HOROLOGICAL™ TIMES

January 2005

American Watchmakers-Clockmakers Institute

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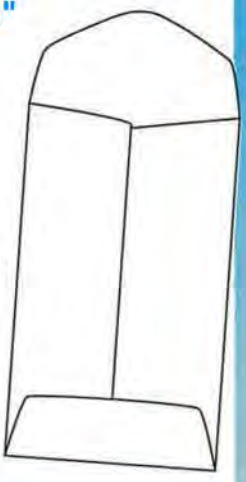

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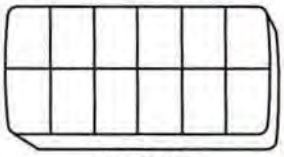
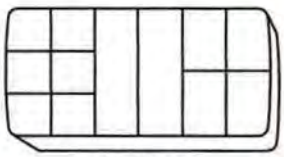


#15.217



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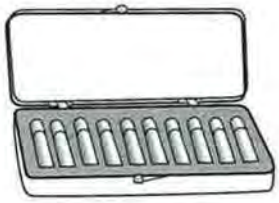

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HOROLOGICAL™ TIMES

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EDITORIAL & EXECUTIVE OFFICES
American Watchmakers-Clockmakers Institute (AWCI)
701 Enterprise Drive, Harrison, OH 45030
Phone: Toll Free 1-866-367-2924 or (513) 367-9800
Fax: (513) 367-1414
E-mail: awi@awi-net.org
Web Site: www.awi-net.org
Office Hours: Monday-Friday 8:00 AM to 5:00 PM (EST)
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HOROLOGICAL™ TIMES

VOLUME 29, NUMBER 1, JANUARY 2005

FEATURE ARTICLES

COLUMNS

DEPARTMENTS

EDUCATION

SPECIAL INTEREST

COVER - This month we are featuring the Strutt Epicyclic Train Clock

President's Message

Jim Door

January is often the time of year we set new goals for ourselves. We reflect on what we accomplished or didn't accomplish in the last year. Many times these are short term goals or so we think. Patience is a hard trait to nurture, we want things done now. Some things take longer than anticipated in order to do them correctly.

What have we accomplished? We are much closer to releasing our new certified watchmaker exam, and in the process have strengthened or created new avenues of cooperation within the industry. In the future this will mean new opportunities for our members. New benefits have been put in place for members, and more are in the works. Laurie Penman's clock courses are being well received.

What goals have you set for yourselves; perhaps to further your training, to improve your skills, to make more money, or to spend more time with family?

I know I intend to improve my skills, upgrade some of my equipment, and as president I find I need to improve my time management skills to get everything done.

To accomplish AWCI goals we need the help of all our members. What can you do for your organization: volunteer to work on a committee, submit articles for this magazine, encourage the companies you deal with to support us by advertising in the *HT* and/or to join the Industry Advisory Board (IAB), encourage others to join us? Please share your talents with all of us.

Together let us make the AWCI into the best organization possible. Our future tomorrow depends on what we accomplish together today.

Horological Times Committee Message

James Sadilek, Chairman

This is a message on behalf of the *Horological Times* Committee to all the past and future contributors to the *Horological Times* (*HT*) magazine. The committee is most grateful for past contributions and earnestly solicits future contributions. Without the work of our readers, we would cease to have a magazine.

While the writers are compensated (Yes! We actually do pay our contributors), it is not a sufficient amount for anyone to earn a living by writing for *HT*. Because of the limited compensation for material accepted for publication, the likelihood of professional writers submitting work to *HT* is virtually non-existent. We must depend almost solely on the generous contributions of our members to fill the magazine's pages. Therefore, although you will not become wealthy writing for the *HT*, your labor of love in contributing to the magazine will be appreciated by the membership, and you will have contributed in part to keeping the magazine viable. It can be argued that the health of the organization is greatly dependent upon the quality of the magazine, since in virtually every survey of member benefits the *HT* is always voted the number one benefit of membership.

It follows that if the magazine is the number one benefit of membership, then any effort to improve the quality of the magazine should serve to recruit new members as well as retaining present members. Perhaps most important to the continued success of the magazine is the fact that the *HT* is a self-supporting function of the organization, being funded by the advertisers. Since most advertisers base the expenditure of their advertising dollars upon the circulation numbers of whatever print media with which they chose to advertise, as our membership numbers decline (and they do continue to decline) we are in danger of losing this most important advertising revenue. Thus, it is critical to the magazine for the members to make the effort to contribute.

