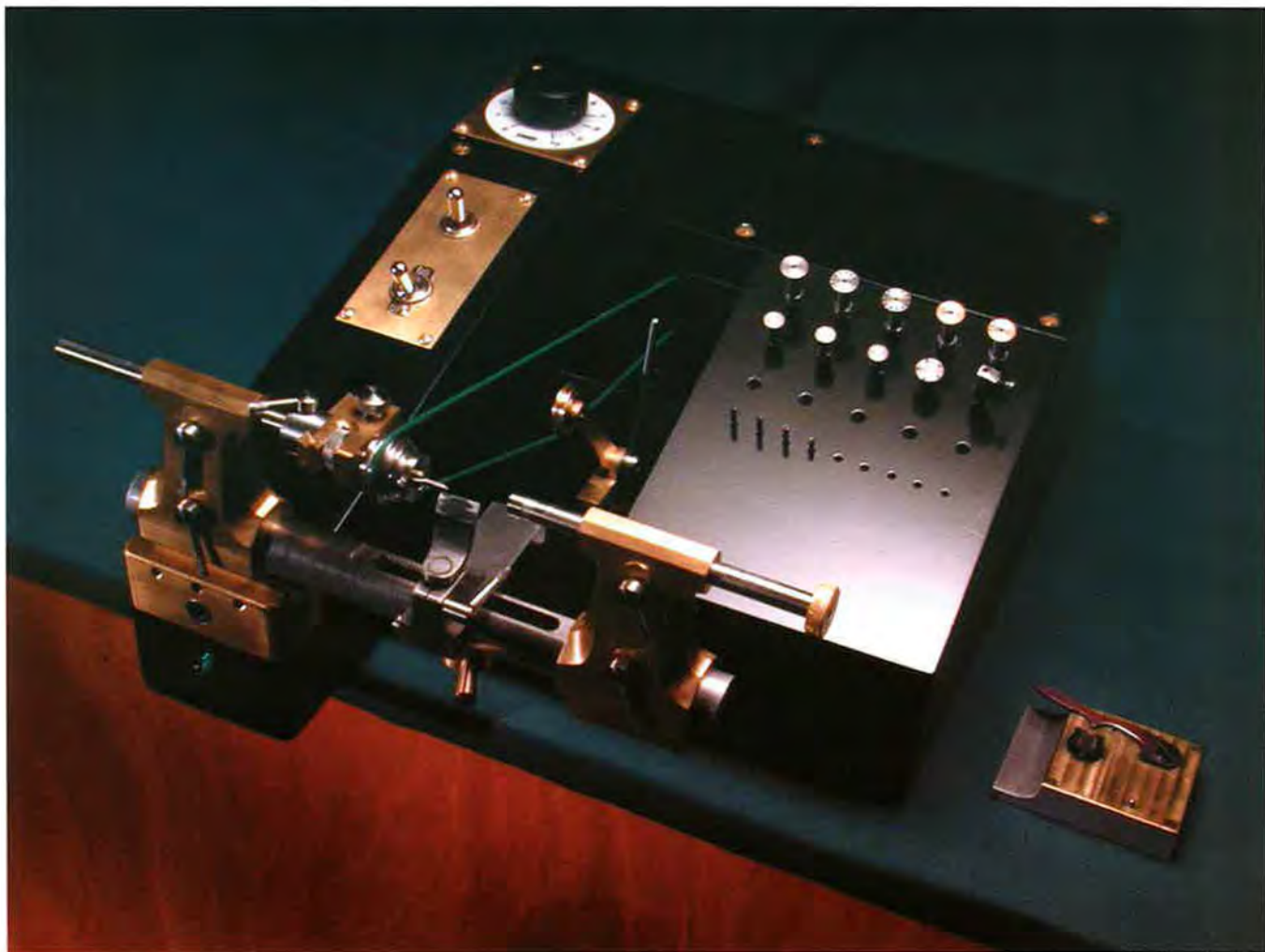


HOROLOGICALTM TIMES

June 2001



American Watchmakers-Clockmakers Institute

NEW

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Assortment is also available in stainless steel – #80.400 Only \$24.95

SPECIAL
Introductory Price!

12-PIECE KIT

#80.420

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(Reg. \$19.95)



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COVER

This month's cover feature is a set of watchmaker's turns.



Vice President's Message

Robert Porter, CMW

President Ron DeCorte asked me to write the June message to our members. Ron addressed the current status of the Spare Parts issue in the May *Horological Times*. This month let's take a look at the dues increase and how we got where we are. There is a lot of misinformation about the dues increase being circulated, especially on the Internet. Some nonconstructive critics have posed the rather ridiculous notion that raising the dues was a way AWI used to reduce the number of amateur horologists from the membership. Nothing could be further from the truth! After all, every professional horologist was a beginner at one time. **AWI is, first and foremost, an educational institution. AWI welcomes anyone who has an interest in horology.** Increasing dues was strictly a business decision passed by a democratic vote of seventeen dedicated Directors who are elected by the membership to make these difficult decisions after carefully weighing all the facts.

In 1997, AWI formed a group known as the Strategic Planning Committee - a Think Tank, if you will, of AWI members having extensive business and academic credentials. The Committee's goal is to recommend ways AWI could function in a more businesslike manner and better serve its members.

These men came up with a well thought out road map and list of priorities for AWI that we in the Strategic Planning Implementation Committee and the Executive Director have been following. The Board of Directors has approved most of the original priorities. Priority 1 was to **provide AWI with an up-to-date record management system.** As a result AWI now has a modern computerized office system to better serve the membership.

AWI should improve the culture of the organization. The AWI Internet website (www.awi-net.org) and new toll free phone line (1-866-367-2924) are helping to improve communications by making it much easier for you to let your Executive Director, board members and others know what your needs and concerns are.

(Continued on page 17.)



Executive Director's Message

James E. Lubic, CMW

Since implementing the "Bench Course Survey" on AWI's website earlier in the year we have had 176 members go to this page to fill out the form in hopes of having some Bench Courses held in a metropolitan area near them. At this point we have been able to identify seven areas around the country that show enough interest in at least one course. Here are the results:

Metro Area	Responses	5 or more chose these	Most Interest
Boston, MA	14	Hairspring Vibrating Clock Escapements American Pocket Watches Platform Escapements	Lathe Program
San Francisco, CA	12	Lathe Program	Lathe Program
Seattle, WA	9	Lathe Program	Lathe Program
Philadelphia, PA	8	Clock Escapements Lathe Program	Clock Escapements
St. Louis, MO	7	Atmos Clock	Atmos Clock
New York, NY	6	Clock Escapements	Clock Escapements
Los Angeles, CA	7	Basic Watch Repair	Basic Watch Repair

This information will be used when we budget for Bench Courses for the next fiscal year. For those members that took the time to fill out the survey, thank you. If you haven't, please do so when you have the opportunity. This information will go a long way in helping us to serve you better.

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Questions & Answers

Question

We have a customer who would like to have this pocket watch (see photos below) identified and dated if possible.

There are no apparent manufacturer marks on the dial or case. The watch is an open face, single push button chronograph and quarter repetition pocket watch. The movement is 19 lignes. The case is marked "argent" and "0.585" and is heavily engraved. On the inside lid, the following is engraved:

CHRONOGRAPHE
REPETITION HEURES & QUARTS
No. 65201

(In this space there is a series of round stamps depicting sun & moon and then alternating leafy wreath.)

Remantoir Amore
Ligne droite spiral Breguet
15 rubis

Any information about the watch would be greatly appreciated.

Jerry Zerbe, Austin, TX

Answer

The best I can do on your watch is repeat the obvious:

The watch is a 1/5 second center seconds chronograph with a quarter-hour repeating mechanism. The movement has a Breguet style hairspring (droite spiral Breguet) and 15 jewels. It is cased in a 14 karat gold case (argent 0.585). And by the style of the hairspring stud, I would guess it was made in the Le Locle area of Switzerland probably for export to the U.S. since 14 karat is looked down upon in Europe. From the style of the case and movement, it appears to have been made around 1900.

David A. Christianson
Technical Editor



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Borel

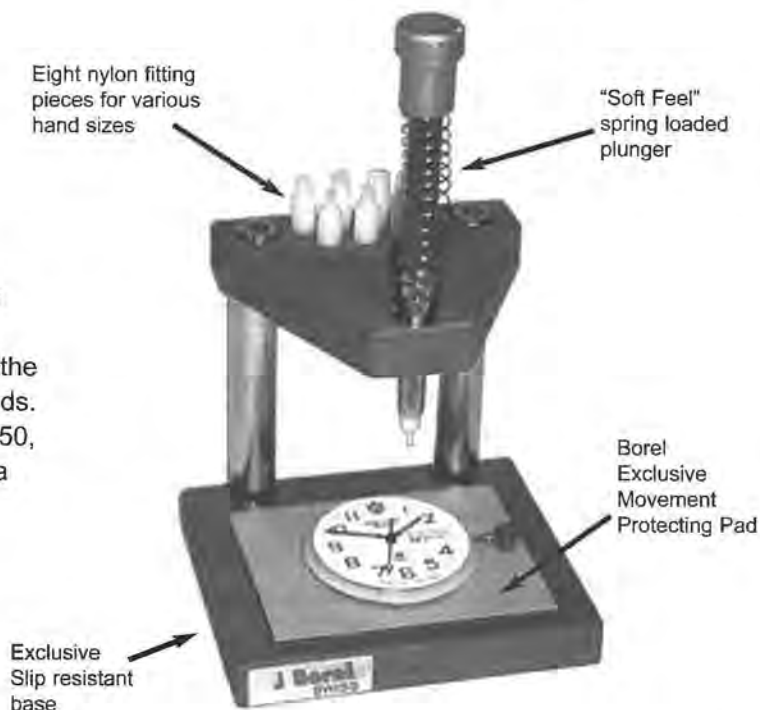
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New Hand Fitting Press

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40-0180	.40	1.80	2.60
50-0080	.50	.80	1.80
50-0160	.50	1.60	2.60
50-0220	.50	2.20	3.20
55-0070	.55	.70	1.80
60-0180	.60	1.80	3.00
70-0060	.70	.60	2.00
70-0080	.70	.80	2.20
70-0155	.70	1.55	2.95
75-0070	.75	.70	2.20

Asst. JBG15 \$24.95

Stock #	Cross-Section (mm)	I.D. (mm)	O.D. (mm)
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35-0060	.35	.60	1.30
40-0080	.40	.80	1.60
40-0090	.40	.90	1.70
40-0100	.40	1.00	1.80
40-0110	.40	1.10	1.90
40-0130	.40	1.30	2.10
50-0100	.50	1.00	2.00
55-0120	.55	1.20	2.30
60-0080	.60	.80	2.00
60-0140	.60	1.40	2.60
65-0120	.65	1.20	2.50

New Flat Type Asst., 60 pcs.

Asst. JBG20 \$24.95

Refill#	Band Width	I.D. (mm)	O.D. (mm)	Thick-ness
1	.30	1.50	2.10	.60
2	.50	1.50	2.50	.40
3	.40	2.15	2.95	.40
4	.60	1.80	3.00	.30
5	.40	2.20	3.00	.40
6	.35	2.50	3.20	.50
7	.85	1.80	3.50	.40
8	.90	1.80	3.60	.40
9	.60	2.40	3.60	.30
10	.35	2.95	3.65	.40
11	1.10	2.00	4.20	.40
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Ask Huck

Diamond Laps for Sharpening Carbide Gravers

Question

The lap for sharpening carbide gravers—how long does the diamond last? Does it wear out, fall out, or need to be replaced often?

Answer

I am not well-versed on this subject, but have used diamond-charged laps for about 40 years.

Some are made of copper, others from cast iron, aluminum, and plastic. My experience is limited to those made of cast iron. My two are shop-built and have never been recharged after about 40 years use.

I fitted the cast iron disc onto a collet-type stub arbor and cut all surfaces true, about a half-inch thick and a bit over two inches in diameter. Diamond compound is available from your material suppliers. The quantity I received was about the size of a large green pea. It was in the form of a large drop of grease and looked much like automobile chassis grease.

The material was spread very thin over the surface to be used. That was done with a fingertip. About half of the total quantity was used.

The material was embedded into the cast iron by holding a small piece of clock spring against the rotating lap. In use, the lap is wet with kerosene and run at about 200 RPM. It cuts the Waller carbide gravers with great ease.

After years of use, the lap surface looks more polished, but cuts “like new.” It would be interesting to know how this compares to laps that are commercially available.

Question

Can tool steel gravers be sharpened on the diamond lap?

Answer

No! Tool steel will damage the lap and very little results can be achieved.

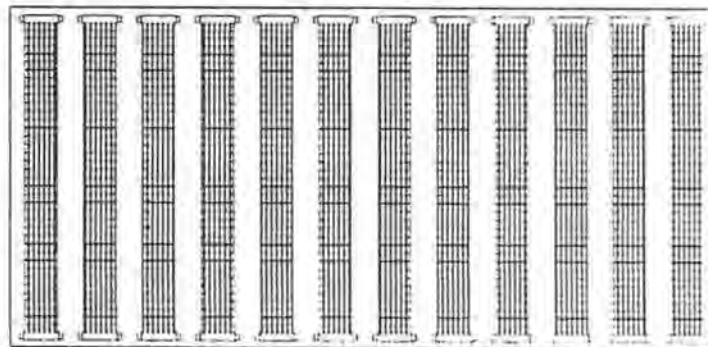
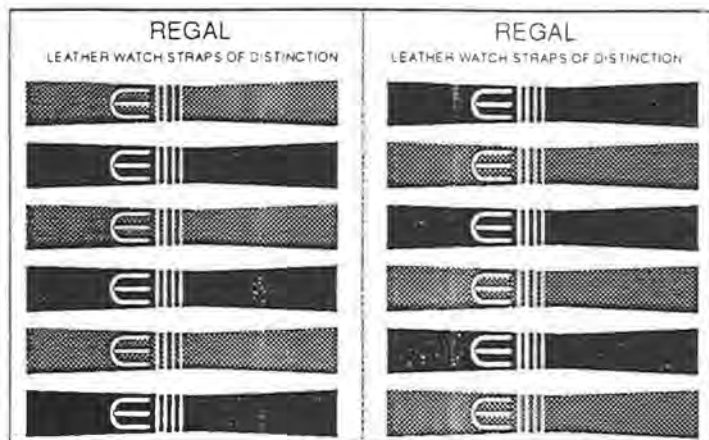
In my ranch shop, I sharpen carbide lathe bits on a “green wheel” on the bench grinder. The wheel is commercially available for that purpose. It is so soft that it can be dressed with a screwdriver tip. It is only good for the carbide material.



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Repivoting for the Watch and Clockmaker

Part 3

Repivoting the Third Wheel, Continued

Robert D. Porter,
CMW

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We made a carbide spade drill in Part 2 that is slightly larger than the pivot, and are drilling the hole for the pivot plug to a depth of about four drill diameters in Figure 18. The drill is held in the same pin vise we used to make the drill and has been aligned with the tailstock center. Pressure is applied to the drill by lightly pressing on the end of the tailstock arbor with our sensitive

“drill press” finger. A larger view of the drill at work is shown in Figure 19.

I used to make my pivot plugs a light press fit, but found that the arbor or staff material in many watches, especially the very old ones, is usually brittle and will break out the side of the hole when the plug is pressed in. I now make pivot wire plugs the same diameter of the

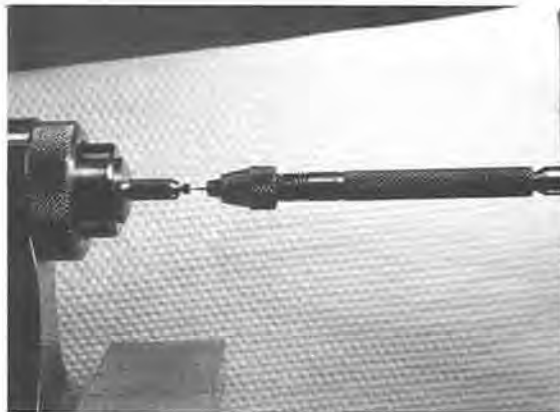


Figure 18



Figure 20

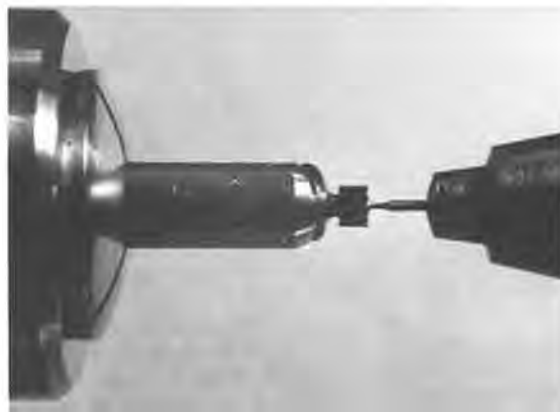


Figure 19



Figure 21

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drill and, since most drills usually cut slightly oversize, this results in a good slip fit. The new pivot will require an adhesive such as Loctite to hold it in place. The pivot is left on the stock, which serves as a handle, and a deep break-off vee is cut in the end of the pivot as pictured in Figure 20.

