



By Dennis J. Warner

All of us, whether we are working in a store or trade shop, have fine timepieces cross our benches for service. We put a lot of skill into properly repairing the movement to a high standard. Over the years I have given little attention to the case and band other than a quick buffing and then a trip through the ultrasonic cleaner, drying, and reassembling. It is time to review this procedure when it applies to high-grade timepieces that are actually fine pieces of jewelry. Following the method I have worked up, fine finishes can be reproduced so that they closely resemble the original.

Stop, Look, and Observe Before You Proceed

It is our goal to reproduce, as closely as possible, the original finishes to the case and band. This should be done only on stainless steel and precious metal components. If you try this on plated, filled, or base metals you may remove material that cannot be replaced. A light buffing and a good cleaning is all you can do on these finishes.

When I separate the case and band from the movement, I first put my mark and AWI identification number into the case back. Then I determine if I am working with a metal that is solid. Take a close look at the surface finish; it may have been polished over. You have to determine if it was a line, satin, swirl, or bright finish. Make notes and drawings to initially aid you at the buffing machine.

It is best to remove the band, back, and bezel from the case. Working in small component parts makes finishing a lot easier. This may mean taking the band apart (end pieces, fold over clasp, and two side pieces). Check and tighten all link screws or pins before proceeding and again after all work and cleaning is completed. There are good methods here that I hope you can incorporate into the system that you now use.

Procedure

Polish all bright finishes on case, back, bezel, and band. It is a good practice to use a worn crown to protect the case tube during the polishing of the

mid-case. Leaving the old crystal on the case will also stop the rounding-off of square corners needed for water-tightness. You can discard the crystal prior to putting the piece into the ultrasonic tank. Using Fabulustre, you can eliminate using the two-step method of tripoli and rouge except in cases where there are deep scratches (see Figure 1). The use of the emery sticks may be needed. Fabulustre cleans up a lot easier than other polishes.

Using the proper chuck in the lathe, you can reproduce the original design on the case, bezel, or back. On many of these parts, rust has pitted the flat surfaces. Using a broken piece of a cut-off wheel, you can reach into small areas to remove the pits (see Figure 2). Case backs that have a circular finish can be spun in the lathe. Holding a bright-boy piece or a green Scotch Bright pad to the surface gives a fine finish (see Figure 3).

Straight line finishes on flat surfaces can be redone by laying a strip (approximately 3" x 8") of 3M paper on a flat surface and drawing the piece in a line toward you. Use a straight edge to get a true line; keep your piece next to the edge as you draw it (see Figure 4).

Curved line finishes on the watch lugs can be done by hand, using the Cratex wheels. These wheels should be trued and squared while running in the lathe by holding an old file to the edge and sides. Try the wheel on a scrap piece to get a finish as close as possible to the original. Then proceed using a slight twisting motion as you address the wheel to your case. (See Figures 5-8.)

Clasps can be finished with the bright-boy wheel and a fine finish with the green Scotch Bright pad. Also the inside ring buff wrapped with the 3M #180 paper works well on the inside and outside of some clasps. Hold the trimmed paper in place with rubber bands. (See Figure 9.)

During many of these operations the piece can get hot, especially when polishing. It is best to wear finger cots. On the left hand, they should be worn on the thumb and index finger. The right hand should have them on the thumb, index finger, and middle finger.



Figure 1. Bright finish on case on buff wheel with Fabulustre.



Figure 5. Mid-frame of case receiving a slight curved finish with a coarse Cratex wheel.



Figure 9. Line finish on inside of bracelet using the inside ring buff wrapped with #180 paper.



Figure 2. Round case back in three-jaw chuck, spinning to remove pits and rust with broken cut-off wheel.



Figure 6. Watch band link receiving a straight-line finish with a medium-grit Cratex wheel.



Figure 10. Supplies needed for use at the buffing machine.



Figure 3. Spinning case back with Scotch Bright pad being held in contact to give fine line finish.



Figure 7. Another view of Figure 6.



Figure 11. Supplies needed for use at the lathe and watch bench.

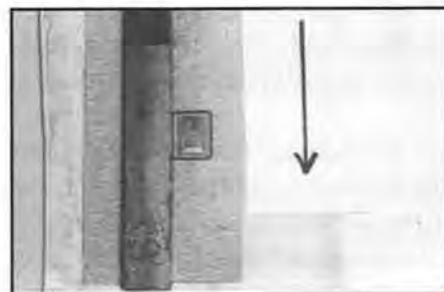


Figure 4. Straight-edge and case back being drawn to create a line finish on #180 paper.



Figure 8. Side of link receiving a line finish.



Figure 12. Shop room where buffing and cleaning are done.

Taking your time to develop the skills to do a professional job will be rewarding in two ways. The pride in seeing the piece presented in the best possible way and being able to charge for your expertise. Customers are willing to pay for a job that is a thing of beauty.

The following are tools and supplies that you will need. Most certainly, you will alter these to meet your own needs. Some tools/supplies are pictured in Figures 10 and 11.

A) Buffing Machine

1. Yellow muslin, 6" buff, 6x50, 4 rows, #17555
2. Two-inch wire wheel
3. Inside ring buff, new or used

B) Watchmakers Lathe with #50 chuck

1. Three arbors to fit chuck and Cratex wheels
2. Three-Jaw Chuck
3. Bezel Chuck

C) Ultrasonic Jewelry Cleaner (with a good grade solution)

D) Hand Tools

1. Emery sticks: 1, 2/0, 4/0
2. Rubber finger cots: small #23-225, medium #23-226, large #23-227, extra-large #23-228

E) Green Scotch Bright Pads

F) 3M Open Coat Paper, PTS, #180-435N

G) Brown tripoli

H) Fabulustre: 1/4 lb. or 1 lb., #47-312 or #47-313

I) 2" x 1/4" Bright-Boy Wheel, #10-691

J) 2" x 1/8" Cratex Wheel: Medium grit #ST1515M (202M), Coarse grit #ST1515C (202C)

K) 2" x 1/4" Cratex Wheel: Coarse grit #ST1516C (204C)

L) Cut-Off Wheels (box of 100), #HR 44-816

M) Safety Glasses or Goggles

These supplies are available through your local supplier. The Scotch Bright pads are in your kitchen. I don't think she will miss just one.



Horological Tour, 1995

By Henry B. Fried

The 1995 Henry B. Fried Horological Tour visited Finland, Estonia, Sweden, Norway, and the Netherlands. The visit to Finland was quite rewarding with a joint meeting with the Finnish watchmakers and clockmakers that went off very well. A mart had been set up by the Finnish who are enamored of large American pocket watches.

A visit to the famed horological school at Helsinki verified again its worldwide earned reputation. This four-year live-in facility selects their students from hundreds of applicants after extensive aptitude testing. A large bronze medal commemorating the Finnish guild's 75th anniversary was presented to Henry Fried by Leena Fagerstoem, the school's director. It is now on display at the new AWI headquarters' museum.

A side trip to Estonia, formerly U.S.S.R., by hydrofoil from Helsinki provided a most interesting trip. A flea market as well as antique shops had many Russian items of horological interest which were bought at bargain prices by members of our group.

An overnight sea voyage from Helsinki to Stockholm on the "Isabella," Viking Lines' newest ship, allowed tour members to enjoy the long daylight of the approaching summer solstice from their outside staterooms.

In Sweden we were greeted by Bengt Dahlgren, president of the Swedish as well as Nordic Watchmakers Forbud. In Stockholm, we attended their convention which was purposely held to coincide with our visit. During that meeting, we heard an excellent lecture on the history of the Swedish Halda watch. Impressively, the Halda watch serialized production number 1 had a detent escapement, helical hairspring and a patent regulator index-end seated in a spiral groove invented by Hammerlund, Patent number 1171 of August 29, 1889. A similar idea was used in a very few Illinois watches. In the Halda's fifty-year period of watchmaking, later models with lever escapements used the same unusual regulating system.

Following a joint mart, an auction was held with some buying by both sides; the Americans mainly buying watchmaking equipment and accessories. A fine old Swedish verge watch was acquired by Seth Finkelstein of California who later lectured to our group about Swedish watches on one of our bus rides through the mountains. John Grass also participated in bus seminars, speaking about Vienna Regulators. Other AWI members spoke on their specialties.

In Oslo, Norway, we met with our Norwegian counterparts and had a special meeting with their group. They boast of a countrywide membership of over 600. In Moss, we were privileged to visit the small but completely equipped clock movement factory of Sverre Dahl, a third generation clockmaker. Mr. Dahl demonstrated the making of wheel-cutters on what at first appeared to be a modern device, but tour member Seth said that it was illustrated in the late-nineteenth-century edition of Saunier's treatise.

Horological Tour Of Scandinavia, 1995

Dial making was also demonstrated, as was the making of clock hands.

We drove through the beautiful countryside of Norway on the way to Stalheim and Lillehammer with snow along the roadside. Lillehammer was a resort area prior to being chosen for the 1994 Winter Olympics. Maihaugen Museum in Lillehammer was quite impressive. We toured realistic "hands on" craft displays of the past in watch and clock making, printing, tools, and many others trades.

We departed from Gothenburg, Sweden, on the "Prince of Scandinavia" for another sea voyage, arriving in Amsterdam the next day. There we visited the diamond-cutting centers and the library and museum at Schoonhoven. We were warmly greeted and allowed to examine some of the oldest and rarest of horological books as well as current volumes. Books about American horology were rather sparse.

The clock shops of Amsterdam contained items of museum quality and rarity which were a bit pricey. There too, we were guided by members of the Netherlands Horological Society.

Plans for the 1996 trip, April 22 - May 8, include the Basel Watch, Clock and Jewelry Trade Fair as well as watch and clock factories. We will then continue on to Austria and visit Innsbruck, Salzburg, and Vienna as well as into Italy to Venice and Milan. For more information, call Nick Lerescu at 1(800)262-4284. □



Photo 2. The 1995 Horological Tour group, Stockholm, Sweden.



Photo 3. Fjord ferry near Stalheim, Norway. Peggy Blair in foreground.



Photo 1. Clock by Erasmus Sorner, called the Thomas Edison of Norway; mechanical, electrical, and electronic.



Photo 4. Watch-clock museum in Bergen, Norway.

Photos by Harry Blair

Outstanding Watchmaking Student Award at St. Paul Technical College for 1995

Congratulations to Greg Bourne, shown on the right, accepting the Outstanding Watchmaking Student Award from his watchmaking instructor, Woody Woodward.

This is a most meaningful award because Greg was chosen by the other watchmaking students with whom he worked every day. The watchmaking students choose one student each year to receive this award, based upon outstanding attitude, attendance, ability, and achievement.

Not only did Greg do an excellent job in all areas of the watch, clock and jewelry repair course, but he was always willing to pick up parts, to repair the most difficult watches, and to help someone else!

Greg will receive a plaque and have his name engraved on the larger trophy that remains on display in Room 305, the Watch, Clock and Jewelry Repair Department, at the St. Paul Technical College in St. Paul, Minnesota.

Congratulations Greg Bourne, on your "attitude of excellence" and best wishes on a long and rewarding future.



Woody Woodward presents the Outstanding Watchmaking Student Award to Greg Bourne at right.

An Organ Clock

By David J. Carlson

Some jobs can present an interesting challenge both technically and professionally. Such was the case with the Black Forest tall-case clock shown in Figure 1. The clock stands over seven feet tall and was probably constructed in the late 1700s. The clock with the bonnet removed is shown in Figure 2. Three weights that run the clock are visible through the open door. From left to right they are the organ, time, and strike weights. The small pendulum is just visible above the strike weight. All of the "works" of the clock, the organ and wooden plate movement, are located on the seat board behind the dial.

When I was approached to work on the clock, the organ section was already in the process of being reworked and a new bellows installed, the dial had been sent out for restoration, and the wooden plate clock movement was in pieces in the bottom of the case. The challenge was "would I please put it all back together."

Clock Movement

The wooden plate clock movement is shown assembled in Figures 3 and 4. Prior to assembly, a water-based cleaner was used on the metal parts and 4-0 steel wool was used to clean the wood and brighten the levers. The brass bushings were cleaned internally with pegwood and the ends with a tuft of 4-0 steel wool held in the tip of a long-nosed pliers. None of the bushings required replacement. The two hammers visible in Figure 4 at the left side of the movement are part of the organ release mechanism and will be described separately.

Organ

A rear view of the organ is shown in Figure 5. The large area with the two springs is the bottom of the "wind chest." The pipes are resting on a compartment which contains the valves that activate the pipes. Note that the two end pipes have been miter-cut to reduce their vertical size. Figure 6 is a top view of the pipes. There are a total of twenty-two of them. The pipes are tuned by a moveable end-piece which is adjusted with a knob. The end pieces are slid in (pipe shorter) for higher frequency and slid out for a lower frequency.

Figure 7 is an end view of the right side of the organ assembly. The edge of the dial is visible at the right front.



Figure 1. Organ clock.



Figure 2. Bonnet removed.



Figure 3. Movement, front view.

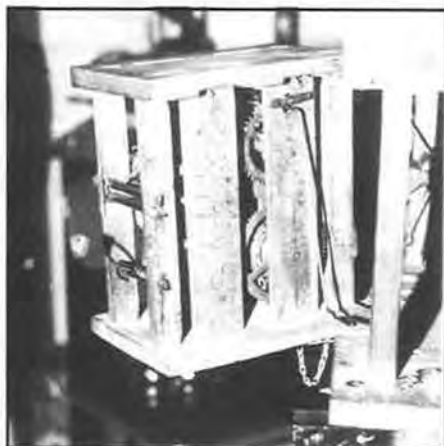


Figure 4. Movement, rear view.



Figure 5. Organ, rear view.