(Continued on page 16.)

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Questions & Answers

Question

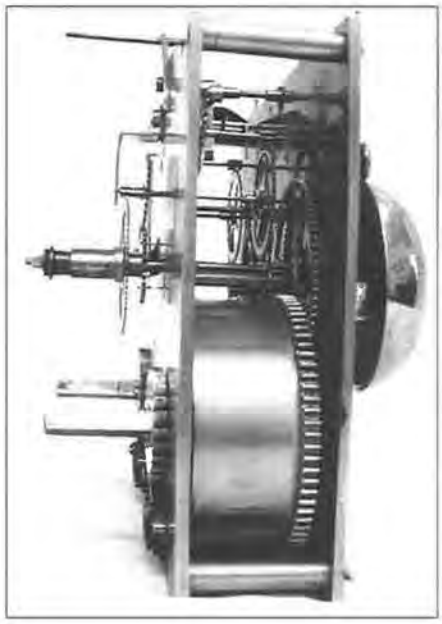
I have enclosed some pictures and information about a clock I have had in my possession for several years. I would like to know more about the clock. In addition to the pictures I can furnish the following information.

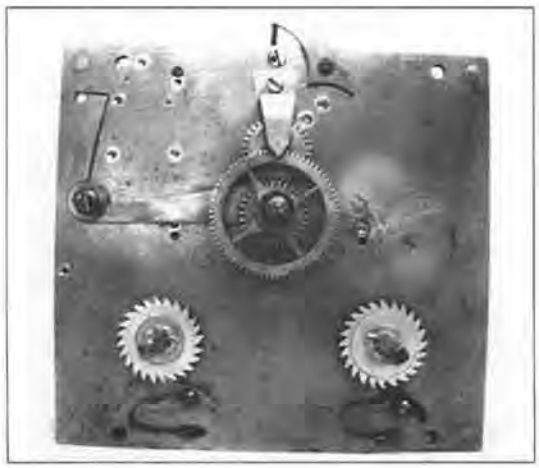
Movement:
160 mm wide x 150 mm high x 42 mm depth
Plate thickness, 3 mm
Spring barrel OD 70 mm
Complete movement weight 6.5 lbs.

Case:
17" wide x 32.5" high x 5" depth
Bezel diameter 10"
The dial is porcelain
Complete weight with movement installed 39.5 lbs.

The case appears to be cast brass with gold plating on the visible surfaces (a lot of which has been worn off over time). There are several openings on each side of the case as well

(Continued on page 17.)





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genuine leather, DC &/or AC adapter included	Lt. Brown	**WTB1448GLBN**	**210**	455
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Ask Huck

J.M. Huckabee,
CMC, FAWI, FBHI

Question

I need to replace the escape wheel in an American clock. Can I expect the wheel to mate with the original escapement anchor, and the hub of the escape wheel shaft?

Answer

Most likely the answer is no. That is my experience. First, the wheel must be installed such that it runs perfectly true in round, and with essentially true in flat. This will require the wheel bore to be true to its outside diameter, to be a perfect fit to a hub that runs perfectly true to its pivotal axis. And to be staked in place without distorting any of the pieces.

The escapement anchor must be a functional mate to the escape wheel. This is a job that is unlikely to turn out well in the hands of a novice clockmaker. How do we develop the skills for the job? I suggest a study of the escapement as presented in the book, *The Modern Clock*, by Ward Goodrich. That will give you the escapement understanding. Now study the book, *The Top 300 Trade Secrets of a Master Clockmaker*, on the techniques of turning between centers, straightening arbors, making wheel hubs, and mounting wheels. This section of the book teaches the fastest, easiest, and most perfect methods of mounting wheels that is known to our trade.

I do not know another place in clockmaking literature that treats the subject as well as does this book.

Question

How important is it to burnish or polish pivots in the old American clock? What is an acceptable running clearance of the pivot in its bearing hole?

Answer

First, let's speak to pivot finish. A pivot that shows "wear rings" will have a matching form in its pivot hole. That means it has no practical end shake in operation. That means it will be prone to stop. That pivot must be refinished, or replaced. It also means the rings inside the pivot hole must be removed, or the hole must be replaced (bushing installed).