The new pivot was then inserted into the pinion and, after the adhesive has set, stoned to length in Figure 21. An old Elgin sapphire pivot polisher is removing any

residual adhesive and reducing the pivot diameter slightly in Figure 22. The cement brass is warmed with the alcohol bench lamp just enough to remove the pinion, which is then cleaned in alcohol to remove any remaining shellac. The pinion is pressed into the third wheel to its original position with the jewelry tool in Figure 23. We will finish the pivot to final size on the Jacot lathe.

While we could have reduced the new pivot to its final size and finish with the pivot polisher, we chose to use the Jacot lathe pictured in Figure 24. While a bow is usually used to drive the Jacot lathe, we will use a more modern method that fellow AWI lathe instructor Mr. Ron DeCorte demonstrated to me. An 18 inch length of 10 pound monofilament fishing line, tied to a 12 inch length of 1/16 inch diameter elastic cord (from my wife's sewing kit), is used to drive the pulley that turns the wheel and pinion. The end of the cord is attached to a hook at the back of the bench, and the monofilament line is wrapped one turn around the pulley so that a downward pull on the line causes the top of the wheel to rotate toward you in a counter-clockwise direction; and, at the same time, the pivot file is held on the pivot (being supported in a truncated vee) and pushed in the opposite direction to reduce the diameter of the pivot. A pendulum bob weight is being used to hold the line on the pulley when not in use.

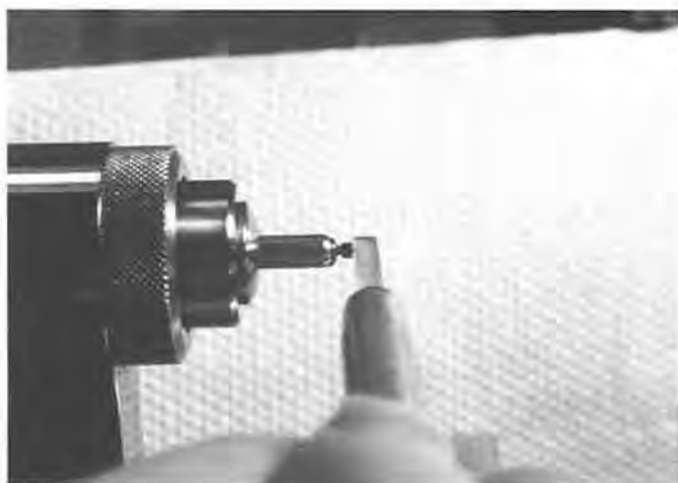


Figure 22



Figure 23



Figure 24

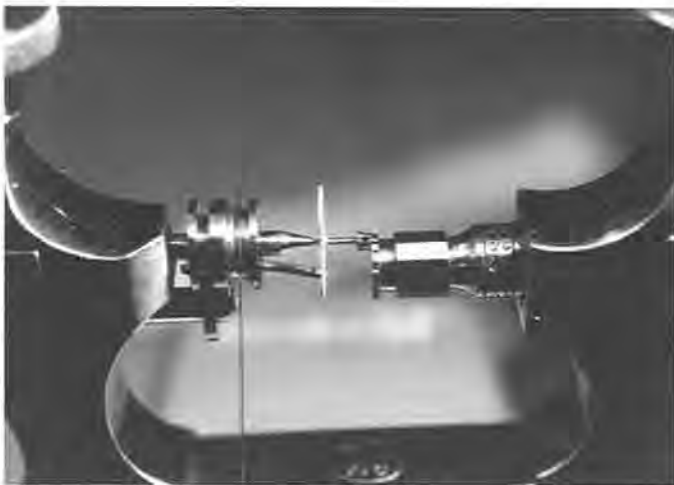


Figure 25



Figure 26

The diameter of the new pivot measures .26 mm (.0102"), and we want the finished diameter to measure .24 mm (.0094"). We start by putting the pivot in the support vee (Figure 25) marked .25, and then with a film of light oil on the file and pivot, use a left hand file to reduce

the pivot to .25 mm as shown in Figure 26. We then locate the .24 support under the pivot and use the file to obtain our final size and finish. We will replace the fourth wheel second hand bit in Part 4.



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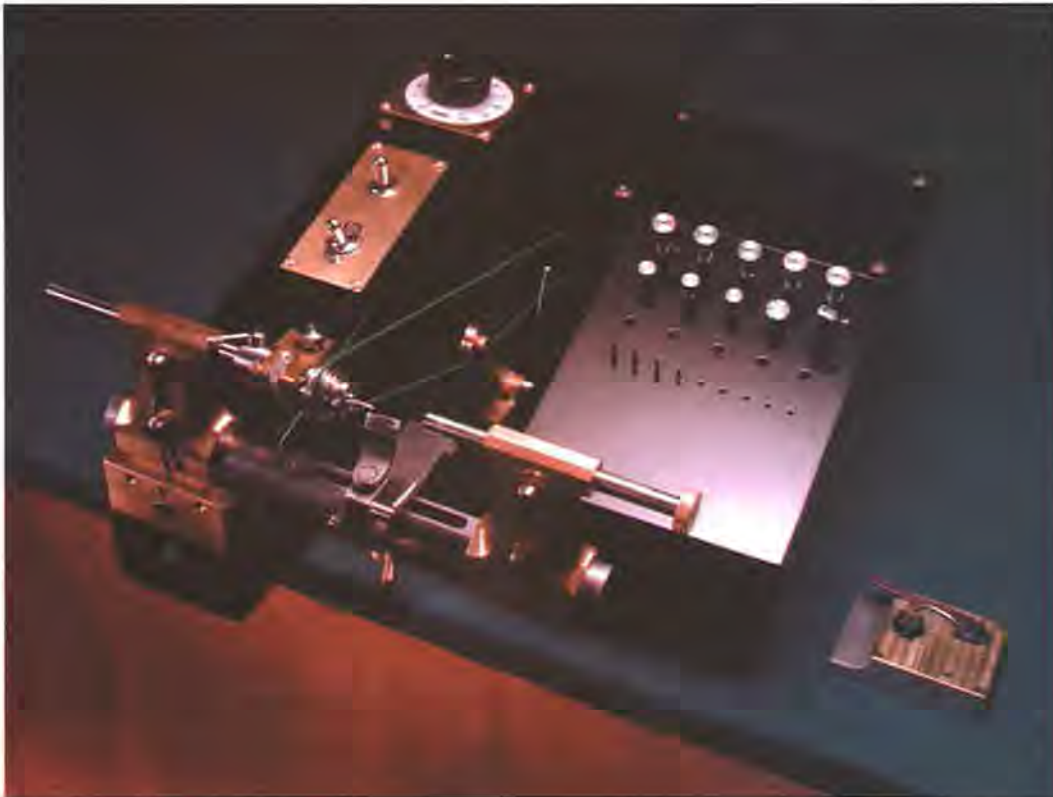
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Watchmaker's Turns



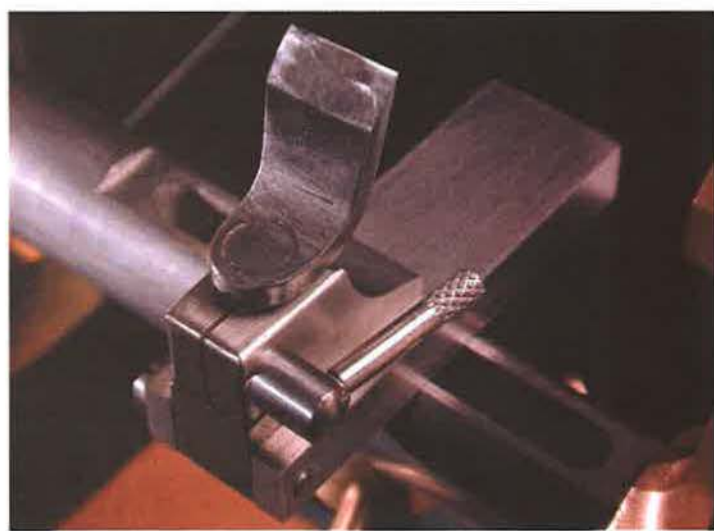
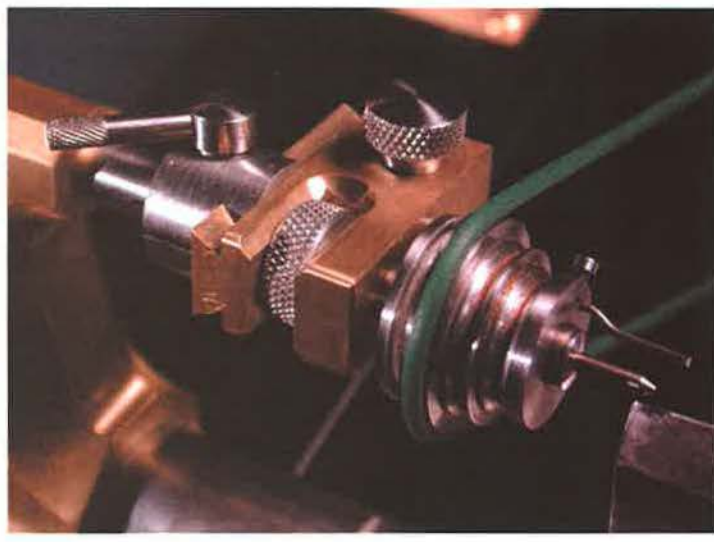
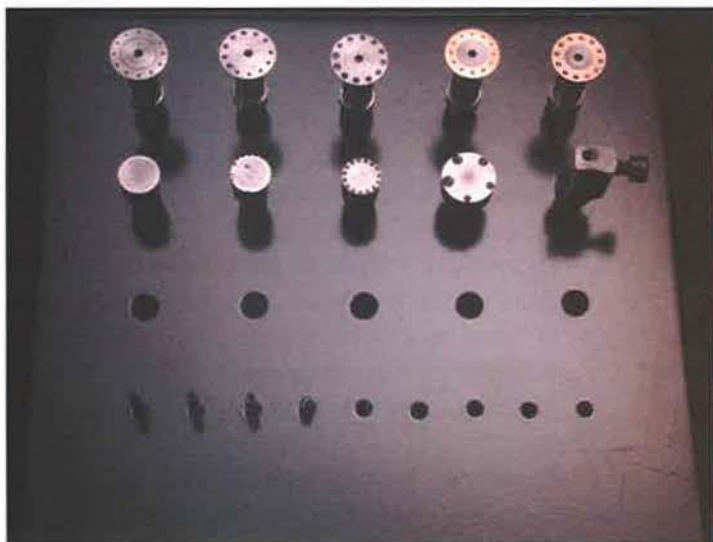
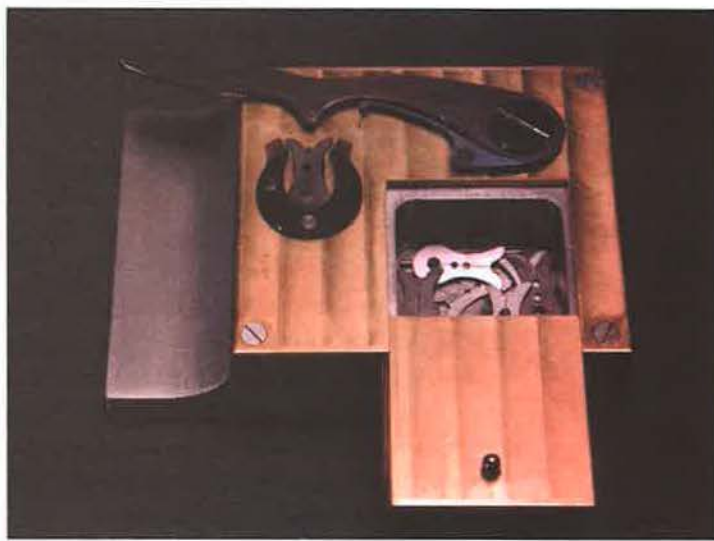
This set of watchmaker's turns and the accompanying set of dogs and opener were constructed entirely by member Matthew Henning. The turns are loosely based on a style used by Steiner of Switzerland, using their clever headstock runner arrangement that allows for quick adjustment when aligning it with the tailstock runners. The poppets (headstock and tailstock) are made of brass, with a unique locking arrangement of Mr. Henning's design for securing the bed and runners. The bed is ground tool steel which has been hand

scraped and matched to scraped gibs in the headstock and tailstock, and the tip-over rest is cast iron with a hardened steel tool rest. The turns are powered by a DC motor, mounted inside the base of the machine for good aesthetics and silent operation. DC motor/drives permit the user to vary the speed without a noticeable change in torque; the advantage over conventional "watchmaker's" lathe motors is obvious—with this particular drive a low speed of 80 RPM is possible at the headstock pulley. Such slow speeds

allow for very controlled turning of delicate parts.

The driving dogs are made of hardened and tempered tool steel, and cover a wide range of sizes. The opener is comprised of an aluminum base, brass top with Geneva-wave finish, and steel components. A dovetailed brass cover hides the storage chamber within the opener. All the steel components have been grained on a shellacstone, blued, and finished with polished bevels.







Mark Butterworth

The Modern German Clock Movement

New Developments

Part 14

In the course of these past 12 months new developments have occurred within the industry which are not generally known and we receive specific questions from time to time which may be helpful to everyone at some point. As a result, this month is an annual review of some these events and questions.

Franz Hermle & Sohn purchased the Johann Jackle Company which is a major manufacturer in Germany of dials, pendulums, and weight shells along with other specialty brass items including cremation urns. Jackle will continue operations in the same location with Fritz Jackle still there to serve you. Hermle is now a vertically integrated manufacturer producing everything but the clock case itself. In some instances, such as anniversary clocks, they also produce the cases.

Hermle has also started producing their own 11 jewel platforms for clock movements such as the ship strike as well as others. This has been previously outsourced and one of the few remaining suppliers had gone out of business causing a reliance on a 5-jewel model with plastic escape wheel. Hermle now offers their platforms in both the 5- and 11-jewel models. It is important when you order parts, escapements, or movements that you specify which model.

Kienzle has ceased operations according to our sources and that material may become harder to get. This is in addition to a number of smaller companies in the Black Forest which have gone out of business during this time.

The large number of tourists in Germany last year due to the weak German mark and the Passion Play in Oberammergau (once a decade) had caused a shortage of cuckoo clocks for export. It seems every foreigner wants to take one home. This is great news for the future of cuckoo clock repair as these do not come cheap and

every person dragging one into the shop says "This one really did come from the Black Forest." Interestingly, they are not found in many German homes! Do they know something we don't?

Howard Miller has increased their reliance on using Kieninger movements since they own that company. They have been using them in the grandfather clocks for a couple of years now, and have just introduced two new series for use in their wall and mantle clocks. The "Statesman" is a side hammer movement available in both triple and Westminster chime. The "Aristocrat" is a bottom hammer Westminster chime intended to replace the Hermle 340-020 balance wheel series. It uses a 2-jewel "Swiss escapement." Both of these models feature a double click system to eliminate the possibility of "snap back" when winding. It is expected that Kieninger will be used exclusively in the Howard Miller clocks in the future.

In the way of service bulletins:

As a reminder, it was discovered that there was a design change in the ends of the Energizer battery which does not always allow positive contact with the Hermle 2114 and 2214 chiming quartz unit battery compartment. Hermle will be making a change in their units to accommodate this, but in the meantime it is recommended that one does not use the Energizer brand or store brands made by them for this purpose. Duracell and Rayovac are two suggested.

We are getting more reports of chemical solvent used in clock cleaning melting or softening plastic parts in the movements such as cable guards, the older automatic verges, and hammer tips. The solution can cause a change in the sound of the hammer tips due to changing

the hardness of the plastic material. Hermle has been using a synthetic cable drum the last couple of years which reduces the fraying of cables and also has deeper grooves to help keep them in place. It is recommended that no plastic parts be put into a cleaning solution.