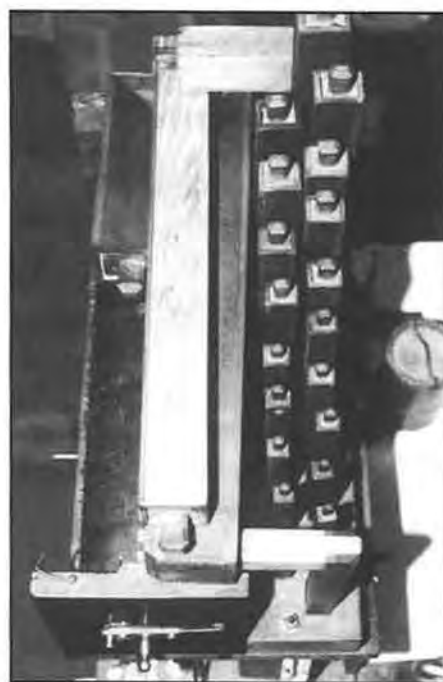


Figure 6. Organ, top view.



Figure 7. Organ, end view.

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1995 INDEX

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

The small horizontal oak rod is the drive for the wind chest. The rod is driven by an eccentric wheel at the right end and drives the top of the wind chest at the left end. Unfortunately, the leather bellows is hidden by the frame.

Combined Clock and Organ

The whole assembly with the clock in place is shown in Figure 8. The wooden music roll is clearly visible. Immediately above the music roll are the lift levers or actuators which control the organ pipe valves. At the right end of the music roll a manual detent is visible which can select one of eight different selections. It is not a simple chore to change the selections because the bonnet has to be removed. Immediately below the right end of the music roll the hour strike gong is visible.

Controlling the Organ

The heart of the control system is shown close-up in Figure 9. Before describing the control action, it is helpful to detail the components visible in Figure 9. Starting at the far left, the eccentric wheel and lever arm driving the wind chest can be seen. The shaft above the lever arm is the winding arbor for the organ. The first section within the organ contains the great wheel and winding spool. The vertical cord is a manual release. The two hammers are part of the release mechanism. The stopwork for the organ is similar to a music box (a lever falls into a notch on the great wheel which in turn stops the governor or "fan"). The governor or "fan" is driven through the wall of the first compartment on the same arbor that drives the bellows eccentric wheel. The fan is comprised of four blades

and four weights. One fan blade and two weights are visible in the picture. The wooden works movement is to the right of the fan. The cannon pinion and hour wheel have been removed so that the action of the control levers can be seen.

The key to the control of the organ are the two hammers which are seen to the right of the manual strike control cord. The top hammer is driven from the lock plate lever arbor (see Figure 8). The lock plate lever is driven from a lever which is to the right and behind the minute wheel in Figure 9. The lower hammer is driven from a lever which is pivoted on the left column of the wooden movement and activated by a pin on the front surface of the minute wheel.

The timing sequence for the hour and organ strike is: as the hour approaches, both hammers start to raise as the pins on the minute wheel drive their respective levers. At the hour, the hour strike begins and the lower hammer falls. When the lower hammer falls it *may* or *may not* strike hard enough to start the organ. When the hour strike is over, the sensing lever on the lock plate falls into its slot and the second hammer falls. If the organ hasn't started, the second hammer will certainly start it.

Comment

Considerable time was spent trying to have the first hammer "set up" the organ and then the second hammer would enable it. Mechanical tolerance seemed against doing this. I would welcome any comments concerning this action.

□

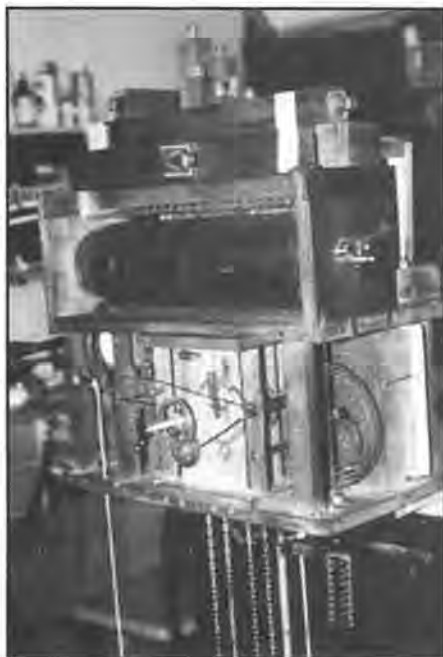


Figure 8. Complete assembly.

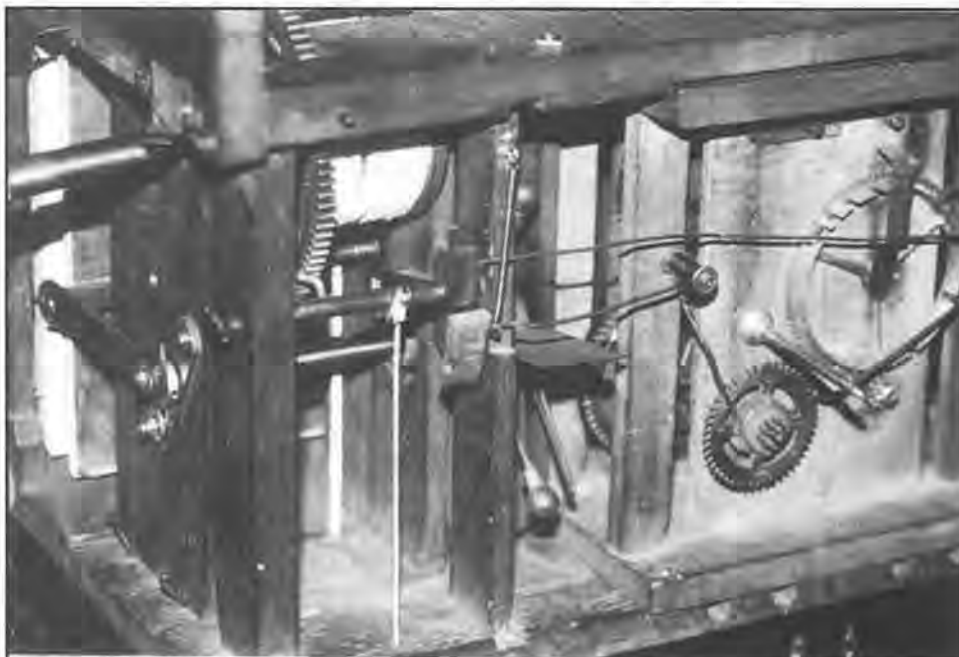


Figure 9. Strike control detail.

J.M. HUCKABEE'S

"Random Clock Talks"

The series of "Random Clock Talks" videotapes listed below are available for loan to AWI members from the AWI Audio Visual Library. The tapes vary in viewing time from 1.25 to 2.00 hours and are available in the VHS format. A service charge of \$5.00 each is to accompany requests to borrow a tape; only one tape is loaned at a time. The service charge covers AWI's production and shipping costs. Tapes should be returned to AWI within 7 days after receipt, insured for \$30.00. Please order tapes by number along with your name, address, and \$5.00 service charge. Send to: **AWI Audio Visual Library, 701 Enterprise Dr., Harrison, OH 45030.**

TAPE 1: Approximately 2 hours

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

TAPE 2: Approximately 2 hours

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

TAPE 3: Approximately 2 hours

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

TAPE 4: Approximately 1.50 hours

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

TAPE 5: Approximately 2 hours

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

TAPE 6: Approximately 1.75 hours

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

TAPE 7: Approximately 1.75 hours

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

TAPE 8: Approximately 2 hours

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

TAPE 9: Approximately 1.75 hours

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

TAPE 10: Approximately 1.50 hours

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

TAPE 11: Approximately 2 hours

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

TAPE 12: Approximately 2 hours

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

TAPE 13: Approximately 2 hours

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

TAPE 14: Approximately 2 hours

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

TAPE 15: Approximately 2 hours

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

TAPE 16: Approximately 1.50 hours

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

TAPE 17: Approximately 1.75 hours

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

TAPE 18: Approximately 1.75 hours

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

TAPE 19: Approximately 2 hours

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

TAPE 20: Approximately 2 hours

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

TAPE 21: Approximately 2 hours

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

TAPE 22: Approximately 2 hours

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

TAPE 23: Approximately 2 hours

SUBJECT MATTER: Pivot and bushing problems and their repair.

TAPE 24: Approximately 2 hours

Not available at this time.

TAPE 25: Approximately 2 hours

SUBJECT MATTER: Clock mainspring and barrel work.

TAPE 26: Approximately 2 hours

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

TAPE 27: Approximately 2 hours

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

TAPES 28 & 29

Not available at this time.

TAPES 30-34: Approximately 2 hours each

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

TAPES 35 & 36: Approximately 2 hours each

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

TAPE 37: Approximately 2 hours

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

Repairing Mechanical Watches & Clocks

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Vibrating the Hairspring, Part IX

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

Vibrating a hairspring is that operation in which the new spring's length is adjusted so that it causes the balance to swing a definite number of times a minute.

There are numerous methods of vibrating a new hairspring to a balance. To give detailed descriptions of each method would require a volume in itself. However, the more efficient and simpler methods will be described here.

Professional hairspring vibrators use a vibrating head with adjustable tweezers. This is illustrated in Figure 65. The subject balance and hairspring are suspended from the tweezer until the lower balance pivot rests on the vibrator platform.

The platform upon which the pivot is made to rest is composed of a disc of transparent glass. Under the glass and set into the platform is a precision-timed master balance and hairspring.

The suspended balance is adjusted so that its pivot is directly over the center of the master balance and the arm of the balance under test is directly over and parallel to

that of the master balance, as shown in Figure 65. Both balances are then shaken into motion by lateral movement of the platform and both balances are observed to see whether the tested balance gains, loses or is in unison with the master balance.

To the beginner, it is difficult to determine whether the balance is faster or slower than the master balance. With some practice, the eye will learn to make this distinction. An aid in this direction is to put both balances in weak motion. It is then more easily observed. If difficulty is still encountered in deciding whether the balance is slower or faster, observe the balance and you will notice that while both balances start off together and in step, this unison will soon be altered. One balance will continue to vibrate and the other will be seen to change until the arms are oscillating *against* one another. A little further on they will catch up to one another and again be in step. With a timepiece with a seconds hand, time this interval from the first vibrations when both are started in unison until they



Figure 65. How a sample balance is suspended over a glass-enclosed master balance.

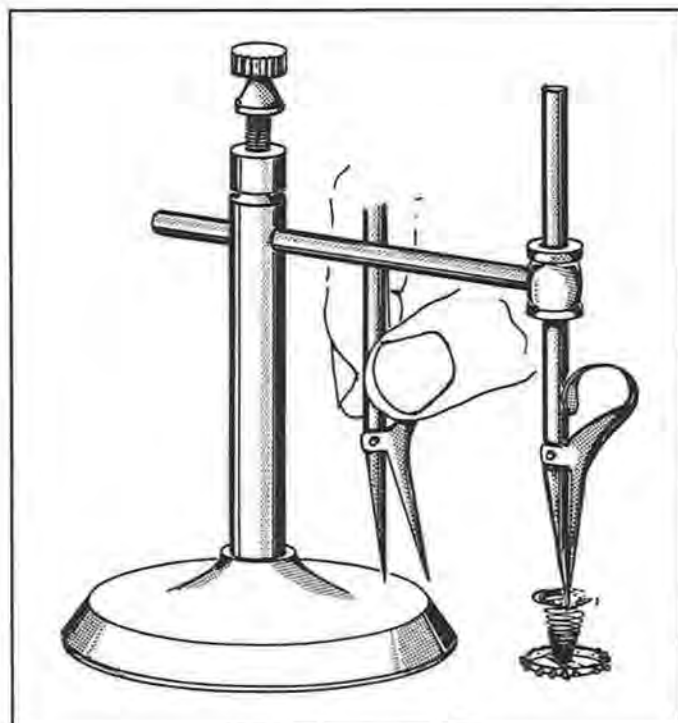


Figure 66. A balance scaffold and adjustable tweezer. Inset shows tweezer opened.

part and finally come together again. Make a note of the time it takes for the completion of this cycle. Shorten the hairspring and retune this period. If the time period is shorter, then it is an indication that the shortening of the spring is aggravating the condition and it is a sign that the subject spring is too short. On the other hand, if the interval becomes longer, it is an indication that you are proceeding in the correct direction and that the spring was slow (too long).

This process is continued cautiously until both balances keep in time for a considerable length of time or until both balances stop. Should the subject balance closely approach unison and the next changing of hairspring length produce a shorter period between the unison and out-of-step duration, it is apparent that the spring's length was overcompensated.

When both balances seem coordinated and remain so until they stop, the hairspring's length may be assumed correct. *The spot where the vibrating tweezer holds the spring becomes the point where it must lie between the regulator pins.* Extra hairspring length must be added to this point so that it may be studded.

For the watchmaker at the bench who chooses to vibrate hairsprings without elaborate equipment, there are a few good practical and simple methods which give accurate results. These methods depend on comparison to a reliable balance, "counting" the vibrations of the subject

and utilizing the simple laws of harmonic motion with another pretimed balance in a going watch.

The basic idea of comparing the subject balance with a pretimed balance is very much the same as described previously and used by professional vibrators. However, the "master" balance may be just an old 18s watch stripped of all parts but the balance and bridge, or some similar simple device.

"Counting" is simply counting the vibrations of the subject balance for a given time. The idea of using the laws of harmonic motion of the subject balance with a master balance will be described in detail.

An old 16s or 18s movement, stripped down so that only the lower plate, balance and bridge remain, makes a good model with which to match the newly sprung balance. Of course, the watch should be timed and regulated to very close limits before it is dismantled in order for the balance to serve such a precise purpose.

To use the comparison method, the subject balance's hairspring may be held in a regular bench tweezer or it may be suspended from a tweezer set into an adjustable platform or scaffold as shown in Figure 66. When the spring is held in the tweezer, the balance is brought directly over the master pretimed balance so that the arms of both balances are directly over one another. Both balances are then twisted into motion at the same time and the subject balance is observed to see how long it will

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keep in unison with the lower balance.

If doubt exists whether the subject balance is slow or fast, time the interval between the start of both balances and the time that it gets out of and into step again. Then shorten the spring and time the cycle once again. As previously described in the paragraphs on the vibrating machine, if the second cycle is of a longer duration, it is an indication that you are proceeding in the correct direction and that the spring was too long. If the interval is quickened instead, the reverse is true and the spring must be grasped with the tweezers at a point nearer its end.