Holes in plates (or in bushings) must permit the arbor to center the pivot hole in the opposite plate. And, if a pivot is not perfectly straight to its arbor rotation must be corrected.

All of the foregoing items are "the father" of causes that often are believed to be a "weak mainspring".

I check each pivot in its respective pivot hole that it will tip about 5° in all directions before assembly. This inspection will essentially eliminate "latent stoppers" and it eliminates the need of long test runs and test stands.

It is much easier to spend a few extra minutes of inspection time than to cope with hidden problems later.

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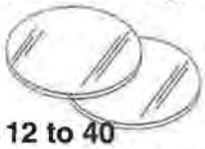

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Letters to the Editor

All letters to the editor must be signed and bear the address and telephone number of the writer. Your address and telephone number will not be published without your permission. AWCI reserves the right to edit letters for length and content. All letters should be concerning the Institute and/or issues specific to the field of horology. Please send your letter via: E-mail: dbaas@awi-net.org; Fax (513) 367-1414 or mail to Horological Times, *"Letters to the Editor," 701 Enterprise Drive, Harrison, OH 45030-1696.*

Hello:

My name is Michael Gainey. I am an AWCI Certified Clockmaker with over 25 years of experience and am currently serving on the Education Committee.

I have some ideas regarding articles for the magazine I wanted to share.

I have discussed some of these already with the staff at AWCI and it seems to have fallen on deaf ears.

I enjoy the magazine and read it cover to cover each month except for the watch related stuff since I am a clockmaker. However, I can do this in most cases in less than half an hour unless there is a deep technical article regarding repair.

I may be wrong, but I think some articles have been repeated.

Here is my idea. Probably not original but I believe very important. I have already heard the excuses why we are not already doing this but I don't buy them. Each month there should be an article about a certified member of the organization. You could alternate between watchmakers and clockmakers. These people must be certified, own their own shops and be the top earners in their fields. According to past surveys I have seen this should be incomes over $65,000 per year. People meeting these requirements have something to say to others in the field and AWCI members I think would be happy to hear it.

One of the most common questions I am asked by my customers is, "How did you get into clock repair?" The answer to this question for most people in our field is usually interesting.

One goal I have had each time I go to the annual convention was to take time to meet at least one other clockmaker and find out how they run their business. What is it they do that makes them successful? There are many people who are skilled in all the trades but very few who know how to run a business successfully. In the clock/watch trade, it is not enough to be a skilled craftsman. You must also be a sharp businessman including shop manager, salesman (whether or not you do any retail) and a people person.

Anyone selected for the article could submit their own digital photos of shop and work areas as well as a photo of themselves, then do a phone interview with someone on the staff at AWCI.

There could, of course, be a certain number of typical questions but the interview should be allowed to move in whatever direction the conversation goes. This interview could be recorded and later re-written into an article.

The article must first give us a reason as to why we should listen to this person's advice. It should mention their training, experience, and certifications. It should also include the extent of their participation in AWCI. Hopefully the person would have excellent reasons why a repairperson should be certified. They could state why it has been an advantage to be certified and how things may have changed since certification. They should also get a chance to state what they think makes them successful.

AWCI staff told me they tried this once but one of the people they interviewed turned out to be someone who was not deserving of an interview and it was also mentioned that they have no one on staff who has time to do the interview.

I believe this type of article would be very well received by the membership. Technical articles pay around $300 if I am not mistaken. I would think that anyone on the staff could do a decent interview and write an article in a day. If anyone on the staff (other than perhaps the Executive Director is being paid that much per day I would be very surprised. I would be willing to bet that the bulk of the staff is making less than $120 per day. If no one on the staff has time to do it during their normal workweek, offer them overtime. If they were paid $30 an hour they ought to be able to get it done in 10 hours! I am sure that we are all aware that any magazine has a writing staff. Why don't we have a full-time writer for the magazine? The point is, surely there is someone who could do this. If not the staff then a member. Members devote considerable time to various committees. Perhaps someone would be willing to volunteer for this.

Another idea would be to have some short stories about odd occurrences in the trade. Strange or funny things that happen during the course of a workday. One member I talked to was at a customer's home when an attempted kidnapping occurred, complete with shots being fired. Another member told of how an old English Bell Striker fell out of the case and onto his head. Not funny, but a good reminder to all that most of these movements are not fastened down. These stories could be submitted by members through email to AWCI. Because these stories would be relatively short, members might be willing to send these in without regard to compensation. You could group several of these stories a month in the magazine.