Repair persons are setting up new grandfather clocks and discovering they chime just fine at night but quit during the daytime. Many of the new clocks sold have the auto night shut-off feature. It is important when setting up the clock to set the time for 12 o'clock with the auto night feature engaged to first determine whether the clock is at noon or midnight. Once that is determined, then set the clock to proper time. In addition, it is important to instruct the customer on this feature and how to properly set the clock if it runs down, such as while the customer is on holiday. If the clock runs down at 8 a.m. and the customer returns at 8 p.m. and decides to wind the clock it will be 12 hours out of synchronization and a house call may be needlessly made. In addition, the customer needs to be made aware that the weights do not come down evenly if the auto night shut-off feature is used. This is also true when the chimes are shut off manually. The exception to this general rule is the Kieninger cable wound series. In this case the chime drum will continue to run but is pushed out of the way such that no hammers are lifted. In this situation the hour strike will continue to be heard unless that lever (on the left side) is placed in the "silent" position which causes the hammers to be pulled back. All three weights then fall normally.

Technical changes have occurred in several movement series over the past several years:

The Urgos uw32 and uw66 series have a different minute hand shaft and hour tube diameter than the older series. This new size is now the same as that used on the Hermle units. As a result, the hands and moon gear need to be changed when a movement is replaced.

Speaking of Urgos, a number of changes have occurred over the years in their uw32 and uw3 series. Each time an engineering change took place a letter code was changed. As a result, the UW32 series may end in letters from A-E. The uw3 series has letters A and B with A generally being manual beat set and B the auto beat set. Although the latest Urgos movements will replace any of these, the internal parts do not always interchange and it is important to realize that when trying to order parts.

In addition, Kieninger changed the size of the hour and minute shaft on the SKS series to this German standard.

The Hermle cable-wound units such as 1161 and 461 series made several internal gearing changes which improved the torque distribution in the trains and also improved the action of the seconds hand. As a result, the new

series uses a different length cable than the older series. These are marked on the movement with the older ones marked with an "A" or "AS" after the number (e.g. 1161-853AS/94cm) and the new series marked "BS" and the newest "BSK." If you are ordering parts such as cable from a material house it is important to specify the proper length of the cable or the complete number of the movement for which it is needed.

The Kieninger J-series made a change in the spring barrels and second wheels for the same reason. As a result, if you are ordering mainsprings and/or barrels complete it is important to specify exactly what you need as it probably is from an older series and not from the first thing your supplier would supply.

In both cases, the movements as a whole will interchange if the movement is replaced, but all of the internal parts will not interchange.

I will do my best to keep you informed on changes in the industry from time to time.

Final thought: *"Happiness is a very small desk and a very large wastebasket."* Robert Orben



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Gene Kelton Retires from Citizen Watch Company

Devoted to His Faith, His Family,
Watchmaking and AWI



John Forbes (right), Senior Vice President of Operations and Administration for Citizen of America, congratulates Gene Kelton on his retirement.

On Friday, April 20th, Gene Kelton completed 23 years of service at the Citizen Watch Company. Gene joined Citizen when the company began to directly market its watch brands in the United States under its own name. Twenty-three years ago it was not easy for a Japanese company to forge a niche in the U.S. watch market; both consumers and watchmakers did not readily accept this new Japanese import.

The fact that Gene Kelton had earned the trust of the American watchmaker by virtue of his educational activities for the Horological Association of California and for the members of AWI, avenues of acceptance were opened. These avenues would have been more difficult to achieve had not Gene Kelton joined this unknown watch company on the West Coast of the United States.

Kelton was one of a handful of pioneer AWI instructors who worked tirelessly to help train mechanically-oriented watchmakers to service the new watches employing quartz technology. At the time it was questionable whether these new watches would be repairable by the conventional watchmaker, or by the people servicing televisions and other electronic products, or whether they could be serviced at all.

Gene Kelton made contact with a fledgling U.S. firm who marketed a solid state watch under the name of "Intertime". This brand was just one of the many startup companies who attempted to carve out a niche in the watch market in this country. Through his efforts, AWI was able to purchase components from Intertime, and discovered what it took to service a solid state watch. The AWI instructors learned from Gene Kelton how to assemble the components of a solid state watch. Instruction for AWI

members was developed using kits of components from Intertime which were assembled on a hotplate.

Through the experience gained in presenting the AWI Intertime workshops, AWI was able to establish a multitude of solid state and quartz watch repair workshops. The importance of these traveling workshops was that it removed the fear of solid state watches from the mechanical watchmaker and proved that we could successfully service these new timepieces. An entire new era in watchmaking began.

Gene Kelton was born in Oklahoma. When a mining accident disabled his father, the family accepted an invitation to make their home with a relative in Arizona. Anxious to escape what almost certainly would have thrust the Kelton sons into a lifetime of working in the Oklahoma mines, the Kelton family happily relocated in Arizona. It was in Arizona that Gene Kelton met his wife, Kay. They found their way to southern California. There they raised four children, two boys and two girls. There are 10 grandchildren and 3 great grandchildren. The Keltons were married for 54 years before Kay's untimely death created a void that has been difficult for Gene to deal with.

Gene and Kay Kelton were familiar faces at all AWI annual meetings, never having missed even one. During this period, Gene recalls that he did miss one Affiliate Chapter meeting. In retirement he plans to continue to support AWI and attend meetings. When asked about retirement, he responded that at age 75 he thought it was time to get about doing some things that he wants to do. We thank Gene Kelton for his friendship and devotion; we are all better off from having his presence in the trade. WE WISH HIM MUCH HAPPINESS!

Milton C. Stevens, FAWI

Vice President's Message

(Continued from page 2)

The priority that **AWI should reach out to clock-makers** is being addressed with the Laurie Penman clockmaking and repair courses now being offered by AWI. Jerry Faier and William O. Smith, Jr. have also done extensive work on a new clock repair course for the future. Laurie Penman and his students are restoring a Riefler precision clock and others for the Cincinnati Observatory. A video is being made of the restoration work and will be available from the Henry B. Fried Lending Library when the work is completed.

Another priority we have made some, but not enough, progress on is that **AWI should reduce the reliance on the Perpetuation Fund income for operating expenses**. This is easier said than done, and will take time to accomplish—here's why:

Twenty years ago, when AWI had upwards of 7000-plus members, it is my understanding that the dues money was used to pay for the operation of the office, building maintenance, etc. The investment income was used to fund educational programs for the membership. With the steady decline of watch and clockmakers due to retirement and passing, and the lack of new people coming into the trade, this side of the equation has changed considerably. **This reduction in membership is not unique to AWI,**

but is prevalent in horological associations around the world. In order to provide the level of service our members deserve, adjustments had to be made in the dues structure which have increased only five times since 1960, from fifteen dollars to the present seventy dollars per year or a little over 19 cents a day. Industry cooperation, and alternate sources of income are also being explored to enhance the value of AWI services to the membership.

Most of the Perpetuation Fund is invested in a "lock box" of very conservative investments backed by the United States Government. Considering the recent wild gyrations of the stock market and the plunge in value of investments in the once high-flying Internet dot.coms, the wisdom of the Directors of years past becomes obvious, although we do wish we had a little more flexibility in making investments. The result is that there is just so much money to work with. AWI operates in the real world of the here and now, using available resources and budgets—not in the make-believe world of 20/20 should have/could have done it this way or that hindsight. Opportunities for watchmakers and clockmakers are better now than any time I can remember. AWI and its members have a bright future ahead of them.

Thank you very much for supporting your organization—The American Watchmakers-Clockmakers Institute. ☺

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Archie B. Perkins,
CMW, FAWI,
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Technically Watches

Pocket Watches and Their Maintenance Part 37

The Assembly of the English Fusee Lever Watch

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After the English fusee lever watch has been disassembled, repaired, and cleaned, it is assembled and oiled.

Before the movement is assembled, some individual units must first be assembled. These are the fusee assembly, the mainspring and its barrel, and the cap jewels. We will show how these units are assembled in that order. Then, we will show how the movement is assembled.

Assembling the Fusee Unit

Figure 1 shows the parts of the fusee assembly. View A shows the main wheel with the maintaining spring in position in the sink in the wheel. View B shows the maintaining ratchet wheel which contains the two clicks and click spring that work with the fusee ratchet wheel when the fusee is wound to wind the mainspring. View C shows the fusee which the fusee chain is wound around when the watch is wound. View D shows the retaining collar for holding the fusee assembly together. A taper pin (not shown)

is usually used through a hole in the side of the tube of the collar and a cross hole through the fusee arbor to hold the assembly together.

To assemble the fusee parts, first the maintaining ratchet wheel is placed in position on the fusee main wheel as shown in Figure 2. The main wheel has a hub which the maintaining ratchet wheel fits onto. This hub should be oiled where the maintaining ratchet wheel fits. The teeth on the fusee ratchet wheel should also be oiled as well as where the bottom of the fusee at the place where it turns against the maintaining ratchet wheel. A small hole in the ratchet wheel fits over a pin in the maintaining spring. *Note: During any assembly process where the parts are held in the fingers, one should wear finger cots.* These can be made by cutting off the fingers of plastic gloves that are the proper size to fit the fingers. Next, the main wheel and the maintaining ratchet wheel are placed onto the fusee arbor as shown in Figure 3. The fusee arbor should be oiled where it turns inside the main wheel hub. The fusee can be held on a

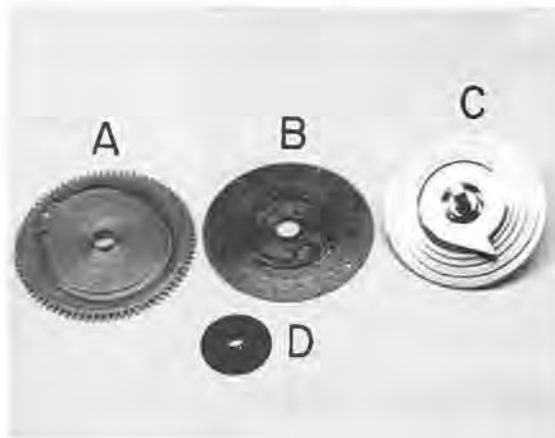


Figure 1



Figure 2

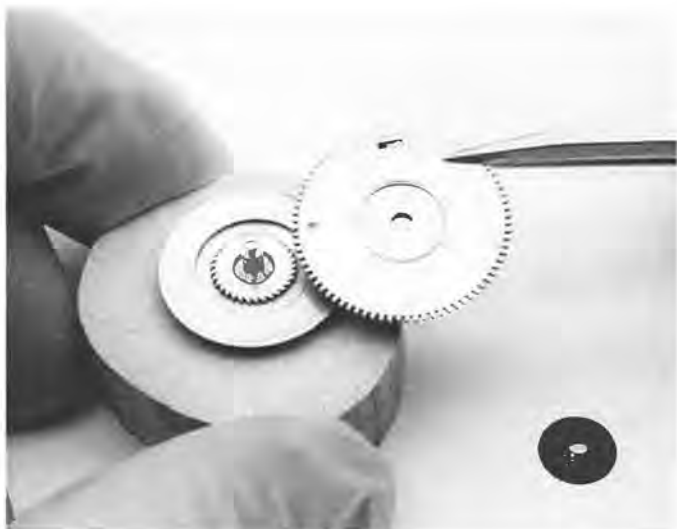


Figure 3



Figure 5



Figure 4



Figure 6

block of pithwood while it is assembled if desired, or the fusee may be held in the fingers by the square on the arbor while being assembled.

Figure 4 shows the fusee assembly after the main wheel and maintaining ratchet wheel have been placed into position on the fusee.

Figure 5 shows how the fusee is held in the cotted fingers as the main wheel and maintaining ratchet wheel are turned on the fusee arbor to cause the two clicks to fall into position on the fusee ratchet wheel teeth. Finger cots should be used on the fingers of both hands when this operation is done.

Figure 6 shows the retaining collar being placed in position on the fusee arbor. Some oil should be placed between the fusee main wheel and the collar where they rub together when the fusee is being wound. As the retaining collar is pressed down on the arbor, it is turned with the tweezers to line up the hole with the cross hole in the fusee arbor. This is shown in Figure 7. The hole in the

collar and the arbor are usually larger on one side than on the other side; therefore, it is important to match these sides up so the taper pin that is used to pin the collar to the fusee arbor fits the holes closely. If the old taper pin is not damaged, it can sometimes be re-used; otherwise, a new pin will need to be fitted.

Repinning the Retaining Collar

When repinning the fusee retaining collar, a brass taper pin is usually used. The taper pin is tried into the hole from the large end of the hole. It is desirable to have a pin that will go into the hole so it will extend about the same amount on each end of the hole when it is pushed in with the tweezers. Figure 8 shows the taper pin being inserted into the hole in the collar and arbor.

Figure 9 shows a taper pin being pressed into the hole with the tweezers jaws. This pin is too large for the hole.



Figure 7



Figure 9



Figure 8



Figure 10

After the proper sized pin is selected for the hole and it has been pushed into the hole, then a pair of cutting pliers can be used to cut the pin off on the large end so it is slightly too long. This is shown in Figure 10. Next, the tweezers are used to press the pin tightly into its hole. This is shown in Figure 11. Any excess can be removed by the cutting pliers.

Figure 12 shows the cutting pliers being used for cutting off the other end of the pin. A small escapement file can be used to file the ends of the pins so they are flush with the retaining collar. Use care to avoid doing damage to the collar.

Another method that can be used to remove the ends of the taper pin is to use an x-acto blade to cut the pin close to the collar most of the way through the pin so the ends of the pin can be broken off flush with the collar. This is done after the pin has been pressed into its hole tightly.

After the pinning has been completed, the fusee is turned to check for freedom. The fusee should turn freely without noticeable sideshake or endshake. If the fusee is hard to turn in the main wheel, then a wood mallet can be used to tap the lower end of the arbor while the main wheel is held in the fingers. This should free up the fusee in the main wheel.

Assembling the Mainspring Barrel

Next, the mainspring barrel is assembled. The proper size mainspring winder is used to wind the mainspring so it can be inserted into the mainspring barrel. Figure 13 shows the mainspring being inserted into the mainspring barrel. The barrel is held in the cotted fingers of one hand while the mainspring is pressed out of the winder with the thumb of the other hand on the ejection button of the winder. Make sure the mainspring is securely hooked in the barrel before pressing the mainspring into the barrel.



Figure 11



Figure 13



Figure 12

After the mainspring has been pressed into the barrel, the barrel arbor is replaced. A pair of strong tweezers should be used to replace the barrel arbor. After the barrel arbor has been replaced, it should be turned in its hole to make sure that the spring is safely hooked onto the hook on the arbor. This is shown in Figure 14. *Note: The mainspring can be lubricated before it is inserted into the barrel by rubbing it with an oily piece of watch tissue, or it can be oiled at three points after it has been inserted into the barrel.*

Next, the barrel cover is replaced. This is shown being done in Figure 15. The cover can be snapped into place with a pair of wooden tweezers as shown. A pair of wooden tweezers can be made for this purpose out of a one-piece clothes pin. The barrel arbor should be oiled where it works in the barrel and cover.