For some beginners in this division of watch repairing, the job of getting both balances to start together is sometimes a bit difficult. To overcome this, the balance under test is placed beside the master so that the screws of one balance enmesh with the screws of the other and fit similar to engaged cog teeth. Of course the arms of each

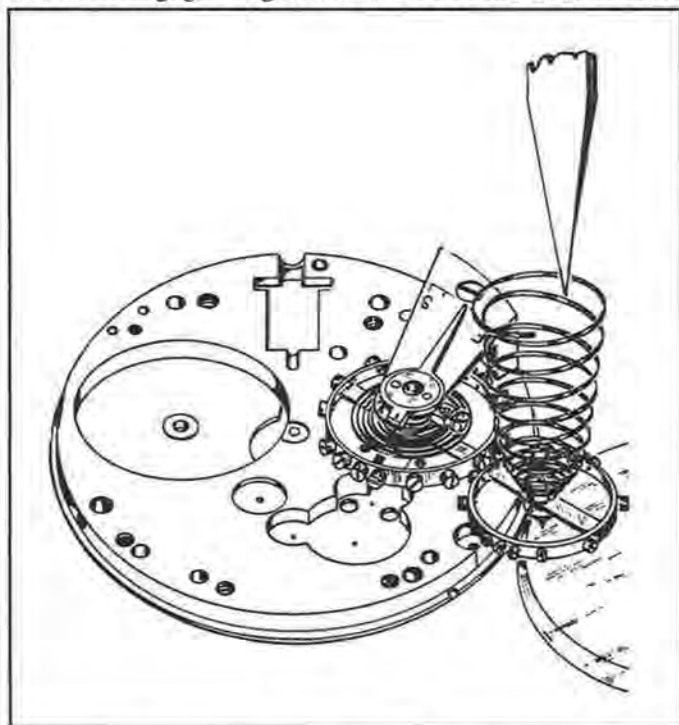


Figure 67. By enmeshing the screws of the suspended balance with screws of the master balance and turning with one finger, they will start together.

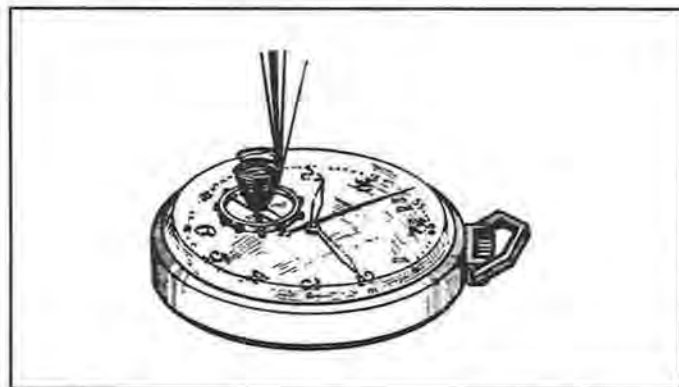


Figure 68. A watch with a sweep second hand can be used to count the vibrations of the trial balance as an alternate method.

balance are made to appear as a straight line as shown in Figure 67. In this manner if one balance is moved, it will motivate the other and both will be put into simultaneous motion. To do this, the index finger of one free hand slowly twists the master balance, which, having its screws enmeshed with the screws of the subject balance, will in turn rotate it as well. When the finger has moved the master balance about a $3/4$ turn, the finger is suddenly removed, releasing the master balance. At the very same moment that this is done, the other hand moves the subject balance sufficiently aside to have its screws clear those of the master balance. Both balances will therefore start off alike.

As they swing back and forth, the arms of both wheels will seem to part and come together again. Thus the length of time this action remains in unison is observed and the spring's length adjusted accordingly. Of course when the subject balance is moved slightly aside, a smooth surface such as a flat watch glass is provided for its lower pivot. The balance should be suspended so that its lower pivot barely rests on the surface chosen.

Another method of bringing the spring's length to size and time is to count the number of vibrations of the balance in a given time, usually for a minute. This method is not as accurate as matching the vibrations of the balance with another, but many watchmakers are able to master this system with remarkable results. A watch with a large seconds hand or one with a sweep seconds hand is used as the timepiece with which the counted vibrations are directly checked. In fact, the counting is done directly upon the crystal over the watch dial to facilitate the observation and counting.

The balance with its new spring is grasped with the bench tweezers and suspended over the center of the watch crystal by bracing the fingers of the hand holding the tweezer in such a manner that its lower pivot barely touches the crystal as shown in Figure 68. With the other hand the balance is twisted around so that when it is released it will have an active motion. When the balance is released and it starts its swings it will be drawn up off the crystal and then down again with an audible tap by the descending lower pivot. These taps are then counted beginning when the second hand on the watch under the crystal *passes* (not reaches) an easily remembered part of the dial, such as the 60-second mark or any of the quarter marks.

Since these taps represent only alternate beats, they are infrequent enough to be counted. The total number of taps in one minute is then multiplied by two. In most watches, there are 300 vibrations a minute. If the spring is of perfect length then there should be 150 taps per minute. If the total number of taps on the crystal by the lower pivot in one minute is more than 150, it is an indication that the spring is grasped at a point too far from its outer terminal. If there are less than 150 in a minute, then the tweezer must grasp the spring at a point farther from the outer end of the hairspring.

Sometimes the motion of the balance falls off to such an extent, before the minute is up that the taps upon the crystal become too weak to be heard. In that case the balance also has a very short arc and it then becomes possible to pick up the count of the alternate vibrations by visual observation. That is, the arcs are short, slower and easier for the eye to follow and thus pick up a count; or the taps heard may be timed for a half-minute period. As with the acquisition of many other watchmaking skills, practice is essential.

Another method is the system in which the balance is suspended and the vibrations observed as explained above. However, instead of the pivot resting upon the watch, the going timepiece is held against the ear. This is shown in Figure 69. If the suspended balance oscillates in harmony with the watch held against the ear, the ticks will seem to come from the suspended oscillating balance. This, of course, is an indication that the spring's length is correctly adjusted.

If the spring on the suspended balance is longer or shorter than it should be, the speed of this balance will, of course, be out of harmony with the watch against the ear. This will manifest itself in the fact that the ear and eye will fail to associate the sounds of the ticking balance with that of the out-of-time oscillations of the suspended balance. As soon as they reenter a phase of unison, the association of sight and sound will again take place. The longer the tested balance and the audible watch remain in unison, the more accurate is the vibration of the tested balance spring. A few trials with an assortment of balances will reward the operator with the desired efficiency.

Harmonic Motion

It is known that if a pendulum was to stand close to a going clock whose pendulum's length approximated its clockless neighbor, the idle pendulum would soon be set into motion. If the clockless pendulum is shorter or longer than the clock pendulum it will stop a short time after it has started and then start all over again, stopping soon after that. These cycles will recur with some degree of regularity. However, if the pendulums are almost exactly alike in length, the free pendulum will remain in motion a longer period of time. The closer the pendulums match each other in length, the longer the free pendulum will oscillate. Breguet made such a clock utilizing this principle.

Utilizing this same principle, it is reasonable to expect that two balances, brought close enough to one another would react in the same way. By the manner in which the balance without the escapement reacts, its timekeeping values may be judged accordingly. To utilize this idea, the Swiss journal describes a method in which it is possible to bring the balance with the newly-fitted spring directly over the balance of a going precision-timed watch. The lower pivot of the balance under test is rested in a

countersink above the elongated upper pivot of the heavy balance of the going watch below.

To produce such a device, a good grade large-sized watch with a heavy balance is obtained. It should be in going condition. Then the balance staff is repivoted or a new staff is made so that its upper pivot is about as long and almost as thick as the fourth wheel pivot. The cap jewel is removed from its setting and another hole jewel is substituted for one to fit the new pivot. A brass socket, similar to that on a seconds hand is made to fit over this



Figure 69. Another method is to suspend the balance and to observe the vibrations, timing them by the sound of a going watch held against the ear.

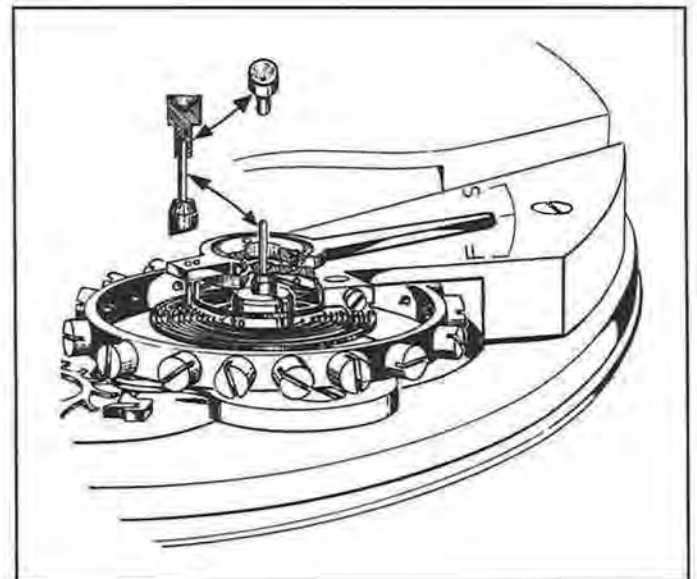


Figure 70. Device for testing balance as described in a Swiss journal, employs a specially-made device pictured here and used on a precision-timed watch which is adapted for its use.



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protruding pivot. However, the top of this socket is cut so that it has a conical countersink, similar to the balance staff nut on a cheap alarm clock. This unit is shown in Figure 70. After it is fitted and the watch is put in good running condition, it is retimed and regulated to compensate for the additional weight upon the balance.

To use this device, the balance and spring under trial is suspended over the going balance so that its lower pivot rests in the conical groove in the socket atop the going balance. This is shown in Figure 71. The suspended balance will soon start to vibrate, impelled by the slight circular friction caused by contact of the socket with the lower pivot. If the suspended balance has an erratic or irregular motion, it is an indication that the hairspring is either too long or too short. The tweezer may then grasp the spring nearer or further from its outer end. As in the case of the pendulums, if the balance starts off and soon stops, it is an indication that the timing of these balances is poor. If the suspended balance picks up motion and remains that way for a long period of time, it is obvious that the length of the hairspring is fairly correct. If the hairspring is of correct length, the motion of the balance picks up considerably and both balances will oscillate in harmonious motion almost indefinitely.

When using this method the balance may be suspended so that the pivot always remains in contact with the socket and the spring may be supported by the tweezers held in the hand. Of course, it would be better if the spring were held in the small mechanical tweezers set into a scaffold such as shown in Figure 66. □

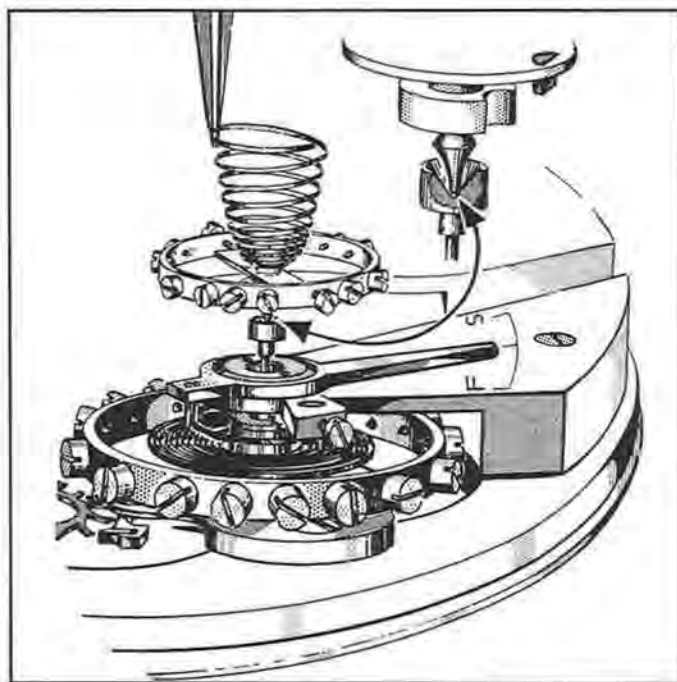


Figure 71. Using this device, the trial balance and spring is suspended over a going balance so that its lower pivot rests in a conical cup. The slight circular friction of the going balance will cause the trial balance to begin vibrating.

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The Novice Watchmaker

Watch Cases: The Material They're Made From

By David A. Christianson, CMW, FBHI



The first impression that a client receives when handed his newly repaired watch is just as important as the impression he receives when being greeted for the first time in your shop.

Even before his newly repaired timepiece has had a chance to perform its "magic" on his wrist, the client has already judged its performance by the way the watch case itself looks. After all, the outside appearance of the watch is all that he can see. He can't see the inside of the watch, nor can he even fathom the knowledge and skills needed to bring his timepiece back to life.

Before we can make the outside of the watch look its best, we need to know what materials are included in the makeup of the case. With this article we'll look at the various materials that can make up the watch case and then we'll follow with information on how to handle these various materials.

Chart #1 shows the more common materials used in watch cases. Each material is different and must be handled differently in order to make it look its best.

Precious Metals

Solid Gold Cases

Solid gold is a term used for "karat" gold cases in order to differentiate them from gold-plated ones. The "solid" does not mean "pure" gold but instead refers to the various alloyed or "karat" golds.

Pure gold is a basic element that neither readily combines with nor reacts with other chemicals. It is called a "noble" metal. In its pure, elemental form it is relatively soft. It will not hold its shape under use. Even "pure" gold coins (called bullion coins) must be mixed with at least 10% base metal so that the design on their faces will be sharp and clean when they are struck or minted.

Gold, in its pure form is called fine gold or .999 fine indicating its nearly pure state. When used in watch cases and jewelry, this "fine" metal is mixed, or alloyed, with a base metal to reduce its fineness and improve its useability. Various combinations of brass, copper, zinc, nickel, silver, and other metals are combined to produce a "karat" gold that can be either yellow, white, green, or rose in color; yellow of course being the most common today.

The degree of fineness or quality is indicated by the term "karat." By definition, 24 karats (with a "k" as opposed to a "c" in carat which is a gem stone weight measure) is fine or "pure" gold. Mixed with 25% base metal, this fine gold becomes 18 karat. In other words 6 parts of base metal mixed with 18 parts

fine gold (6 parts is 25% of the total 24 parts). If one mixes 10 parts base metal with 14 parts of fine gold, one has 14 karat solid gold. With 14 parts of base metal and 10 parts of pure gold, one gets 10 karat solid gold.