Another idea would be for membership to submit stories related to difficult customers and how they handled it.

These could serve as warnings and give other members an idea of how they might prepare for these things. How about articles on what different shops do when clocks and watches are not picked up? How about different examples of repair service orders? How about an article on guarantees? There are many opinions on this I am sure.

Now, in regard to technical articles. One of AWCI's goals is to promote the fact that a good repairman can earn a good living in this trade yet we are only willing to pay $300 for an article. In my shop, I must earn $425 per day to meet the current needs of my family and business. A properly written technical article would take at least a full day to write. I am currently holding onto notes for a series of articles or a bench course on a particular topic that has never been written about in the magazine (at least as long as the ten years I have been reading it). I had begun to put the notes into an article form but realized right away it is much easier to have a discussion about the notes in bench course style than it is to write an interesting cohesive article.

I realize that I should be willing to volunteer the time it takes to write these articles. Fortunately, I am blessed with a busy shop, wife, son and church to take up the bulk of my time. What little free time I have left is not going to be spent writing the articles, at least not at this present time. If the magazine were prepared to pay a clockmaker's wage for my time, I would take a workday to complete one. I could probably write a full year's worth of articles with the notes I already have.

The magazine is the only link to the organization that most members have. If the magazine does not hold their interest month to month they begin to ask themselves, "What am I paying for?"

I realize that AWCI's funds may be limited. I realize that membership has been declining. I also realize that less than 10% of our membership is certified at any level. (I checked this number a year or so ago and have forgotten the exact number, but I am sure it is close to what I have stated.) We are currently spending enormous hours putting the clock requirements together for new certification levels, preparing study materials and new tests. What a shame to spend all this effort and have only one or two people a year bother to take advantage of it.

Articles based on successful certified members would encourage others to seek certification. Also, hearing from others that are earning top incomes might encourage others to enter the trade. AWCI is a professional organization. If you want to get the ear of the membership you have to teach them not only how to be excellent craftsmen but also to be monetarily successful. According to past surveys I have read, the bulk of clock/watchmakers are earning less than $40,000. This is an excellent income in the eyes of most people but what if they could learn how to earn twice that much? During Clinton's run for the presidency they had a saying, "It's the economy stupid". You want to increase membership participation? We need a saying amongst the staff and committees, "It's the earning potential stupid!" or "Show them the money".

I understand that AWCI is considering requiring new certified members to write an article for the magazine. In many cases, this would be great. But what would we get from a person that has no experience who completes a correspondence course and passes the test? Not much. And, if only a few people are taking the test each year, we might get only a handful of articles a year from this method.

I understand that the membership is supposed to be willing to give of themselves for the sake of the organization, and many are, but where articles are concerned it isn't working!

I just thought of another idea. How about selecting a topic each month and ask the membership, perhaps by e-mail survey through the web site, how they do it? For instance, what method do you use to bush a clock, by hand, bushing machine, drill press? Tell us how you handle guarantees. How do you sell the customer major repairs? How do you interact with other repairmen in your area? What form of advertising do you do? How many hours a week do you work? How do you schedule your repair work? Have members send in copies of their repair order forms. Here is a great topic: What do you think about the fact that our clock suppliers sell "wholesale" to anyone with a catalog? Or, why don't they sell at a discount to those who buy hundreds and hundreds of dollars worth of parts each year.

Is everyone aware that Howard Miller just bought Ridgeway? How about an article on that? How is that going to affect retail sales?

I realize this letter rambles. I hope my points are well taken. I'll get off my soap box now and give the *Horological Times* Committee a chance to respond.

Respectfully,
Michael Gainey, CC

Michael:

Your criticism is taken seriously, and there is agreement in the committee regarding the points you have made. The simple answer is change is difficult; I will attempt to expand.

You wrote in connection with your ideas for more interesting content in the *HT* magazine: *"I have discussed some of these already with the staff at AWCI and it seems to have fallen on deaf ears."* As you have noted, the *HT* has no staff writer. It is the committee's understanding that the staff, as it is presently constituted, simply has no time, with their other assigned duties, to perform the tasks of a staff writer. The situation seems unlikely to change. While this may seem a trite excuse, the root of this problem and the primary reason for not incorporating new ideas in the magazine is a lack of money.