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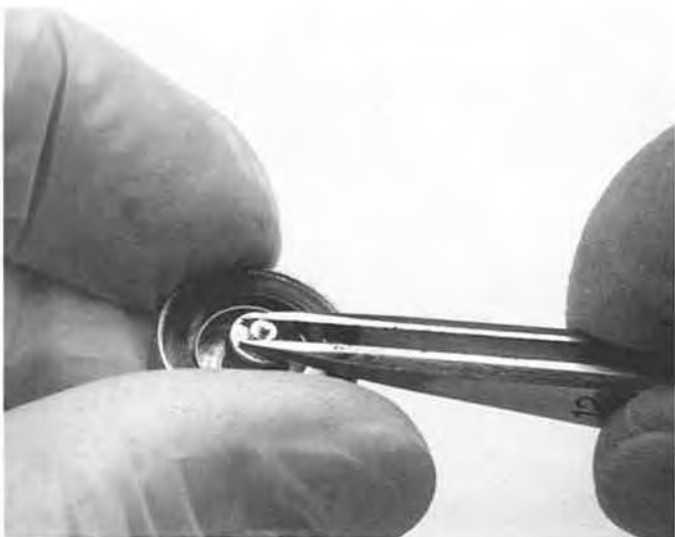


Figure 14

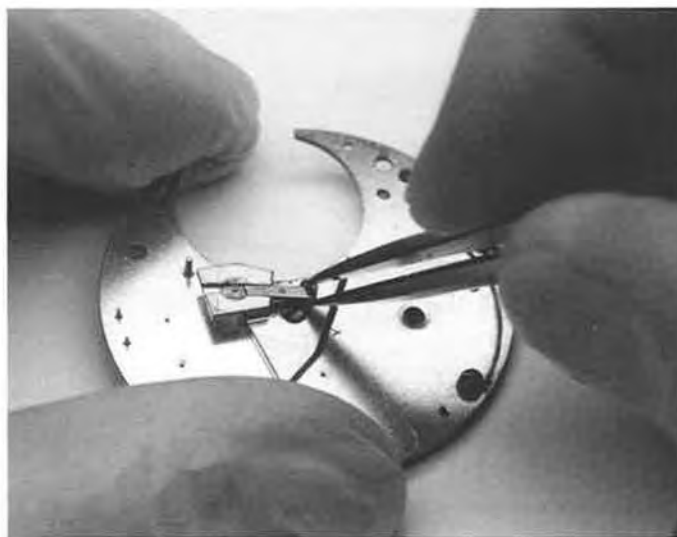


Figure 17



Figure 15

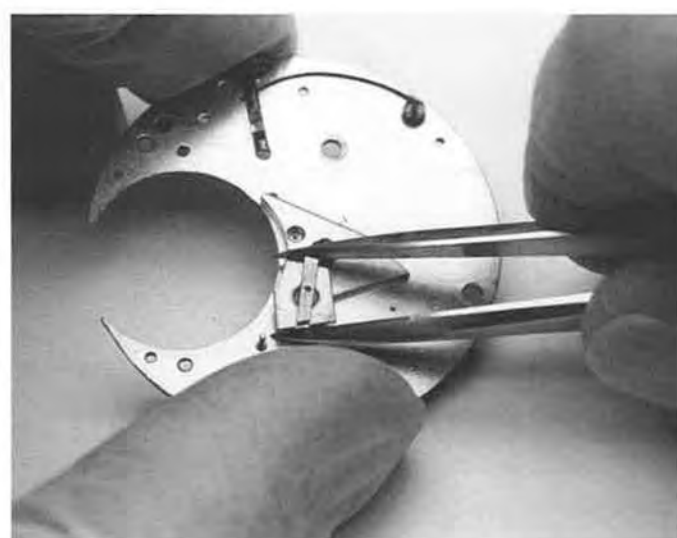


Figure 18

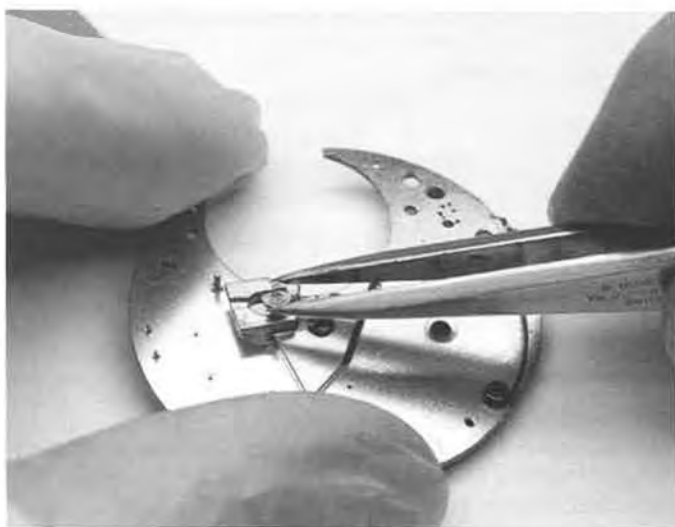


Figure 16

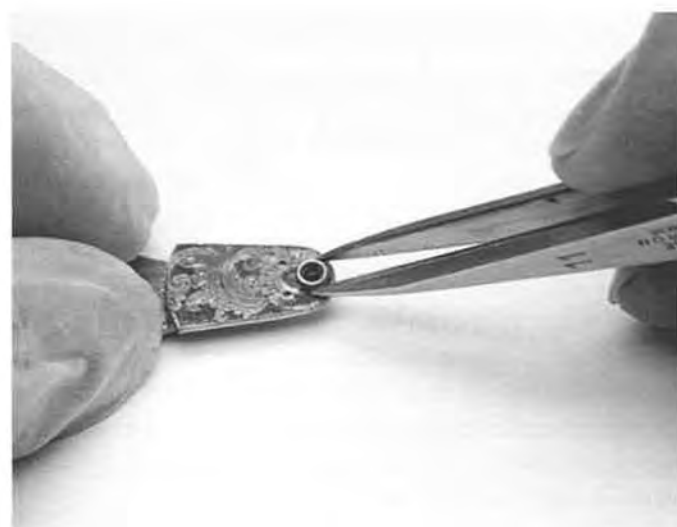


Figure 19

Replacing the Cap Jewel Settings

Figure 16 shows the lower balance hole jewel setting being replaced. This setting has a "V" slot cut across its top to fit the tapered bar type cap jewel setting; therefore, the hole jewel setting should be replaced so its tapered slot matches the tapered slot in the potence in which it fits.

Figure 17 shows the tapered bar type cap jewel setting being replaced in the slot in the potence and balance hole jewel setting.

Figure 18 shows the tweezers being used to press the cap jewel setting into place in its slot in the potence. One jaw of the tweezers is placed on the end of the cap jewel setting and the other jaw of the tweezers is placed on the edge of the potence. The tweezers are squeezed to press the setting until the cap jewel is centered with the balance hole jewel and is tight.

Figure 19 shows the upper cap jewel setting being placed into position over the upper balance hole jewel setting.

Figure 20 shows the jewel screws that hold the upper cap jewel setting in place being replaced. In this case, there are three jewel screws.

After the cap jewel settings have been replaced,



Figure 20

the jewel assemblies are oiled and the oil is pushed through to the cap jewels to form the proper size oil ring.

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Kari Halme

Making Crystals

Photo by Kari Halme



From Sand to Glass

The function of a watch crystal is to be a transparent cover which protects the dial and the hands of a watch. The watch crystal is also often called a glass, since this was the first material used. Around 1620 - 1630 the first pocket watch crystals were cut out of rock crystal. They were faceted and hollowed-out masterpieces for the most expensive timepieces only. For some, the entire case was carved out of a solid rock crystal instead of the previous means of protecting the dial and the hand(s) with a decorative metal lid.

One of the most innovative ways of using glass in watchmaking was by the Waltham

Watch Company in the late 1880s and early 1890s. The bridges of a 16-size pocket watch ("Stone Mountain") were made of rock crystal, but that is a whole other story.

The dawn of the 1700s brought about the manufacturing of traditional glass crystals. The main ingredients of raw glass were iron free sand, lime and sodium carbonate, which were mixed. The mixture was poured into fireproof containers which were heated for hours in frit kilns. A temperature of about 760°C (1400° F) was needed to make the mixture clear.

After the mixture was cooled back down to 530° - 600° C (985° - 1110° F), a glassblower

took some of the melted mass onto his blowpipe. He then shaped the mass with a wood stick and blew it into a ball. According to the glassblower's skills, the ball was even in thickness and of a desired size - or something completely different.

The completed ball was removed from the blowpipe and was laid aside to cool down slowly. The faith of the cooled-down ball was to be cut in pieces which were sorted out by their thicknesses and cut further into round blanks.

The curvature of some blanks was very irregular, and they were reshaped in simple compression molds. In kaolin (china clay) molds, a glass piece was heated until it became soft on one side only. The reshaping was then done by pressing the opposite (cooler) side with a shaped and polished metal weight.

Every piece was then ground optically and to the desired outside diameter at the accuracy of 0.01 mm. Shaped (fancy) crystals were shaped the same way.

Most of the eighteenth century watch glasses were imported to Switzerland from France. By the early 1800s, there were specialized glasscutters in Switzerland. The firm of Bastard and Redard of Geneva is to thank for the invention of the diamond glass cutting compass and of the bevelling machine which eliminated the need for cementing each glass one by one on a chuck for shaping and edge polishing.

Plastics and Other Alternatives

The traditional watch glass was very transparent, but also hard and thus prone to breaking. The invention of plastics in the beginning of the 1900s had an effect on watches, too. The Second World War accelerated the research work on new materials, and the end of the 1940s, along with the rest of the century, became the golden age of the new wonder material.

Since plastic was relatively durable and very easy and inexpensive to make, it started replacing older and more expensive materials. For a long time, the main use of plastics in watches was simply to replace glass crystals. In modern, inexpensive watch movements plastic is the main ingredient.

Although acrylic plastic scratched more easily than glass, it was more impact resistant. It was easy to shape, since it could be pressed or cast to almost any shape. In retrospect, the cheaper cost of manufacturing still made it desirable, despite of the drying, cracking and yellowing of aging plastic.

When a metal tension ring was added inside a plastic crystal, watch cases became really tight. The same tightness could not be achieved with glass crystals, and as a result they started to disappear. Plenty of old glass crystals can still be found in old stocks of dead or retired watchmakers.

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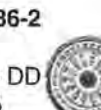


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In his book, *Watchmaking*, George Daniels describes his way of making acrylic watch crystals. The book should be a part of any serious watchmaker's library, especially since a new edition of it came out last year. In case you don't have this book, please contact companies who sell horological books. You'll learn more than just crystal making!

The 1970s saw the conquest of the world by Japanese watches. By the end of the decade many of their plastic crystals were replaced with a new kind of real glasses, now called mineral crystals. The Japanese had solved the sealing problem with plastic gaskets. The price of mineral crystals remained above that of plastic crystals for a long time, but they were often the only available replacements for broken, fancy shaped originals.

In the 1980s the Swiss introduced the watch world to inexpensive machines which could shape a watch crystal out of a glass or plastic blank. Around the same time, the manufacture of mineral crystals started to shift to the Far East - especially to Hong Kong which produces the majority of today's mineral crystals. Today the mineral crystal is so inexpensive that it has replaced the plastic crystal almost completely.

Because most mineral crystals are flat, watch cases protect them fairly well from impact, but they still scratch easily in hard use. A plastic crystal is easy to polish, but polishing a mineral crystal is much more complicated. This paved the way towards the next generation of crystals.

Blessing of a Metal Oxide

The watch industry's answer was a sapphire crystal. The first sapphire crystals were manufactured in France already in the 1940s, but they did not become commonplace before the end of the 1980s. The material for a sapphire crystal is the same aluminum oxide which has made watch jewels practically eternal. However, the manufacturing process differs so much that I will describe it separately.

The life of a sapphire crystal begins as a single crystal raw stone, just like the life of watch jewels. However, the raw stone for watch crystals must be reheated, or annealed, in a vacuum at around 1800° C (3200° F) for several hours. After the stabilization, and depending on the final shape of the crystals, the raw stone can be cut into big cylindrical chunks or long round, square or rectangular sticks.

These chunks or sticks are cut into thin wafers with metal blades and diamond powder. The wafers can then be shaped further, since their thickness is not uniform after the slicing. At this stage, about half the material is lost as dust.

The wafer blanks are then ground with diamond disks to make them even in thickness. The accuracy at this

stage is 0.02 mm. One way to make them even is to grind one side at a time while the blanks are cemented to a metal plate. Another way is to place the blanks between two fine diamond grinding wheels and grind both sides at the same time.

The pre-ground blanks are placed in a machine which has two disks. One of the disks is made of rubber. The rubber disk pushes the blank against a diamond wheel which cuts the outside shape of the crystal with the accuracy of 0.01 mm. Different shapes can be cut by fitting the machine with cams that represent the desired form.

Today's cutting machines are computer controlled which allows a large range of complex shapes which you could not even dream about a few years ago. The control system keeps the cutting disk and the blank in appropriate positions in respect to each other. One machine can cut anywhere from 20 to 100 blanks at a time.

Computer control allows cutting room for the hands on the underside of a crystal, or the whole crystal can be made convex, no matter what the basic shape is. Since operations like these require precision centering and long machining time, the most unusual shapes are reserved only for the highest quality watches. For the same reason, the shaped and curved crystals of less expensive watches are mineral glasses. The edge of a crystal can be beveled or ornamentally cut with the same principle.

After evening-out and pre-shaping, both sides of the crystal are polished with various wheels and diamond powder. This operation is done in several phases and with different coarsenesses of wheels and powder until the crystal is perfectly transparent. Finally all micro scratches are removed with a mechanical-chemical process whose details crystal manufacturers do not share.

The parts are carefully cleaned after each operation. Naturally the cleaning is most important after polishing, because this is the first time the flaws of a piece can be seen. Absolute flawlessness is required if the crystal is to be coated with coloring, or a metal or anti-reflective coating, because all of them only accentuate any defects.

The sapphire crystal's hardness is right below that of a diamond. It is practically scratchproof and very impact resistant, but any sharp blow from a right angle will make it chip (from the edge) or break into countless tiny pieces.

Since it is visually impossible to tell the difference between a mineral and a sapphire crystal, the only way is to do a test by trying to scratch the glass with a steel knife or a screwdriver. You can be sure that a mineral crystal will not pass this test without showing signs of damage. You can scratch a sapphire crystal with a diamond or any hard metal that contains carbides.

The biggest sapphire crystal producing countries are Switzerland, Germany and France.

Visions of Future

The latest applications of a sapphire crystal are the see-through glasses on the backs of some watches and the oscillating weight of the Ventura V-Matic (based on Lemania 8810). Seiko's Sapphlex crystal is a combination of a mineral crystal and a layer of hard aluminum oxide.

Rado has led the way in development of new case materials for a long time. The DiaStar, introduced in the 1960s, had a scratch resistant hard metal case. Three decades later the brand introduced a ceramic watch case. A couple of years ago Rado made a case that was covered with a transparent layer of crushed diamonds.

Although Rado has mainly worked on case materials, I believe that one day we will see a practically scratchproof diamond crystal in a common man's watch.

Originally printed in the Finnish magazine *Kello ja Kulta/Watch and Gold* magazine.



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The Herschede Two-Weight, Five-Tube Movement

Edwin U. Sowers III, CMC, MSME

Edwin U. Sowers III is a retired engineering research and development project manager, with a Master of Science degree in Mechanical Engineering from Drexel University. He is a member of the American Society of Mechanical Engineers and the Society of Manufacturing Engineers. Mr. Sowers is certified as a Master Clockmaker by the American Watchmakers-Clockmakers Institute. He is a 23-year NAWCC member and a member of Philadelphia Chapter 1 and Keystone Chapter 158. He has published articles in the NAWCC Bulletin and the Clockmakers Newsletter dealing with various horological subjects, including deadbeat pallet repair, repair of clock cases, and a detailed description of the operation of the ingenious Poole electro/mechanical clock. Mr. Sowers, who resides in Lebanon, Pennsylvania, has been involved in the restoration of clock movements and cases for 25 years.

The Herschede Hall Clock Company produced a variety of tubular chime movements. The most interesting of these is the two-weight, five-tube movement. I have encountered the normal two-weight movement, as well as one that is motor driven. The latter movement is essentially the same as the former, but is driven by two motors, one for time, and a second to drive the chime/strike mechanism.

Figure 1 shows the silvered brass dial which was used with movements furnished to various clock manufacturers. Figure 2 shows the movement with the chime/strike drum, hammer pulling levers, and five tubes. The movement which accomplishes the timekeeping, chime, and strike functions, performs these three functions with but two gear trains. The time train performs the timekeeping function; the second train deals with both the chime and the strike functions.

To simplify the discussion, the second gear train will be referred to as the chime train. The chime train drives the chime/strike drum, which incorporate pins on the periphery that act upon hammer levers. The hammer levers, in a conventional manner, pull on strings connected to hammers that impact upon five chime tubes to generate the Westminster chime sequence, then strike the hour. The fascinating feature of the movement is the concepts involved in accomplishing the chime and strike functions by shifting the chime/strike drum through three lateral positions during three full revolutions of the drum.

In the first position (to the right), the four quarter-hour chime sequences are accomplished within two



Figure 1

revolutions of the drum. After chiming the fourth quarter (completing two revolutions), the drum shifts to the left. This disengages the chime pins from the chime hammer levers, and positions a row of strike pins to engage the strike hammer lever. Striking proceeds through the correct number of strikes, at which time the drum shifts again to the left, disengaging the strike pins from the strike hammer lever. The drum, however, continues to rotate to completion of a full revolution. The drum has now rotated a total of three full revolutions. It is subsequently reset to the first position (to the right) as the minute hand approaches the first quarter position.

Figure 3 shows the mechanism which controls chiming. The upper lever, pivoted to the left, and with a vertical extension, is the locking lever. Below that is a detent arm which pivots to the left on a screw attached to the front plate; there are two detent notches on the right-hand end. Below the detent arm, and also pivoted to the left, is the warning lever. Suspended from the warning lever is the lifting lever. The lifting lever lifts the warning lever by means of the pin which can be seen immediately to the left of the tail of the second hand.

The action which takes place in the course of an hour, plus the manner by which automatic chime correction is achieved, is presented by the following:



Figure 2

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First Quarter

At the first quarter, a lifting cam on the minute hand arbor, with 4 pins acting as lifting lobes, raises the lifting lever. This raises the warning lever, the detent arm, and the locking lever. Warning occurs. The locking lever is latched in a raised position by a pin on the lever which engages the *lower right notch* of the detent. When

the lifting lever is released by the lifting cam, the warning lever drops, the drum commences rotation and chiming begins. The locking lever is held in an elevated position by the detent. The detent latching also determines the lateral position of the vertical arm of the locking lever; the lower notch positions the vertical lever arm to the left of that for the upper notch. As shown

by Figure 4, the tip of the arm incorporates a hook.