In some parts of the world you can find 12 karat gold and especially in England you will find 9 karat and even 6 karat gold. But in the United States only fine, 18 karat, 14 karat and 10 karat can legally be called solid gold. Anything less than 10 karat gold would have so little gold as to be quite deceiving if called solid gold. (See Chart #2.)

A Few Observations

An 18 karat gold is rather soft. (See Figure 1.) In watch cases of 18 karat the case will tend to stretch while worn and could cause such problems as the crystal and/or back becoming loose or even falling off as the bezel or case frame is deformed. However, 18 karat does have a richer, softer, slightly rosy tone. A 14 karat gold (see Figure 2) and 10 karat are very close in fine gold content; 14 karat having just over 1/2 pure gold content and 10 karat having just under 1/2 pure gold content, yet the appearance of each case can differ. Both will look the same when new and/or brightly polished. However, after use, the 14 karat will tend to keep its looks, whereas, 10 karat will tend to tarnish, especially when not worn. Theoretically, 10 karat is a bit harder than 14 karat, but the difference is negligible, so both will tend to show wear when used. A 14 karat gold will tend to have a softer color; 10 karat will tend to have a brassier, more yellowish color.

The Federal Trade Commission (FTC) oversees the stamping of precious metal objects but does *not* require that the metal content be marked on the object. However, if the content is marked on the object, then the FTC requires that the marking be accurate within very close tolerances and it requires that along with the quality marking there *must* be a trademark. International convention recognizes both the karat mark of the United States as well as the commonly used international decimal standard (.999, .750, .585, etc.). Some countries, most notably England and some middle-European countries, still use a symbolic marking, called a "hallmark," to indicate precious metal content.

Silver

Another precious metal found especially in older watch cases is silver. Silver, like gold, is often alloyed for strength, but silver in its "pure" form is quite strong in its own right.



Figure 1. A pocket watch case stamped "K18" (18 karat) with the maker's name: E. Bourquin & Fils, and the maker's office: Locle (Switzerland).

Chart #1

The More Common Watch Case Materials

Precious Metals: Solid Gold (18K, 14K, 10K, .999, .750, .585)
Solid Silver (999, fine silver, coin silver)
Platinum (10% irid. plat., plat.)
Vermeil

Plated Base Metals: Gold Filled (G.F., 10- & 20-year cases)
Gold Plated
Micron Plated
Nickel (ore silver, nickel silver)
Chrome Plated
Nickel Plated
Silver Plated
Rhodium Plated

Stainless Steel

Exotic Metals: Titanium
Aluminum
Tantalum
Niobium

Plastics: Solid Plastics
Plastic & Metal
Metalized Plastic
Chrome-plated Plastic



Figure 2. A ladies' case marked "14K gold."



Figure 3. Three gold-filled cases: one marked "Gold filled," one marked "guaranteed twenty years," and one marked "warranted."

Chart #2

	Ratio of gold to fine gold		Decimal equivalent of pure gold	Colloquial Terms	International Stamping
Fine gold	24/24	=	.9999	Fine	999
18 karat	18/24	=	.7500	3/4 gold	750
14 karat	14/24	=	.5833		585
12 karat	12/24	=	.5000	1/2 gold	500
10 karat	10/24	=	.4160		416
9 karat	9/24	=	.3750	1/3 gold	375
6 karat	6/24	=	.2500	1/4 gold	250

Chart #3

Fine silver	999
Sterling: Britannia silver	985
Mexican silver	925
Coin silver (US)	900
Coin silver (European)	800

Typical silver cases can be made of fine silver, sterling silver, and coin silver. Fine silver is nearly pure and is indicated by the marking 999 (like gold, but without the decimal point). Sterling silver varies a bit in fineness but is generally 985 to 925 fine (in other words, from 98.5 % pure to 92.5% pure). Coin silver, the quality used in the old silver coinage is about 90% pure silver in the United States and is indicated as 900 or as "coin." Earlier United States standards allowed 80% coin silver (marked as 800). (See Chart #3.)

In the United States, only silver alloy of 925 fineness or greater can be called sterling silver.

Some Observations

Silver tarnishes very easily and is harder to work because it conducts heat so well. It is a beautiful metal, takes a very high polish and is less rare, and thus less expensive than white gold or platinum.

Platinum

Platinum is a grayish-white metal that is more rare and more expensive than gold. It is non-tarnishing, harder, and much more durable than gold. Platinum watch cases are more commonly made from a platinum alloy of 90% platinum and 10% iridium (a rare, related metal used as a hardener). Another related platinum group metal, rhodium, is used as a white plating on silver and white gold objects to reduce tarnishing and add hardness and durability to the object's surface.

Vermeil

If sterling silver is plated or overlain with a coating of gold, the product is called vermeil (vur-MAY). This is a cheaper way of making a watch case look like solid gold, yet have a pure, precious metal content. However, the case will tarnish up through the gold plating in time. Plating the silver base metal with nickel before plating with gold will retard this tendency of the silver base to tarnish.

Plated Base Metal Cases

Gold Plated

To reduce the cost of raw material and yet to retain the look of gold, several methods of gold plating are used in watch case manufacture.

Gold filled refers to a composite metal consisting of a low-cost base metal with a layer of karat gold which has been applied using a method of heat and pressure. (See Figure 3.) This produces a watch case whose surface looks like karat gold. The layer of karat gold must make up at least 1/20th the total weight of the case and must be marked: 1/20 12K G.F. (for example, if the plating layer is of 12 karat gold). Another way of describing gold filled is to say that it is a plating of gold that is "mechanically" applied.

In past years gold-filled watch cases were marked "10 year" or "20 year," or "10 (or 20) Year Warranted," or just "Warranted." This indicated that the gold-filled layer would last at least the 10 or 20 years for which it was warranted before the gold layer would



Figure 4. The center ladies' case is marked "10K gold filled." The other two cases are rolled gold plate, a thinner plating than gold filled. The lady's case on the left has a 10K R.G. P. bezel with a stainless steel back. The gent's case on the right is all 10K rolled gold plate.



Figure 5. The gent's case on the left says it has a stainless steel back and a base metal bezel (and case frame, since the bezel and frame are all one piece). Although the bezel is actually micron plated with gold, it is often marked base metal. The one on the right implies that the entire case is stainless steel, since there are no qualifying markings other than "stainless steel."

wear off under “normal” use. If you examine the edges of most gold-filled cases, you’ll find the distinct line between the lighter gold coating and the darker (tarnished) brass base metal where the gold layer has worn off. Keep in mind that gold does not tarnish but brass tarnishes readily when exposed to the air.

Rolled gold plate refers to a composite metal made the same as gold filled (i.e., mechanically bonded) but in which the layers of karat gold can be thinner; in fact as thin as 1/30 or even 1/40 the total weight of the item, or even less. Federal Trade Commission rulings, however, require that the item be marked with its fineness and content: “1/40 12K R.G.P.” for example. In older watch cases, oftentimes just the words “Rolled Gold Plate” or “R.G.P.” were used without a notation of content (see Figure 4). These cases are cheaper to produce and cheaper to buy but are, of course, much less durable than gold filled. Gold overlay is a very descriptive term often used to describe either gold filled or rolled gold plate.

Gold electroplate is made by applying a coating of gold to a base metal using a process of electrolysis called “electroplating.” This method is the cheapest way of providing the look of solid gold and is commonly used on watch cases. The process results in a very thin, porous coating of poor durability. Commonly, the watch case is marked “gold electroplate” or “H.G.E.” (referring to heavy gold electroplate for a thicker coating).

Micron plating is simply another way of expressing a gold electroplated coating. Micron plating denotes a thickness measured in microns or 1/1000th of a millimeter. In years past (around 1970), a well-plated case was considered to be a 40-micron case. In other words, a case whose gold thickness measured 40-thousandths of a millimeter. Today, our standards have dropped considerably and a 6-micron case (6-thousandths of a millimeter) is something to brag about in selling a gold-plated case. Unfortunately, most of the gold-plated cases are in the range of 1-3 microns. Needless to say these cases show wear very quickly, letting the base metal show through in no time at all.

There are other processes for plating base metals that use a low micron gold plating that wears far better than those cases plated with the electrolysis process and are used on the better cases of the better known watch brands. In fact, some of the micron plating applied by these special processes are so durable that some of the manufacturers guarantee their cases against showing any wear for a lifetime. Most times, these cases are just marked “base metal” even though they have a gold micron plating. (See Figures 5, 6, and 7.)

Nickel Cases

Nickel is a hard, malleable, and ductile metal of nearly a silver-white color. It is used as a silver-white plating over a base metal, and as an alloy (mixture of metals) to make the silvery blue-white nickel silver and the yellow-white German silver cases. Neither of these alloys, by the way, contain any silver. Other common names for nickel silver and German silver are ore silver, Feyes silver, and silvertine. (See Figure 8.)



Figure 6. This and Figure 7 are illustrations more of nomenclature than anything else. The back tells us that the entire case is stainless steel, not just the back, because there are no qualifying statements such as “stainless steel back,” although it does state the case has a base metal bezel. See Figure 7.



Figure 7. When we turn the case around we see that on the stainless steel case frame there is a yellow gold micron-plated base metal bezel around the crystal and dial.



Figure 8. Illustration of three nickel cases variously marked “nickel,” “ore silver,” and “silvertine,” none of which has any silver in it.

Chrome Cases

Chromium, a very hard and brittle metal, is often used to provide a white chrome-plated case. This is a very inexpensive process and is used on very inexpensive watch cases.

Silver-Plated Cases

Base metal watch cases can be plated with silver as well as with gold. Like gold plating, silver filled refers to a silver alloy of at least 925 fineness with at least 1/20th of the metal weight being silver. This silver plating can be called silver overlay but never silverplate.

Silverplate is a film of fine silver that is electrically deposited on a base metal using the same electrically charged bath used to make a gold-plated case.

Stainless Steel Watch Cases

Stainless steel is an alloy of iron with a small amount of carbon combined with chromium and sometimes nickel to make these watch cases corrosion-resistant. Stainless steel is used in some high-grade watch cases as well as modestly priced cases because it is extremely durable, rigid, and yet will take a very high polish. (See Figure 5.)

There are better grades of stainless steel as well as poorer grades. The poorer grades do tend to corrode in time and tend to be softer than the better grades.

Exotic Metal Watch Cases

Aluminum has been used in very low-priced watch cases for many years, sometimes even plated with gold, as well as anodized with other colors. Titanium is used in some of the higher grade watch cases because it is very lightweight, yet strong and corrosion-resistant. It can be colored by heating or can be anodized electrically with a protective oxide coating to produce a dark gray to black finish (as well as other colors).

Niobium and tantalum can be anodized with colored oxides, also. Niobium is gray but very color receptive and weighs about twice as much as titanium. Tantalum is dark gray, more expensive than either titanium or niobium, and nearly as dense as gold but very soft.

Plastic Watch Cases

Various types of plastics, from the relatively soft plastics to the tough and durable "engineered" plastics are found in many inexpensive watch cases. Generally black, but available in any color of the rainbow, plastic cases present their own set of problems when being worn or when being treated by the watch repairman.

Plastic cases can be combined with metal backs or bezels, can be chrome-plated or coated with various colored base metals, or can even have colored metal caps that snap over the plastic case to give a look of a solid metal.



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Affiliate Chapter Column



By Jack Kurdzionak

Triage

The dictionary states that triage is a system of assigning priorities of medical treatment to battlefield casualties on the basis of urgency, chances of survival, etc. This is done so that the limited resources of the medical corps will be used where they will do the most good for the greatest number of wounded soldiers.

Efforts to build chapter membership do not in any way constitute an emergency, but we do have finite resources and time available for any goal we wish to attain. Chapter building efforts must be assigned priorities to attain the maximum results utilizing the limited resources we have. Therefore we should expend our efforts where they will do the most good, in the same way that a battlefield medic assigns his treatment priorities.

The medic will usually pass over a person who is mortally wounded with no chance for survival, because his efforts would be for naught and he would neglect others with a better chance of survival. The same goes for membership drives. You must not waste time and effort on those people who are not even remotely interested in joining your chapter. You must be able to accept a firm no from someone you approach and not take it on a personal basis. Any more effort in asking that person to join is a waste of your time and will offend the person you have approached.

The medic will also not give too much treatment to a person with superficial wounds who will survive regardless of medical attention. You will generally find people who need little encouragement to join your chapter or are in your chapter already. They are there and you are amongst that group. These are the folks who support the chapter, come to meetings, and pay their dues. They do not need attention to join. They just have to be kept in the chapter.

The third and probably largest group the medic will see and also treat are the wounded who will survive with treatment and probably perish without it. Membership efforts should be directed to people who are potential new members with a good probability of joining the chapter. If you don't ask and encourage these people to join, you will lose them as a medic will lose an untreated soldier. If you focus your efforts to seek out those potential members, you will get many of them to join your chapter. Well, you might say, it all reads well on the printed page, but where do I get these potential members? The medic doesn't look for wounded soldiers at a football game just because there are 50,000 people there. He goes to the battlefield where there may

be a lot fewer people but many of these are wounded. In the same way, if you passed out leaflets to the 50,000 patrons at the football game announcing that your local chapter is looking for new members, you might get a few, but not too many, new members. You must go to where there is a high potential for new members. There are several places you can try.

A list of AWI members in your area who don't belong to your chapter is a good place to start. Those people have already demonstrated an interest in horology by joining AWI and many of them are waiting to be invited to your next chapter meeting. NAWCC members have also demonstrated an interest in horology, and many of them are pursuing horology as an avocation or a second career. It won't hurt your AWI chapter if you take a table at the next mart to promote your chapter. How about a member of your chapter putting an educational program together for the next NAWCC chapter meeting in your area? Show the NAWCC members what AWI's chapters can do for people who want to learn more about horology. Those of you with retail stores can also invite new chapter members from your customer base, which will include many watch and clock enthusiasts who do not know of AWI or NAWCC. There are a lot of silent watch and clock enthusiasts out there who have never been invited to an AWI chapter meeting and would be happy if someone did invite them. Some chapter people check the local yellow pages each year. They go to every new watch, clock, and jewelry store that opens and invite the folks there to join the chapter. They also visit existing shops with the same invitation.