The revenue generated by the *HT* magazine is projected to drop by 20% this year compared to last year. This is $30,000. In addition, magazine expenses are projected to increase by $2,500. The major reason for the decrease in revenue is a drop in advertising dollars. As you probably know, advertising rates are based generally on circulation numbers, as well as the perceived reaction of the readers by the advertisers. As our membership, and correspondingly the *HT* circulation drops, advertising revenue drops with it. This problem could be viewed as a vicious cycle. As revenue decreases, magazine quality is affected by a lack of revenue. As quality goes down, members drop away, and revenue is further cut.

You wrote: *"AWCI staff told me they tried this once but one of the people they interviewed turned out to be someone who was not deserving of an interview and it was also mentioned that they have no one on staff who has time to do the interview."* I am unaware of this example, but then I have only been on the committee a little over a year, and if it only happened once, I may not recall it. Additionally, it should be noted that not everything appearing in the magazine, for various reasons, goes through editorial committee review process.

Further on you wrote: *"Technical articles pay around $300 if I am not mistaken."* Sadly for our contributors, you are mistaken, at least in most cases. It is my understanding that the average figure would be closer to $200. However, the committee actually exercises no control over the amount of compensation that is paid to contributors—it is a function of the Editor and the Executive Director. My research, and your estimates as well, indicate that in order to stimulate the interest of freelance writers, we need to be paying about three times the present rates. Unless some yet unknown source of revenue is discovered, it seems unlikely that rates will increase.

You also wrote: *"I understand that AWCI is considering requiring new certified members to write an article for the magazine."* This is the first time I have heard of this program. Your position on the Education Committee obviously puts you in a position of having knowledge not available to those of us outside the Education Committee. Is this a good idea? That depends upon whether the newly certified members are able to write and have some interesting and useful knowledge to impart. Simply to require an article to be written as part of the certification process does not necessarily seem to guarantee a source of quality contributions.

Your post has been forwarded to the Board of Directors, along with my comments, because I suspect that your opinions represent a majority view. Whether the Board will find the opinions and suggestions in your post sufficiently compelling to make any changes in the *HT* and its budget remains to be decided.

Please continue this correspondence if you have additional suggestions or commentary. We need all the ideas we can get. Being a watchmaker rather than a journalism major, I have no illusions about my lack of knowledge when it comes to publishing a magazine.

Kind regards,
James Sadilek,
HT Committee Chair

The Chronometer Club

"Focusing on the needs of today's watchmaker"

Watchmakers:
As a member of the AWCI, you are invited to join "The Chronometer Club". Now is the ideal time of year to join this growing affiliate theme chapter.

Our purpose is: "To 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 organization has an outstanding technical newsletter, *The Communicator*. Our e-mail forum (eGroup) and our Membership Directory make it possible for our members to exchange technical news and information as a group or on a personal basis.

Dues for 2005 are $30 (or two years for $55) for members in the U.S. and Canada. A registration form, or additional information, is available from Ewell Hartman, CMW, Executive Secretary, at 5114 Downy Lane, #203, Richmond, VA 23228 or by e-mail at ewellhartman@msn.com

In the race for quality, there is no finish line.

W. R. Smith, CMW, CMEW, BSME, FBHI, FNAWCC

The Strutt Epicyclic Train Clock

A bit over 20 years ago, I happened to see in Royer-Collard's book, *Skeleton Clocks*, a picture of a William Strutt epicyclic train clock along with a half page description that included the tooth count of the train. I was completely fascinated by the planetary gearing and set about building one.

A real Strutt clock had never been seen. Thus, a means had to be found to determine its size. From the tooth count, it was possible to calculate the theoretical pendulum length and from this a guess could be made as to the clock's height. This allowed a choice for the module of the wheels and it was decided to cut all of them with a standard 0.8 mm commercial cutter.