The locking lever hook is acted upon by stop pins critically positioned about the drum. There are three pins; the first two (chime stop pins) lead to stopping of the drum at the end of the first, second and third quarter chiming, the third (strike stop pin) to stopping at the end of striking. The position of the first two pins is as shown by Figures 3 and 4; above and to the left of the locking lever hook. When the locking lever is engaged by the lower notch of the detent arm, the locking lever arm is shifted to the left, in line with the shown stop pin.

The drum, which has commenced rotation, continues until nearing completion of the first quarter chime. At this point the first stop pin on the drum catches the locking lever hook, lifting and rotating the locking lever counterclockwise. The detent disengages and drops. The locking lever is lifted further by the pin and rotates until the hook moves sufficiently to the left to disengage on the right side from the pin. The locking lever then falls to the position shown by Figures 3 and 4, and stops the drum, coincident with completion of the first quarter chime.

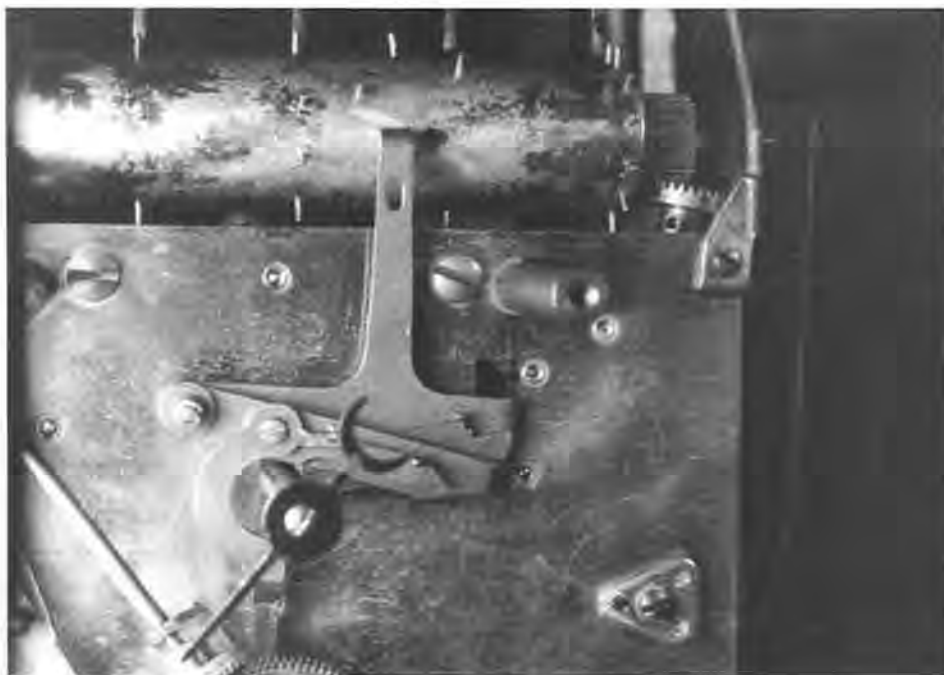


Figure 3

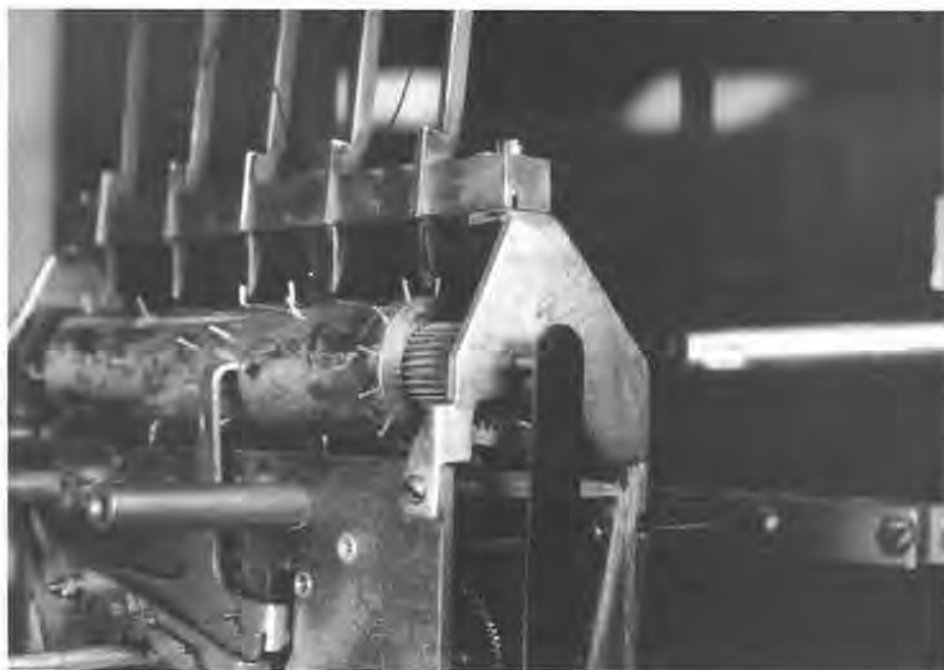


Figure 4

Second Quarter

A similar sequence occurs at the second quarter, where the drum is stopped by a second chime stop pin, after completion of the second quarter chiming sequence. This pin is located in the same lateral position as the first.

Third Quarter

The same occurs at the third quarter, with stopping effected by the first chime stop pin, which had caused stopping at the end of the first quarter. There are five, 4-note tunes generated by one revolution of the drum. The first quarter plays one, the second two. The melody played at the third quarter is comprised of the last two tunes (of five) from the first full revolution, plus a repeat of the first tune at the start of the second revolution. Thus the first

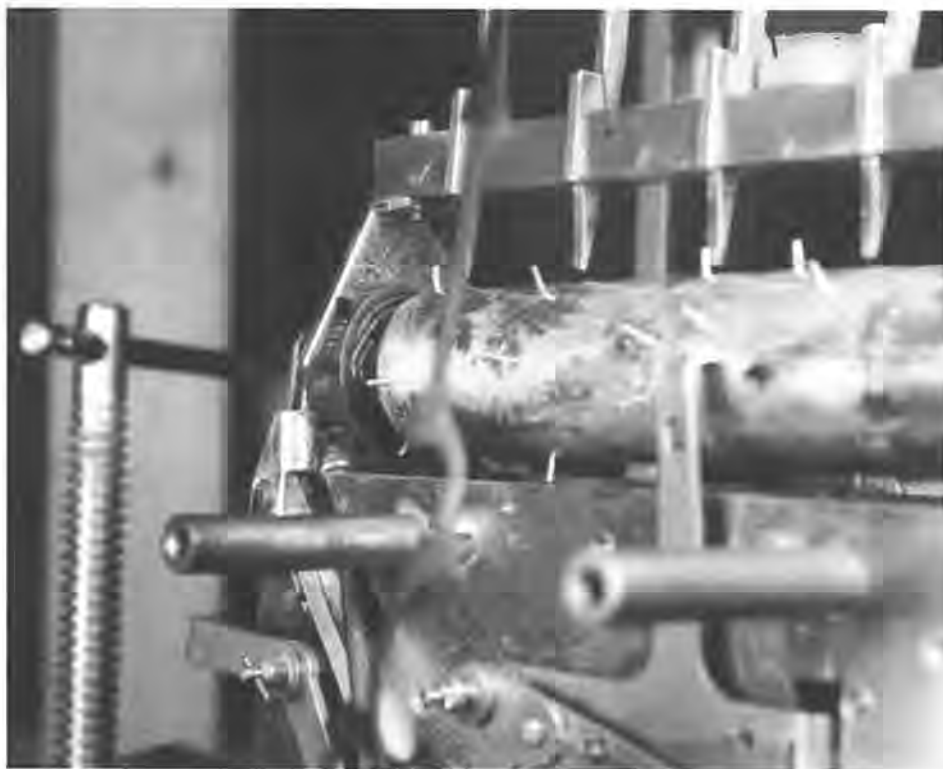


Figure 5

chime stop pin is in the correct position for stopping the third quarter chime sequence.

Fourth Quarter

At the fourth quarter, the lifting lever is *lifted less* than for the prior quarters, due to a pin on the lifting cam placed at a smaller distance from the arbor center. This pin will subsequently be referred to as the short cam lobe. The action is the same as for the prior quarters, except that the detent latches the locking lever pin in the *upper notch*, since the locking lever is not lifted high enough to engage the pin in the lower notch (refer to Figure 3). This places the vertical arm of the locking lever to the *right* of the position for the prior three quarters. In this position the locking lever *bypasses* the *second chime stop pin*. The drum continues to rotate to completion of the fourth quarter (or hour) chime. At this point the drum has completed two full revolutions and proceeds into the strike mode. Note that in normal operation it is

possible to proceed into the strike mode *only* when the second chime stop pin is bypassed by the locking lever; this occurs only when the locking lever is latched into the upper detent notch.

Striking

At the end of two full chiming revolutions, the drum is shifted to the left through action of a fixed spiral grooved flat cam at the left of the drum, as shown by Figure 5. A cam pin on the left end of the drum follows the cam groove for the two revolutions during chiming, then drops off onto the depressed surface of a moveable segment behind and towards the center of the flat cam. A spring on the right, shown in Figure 4, causes the drum to shift to the left.

The drum continues to rotate, with a row of striking pins now contacting the strike hammer lever, and causing striking. The pins are shown in Figure 3, on the right end of the drum. (The chime pins have been shifted out of contact with the chime

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Figure 6

hammer levers.) Striking continues until the cam pin encounters a discontinuity which allows the pin to shift to a second and lower level, moving the drum further to the left. This disengages the strike pins from the strike hammer lever and stops striking. The location of this discontinuity is established by gearing which connects to the hour hand tube, as shown by Figure 6. The drum continues to rotate, *with no striking*, to completion of one revolution. The 12 striking pins are positioned around the drum such that a 12-strike requires the full one revolution. Upon completion of the striking revolution, a third pin (the strike stop pin) on the drum acts upon the locking lever to stop the drum. The strike stop pin is located on the drum in such a position that it is bypassed by the locking lever except when the drum is in the third (left) position. The drum has now completed three full revolutions during the chiming of the four quarters and striking of the hour.

Drum Reset

It remains to reset the drum to the right hand position. This is accom-

plished by a pin on a gear coupled to a gear on the minute hand arbor. The gear with the pin rotates once per revolution of the minute wheel. As the minute hand approaches the first quarter position, the pin acts upon a reset lever which pushes against the left end of the drum arbor, moving it to the right. The reset lever can be seen in Figure 6. The pin wheel is marginally visible at the bottom of the reset lever. The drum is held to the right by the cam pin on the left side of the drum which is positioned against the flat cam. The cam pin is pivoted and spring loaded such that it springs out to the beginning of the flat cam when the drum is shifted to the right. The drum is thus reset to the right, to permit actuation of the chime hammers, prior to initiation of the first quarter chime.

Automatic Chime Correction

An error between chiming and the minute hand position can occur typically where the chime sequence lags behind that which is correct for the position of the minute hand.

Correction will occur at the first hour reached by the minute hand.

The short lifting cam lobe will cause the locking lever to latch onto the upper detent arm notch. The locking lever arm and hook will then be positioned to its right-hand position. Regardless of what quarter is being struck both chime stop pins will be bypassed by the locking arm hook, so the drum will not stop at the end of any quarter. The drum will proceed into the strike mode, will strike the hour defined by the hour hand, will shift fully to the left into the end-of-strike position, and will be stopped by the strike stop pin. Reset of the drum to the right will take place as the minute hand approaches the first quarter; correction will then be completed.

Should the error be reversed, where the hand lags the chime sequence, correction will also occur when the minute hand reaches the hour position. The sequence of events in some causes is more complex. This error, however, is not highly probable.



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that have not updated their systems to recognize this code. If you work for one of these businesses, and have experienced difficulty placing phone calls to AWI on the toll-free line, you may wish to contact your company's phone administrator. That person should be able to tell you if the 866 toll-free code has been programmed into your company's phone system. You should not have any problems calling this toll-free number from a standard phone line, such as in a residence or a small business.

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John B. Shadle, CMC

Pilot Cutters

One thing horologists share is a love of timepieces. Another thing we share is a love of the tools we use. In this article, I will introduce you to a group of useful tools you can make yourself—which you'll surely enjoy making and using.

Similar tools are called "pin drills" or "piloted countersinks" or "counterbores" but I'll just call them "pilot cutters". You use them in your drillpress, and you make them using only your lathe, a jewelers saw, and needle files. They're easy to make, and you can make one in fifteen minutes.

Pilot cutter uses are many—you can use them to shorten long bushings which are already inserted into plates. In another form, you can

use them to make oilsinks or to increase the amount of endshake in an arbor. You can also use them to cut recesses or pockets for screws.

The basic pilot cutter is as shown in Figure 1. It consists of a cutting surface with a vertical pilot pin. The pilot pin's function is to fit into a hole in the work material to guide and steady the cutter while it cuts. Similar cutters exist to cut steel, but the form I describe here cuts brass.

Pilot Cutter Uses

An important use is to shorten bushings which are already inserted into plates. Too-long bushings must be shortened, and it's more time-efficient to shorten bushings after they're already