Put your time and effort for membership where it will do the most good. Even though you may not understand why a watchmaker or clockmaker is not interested in your chapter or AWI, respect his wishes and don't force the issue. In our area we have several shop owners who are competent horologists but have flatly refused to join the Massachusetts Watchmakers Association or AWI. We remain friends with them and maybe they will someday be ready to join and they will be welcomed. Don't shut them out, but don't waste your time offending these folks when they are just not interested. Focus your efforts and those of your officers and directors. Do not force chapter membership upon anyone. Take no for an answer and move on. Just as the medic does, direct your time and effort to those for whom it will do the most good and you will obtain the maximum results for your efforts.

□

Technically Watches

Antique Watch Restoration, Part CXIX

Colleting Hairsprings (2)

By Archie B. Perkins, CMW, FNAWCC, MBHI

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When pinning a hairspring to the collet, the collet must be held on an arbor that will not allow the collet to rotate. The arbor must be shaped so a corner on the arbor goes into the slot of the collet to prevent it from turning during the pinning operation.

Figure 1 shows a hairspring collet holder that can be made by the watchmaker. View A shows a three-dimensional view of the holder. The holder is made of three parts which consist of a handle, a table, and the adjustable arbor. The table is fastened onto a shoulder on the end of the handle by friction and riveting. A hole is drilled lengthwise through the center of the handle for the center arbor. The arbor should fit the hole with a close sliding fit so the arbor can be adjusted lengthwise through the hole. A cut-away view of the holder is shown in View B, Figure 1.

The end of the arbor that holds the collet can have one of two shapes. The end of the arbor may be

shaped like a cutting broach as shown in View "a," Figure 1, or it can be shaped as in View "b," Figure 1. An interchangeable round tapered arbor can be made up for holding an already colleted hairspring while truing it around the collet.

In lieu of the special holder shown in Figure 1, the hairspring collet may be held on a cutting broach. The broach is held in a pin vise. An arbor can be made to the shape that is shown in View "b," Figure 1 instead of using the broach for the arbor. A sewing needle is used to make this arbor. The needle is shaped on an India wheel while being held in a pin vise. A pin vise can also be used as a handle when the arbor is used to hold the collet while the spring is being pinned. When a spring is being pinned while using the broach or the arbor made from the needle, the thumb and forefinger are used underneath the hairspring to keep it level. When using the special colleting tool, the table keeps the hairspring level.

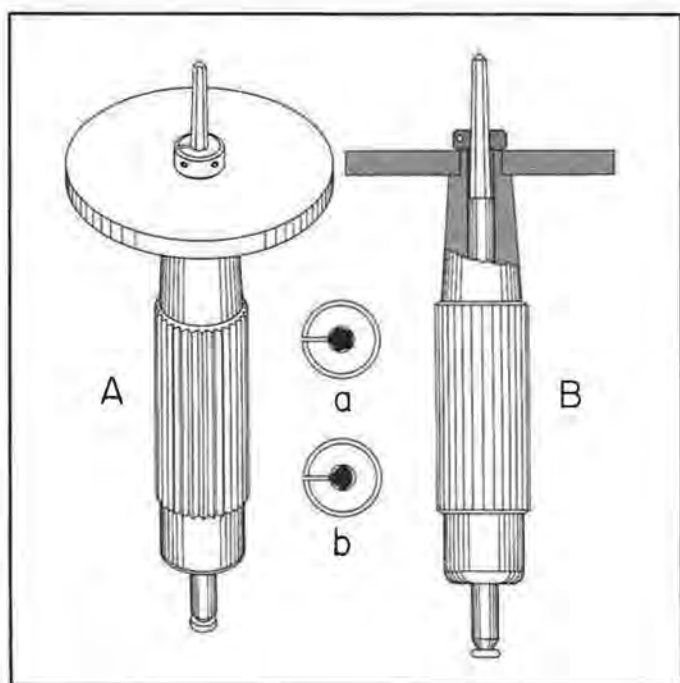


Figure 1.

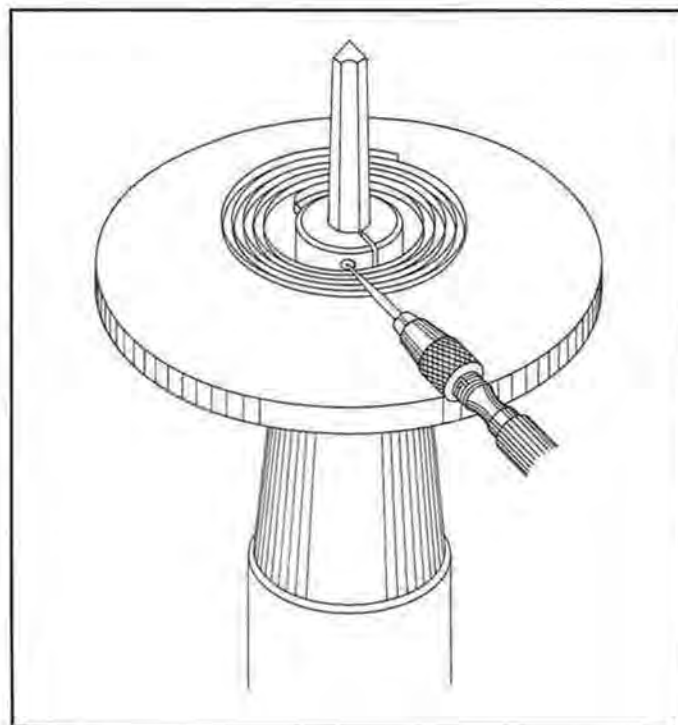


Figure 2.

Unpinning a Hairspring When Using the Old Collet

When fitting a new hairspring to a watch, it is usually better to use the old original collet if it is in good condition. This means that the watchmaker must remove the hairspring pin in order to remove the old hairspring from the collet. Figure 2 shows this operation. First, the collet is placed on the collet-holding arbor. Then, a sewing needle is used in a small pin vise when pushing the pin from the hole in the collet. The needle should have its end stoned flat just to remove the sharp tip of the needle. If this is not done, the sharp tip of the needle is likely to go into the end of the pin and spread the pin, making it more difficult to remove. The pin is pushed toward the curve in the tongue as shown in Figure 2. The pin is not pushed all the way from the hole with the needle. It is loosened in the hole enough so the pin can be removed with tweezers.

Making a New Hairspring Pin

It is not recommended to try to use the old hairspring pin for pinning the new hairspring to the collet. Tapered hairspring pins can be bought but they are not always the correct size for the job. A new taper pin of the proper size might need to be made by the watchmaker.

Figure 3 shows how a new taper pin is made. A hardwood filing block is held in the bench vise to support the wire while the pin is taper-filed. The filing block has assorted size tapered slots to accommodate different diameter wires for making different sized taper pins. The brass wire for the taper pin is held in a pin vise and rotated back and forth between the thumb and first two fingers while the pin is filed. The brass wire used should be hard brass. Brass wire can be hardened by rolling the wire be-

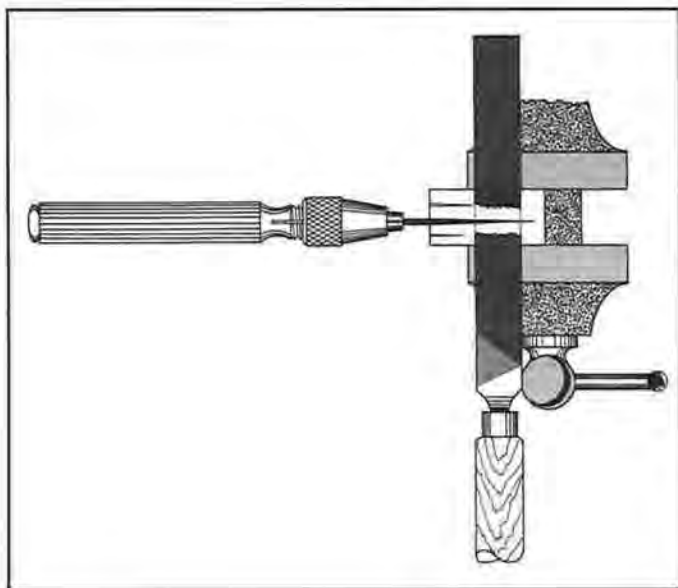


Figure 3.

tween a smooth burnish file and a flat, smooth, hard steel surface. Most hairsprings are pinned to the collet with round taper pins as shown in Figure 4, View A. When the pin is tightened in the collet hole, a cross curve is formed on the tongue of the hairspring. This condition causes the tongue to have unneeded stress. To reduce the stress on the tongue of the hairspring, the pin can be filed flat on one side so the cross curve will not be made on the tongue. The flat side of the pin goes against the tongue of the spring as shown in View B, Figure 4. The flat-sided pin is used mostly to pin the hairspring on high-grade watches and chronometers. The round pin is used mainly on production watches.

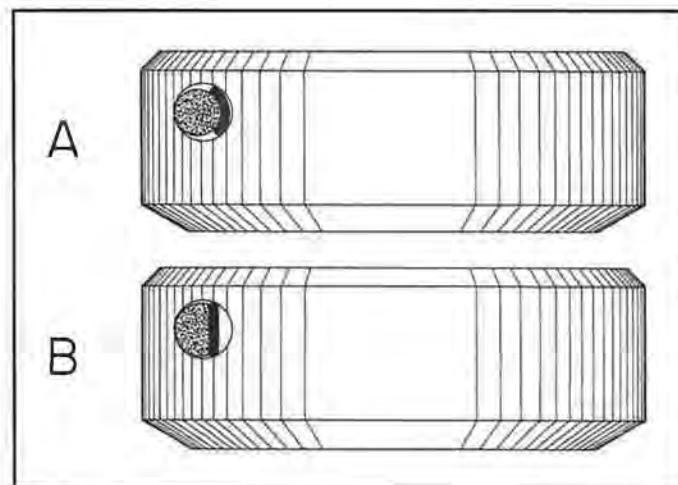


Figure 4.

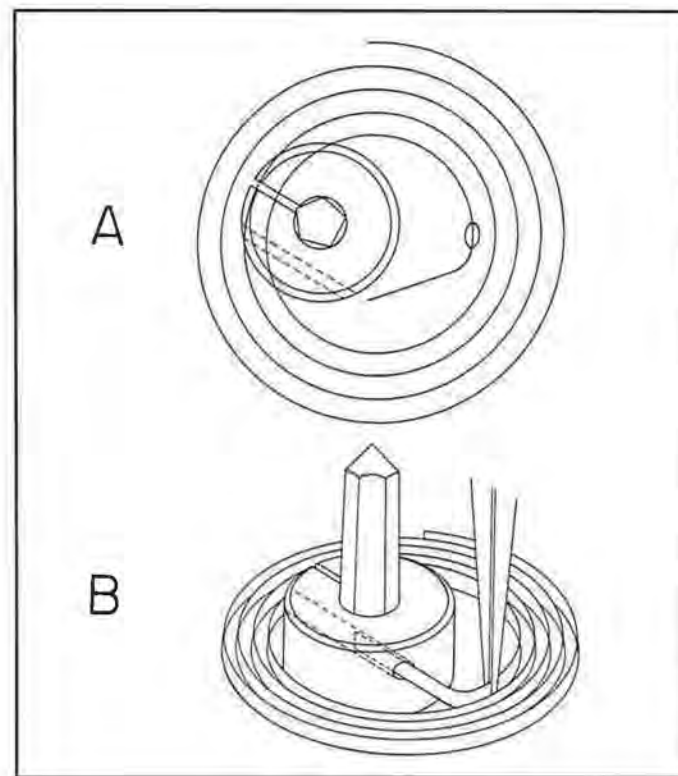


Figure 5.

Inserting the Tongue into the Hole in the Collet

Figure 5 shows how the tongue of the hairspring is inserted into the hole in the collet. When doing this operation, the hairspring is held with the tweezers near the bend in the tongue as shown in View A, Figure 5. The hairspring is then brought down over the arbor holding the collet. Then, the arbor and collet are turned counterclockwise as the tongue is inserted into the hole in the collet.

View B, Figure 5 shows the operation after the tongue has entered the hole in the collet. The tongue of the hairspring is inserted in the hole to a depth that allows the coils of the hairspring to be centered with the collet.

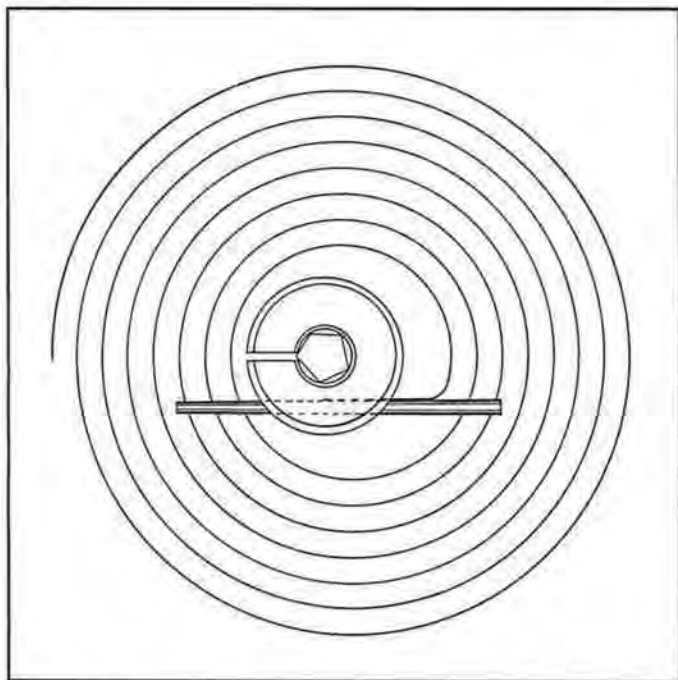


Figure 6.