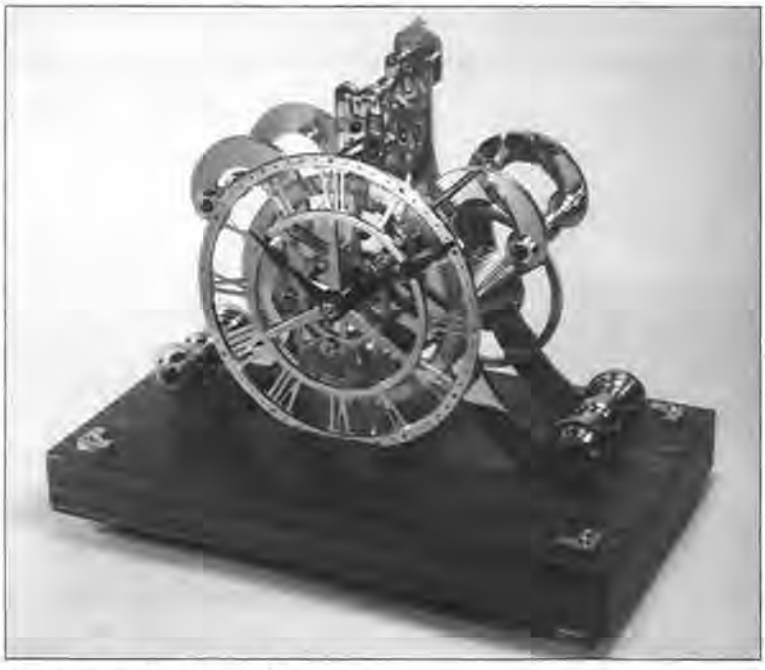
When completed, the clock was entered in the 1981 NAWCC Craft Contest and won a gold medal for First Place in the Single Train Category.

Unfortunately, the construction effort was not documented photographically and no "how to" manual could be written for use by others.

Because of the clockmaking books and videos I have authored since then, many have asked for information for building the Strutt. Thus, a second Strutt was built just to get the photographic documentation so the workshop manual could be written. This second clock, described here, was entered in the 2003 NAWCC Craft Contest in Charlotte, NC this past July and also won a Gold for First Place.

Figure 1 is a sketch of my version of the Strutt trains and motion work. Being a train drawing, the mainspring barrel from which a cable wraps around the fusee is not shown, nor is the escapement.

Figure 2 offers a front view sketch of the train, making it easier to understand the relationship of the planetary components. At the center is a sun wheel that is anchored to the dial and cannot turn. The center arbor carries the minute hand. Also mounted on and pinned to it is a planet arm, on one end of which is a counter weight. On the other end is a post carrying a planet pinion and planet wheel. The pinion engages the fixed sun wheel and must rotate while being swept around it by the planet arm. The teeth of the planet wheel engage the internal teeth of the ring wheel, which is free to turn on the center arbor. Its external teeth engage a pinion on the escape wheel arbor and rotate



Strutt Epicyclic Train Clock

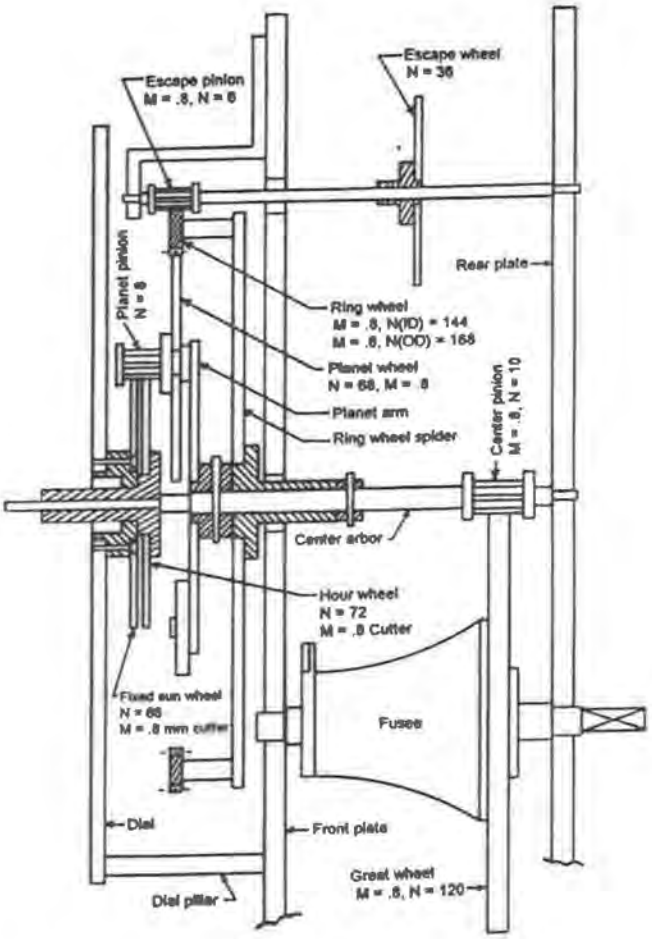


Figure 1. Side view of the train.