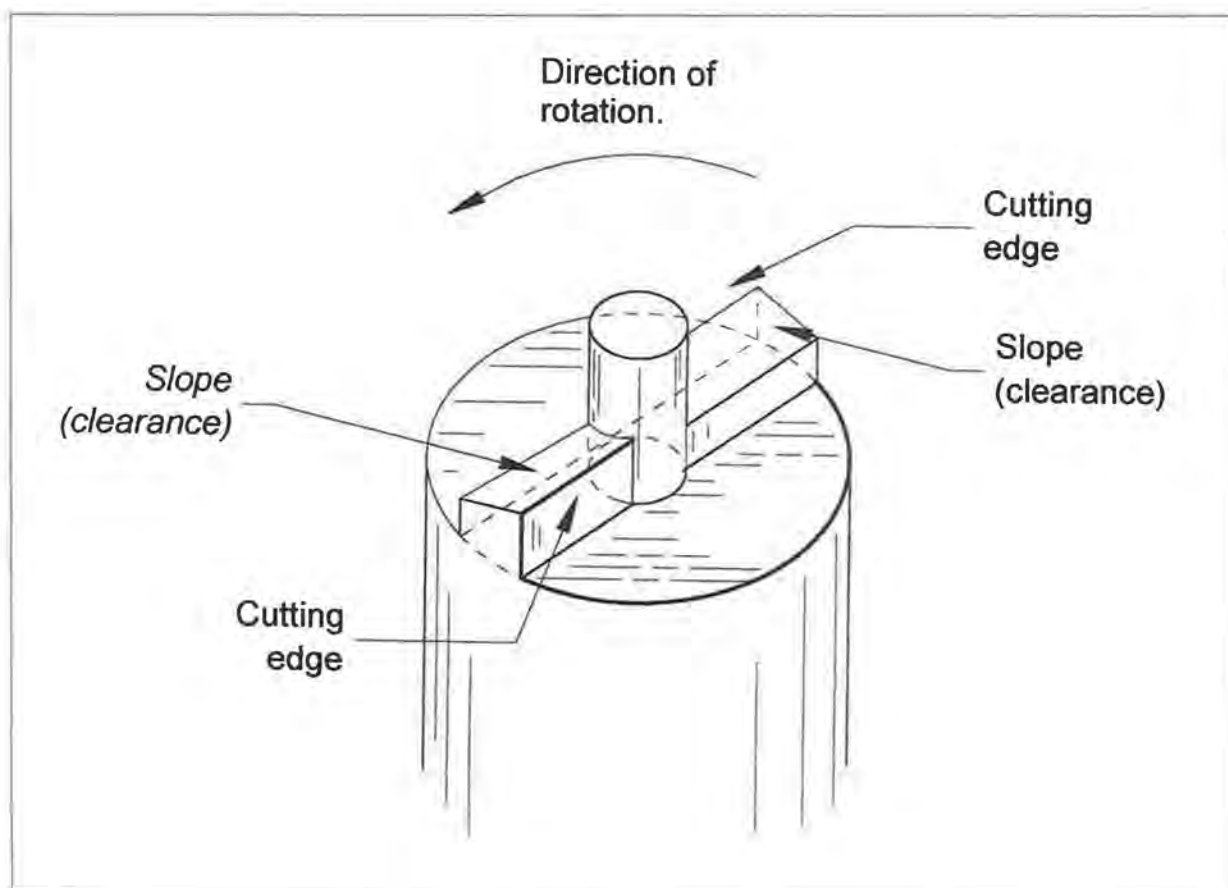


Figure 1

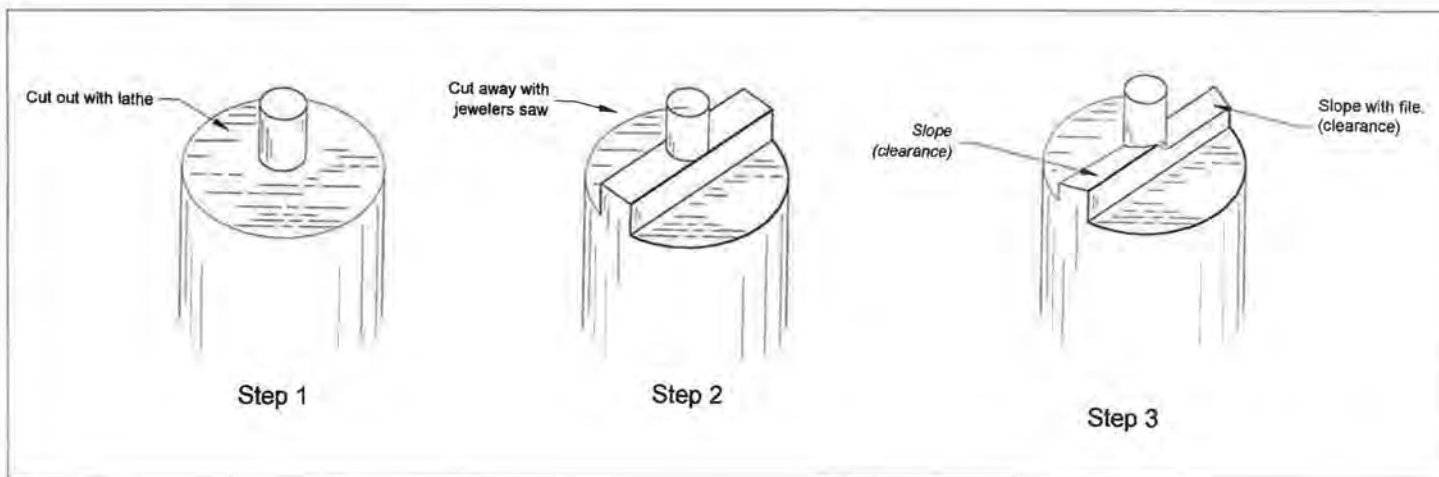


Figure 2

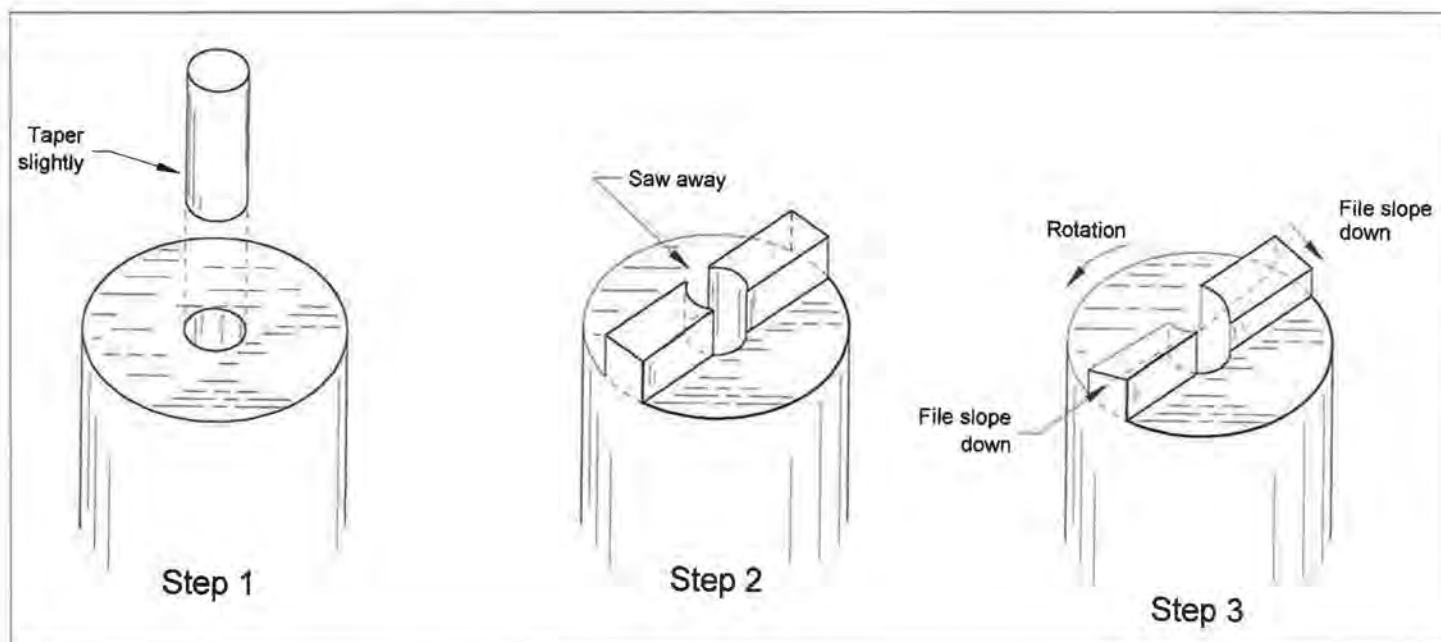


Figure 3

installed in the plates. And then we sometimes receive work which someone else has bushed, leaving the bushings too long.

Skill and time are required to shorten bushings with a file, and the danger exists that plates will be marred. There's even more danger if a motorized tool is used to grind away bushing excess.

Insert a pilot cutter in your drillpress, and in a few seconds you can shorten a bushing, or even a lot of bushings, leaving behind only a nicely machined surface on the top of the bushing. You won't even touch the plate, with a little care. Pilot cutters can be made quite small, so that very small bushings can be shortened.

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Pilot cutters can also cut or restore oilsinks. Oilsink cutters have rounded cutting flutes, as shown in Figure 4, or you can make a pilot cutter to cut conical oilsinks, also shown in Figure 4.

After you install a bushing into an existing oil sink, you can restore the oilsink with a pilot cutter. The result is a nearly invisible repair—the new bushing doesn't show.

Pilot cutters can also make recesses into plates or bridges, such as recesses for screws. These cutters make such cuts quickly and cleanly, without chatter.

Another use for pilot cutters is to increase arbor endshake, when the only other alternative is to cut back an arbor to increase the length of a pivot, which can be troublesome if the pivot is hardened. The pilot cutter can be used to make a shallow recess on the inside of a plate to provide some clearance.

Special pilot cutters can also cut decorative grooves around oilsinks. Such a cutter appears in Figure 5.

Making Pilot Cutters

You make pilot cutters from ordinary water- or oil-hardening drill rod, which is a high-carbon steel available at low cost from any tool supply house. I have cutters made from 3/32" to 1/4" drill rod, but for clock work 3/16" is probably the handiest. Usually I begin with about two inches of rod, but the length isn't critical.

There are two ways to make pilot cutters. The first is to make the pilot integral with the body of the cutter. You simply use your lathe to cut out the pilot, as shown in Figure 2.

The other way is to use your lathe to drill a hole in the end of the rod, into which you'll later insert a pilot pin—much as you'd do when repivoting an arbor. This is shown in Figure 3. Make the pin of hardened material, such as blue pivot steel or music wire. Taper the pin slightly so it can be tap-fit into the hole after the cutter itself is hardened and tempered.

The diameter of the pilot pin isn't critical. Obviously, it must be small enough to fit into the target hole, but it can be quite a bit smaller than the target hole and still function well. You don't need a lot of different sizes for bushing work. If the pilot cutter wobbles when run, use a cutter with a larger pilot. The pilot pin length is also not critical. Its length should be about the same as the thickness of the material it cuts.

The next step is to make the flutes by sawing away material with a jewelers saw, as shown in Figures 2 and 3. Usually, I use size 00 saw blades, but of course tiny cutters require tiny saw blades. This is an easy job made easier with magnification.

The third step is to file clearance slopes on the backs of both flutes, as shown in Figures 2 and 3. Be sure you take into account the direction of rotation of the cutter when filing the slopes—it's possible to slope them in the wrong direction. And remember, the slopes on the opposed flutes lie in opposite directions because the tool rotates around the center. Only a few degrees of clearance slope is necessary.

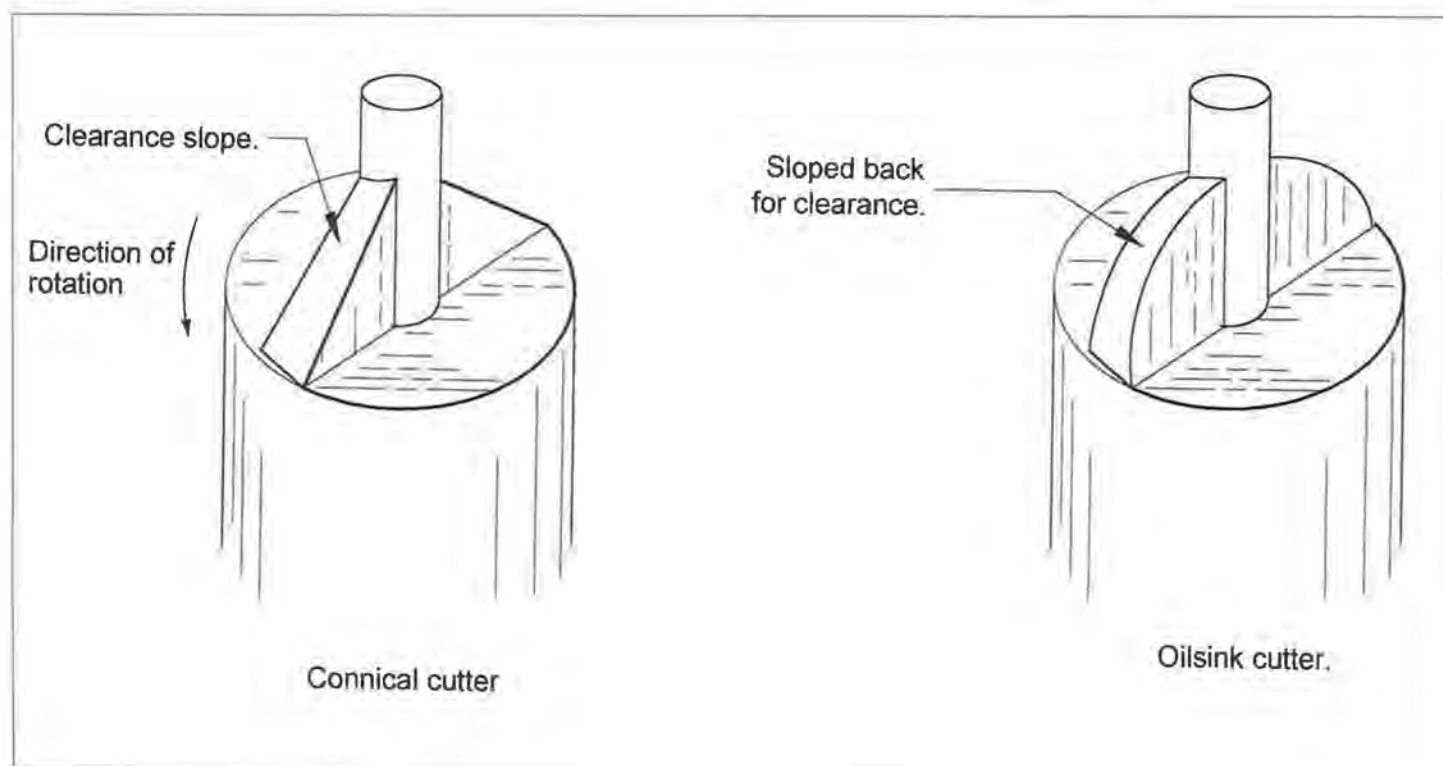


Figure 4

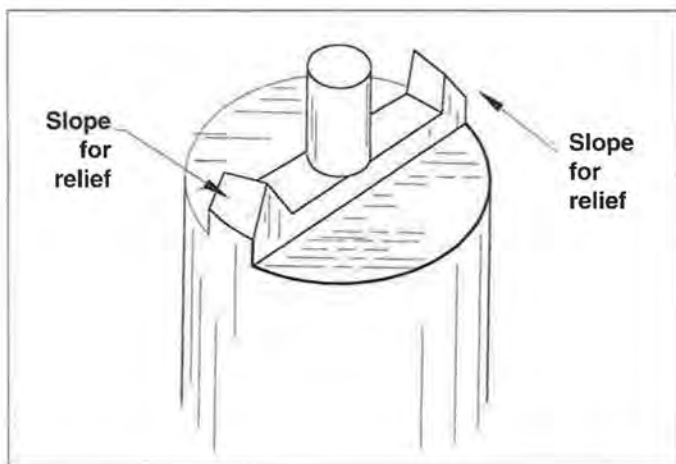


Figure 5

If you're making the integral-pilot kind of cutter, it's good to use a file with a "safe" edge—one on which an outside edge of the file has been ground smooth. This helps to avoid marring the pilot.

It's a little harder to slope the flute backs of round-fluted cutters, as shown in Figure 4. The job can be made easier by first darkening the rounded edge with layout blue or a felt-tip pen, then filing up to the cutting edge—use the darkening to indicate where you're filing. This job is easier when making cutters with separate pilot pins, since you'll file the slopes before you insert the pin.

The front of the cutting edge should remain vertical. This brings the cutting edge against the work material at a 90-degree angle, which is ideal for brass.

Decorative cutters, such as seen in Figure 5 are made by first making a cutter such as shown in Figure 3. Then file away material to form cutting triangles. Pilot diameter is more critical than in other cutters—it should be close to the size of the target hole to keep the cutter from wandering.

Cutting edges can be improved by honing them smooth with an Arkansas slip or a fine diamond hone. The better the finish on the cutter, the better the finish on the work.

Once the pilot cutter is finished, harden and temper it. Heat the business end of the cutter until it's bright red, then plunge into oil or water. Temper it to a light straw color. I clean it with a rotary wire brush inserted into a rotary tool to make color changes visible. I temper with an alcohol lamp or a small butane torch.

Run these cutters at a fairly low rate of speed. The speed of most bench-top drill presses (about 700 rpm) is fine. Too much speed causes chatter.

While making and using pilot cutters is basically quite safe, you should use safety glasses and any other precautions deemed necessary.



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Jack Kurdzionak, CW

From the Workshop

You Are Invited

Do you have a solution to a watch or clock repair problem that you want to share with our membership? Do you have a question about a repair problem you would like to ask? I invite you to participate in this column with your suggestions, questions, and comments. It's easy. Just e-mail me at AWI <magazine@awi-net.org> or write using the old standby known as the postal service. You can even fax me at 513-367-1414. I will do my best to help you help the membership. By sharing your questions and suggestions all of our members can benefit from our combined knowledge and experience.

Mother's Advice

Long before I ever picked up tweezers to repair a watch, my mother told me, "Jack, don't ever use old shellac." At the time I was a young man, recently married, and didn't understand the full meaning of what she told me. Later on I ignored her words of wisdom when I was cementing a roller jewel to the single roller of an old American pocket watch. I followed Henry Fried's procedure as he had written it in *The Watch Repairer's Manual* to the letter. The roller table and roller jewel were cleaned in denatured alcohol so that all foreign material was removed. I heated the roller table and jewel in the combination tool to just the right temperature and then applied a speck of shredded jewel shellac to the roller. According to Fried's book, the shellac should have flowed into the juncture between the roller jewel and the roller table, and then solidified to secure the jewel in place. Nothing of the sort happened. The shellac just formed a small ball on the roller table and hardened in place. The roller jewel fell out of the roller. I thought maybe more heat would be the answer so I repeated the procedure only to burn the shellac. After repeated failures to secure the roller jewel to the roller table, I was ready to quit. I related

the story of my failure to an elderly watchmaker friend. His first question to me was, "How old is the shellac you used?" I said I really didn't know its age except that I received it from a retired man who got it from his father who was a watchmaker. The elderly watchmaker gave me some fresh shellac from his bench and told me to try again, this time with fresh shellac.

On the first try with fresh shellac, the roller jewel was set just as Fried said it would. All that was needed in addition to having the parts clean was FRESH SHELLAC. If you are having trouble setting roller jewels, try some fresh shellac. It will make the job much easier.