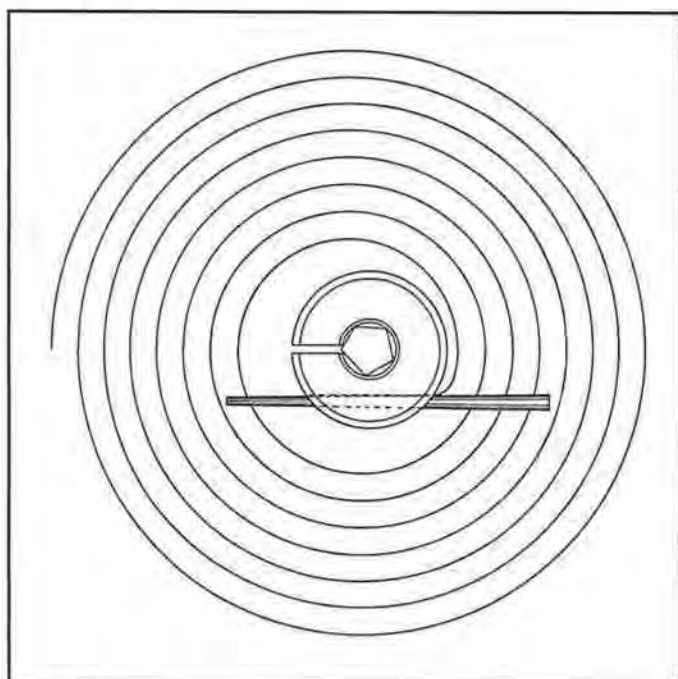


Figure 7.

Next, the hairspring pin is inserted loosely until the tongue is set at the proper location so the hairspring is centered on the collet. Figure 6 shows a hairspring which does not have the tongue inserted far enough into the hole in the collet. In this case, the pin is backed up enough that the tongue can be inserted deeper into the hole in the collet.

Figure 7 shows a hairspring that has the tongue inserted too far into the hole in the collet. In this case, the tongue needs to be moved out of the collet until the coils are centered with the collet.

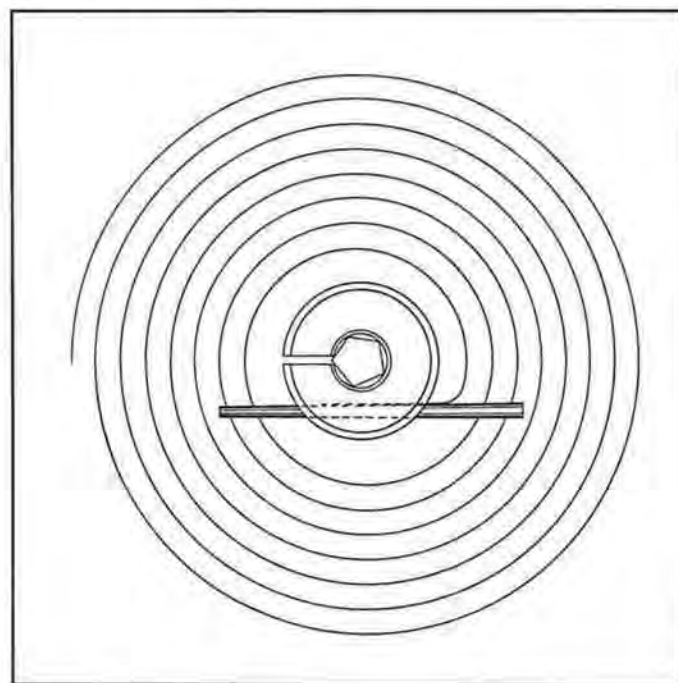


Figure 8.

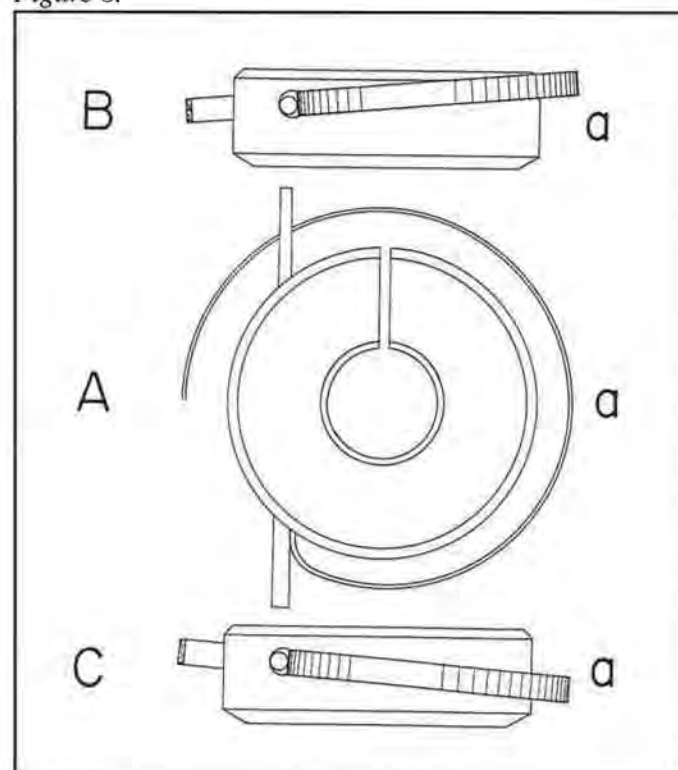


Figure 9.

Figure 8 shows a hairspring that is set centered with the collet. In other words, the tongue has been inserted into the hole the correct amount.

Leveling the Hairspring to the Collet

After the tongue of the hairspring has been inserted in the hole in the collet to the proper depth, the spring is leveled on the collet before tightening the hairspring pin in the hole in the collet. Figure 9 shows this process. View A shows a top view of the collet and a hairspring that is centered on the collet. View B, Figure 9 shows an edge view of the collet and hairspring in which the hairspring is not level with the collet. The spring is too high at "a" opposite the tongue. In this case, the first coil of the spring is pulled down at point "a." This can be done with a needle or tweezers. The hairspring would need to be loose enough to allow the spring to be leveled without having to bend the tongue. View C, Figure 9 shows a hairspring that is too low at point "a" opposite the tongue. In this case, the spring would need to be lifted up at point "a" until it is level with the collet.

Pinning the Hairspring to the Collet

After the hairspring has been centered to the collet and made level with the collet, the pin is tightened in the hole in the collet. Figure 10 shows how this can be done. View A shows how the pin can be

pulled into the hole to tighten it. Tweezers are used for this purpose. In this particular case, a flat-sided pin is being used. Note that when a flat-sided pin is used, the pin can be turned in the hole to level the spring with the collet. After the pin has been pulled into the hole so it is almost tight enough, the pin is cut off just outside the curve in the tongue at point "a." Then, the pin is pulled further to tighten it and make the end of the pin flush with the collet.

Another method that can be used to tighten the pin and make it flush with the collet is to press the pin in with strong tweezers. One point of the tweezers would rest on the end of the pin and the other point would rest on the collet opposite the end of the pin. After the pin has been tightened, the small end of the pin can be cut off flush with the collet with cutting tweezers or small oblique angle nippers. View B, Figure 10 shows this operation being done. The reason that the large end of the pin is not cut off after the pin is made tight is that there is danger of cutting the hairspring off at the same time the pin is cut off.

Second Method of Pinning the Hairspring

Another method that can be used to pin the hairspring to the collet is shown in Figure 11. The pin can be round or flat-sided. With this method, the pin is first pulled or pushed into the hole until the hairspring is tight in the hole. Then, the pin is nicked on each side of the collet, flush with the collet, as shown in Figure 11, View A, point "a." The notches are cut in the pin with a Number 24 X-acto blade as shown in View B, Figure 11. The sharp edge of the blade should be made rough so the blade will actually saw the notches in the pin. Once the notches are cut three-fourths of the way through the pin, the ends of the pin are broken off at the notches.

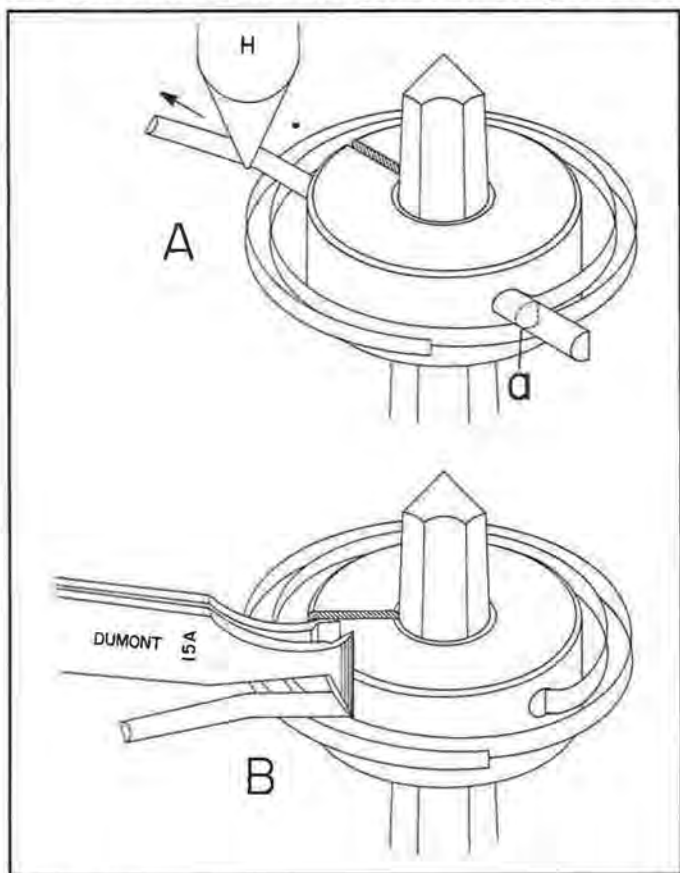


Figure 10.

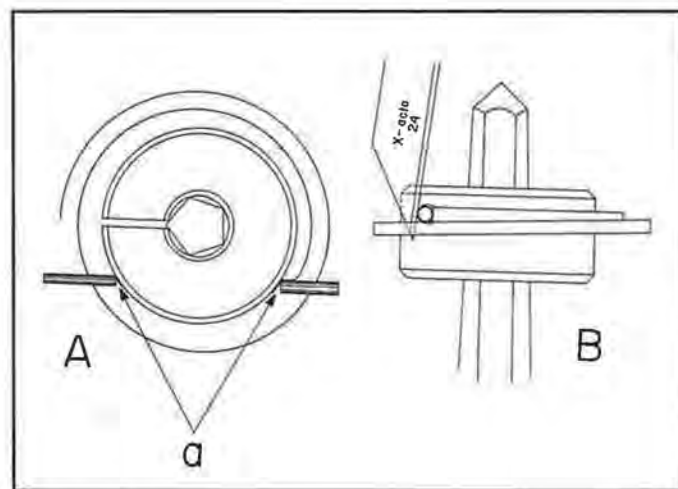


Figure 11.

Third Method of Pinning the Hairspring

Still another method that is sometimes used to pin hairsprings to the collet is shown in Figure 12. This method is used by some watch companies on low-grade, mass-produced watches where position adjusting is not of the utmost importance. One of the reasons this method is used is because it is a faster method. There are some faults with this method that are not present with the two previous methods.

This method is done in the following manner. The pin is pulled into the hole in the collet to tighten it onto the tongue of the hairspring. A small plier or strong tweezer is used for this operation. Then, the end of the pin is broken off by bending the pin sharply as shown in View A, Figure 12. There should be a pulling motion on the pliers as the bend is made. After a sharp bend has been made in the pin, it is bent back in the other direction to break it off. To make the bend in the pin, the arbor holding the hairspring is turned in a clockwise direction as the end of the pin is held with the pliers or tweezers. Then, to break off the pin, the arbor is turned in the opposite direction.

View B, Figure 12 shows how the large end of the hairspring pin is broken off. When this is done, there should be a pushing motion on the plier or tweezer as the arbor is turned counterclockwise to make the sharp bend in the pin. Then the arbor is turned in the opposite direction to break off the pin.

Some of the disadvantages of this method of pinning the hairspring are as follows. In the first place, the pin can loosen up in the hole as the large end of the pin is broken off. Secondly, the end of the pin-hole becomes distorted as the pin is bent sharply to break it off. Thirdly, the end of the pin shown at "a," View B, Figure 12 remains bent over the edge

of the hole which makes it difficult in some cases to remove the pin if the spring needs to be repinned. In the fourth place, when the large end of the pin is bent sharply to break it off, the pin is pulled away from the tongue of the hairspring as shown at "b," View B, Figure 12. This takes support away from the tongue of the hairspring. Since the pin supports the tongue at a different point than where the corner of the hole supports the tongue, there may be a significant difference in the vertical position rates of the watch.

"Antique Watch Restoration" will continue next month. □

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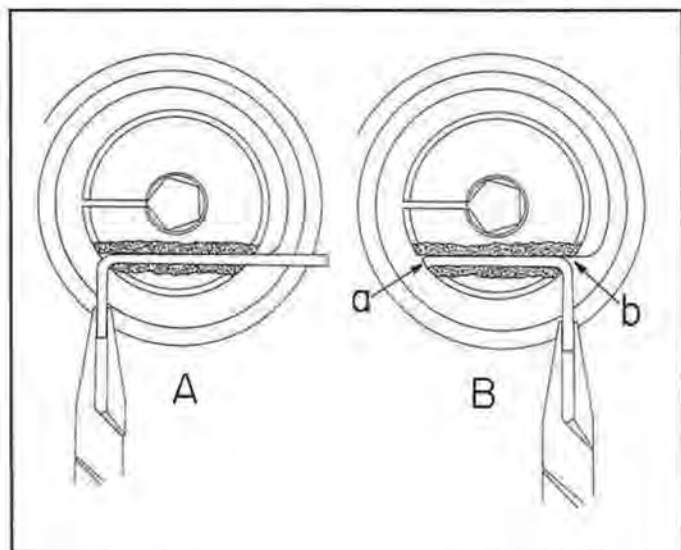


Figure 12.

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.