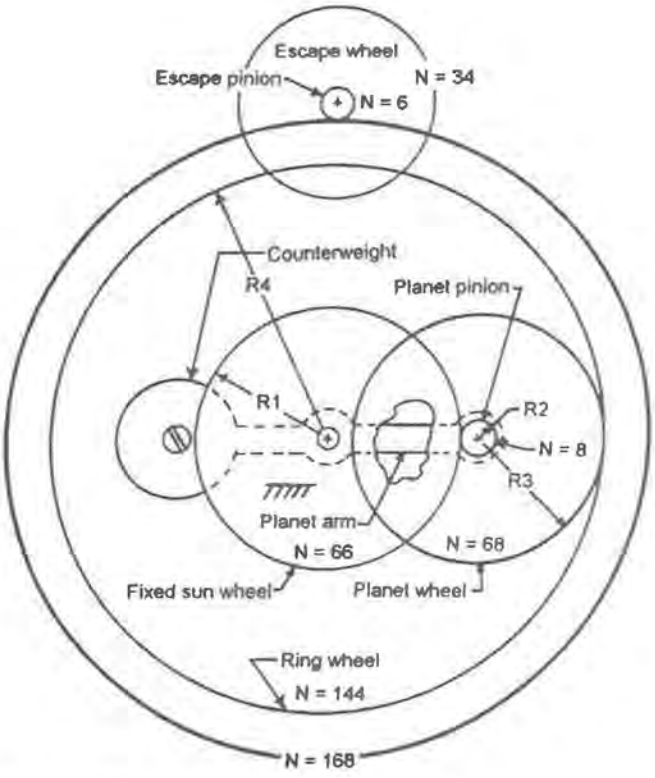


Figure 2. The epicyclic train.

the escape wheel. A recoil escapement then drives the pendulum.

The clock runs 8-days and is powered by a spring in a barrel. A cable around the barrel is wrapped around the fusee, which offers uniform torque to the train.

The Missing Module

A study of the train indicated that the use of a standard commercial cutter would result in a missing module as follows. The module of a wheel or pinion is the pitch circle diameter divided into as many equal length parts as the wheel or pinion has teeth, i.e., M = D/N. From this, it is obvious that a pitch circle diameter can be thought of as containing N modules and has a radius of N/2 modules. This allows a very handy means for checking a train. Remembering that all pitch circles must be tangent to each other, it follows that if all wheels are cut with the same cutter, R1 + R2 + R3 must equal 3 R4. R1 is (66/2)M, R2 is (8/2) M and R3 is (68/2)M, for a total of 71M. However, R4 has a length of (144/2)M = 72M. Quite obviously, there is a missing module and R1 + R2 + R3 will not reach the pitch circle of the ring wheel. I have never seen this reported in any previous discussions of the Strutt clock. Furthermore, I seriously doubt if Strutt or the builder of his first clocks were aware of the problem.

Figure 3 is an enlargement of a portion of a photograph of a genuine Strutt clock showing the planet

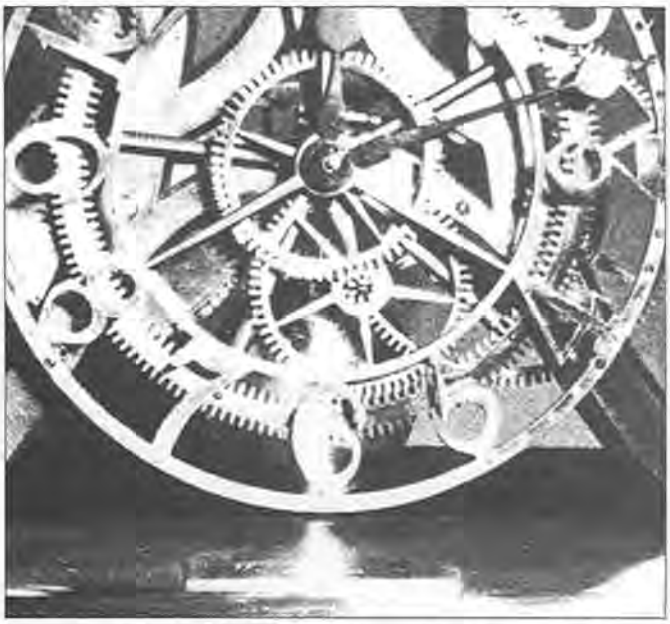


Figure 3. Showing the poor depthing of the planet wheel to ring wheel.

wheel driving the ring wheel. It is quite obvious that the wheels are too far apart for their pitch circles to be tangent. Could this be the result of the missing module that escaped notice by Strutt and his clockmaker?