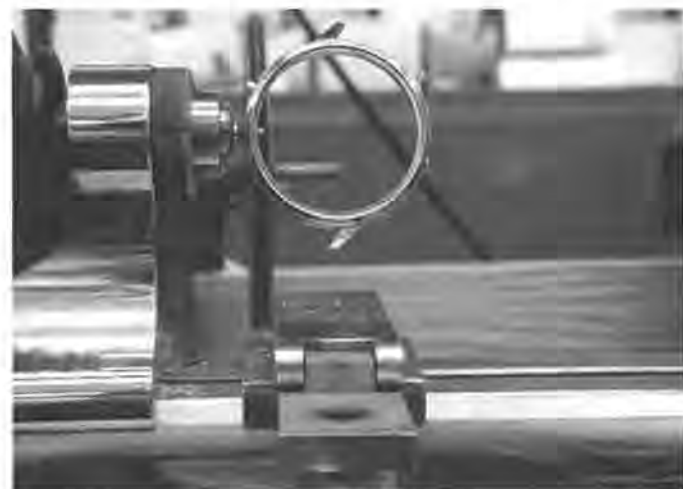
Mother wasn't thinking of roller jewels when she gave me her advice. Rather, she had liquid shellac used as a wood finish in mind when I was coating a new door with some shellac that had been in my cellar for over 15 years. The shellac on that door never dried, even after several weeks. It remained tacky until the entire door was stripped using denatured alcohol. It was then refinished with FRESH SHELLAC. Mother, as usual, was right.

Jack Kurdzionak

Chronograph Pushers

Many chronograph pushers can be completely taken apart by unscrewing the pusher pin. These pins are long threaded posts that are screwed into the exterior pusher button. To remove them, they are unscrewed from the inside of the case with a small screwdriver. Usually this is easily done because the pusher button has internal splines to mesh with matching splines on the pusher tube. While the pin is unscrewed the button does not turn because the splines prevent the button from turning. The trouble begins with these when one is unscrewing a pusher pin from a button that has no splines. The button just turns as the screw is turned. Since the button's external surface is smooth, it is

difficult to hold while removing the screw. Some repairers resort to holding the button in place with pliers. This will mar the surface of the button. A better way to do this job is suggested by Glenn Gardner from Madison, Wisconsin. He grasps the exterior surface of the button in a close fitting lathe collet and tightens the collet so that the screw can be turned whilst the button is securely held safely in the collet as shown in the photo.



Invitation to Join The Chronometer Club

As a member of the AWI, you are invited to join one of its largest affiliate chapters, The Chronometer Club.

We provide a technical forum for professional horologists engaged in the service and repair of certified chronometer watches, for the express purpose of enhancing the level of craftsmanship and elevating quality standards.

Our group has an outstanding technical newsletter, *The Communicator*, edited by our president, Stan McMahan. We also have a very active eGroup as well as personal membership directories; they make it possible for members to contact each other on a group or direct basis.

Dues for the current calendar year are \$20, for members in the U.S. and Canada. A registration form, or additional information, is available from: Ewell Hartman, CMW, Secretary, at 5114 Downy Lane, #203, Richmond, VA, 23228, or by e-mail, ewellhartman@msn.com.

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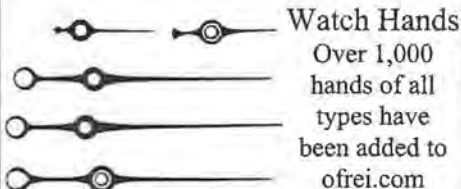
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Just a sample selection of the items on Sale this month. Visit our web site or contact us for a complete list.

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AWI Bench Course Request Form

1. Please fill out all of the information. This survey will help AWI decide where to hold Bench Courses.
2. Naming your city and closest major metropolitan area (New York, Chicago, Cincinnati, Tuscon, Seattle, etc.) is very important. We must have 8 students to hold a Bench Course. This may result in courses being held in large cities in a given region.
3. Bench Courses are \$100.00 per day for AWI members.

Name _____ AWI Member # _____
 Address _____ Business Phone _____
 City _____ Home Phone _____
 State/Province _____ Zip/Postal Code _____ Fax _____
 Closest Metropolitan Area _____ E-mail _____

COURSE	INSTRUCTOR	COURSE	INSTRUCTOR
☐ 400-Day Clock Repair	Ron Iverson	☐ Mechanical Chronograph	Tamara Houk
☐ Adjusting the Lever Escapement	Jim Lubic	☐ Mechanical Watch Repair	Jim Williams
☐ Basic Pocket Watch Repair	Alice Carpenter	☐ Micro Lathe Operations	TBA
☐ Basics of Hairspring Vibrating	TBA	☐ Modern German 3-Train & Floating Balance	Ron Iverson
☐ Citizen Quartz Watch Repair	TBA	☐ Organize Your Work Habits for Success	Bob Ockenden
☐ Clock Barrel & Wheel Repairs	Ron Iverson	☐ Platform Escapements	Ron Iverson
☐ Clock Case Repair	Jim Williams	☐ Repair of the Atmos Clock	Gerald Jaeger
☐ Clock Escapements	Jerry Faier	☐ Repair of the Bulova Accutron	Henry Frystak
☐ Cuckoo Clock Repair	Jim Williams	☐ Repairing Cuckoo Clock Bellows & Music Boxes	Jim Williams
☐ Demonstration of Watch Case Repairs	Charles Cleves	☐ Replacing Balance Staffs	Jim Lubic
☐ ETA Products	Tamara Houk	☐ Seiko Kinetic Quartz Watch Repair	David Christianson
☐ Filing & Flat Polishing	TBA	☐ Sequential Chime & Night Shut Off	Jim Williams
☐ Hairspring Vibrating	TBA	☐ Servicing ETA Quartz Chronographs	Tamara Houk
☐ Introduction to American Pocket Watches	Alice Carpenter	☐ Servicing the Seiko 5C23B Quartz Chrono/Alarm	TBA
☐ Introduction to Clock Repair	TBA	☐ Striking Clocks	TBA
☐ Introduction to Quartz Watch Repair	TBA	☐ Swiss Autoquartz	Tamara Houk
☐ AWI Lathe Program	TBA	☐ Watch Case Refinishing	Dennis Warner



EDUCATION

AWI Bench Courses

Bench Courses

To schedule a Bench Course in your area please contact AWI for complete information. A list of available Bench Courses is printed here for your convenience. To register for Bench Courses, please mail, phone, fax or e-mail your registration and payment information to: **American Watchmakers-Clockmakers Institute, 701 Enterprise Drive, Harrison, OH 45030-1696; Toll Free 1-866-367-2924, Phone (513)367-9800, Fax (513) 367-1414, E-mail: educate@awi-net.org** PLEASE NOTE: Registrations are limited and will be selected by the earliest date received. Please include a check or charge card number (Visa, Mastercard, Discover or American Express), card expiration date, signature and phone number. All registration fee checks and charges are processed immediately upon receipt. **DEADLINE FOR REGISTRATION IS 30 DAYS BEFORE THE SCHEDULED DATE OF THE COURSE.** * Indicates Bench Courses held in conjunction with a convention.

DATE	CLASS	INSTRUCTOR	LOCATION	FEE
JUNE 2001				
9-10	Recoil Escapement - Solid & Strip Pallet	Laurie Penman	Atlanta, GA	\$200.00
SEPTEMBER 2001				
15-16	Recoil Escapement - Solid & Strip Pallet	Laurie Penman	Detroit, MI	\$200.00
OCTOBER 2001				
6-7	Recoil Escapement - Solid & Strip Pallet	Laurie Penman	Chicago, IL	\$200.00
20-21	Recoil Escapement - Solid & Strip Pallet	Laurie Penman	St. Louis, MO	\$200.00

AWI Continuing Education

AWI Training Center Harrison, Ohio

AWI's continuing education program offers 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. All classes are held in AWI's training rooms in Harrison, Ohio. Call or write for information and details for the classes that interest you! **DEADLINE FOR REGISTRATION IS 30 DAYS BEFORE THE SCHEDULED DATE OF THE CLASS.** To register for these courses please mail, phone, fax or e-mail your registration and payment information to: **American Watchmakers-Clockmakers Institute, 701 Enterprise Drive, Harrison, OH 45030-1696, Toll Free 1-866-367-2924, Phone (513) 367-9800, Fax (513) 367-1414, E-mail: educate@awi-net.org.** Please include a check or charge card number (Visa, Mastercard, Discover or American Express), card expiration date, signature and daytime phone number. All registration fee checks and charges are processed immediately upon receipt.

CLOCK COURSES

DATE	CLASS	INSTRUCTOR	FEE
JUNE 2001			
6-9	Servicing a Tower Clock	Lloyd Larish	\$200.00
18-22	Disassembly of the Riefler Clock (Includes tour of Cincinnati Observatory)	Laurie Penman	\$250.00
25-29	Assembly of the Riefler Clock (Includes tour of Cincinnati Observatory)	Laurie Penman	\$250.00
AUGUST 2001			
6-10	Making Your Timepiece	Laurie Penman	\$250.00
27-31	Making Your Timepiece, Part 2	Laurie Penman	\$250.00
SEPTEMBER 2001			
24-28	Troubleshooting and Finishing Your Timepiece	Laurie Penman	\$250.00

Advanced Clock Repair

Clock Case Repair

Clock Escapements

Cuckoo Clock Repair

ETA Products

Filing & Flat Polishing

400-Day Clock Repair

Hairspring Vibrating

Introduction to
American Pocket Watches

Introduction to Clock Repair

Introduction to
Quartz Watch Repair

Lathe Program

Mechanical Watch Repair

Micro Lathe Operations

Mechanical Chronograph

Organize Your Work Habits
for Success

Platform Escapements

Repair of the Atmos Clock

Repair of the Bulova Accutron

Seiko Kinetic
Quartz Watch Repair

Sequential Chime

Servicing ETA
Quartz Chronographs

Striking Clocks

Swiss Auto Quartz

For details on scheduling a Bench Course in your area, please contact Nancy Wellmann, AWI Education Coordinator at 1-866-367-2924 ext. 303 or e-mail educate@awi-net.org

54th Annual WAO Convention

The 54th annual convention of the Watchmakers/Clockmakers Association of Ohio was held July 21st and 22nd, 2000 at the Best Western, Columbus-North. With forty-two people in attendance, the talents of speakers Mark Butterworth and Dan Fenwick, plus three material

displayers on hand we had "...one of the best conventions in recent years."

The Speakers

The Modern German Clock Movement was presented by Mark Butterworth. He covered a few of the special features some of these movements have as well as some repair and adjusting tips that every repairman needs to know to handle these more recent products. Mr. Butterworth's enthusiasm and love of this profession is most refreshing and invigorating. There is no doubt after hearing Mr. Butterworth talk that a person can make a good living repairing clocks.

Dan Fenwick presented *The Latest Developments from the Swatch Group of Manufacturers*. He showed us several of the new products coming out of Switzerland including the Swatch "Beat" watch, the newest Omega used by the Space Shuttle astronauts and the Omega automatic with the "Daniel's co-axial" escapement. Mr. Fenwick also handed out repair manuals for some of the watches he discussed and gave us some repair tips which will prove to be valuable in the future.

Awards

Kent Garber received an award of appreciation for his outstanding service to the WAO in the past year.

The Displayers

We are grateful to have had three material distributors with us this year. Peter Eckel from the Wm. S. McCaw



Mark Butterworth of Butterworth Clocks.



Dan Fenwick of the Swatch Group.



Lou Esselman at the Cas-Ker Co. display table.

Co., Lou Esselman from Cas-Ker Co. and Chris Gaber from Gaber & Co. were all on hand with a variety of supplies, parts, tools and material assortments for us to see and buy. THANK YOU to these three companies for their support of our event.

The Door Prizes

We must thank the following companies and individuals for their generous donations of door prizes to this year's convention.

North Coast Import
Cas-Ker Co.
Merritt's Antiques
Eveready Battery Co.
Wm. S. McCaw Co.
American Watchmakers-Clockmakers Institute
Citizen Watch Co.
Gaber & Co.
Dan Fenwick of the Swatch Group
Albert Brehl

The AWI Bench Course

On Sunday, July 23rd Mark Butterworth presented *The Modern German Clock Movement*. We viewed a video of the Hermle factory, had a hands-on demonstration of setting up the striking and chiming systems of several of



WAO officers for 2000-2001 (L to R) Mark Baker, treasurer; Kent Garber, secretary; Charles Atchison, vice president; and Charles McKinney, president.



WAO directors (L to R): Monroe Troyer, Jack St. Cyr, Kent Garber, and Charles McKinney.



Chris Gaber mans the display table for Gaber & Co.



WAO members shop at McCaw's table.

the modern German movements, as well as discussion of repair tips and "do's and don'ts" for some of the movements. This course would be very valuable to a beginner and the seasoned veteran would gain enough from it to find it worth his/her while.

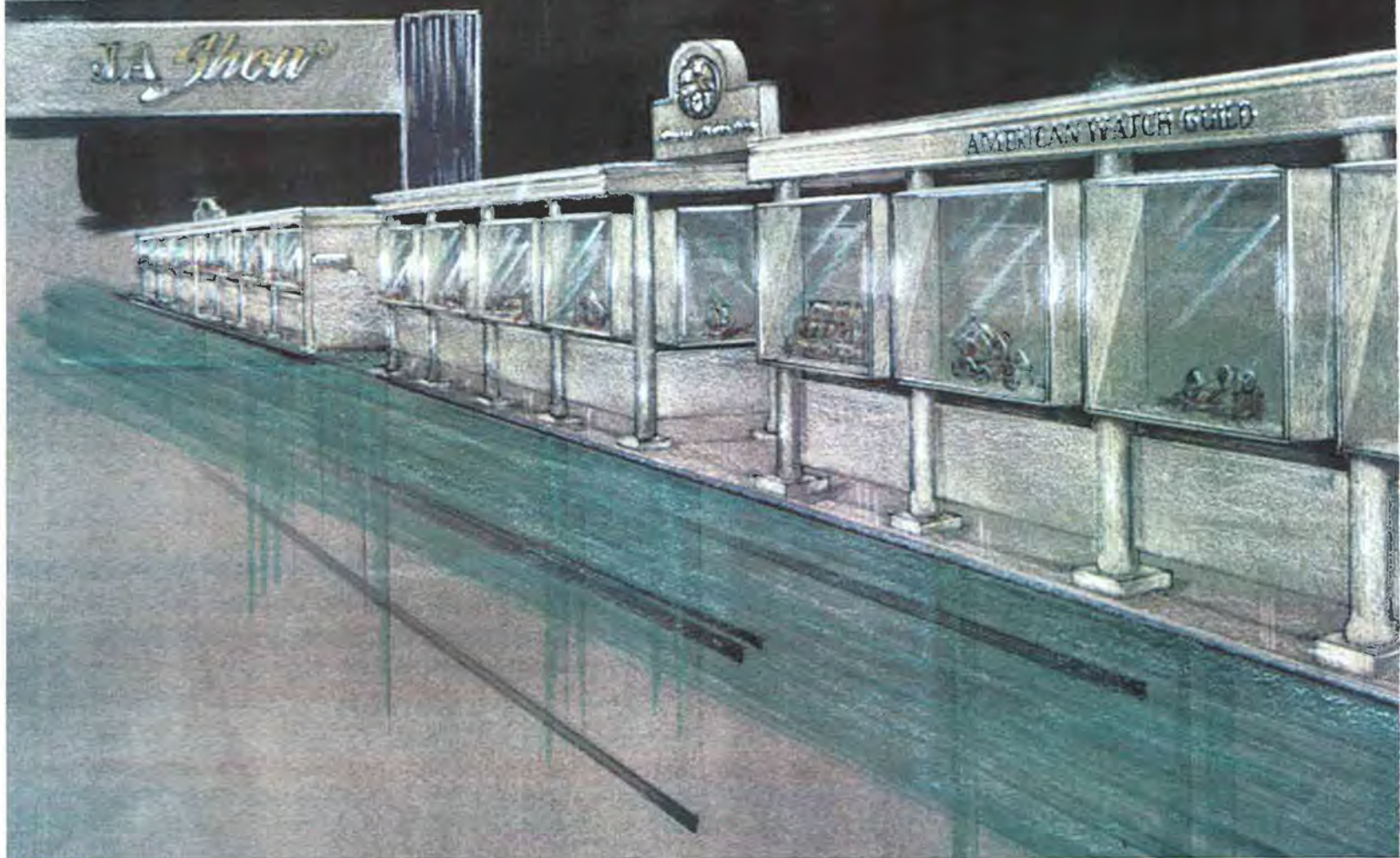
Thank you to the many people who helped make this a successful convention and a special thank you to Al Brehl for his help and footwork in planning this event.

The 55th annual convention of the Watchmakers/Clockmakers Association of Ohio will be held July 27th and 28th, 2001 at the Comfort Inn North, 1213 East Dublin-Grandville Road, Columbus, Ohio, Phone (614) 885-4084. Programs are in the planning stage and will be finalized soon. Contact: Mark A. Baker, P.O. Box 292, Damascus, Ohio 44619-0292, phone (330) 537-3939 or e-mail to <bakerclock@voyager.net> for details and information.