- 8A1 ESA(Omega), 9162 (1250), needs a Click (index) wheel, part #4360
- 8A2 Seiko case, part #4006-6031, needs a white alarm button. Coserv says discontinued.
- 8A3 16S Illinois Bunn Special, needs a Motor Barrel Hub Snailed, part #1667
- 8A4 Excelsior Park 40 (base 4), needs: Hour Hammer Lever, part #8683, Hour Recorder Stop, and Stop Lever Screw, part #58690
- 8A5 LeCoultre, needs a 23.50 X 23.10 mm plastic domed watch crystal
- 8A6 Cartier (LeCoultre?), 38.2 x 2 mm, very thin (see Figures 1 and 2, right), needs: winding wheels and screws, barrel cover and main-spring

If you can supply any of these items, please contact:

AWI Material Search Network
AWI Central
701 Enterprise Dr.
Harrison, OH 45030

1995 INDEX

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

If you have any ideas to share with the *Horological Times* staff, send your letters to:



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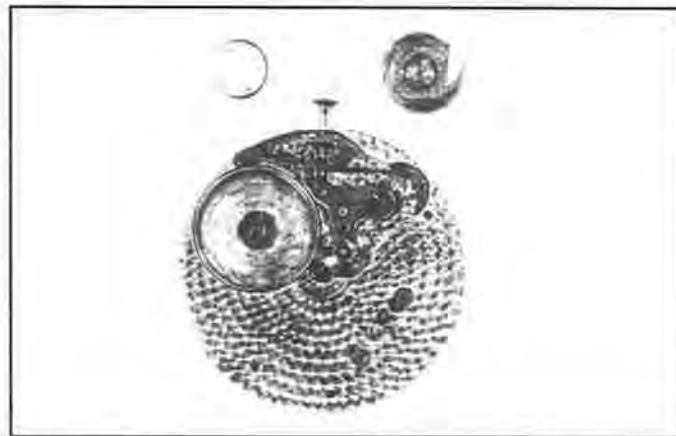


Figure 1. Actual size.



Figure 2. Scale=2:1, 2X.

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News of the Trade

ZODIAC WATCHES TO BE FEATURED ON *WHEEL OF FORTUNE*'S COLLEGE WEEK SALUTE

Zodiac, the official watch of the Fraternal Order of UDT/SEAL, will be featured on *Wheel of Fortune* during the show's College Week Salute airing nationally the week of November 13, 1995.

During the week-long salute, which was taped in Seattle during July, college contestants will be awarded Zodiac Swiss Formula watches. *Wheel of Fortune*, which boasts a nightly audience of over 18 million viewers, has arranged for "The Ultimate Sports Watch For Mere Mortals" to be modeled by Vanna White in two separate spots during the week.

"Zodiac is delighted to team up with America's favorite game show during its salute to college students. Zodiac watches are perfect for their active lifestyles—rugged enough to survive Spring Break yet sophisticated enough for that first job interview," said Phil Schwetz, Zodiac Director of Marketing.

The Zodiac line retails for \$215 - \$2,495 and consists of seven collections. Both men's and women's styles are water-resistant to 200 meters or more, feature a patented system of shock-resistant cases, unidirectional rotating bezels, an evacuation system to remove unwanted particles, and a three-year Buckle-To-Buckle™ warranty.

The Zodiac Collection is available through fine jewelry stores throughout the country. Contact: Jeanine M. Magarine or Jean Brandolini, Markham/Novell Communications. Phone: (212)687-1765.

UNIVERSAL GENÈVE NAMES UNIVERSAL WATCH REPAIR ITS EXCLUSIVE FACTORY-AUTHORIZED REPAIR CENTER

Wittnauer International, the new distributor of the prestigious Universal Genève, has announced that it has selected Universal Watch Repair in Southfield, Michigan to be the official repair source for all Universal Genève watches.

As the company's factory-authorized service center, Universal Watch Repair will handle all warranty and non-warranty repairs on all Universal Genève watches. The company will also sell and distribute Universal Genève watch parts.

"Universal Genève is delighted to be working with Universal Watch Repair in an effort to ensure that our customers receive the finest repair service should they encounter any problems," said Phil Schwetz, Director of Marketing for Universal Genève.

One of the original Geneva watch companies, Universal Genève specializes in combining inventive technology with beauty, style, and elegance. The brand cel-

ebrated its 100-year anniversary by reintroducing several of its luxurious styles including the special limited edition of the Golden Janus worn by artist Leroy Neiman in the company's new ad campaign. Other collections include the Golden Shadow, the Golden Tech, and the Golden Compax ranging in price from \$1,500-\$15,000.

Jewelers across the country can send their customers' Universal Genève watches accompanied by a copy of the watch receipt directly to: Universal Genève Service Center, 28411 Northwestern Highway, Suite 250A, Southfield, Michigan 48034, Attention: Candy Rosen. Phone: (810)358-6898. Fax: (810)358-6897.

FOAM-ON-A-STICK

Frank Hillson, Chief Engineer and Designer, has created a new and unique product called Foam-On-A-Stick.

Saturated with a variety of silicone greases: #111, #7, #747, #33. Foam-on-a-Stick can be used to lubricate O-rings and small parts without disassembling the equipment.

Pumps, relays, and machinery can be easily lubricated with Foam-on-a-Stick. The watchmaker can lubricate the O-ring on the watchback without removing the O-ring. FS #111-1", FS #747-1", FS #7-1", and FS #33-1" are all individually polybagged and measure 1" in diameter x 1" in length, plus a 4" stick. Other diameters and stick lengths are available.

For more information contact Frank Hillson Co., Post Office Box 2231, Cupertino, CA 95015-2231. Phone: 1(408)446-9660.



News of the Trade

GROBET USA ANNOUNCES NEW WATCH MATERIAL DIVISION MANAGER

Grobet USA is pleased to announce the appointment of Kenneth Marler as Manager of its Watch Material Division. In keeping with its commitment to expand its watch parts division, Ken Marler offers a strong background in Swiss and Japanese watch materials, as well as an established background in the jewelry industry. Mr. Marler began his career in the retail jewelry business. His focus on watch materials dates back fifteen years with Young-Neal Company in Nashville, Tennessee, where he served as manager of their watch material department for the past twelve years and as vice-president for the past eight years. When asked what he liked best about the watch business, Ken's response was, "the customers."

LORUS TO ESTABLISH NEW U.S. WATCH DISTRIBUTION SYSTEM

Seiko Corporation announced today that it will establish a new master distribution system in the United States for its Lorus watch brand in a move designed to capitalize on one of the organization's greatest attributes.

"Retail customer service is one of the strong points of our organization," said Shigeho Kurashina, General Manager of Seiko Corporation's Watch International Marketing Division. "This change is expected to facilitate better communications between our company and our retail customers and is indicative of Seiko Corporation's commitment to building long-term relationships."

The current distributor network will service retailers for the balance of 1995, according to Kurashina. The new master distribution system is expected to become operational on January 1, 1996, and will be headed by Mr. David Arnold who currently owns and operates The King Company of Austin, Texas. The King Company is one of four current Lorus watch importers/distributors in the United States.

He also said the change will not affect the Lorus Clock Sales Division which is currently operated by Seiko Corporation of America.

Lorus offers a full range of quality quartz watches with suggested retail prices from \$15-\$100. For information, contact the Lorus Advertising Department, 1111 Macarthur Boulevard, Mahwah, NJ 07430. Phone: (201)529-5730.

NEW YORK STATE JEWELERS ASSOCIATION ENDORSES IJE '96

Manny Fuchs, New York State Jewelers Association (NYSJA) Executive Director, announced The NYSJA's endorsement of the International Jewelers Exposition, taking place May 18-20, 1996 in Atlantic City. The NYSJA

STEAM DRAGON Atmospheric Steam Cleaner

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Instantly on
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•Unlimited distilled water supply

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available parts.

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or Foot pedal models.

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boiler) Stores heat not
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News of the Trade

and IJE expect this alliance to make IJE the number one show on the east coast.

"IJE will provide an opportunity for our members to be directly involved in their own sort of show," said Fuchs. "Formerly, our members attended a show which was not their own, but IJE is different. This show was designed for retailers, by retailers."

Fuchs believes the prestige and image of their 100-year-old jewelers organization will serve as a link between other state associations and IJE. "Our endorsement should enhance the standing of the show in the eyes of the retailer and bring us closer to other state groups who will also be able to identify this show as their own. We will be actively promoting IJE, providing increased exposure and the opportunity to market this show to retailers as one of their own and not as an outside source," added Fuchs.

The NYSJA will be holding its annual convention in conjunction with IJE. "The timing is ideally suited for the NYSJA's traditional convention dates and the Atlantic City location should enhance our convention. We have been searching for a way to present a convention offering social and educational programs in a social and business environment. Atlantic City offers the best opportunity for both," Fuchs said. □

The 1996 Lathe Program



Instructor—Roy A. Hovey

The 1996 Lathe Program has been designed with the following objectives in mind:

1. To serve the needs of all watchmakers and clockmakers holding memberships in The American Watchmakers-Clockmakers Institute who use lathes and milling equipment in their work.
2. To support members preparing to take examinations conducted by The American Watchmakers-Clockmakers Institute which require the use of lathes, micro-mills, and wheel cutting equipment.
3. To provide all members of the horological community seeking to develop their skills on lathes, micro-mills and wheel cutting equipment with the best instruction available.

Over the years, considerable success has been experienced with the teaching concept being used in the current lathe program. This concept is designed to provide a learning experience that instills confidence in the student. This is accomplished by using a progressive building block pattern in which the student learns new skills using fairly large workpieces.

As the program progresses, the student continues to refine the skills learned in the preceding blocks while working with smaller and smaller components to develop his confidence. Each block of instruction is designed to add a new skill and provide continued reinforcement of those already mastered.

The pace of the course is set by the individual student. Each student determines how much he can accomplish in the classroom environment while the course is in session. Those in attendance are encouraged to learn the fundamental teaching points set forth in each lecture, do as much as possible in the classroom and take unfinished work home to complete it.

A considerable effort has been made to provide students with opportunities to examine and use several types of specialized equipment so they can gain a full understanding of its capabilities and limitations before investing in it themselves.

The participation of guest instructors has always been a major part of the lathe program. A special word of thanks is extended to Mr. Jim Huckabee and Mr. Archie Perkins for their contributions during the 1995 program. Mr. Huckabee's generous support of the Austin program pro-

vided the students with several different insights into the practical application of turning skills they learned during the course. Mr. Perkins provided an outstanding presentation and brought an excellent display of unusual wheel cutting work he has done over the years for the students to examine. Another word of thanks goes to Tom Brown for his generosity and hospitality in allowing his shop to be used to conduct Phases I - III of The Lathe Program in North Little Rock, Arkansas.

As before, the 1996 lathe program is organized into two distinct categories of instruction: The Skill Development Courses and The Special Interest Courses.

The Skill Development Courses consist of those blocks of instruction found in Phases I - IV. The Watchmakers and Clockmakers Skill Development Courses are shown in Table 1. These courses are designed to provide the basic skills required to operate a watchmakers lathe and selected types of wheel cutting equipment.

The Special Interest/Special Equipment courses address the use of specialized accessories and micro-lathes in horological turning. These courses are also shown on Table 1. Although these courses follow the Skill Development segment of the program, completing Phases I - IV is not a prerequisite to taking them.

Several blocks of instruction lend themselves to being used as specially tailored lathe courses to support other training programs conducted by The American Watchmakers-Clockmakers Institute. Most blocks of instruction can be specially tailored to support educational programs sponsored by state organizations, affiliate chapters, and schools.

A one-day introductory lathe course is available for convention attendees with an interest in learning exactly what the 1996 lathe program consists of, how to prepare cutting tools, and the fundamentals of how to use the watchmakers lathe. Affiliate chapters and state organizations can make arrangements with AWI Central to have this course conducted during their conventions. Lathe courses tailored to support joint educational activities that AWI conducts in conjunction with other horological organizations are available and can be presented when appropriate arrangements have been made through AWI Central.

The 1996 Lathe Program will retain several of the traditional characteristics along with several improvements.

Separate programs for watchmakers and clockmakers will be conducted simultaneously in both bench courses and in the Project Extend Resident Program as before. The teaching points will be the same for both watchmakers and clockmakers, but the dimensions of the projects will differ for each group of students. Several new projects have been added in each program.

Considerable progress has been made in reducing the amount of equipment the student will be required to bring when attending the 1996 courses. The student will be expected to bring his own lathe, collets/work-holding devices, an eye loupe, and a small number of common horological hand tools. Specialized tools such as taps, dies, diamond wheels and wheel cutters will be provided for the student to use during each course.

Every effort has been made to provide the student with something worthwhile at the end of each block of instruction. The tools, lathe accessories, and parts the student makes during these courses are his to keep and their value far outweighs the cost of the material fees. Most of the material for major student projects has been premachined so very little class time is required to assemble them. Students will have the option of bringing material to make their own cutting tools or it can be purchased as needed while the course is in progress.

Each block of instruction offered in the Project Extend Resident Program will be made available in the 1996 Bench Course Lathe Program. Phases I - III will be broken into four-day segments. The instructor will return to the same city three times to present each of these segments. Phase IV will normally be offered in a six-day configuration in both the resident and bench course programs, but can be tailored to meet the needs of the group requesting it. Due to limitations on how much equipment can be carried, some minor differences will exist between the Phase IV Project Extend Resident and Bench Course Programs.

To simplify financial matters for members enrolling in the 1996 Lathe Program, all tuition, material, and specialized equipment costs have been averaged and combined into one figure. The tuition cost for the 1996 Lathe Program will be \$62 per day. The only additional costs will be for incidental material items listed in the brochure that the student elects to buy, rather than supply himself, while the course is in progress.

Individuals or groups interested in making arrangements to have The Lathe Program presented in the resident or bench course configuration are welcome to make inquiries regarding scheduling with AWI Central. Groups interested in obtaining an illustrated publication which presents an account of what is accomplished during each day of the program may obtain a copy of the student handout for "The Introduction To The Lathe Program" from AWI Central. Affiliate chapters and groups are welcome to reproduce copies of this publication for members who

are interested in the 1996 Lathe Program.

To receive a copy of the student handout, send a 9 1/2" x 11" self-addressed envelope with \$1.47 postage affixed, or a mailing label and \$1.47 in usable postage stamps.