Mark A. Baker
Convention Committee



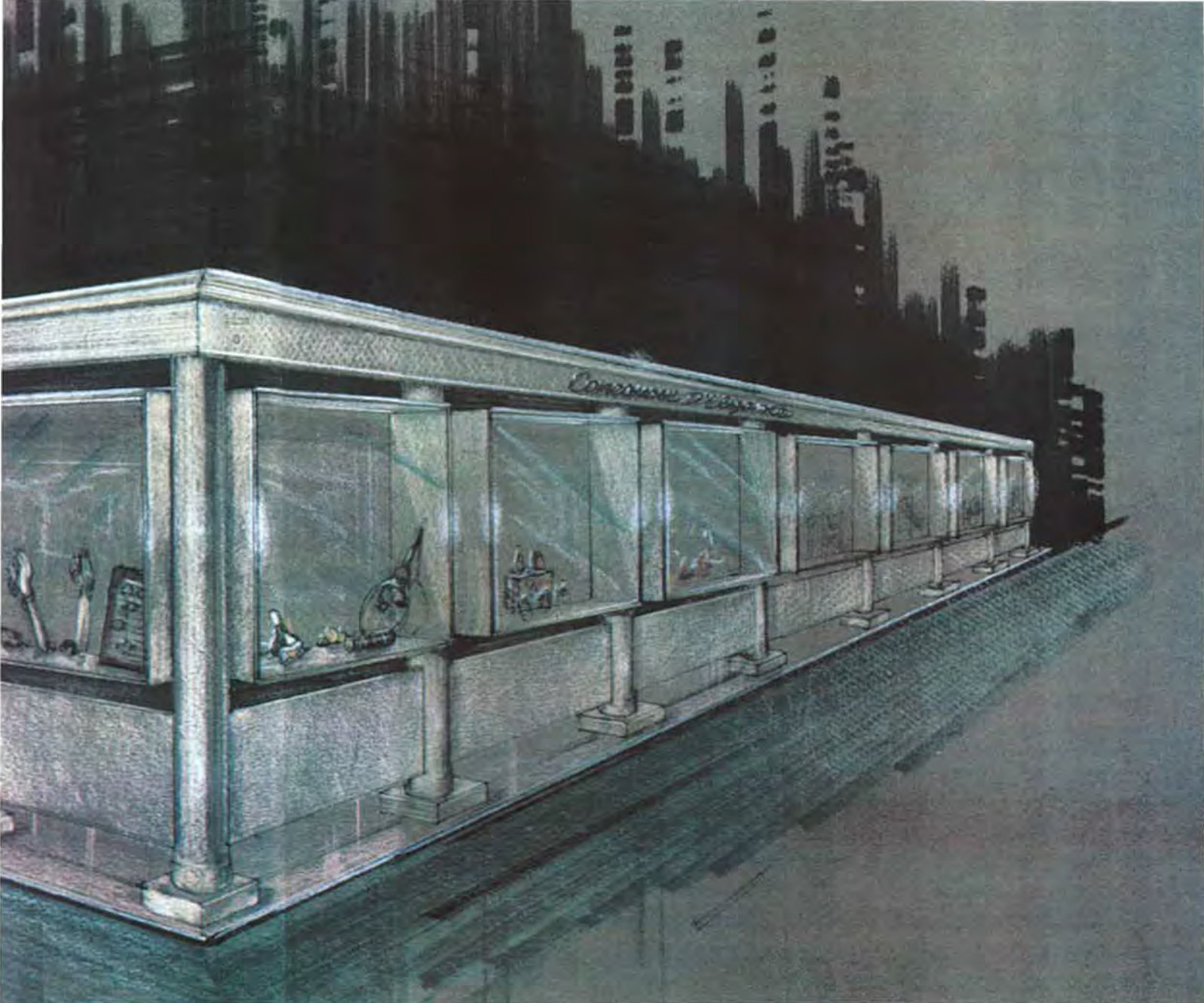
Concours d'Elegance



The AMERICAN WATCH GUILD presents JA New York Show, July 29 - August 1, 2001

Imagine over 12,000 watch and jewelry retailers from the continental United States, Canada, the Caribbean and South America arriving at the JA International Jewelry Show. They will all pass through the Grand Lobby of the New York Javits Convention Center where our 100 foot X 35 foot American Watch Guild Pavilion will be located.

On the outside for all to view will be 33 exhibition windows each 48" wide. They will exhibit the very latest watches in a window display contest to be judged by over 50 of the most prestigious watch retailers. Inside the pavilion will be additional floor cases with even more watches, clocks, watch straps, winding boxes and a demonstration of watch testing equipment. As an added feature, there will be 15 "By Appointment Only" private offices.



The World's Finest Timepieces

The Concours d'Elegance will be sponsored and promoted by the American Watch Guild, *American Time and Watch & Clock Review*. A portion of each exhibitor's fee will be donated directly to Memorial Sloan-Kettering Cancer Center.

This is your invitation to be a part of what promises to be the largest and most exciting Concours d'Elegance of the world's finest watches, clocks and winding boxes.

For additional information, contact Bert Kalisher at 516-295-2516.



BULLETIN BOARD

NEW REQUESTS

Hamilton Pocket Watch Case

D. A. Bilger, Jr., Mifflinburg, PA, is looking to buy a 14 karat yellow gold or gold-filled case for a Hamilton pocket watch model #921.

RESPONSES

Ladder Chains

Bernard Petit, Dothan, AL, was able to assist Daniel T. Moore, Kansas City, MO, in his search for 144" worth of strong (11 pound) ladder chains that have 40 links per foot.

ITEMS STILL NEEDED

Preciso

Bobby Long, Euless, TX, is seeking information on the watch brand Preciso (Standard). The Preciso watch is a 15 jewel, licence auchere brevetes. S.G.D.G. #1098471.

Atmos Bellows

Ethylene Chloride

Allan Lipney, San Rafael, CA, is seeking patent information on Atmos which might give some insight on the amount of Ethylene Chloride used in the Atmos bellows.

Do you have information regarding this month's requests? Do you need information about one of this month's responses? If so, send your information or requests to:

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AWI Certification

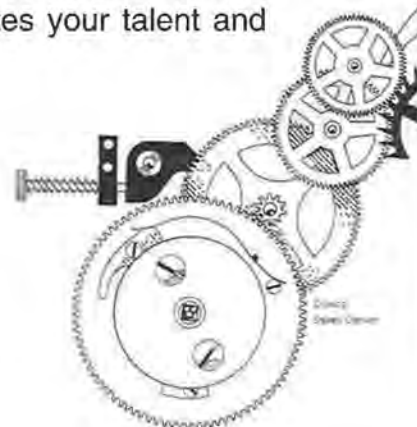
TESTING AND CERTIFYING YOUR PROFESSIONAL SKILLS



American Watchmakers-Clockmakers Institute Certification is the internationally recognized standard for professional clockmakers and watchmakers. A certified designation from AWI elevates your status among customers, colleagues and manufacturers. For employers, it is a mark of excellence that validates your talent and craftsmanship.

AWI offers six certification designations:

- AWI Certified Clockmaker - CC
- AWI Certified Master Clockmaker - CMC
- AWI Certified Electronic Watch Technician - CEWT
- AWI Certified Master Electronic Watchmaker - CMEW
- AWI Certified Watchmaker - CW
- AWI Certified Master Watchmaker - CMW



For a free certification information booklet, call 1-866-367-2924 or e-mail certification@awi-net.org

New Members

California

Fast, Orville K.—Dinuba, CA*
Foran, Kat—San Francisco, CA
Iosilevsky, Oleg—Palo Alto, CA*
Nguyen, Tuan—San Diego, CA*
Rogers, Richard R.—Stockton, CA*
Spring, Jay—Torrance, CA

Colorado

Schierling, Jim—Pueblo, CO

Florida

Bennett, Jody L.—Jacksonville, FL
Horsley, Terry K.—Mount Dora, FL
Rieger, Joseph—West Palm Beach, FL

Illinois

Brooke, Lee—Peotone, IL

Indiana

Prow, Fred—Muncie, IN

Maryland

Faye, Jon—Hyattsville, MD
Hain, Irv—Pikesville, MD
McCain, Jaret—Fort Washington, MD

Massachusetts

Owen, Janie—Somerville, MA
Ravinski, Robert—Norfolk, MA
Tapiero, Eddie—Arlington, MA

Michigan

Riesterer, John L.—Roseville, MI

Nevada

Beres, David—Gardnerville, NV

New York

Newman, Larry—New York, NY
Sulkey, Kevin L.—Gilboa, NY

Venkersammy, Randolph H.—Floral
Park, NY
Waldemar, Polak—Brooklyn, NY

North Carolina

Cromartie, Howard W.—Atkinson, NC*

Ohio

Sunday, Edmund P.—Uniontown, OH

Oklahoma

Stodola, Dwight D.—Lawton, OK

Oregon

Farr, Robert—Portland, OR

Pennsylvania

Akin, Cecelia Y.—York, PA
Gibbs, Stephen—Carlisle, PA
O'Byrne, Richard—Johnstown, PA
Wisnosky, Michael G.—Tunkhannock, PA

Puerto Rico

Torres, Olvin Burgos—Aguas Buenas, PR

Tennessee

Cunningham, Calvin Jr.—Memphis, TN*

Virginia

Busey, William—Vienna, VA

Canada

Bosch, Lauren—Calgary, Alberta*

International

Kaesler, Darrell M.—Tanunda, SA, AUSTRALIA

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

AWI Fiscal Year End

AWI's fiscal year end is June 30, 2001. Those parties who have provided goods and services to AWI up to and including June 30, 2001 must submit those claims or invoices to AWI no later than July 15, 2001. This includes chapter and individual expense reimbursement claims. Claims or invoices received after that date will be subject to additional review by our accounting firm. They are also subject to not being paid by AWI. Thank you in advance for your consideration and attention to this matter.

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AWI Annual Meetings & Convention

Thursday, August 2, 2001 – Sunday, August 5, 2001

Hilton Greater Cincinnati Airport

(formerly Commonwealth Hilton)

7373 Turfway Road • Florence, KY 41042-1356

Reservations: Call 1-800-HILTONS or call the hotel directly at 859-371-4400
Ask for the AWI rate of \$84.00. Deadline for Hotel Reservations - July 13, 2001

Thursday, August 2, 2001

9:00 a.m. – Noon	Research & Education Council (REC) Annual Meeting, AWI Classrooms - Harrison, Ohio
Noon – 1:30 p.m.	Lunch on your own
1:30 p.m. – 5:00 p.m.	Continuation of REC Program
2:30 p.m. – 5:00 p.m.	Chronometer Club Business & Technical Forum (members and applicants only) Hilton - Conference Room II
3:00 p.m. – 6:00 p.m.	Registration Hilton Greater Cincinnati Airport
7:30 p.m. – 10:00 p.m.	Round Table Reception

Friday, August 3, 2001

8:00 a.m. – 9:00 a.m.	Registration Hilton Greater Cincinnati Airport
9:00 a.m. – Noon	Affiliate Chapter Meeting Keynote Speaker Peter Laetsch President, Federation of the Swiss Watch Industry
10:00 a.m. – Noon	J.M. Dodson Perpetuation Fund Meeting (Trustees only)
10:00 a.m. – Noon	Industry Advisory Board (IAB) Meeting
Noon – 1:30 p.m.	Lunch on your own
1:30 p.m. – 3:30 p.m.	Affiliate Chapter Meeting (resume if necessary) Immediately followed by Theme Chapters: Chronometer Club, Chapter 102, Chiming Clocks
1:30 p.m. – 4:30 p.m.	Board of Directors Meeting (Directors only)
6:15 p.m.	Bus leaves for AWI Open House and Cookout
7:00 p.m. – 9:30 p.m.	AWI Open House and Cookout Sponsored by the ELM Trust AWI-ELM Trust Battery Weigh In Auction
9:30 p.m.	Bus leaves for Hilton

Saturday, August 4, 2001

8:00 a.m. – 9:00 a.m.	Registration
8:00 a.m. – 9:30 a.m.	<i>Recoil Escapements</i> <i>Isochronism & Positional Adjustments</i> <i>Organize Your Work Habits for Success</i> Laurie Penman Dr. Matthew Clark Bob Ockenden, CMC
9:00 a.m. – Noon	AWI Board of Directors' Meeting
9:45 a.m. – 11:15 a.m.	<i>Diagnosing Poor Balance Motion</i> <i>Clock Restoration Practices</i> <i>Rolex Fakes</i> August Cornell Jerry Faier, CMC Charlie Cleves
11:00 a.m. – 3:00 p.m.	Trade Fair
11:30 a.m. – 1:30 p.m.	Luncheon Buffet
1:30 p.m. – 3:00 p.m.	<i>Diagnosing Poor Balance Motion</i> <i>Clock Restoration Practices</i> <i>Organize Your Work Habits for Success</i> August Cornell Jerry Faier, CMC Bob Ockenden, CMC

1:30 p.m. – 4:30 p.m.	AWI Board of Directors' Meeting resumes
3:15 p.m. – 4:45 p.m.	<i>Recoil Escapements</i> <i>Isochronism & Positional Adjustments</i> <i>Rolex Fakes</i> Laurie Penman Dr. Matthew Clark Charlie Cleves

6:00 p.m. – 7:00 p.m.	President's Reception
7:00 p.m. – 10:00 p.m.	Dinner Buffet & Awards Program

Sunday, August 5, 2001

8:00 a.m. – 9:00 a.m.	Grand Café Breakfast Buffet
9:00 a.m. – Noon	AWI Board of Directors' Meeting

AWI Convention

Technical Presentations



Charlie Cleves

Rolex "Fakes"

Charlie Cleves will use photos from his popular video "Identifying the Fake Rolex" to clearly illustrate the difference between "fake" hallmarks and authentic hallmarks. The audience will then have the opportunity to examine high-end "fake" watches.



August Cornell

Diagnosing Poor Balance Motion

A hands-on workshop where participants are encouraged to bring problem watches that have been cleaned and repaired, but continue to exhibit poor balance assembly motion. Participants are "invited" to bring those exact watches in to try this repair and diagnostic technique which will leave participants with the ability to return to their own workbenches with the skill to sort out and solve their future motion problems. (*"Hands-on" participation is not mandatory to attend this presentation.*) "Hands-on" participants should bring a complete watch movement of any size, preferably not full plate, and those tools required to remove a pallet fork and arbor assembly from an assembled watch. Appropriate magnification and an air squeeze are also recommended.



Bob Ockenden, CMC

Organize Your Work Habits for Success

This class is part bench practices, dealing with specific working techniques, and part business workshop. My credo is that we are an under-appreciated and therefore underpaid group. This is largely of our own doing. I work with my participants to foster an appreciation of our worth in the marketplace as a whole. By focusing on quality workmanship as the primary goal, efficient working methods as the vehicle, and a sense of our comparative rarity in a discretionary spending economy, I attempt to help my participants to earn significantly more money.



Dr. Matthew Clark

Isochronism & Positional Adjustments

Continuing research on factors influencing isochronism and positional timing will be presented. These will include a detailed study of the effect of the escapement, as well as a comparison of theory and experiment of the effects of various adjustments on wrist and pocket watches. In addition, an analysis of the unique hairspring and escapement of Harrison's H4 chronometer will be discussed.



Jerry Faier, CMC

Clock Restoration Practices

Even though the products for discussion will highlight clocks, the principles discussed are equally applicable to the watchmaker as well. From a general understanding of repair, restoration, and conservation practices, this talk will address various professional practices and procedures used by the speaker daily in his business to satisfy the customer, while insuring the future quality and originality of the product. Frequently, the benchman must lay out careful steps to help educate and aid the customer in a direction that will result in maintaining the originality of the product while allowing it to continue full-time operation. There will be in-depth discussions dealing with case, movement, and dial problems for both common and esoteric clocks. At the closure, there will be an opportunity for discussion and questions.



Laurie Penman

Recoil Escapements

The geometry of recoil escapements; French, German, British, US is essentially the same yet very few of them are found to comply with the widely taught 'Square escapement'. This presentation will offer a system of laying out the recoil which works whether it is of square form or not and then move to the method that the author believes was used in the ill-lit workshops of the 18th and 19th century where a clean piece of paper was as scarce as a hen's tooth.

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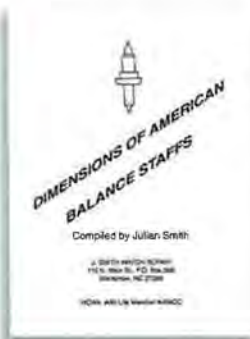
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