Photo 1. Doug Cochrane studies a technical diagram during the Project Extend Twelve-Day Lathe Program conducted in Cincinnati, March 20 - April 1, 1995.



Photo 2. April 1, 1995 graduates of the Project Extend Twelve-Day Lathe Program. From left to right: Roy A. Hovey (Instructor), Jim Kechajias, James White, Norm Kocher, Douglas Cochrane, and David Claggett.

INTRODUCTORY COURSES

One-Day Courses

Introductory Courses (One Day)	<u>WATCHMAKERS</u> Introduction to the Watchmakers Lathe Program The student will receive an overview of the lathe program, turning theory and cutting tools. He will make a watch bushing and a sub chuck for holding small parts.	<u>CLOCKMAKERS</u> Introduction to the Clockmakers Lathe Program The student will receive an overview of the lathe program, turning theory and cutting tools. He will make a clock bushing and a sub chuck for holding small parts.
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SKILL DEVELOPMENT COURSES

Two-Day Courses

<u>PHASE I</u> Course 1 (Two Days) Request Phase I Brochure Course 2 (Two Days)	<u>WATCHMAKERS</u> Basic Lathe Operations for the Watchmaker The student will prepare steel and carbide cutting tools. He will make a set of jewel pushers and six staking tools. Lathe Accessories for the Watchmaker The student will construct a set of brass cement chucks, a precision grinding arbor, a tailstock drilling pad, and a filing rest with a micrometer adjusting mechanism.	<u>CLOCKMAKERS</u> Basic Lathe Operations for the Clockmaker The student will prepare steel and carbide cutting tools. He will make a boxwood chuck arbor and a set of five clockmakers punches. Lathe Accessories for the Clockmaker The student will make a lantern pinion drilling guide, a precision grinding arbor, a tailstock drilling pad, and a filing rest with a micrometer adjusting mechanism.
<u>PHASE II</u> Course 3 (Two Days) Request Phase II Brochure Course 4 (Two Days)	Watch Wheel Blanks and Arbors The student will make an arbor and a wheel blank. These components will be mounted to make a watch wheel ebauche. He will also make a chronograph idler wheel ebauche. Winding Stems and Spring Barrel Arbors The student will make a winding stem and a winding arbor for a pocket watch.	Clock Wheel Blanks, Hubs and Arbors The student will make an arbor, a hub, and a wheel blank for a clock. These components will be mounted to make a clock wheel ebauche. He will make a lantern pinion to include the arbor, shrouds, and trundles. Winding and Function Control Arbors The student will make an arbor to regulate the time keeping function and a winding arbor for a clock.
<u>PHASE III</u> Course 5 (Two Days) Request Phase III Brochure Course 6 (Two Days)	<u>WATCHMAKERS</u> Turning Watch Staffs Between Centers, Repivoting and the Use of the Jacot Tool The student will cut a balance staff for an English pocket watch between centers, learn to repivot two sizes of watch wheels, and burnish pivots using the Jacot tool. Jeweling and Cutting Staffs The student will make a setting and secure a jewel in place. He will cut a staff for a small pocket watch using a cement chuck.	<u>CLOCKMAKERS</u> Turning Large Marine Chronometer Staffs between Centers, Repivoting and the Use of the Jacot Tool The student will cut a balance staff between centers for a large marine chronometer; repivot two sizes of clock wheels and burnish pivots using the Jacot tool. Jeweling and Cutting Staffs The student will turn a large jewel setting for a marine chronometer balance and secure the jewel in place. He will cut a staff for a small marine chronometer using a cement chuck.
<u>PHASE IV</u> Course 7 (Two Days) Request Phase IV Brochure Course 8 (Two Days) Course 9 (Two Days)	Cutting Watch Wheels Using Commercially Produced Cutters The student will make a large watch wheel using wheel cutting equipment provided by the instructor. He will also have the opportunity to cut a small watch wheel using this equipment. Cutting Watch Wheels With Fly Cutters The student will make fly cutters and arbors to cut large and small watch wheels on equipment provided by the instructor. Cutting and Polishing Watch Pinions The student will make a large pinion for a watch and use a pivot polisher provided by the instructor to finish the pivots. The pivot polisher will also be used for a simple damaskeening exercise.	Cutting Clock Wheels Using Commercially Produced Cutters The student will make a large clock wheel using wheel cutting equipment provided by the instructor. He will also have the opportunity to cut a small clock wheel using this equipment. Cutting Clock Wheels With Fly Cutters The student will make fly cutters and arbors to cut large and small wheels on equipment provided by the instructor. Cutting and Polishing Clock Pinions The student will make a pinion for a clock and use a pivot polisher provided by the instructor to finish the pivots. The pivot polisher will also be used for a simple damaskeening exercise.

THE WATCHMAKERS AND CLOCKMAKERS SPECIAL INTEREST/SPECIAL EQUIPMENT LATHE PROGRAM COURSES

(Each four-day course consists of two blocks of instruction)

Cross Slide Operations (Four Days) Micro Lathe Operations (Four Days)	The student will make a general purpose cutting tool and boring bar. He will make a key set center wheel and winding ratchet ebauche. The square will be placed in the winding ratchet using a set of broaches made on the watchmakers lathe. The student will make a general purpose cutting tool and a boring bar. He will make a spring barrel and a fusee ebauche for an antique pocket watch using the micro lathe or a watchmakers lathe equipped with a cross slide.	The student will make a general purpose cutting tool and a boring bar. He will make a center wheel and a winding ratchet ebauche. He will make the square in the winding wheel with a set of broaches made on the watchmakers lathe. The student will make a spring barrel and a great wheel ebauche for an antique clock using the micro lathe or a watchmakers lathe equipped with a cross slide.
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Photo 3. True dedication in North Little Rock, Arkansas. On January 23, 1995, Tom Brown, John Williams, and Curtis Keech heat-treated their filing rest blocks in sub-freezing weather during Phase I.



Photo 4. Larry McCollum makes adjustments on his lathe during the Phase I course conducted in North Little Rock, Arkansas between January 20 and 23, 1995.



Photo 5. John Williams completes a project in North Little Rock during Phase III of the lathe program on April 29, 1995.



Photo 6. Graduates of Phase III, North Little Rock, Arkansas, taken in front of Tom Brown's clock shop where the course was conducted. From left to right: Roy A. Hovey (Instructor), John Williams, Merrill Compton, Omer Singleton, Greg Vick, Tom Brown, Curtis Keech, and James Fielder. August 7, 1995.



Photo 7. Nino Gonzales works on a project in Austin during Phase III of The Lathe Program, February 10 - 13, 1995.

When registering for these lathe courses, please be sure to specify whether you're signing up for the Clockmakers or Watchmakers Course.



Photo 8. February 13, 1995 graduates of Phase III of The Lathe Program in Austin, Texas. From left to right: Roy A. Hovey (Instructor), Mark Headrick, David Langston, Sue Ann Wysong, Michael Stafford, Ronald Robbins, Nino Gonzales, Robert Fesler, Michael Webb, Carrol Bell, Brian Stokes, and Bob Dodd.



Photo 11. Ben Lam concentrates on turning a balance staff in Denver during Phase III, March 10 - 13, 1995.



Photo 9. Guest Instructor Archie Perkins delivers a lecture during Phase III of the Lathe Program in Denver on March 13, 1995.



Photo 12. Marvin Morrison, Ken Fuhr, Ben Lam, Ron Tidball, and William Fetcher look on as Llewellyn Oswald demonstrates the top of the line Keystone bushing machine in Denver during Phase III, March 12, 1995.



Photo 10. Ken Fuhr, Les Grenz, Ron Tidball, and Ben Lam examine examples of unusual clock and watch wheels that Mr. Perkins has cut over a period of several years.



Photo 13. Norm Kocher works on a lantern pinion arbor during the Project Extend Twelve-Day Lathe Program conducted in Cincinnati between March 20 and April 1, 1995.

PROJECT EXTEND

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

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

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

American Watchmakers-Clockmakers Institute
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Bulletin Board

A. NEW REQUESTS

PAUL MARED BRAND WATCHES

Harold D' Souza, Altamonte Springs, FL, is seeking a distributor or service center for the Paul Mared brand watch.

CUSTOM-MADE OR STANDARD-SIZED CLOCK BEZELS

Robert Good, St. Louis, MO, is seeking a source for clock bezels either custom-made or standard sizes from stock. Several years ago we had an individual who custom-made bezels but that source is no longer available.

REMOVING SCRATCHES FROM GLASS WATCH CRYSTALS

Sergio Lotenschtein, Honolulu, HI, is wondering if any "Bulletin Board" readers have had success with removing scratches from glass watch crystals. If so, will you share that information?

ZENITH WILCOMETRE MANUAL

E. Kiska, Grosse Pointe Farms, MI, is seeking an instructional manual for the operation of a Zenith Wilcometre watch rate recorder. AWI will be happy to copy yours for Mr. Kiska and return yours to you.

B. RESPONSES

VIBRASONIC 614A SERVI-ELECTRONIC OWNER'S MANUAL

Leo P. Tracy, Spokane, WA, sends a copy of a Vibrasonic 614B Servi-Electronic cleaning machine. We have forwarded this to William Carson, Groton, MA in the hope that it may be practically the same thing as the 614A model.

C. ITEMS STILL NEEDED

ATTONA BRAND CLOCKS

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

PEERLESS LATHE CATALOG AND OWNER'S MANUAL

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

PRECISE WATCH TIMER MANUAL

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

BOSTON CLOCK CO. BALANCE INFORMATION

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

DISTRIBUTOR OR SERVICE CENTER FOR PELTIER WATCHES

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

SELF WINDING CLOCK COMPANY OF NEW YORK MOVEMENT

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

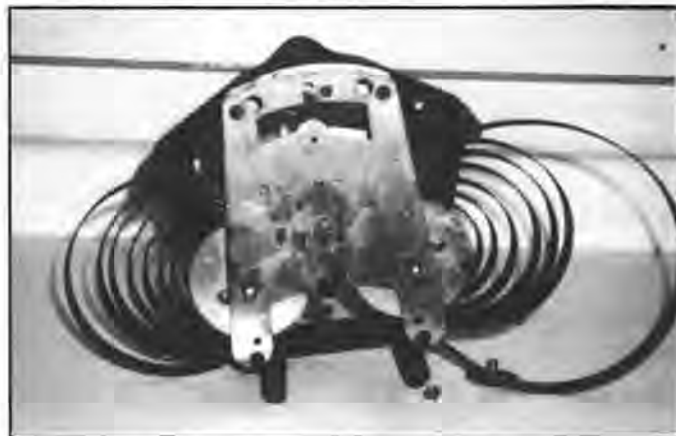


Figure 1. Self Winding Clock Co., New York, NY.

THE FABRICATION OF WHEEL AND PINION CUTTERS

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

C. & E. MARSHALL STAKING TOOL INSTRUCTION BOOKLET

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

Bulletin Board

DEJUNO WATCH COMPANY

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

ELGIN TOOL WORKS CATALOG FOR ORNAMENTAL LATHE

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



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



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

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

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NOVEMBER 1995

10-12	Mechanical Watch Repair	Dallas/Ft. Worth, TX
10-13	Micro Lathe Operations (FULL)	Minneapolis, MN
11-12	Striking Clocks	Orlando, FL

JANUARY 1996

27-28	400-Day Clock Repair	San Diego, CA
27-28	Cuckoo Clock Repair	Orlando, FL

FEBRUARY 1996

23-26	Lathe Course (Phase I)	Charlotte, NC
24-25	Striking Clocks	Seattle, WA
24-25	Cuckoo Clock Repair	Dallas/Ft. Worth, TX
24-25	Repair of the Atmos Clock	Oakland, CA

MARCH 1996

16-17	Hairspring Vibrating	Kansas City, MO
16-17	Advanced Quartz Watch Repair	Seattle, WA
22-25	Lathe Course (Phase II)	Charlotte, NC
23-24	Repair of the Atmos Clock	Minneapolis, MN

APRIL 1996

13-14	Mechanical Chronographs	Oakland, CA
13-14	Advanced Quartz Watch Repair	Boston, MA
14	Servicing ETA Quartz Chronographs	Seattle, WA
27-28	Hairspring Vibrating	Dallas/Ft. Worth, TX

MAY 1996

5	Servicing ETA Quartz Chronographs	Oklahoma City, OK
17-19	Advanced Clock Repair	Seattle, WA
17-20	Lathe Course (Phase III)	Charlotte, NC
18-19	Mechanical Chronographs	Dallas/Ft. Worth, TX

JUNE 1996

15-16	Mechanical Chronographs	Seattle, WA
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Advanced Clock Repair	Roland Iverson, CMC
Advanced Quartz Watch Repair	Robert Bishop, CMEW, FAWI
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400-Day Clock Repair	John Nagle
Hairspring Vibrating	Joseph Cerullo, CMW, CMC
Introduction to American Pocket Watches	Alice Carpenter, CMW, CMEW
Introduction to Clock Repair	Buddy Carpenter, CMC, CMEW
Introduction to Quartz Watch Repair	Buddy Carpenter, CMC, CMEW
Mechanical Chronographs	Mark Heist
Mechanical Watch Repair	James Lubic
Micro Lathe Operations	Roy Hovey
Quartz Perpetual Calendar	Remy Waelchli
Repair of the Atmos Clock	Gerald Jaeger, CMW, CMEW, FAWI
Repair of the Bulova Accutron	Henry Frystak, CMW
Servicing ETA Quartz Chronographs	Jeff Broughton
Servicing the "Smart" Analog Quartz Watch	Robert Bishop, CMEW, FAWI
Striking Clocks	John Nagle
Watch/Clockmakers Lathe Course	Roy Hovey
Phase I: Basic Theory, Tools and Accessories for the Watch/Clockmakers Lathe	
Phase II: Making Wheels, Function Control Arbors and Lantern Pinions	
Phase III: Making Staffs, Jewel Settings for Watches and Marine Chronometers, Turning Between Centers, and the Jacot Tool	
Phase IV: Making Wheels/Pinions and Use of the Pivot Polishing Accessory	