Supplying the Missing Module

For various theoretical reasons, the only correction that could be made to the train for using a standard cutter was to alter the sun wheel. One module of radius is missing, thus, two modules had to be added to its pitch circle diameter. This made the wheel have a pitch diameter of 68M. Add to this 2.7M for the two addenda and one has the correct blank OD, 70.7M, for cutting the wheel. This increase in diameter results in an increase in circular pitch of approximately 0.004", all of which is added tooth width. Thus, after the sun wheel had been cut, the cross slide was offset 0.002" and the teeth cut a second time, making the tooth and space widths equal. This proved to be an answer to the missing module problem.

Cutting the Internal Ring Wheel Teeth

There was no known cutter available for cutting the internal wheel teeth of a clock wheel. Thus, one had to be designed and built. This took the form of a cutter frame but with a most unusual rotor, as shown in Figure 4. In order to have the cutter frame clear the ID of the ring, it was necessary for the tip of the cutter to swing a rather large radius. This was accomplished by mounting a standard commercial wheel cutter very much off center and pinning it against possible rotation. A single tooth of it was used as a fly cutter.

Cutting the External Teeth of the Ring Wheel

In order to ensure concentricity, an arbor was turned for a slip fit with the internal teeth tips of the ring wheel

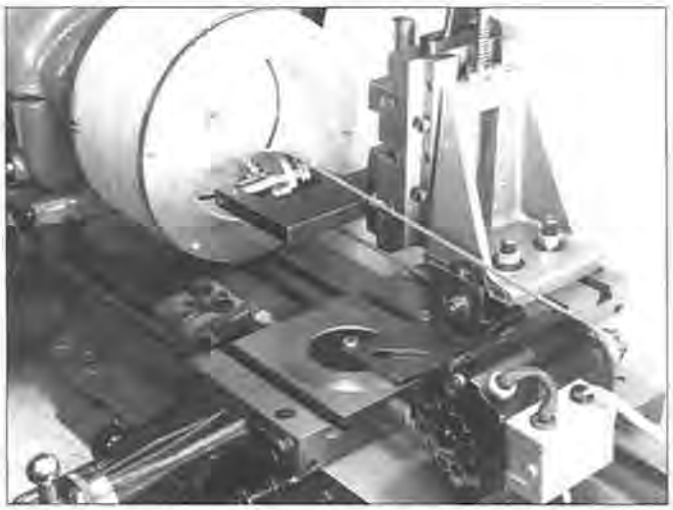


Figure 4. Cutting the internal teeth of the ring wheel using one tooth of a commercial cutter on a cutter frame driven by a sewing machine motor.

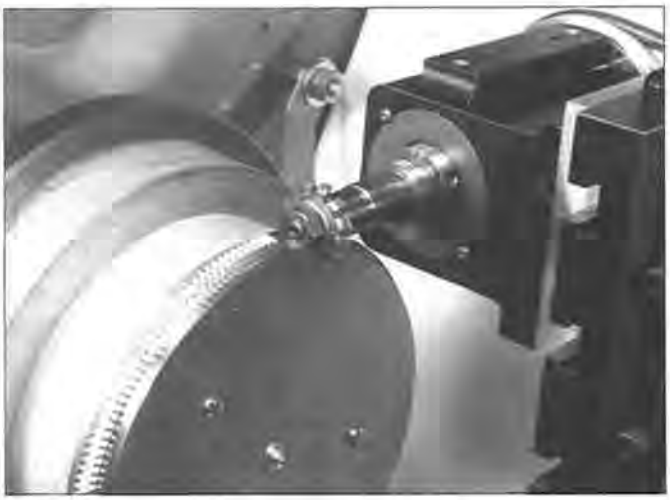


Figure 5. The setup for cutting the external teeth on the ring wheel.

and it was bonded in place with super glue, as shown in Figure 5. A center pin was installed in the arbor and turned for a slip fit in the reamed hole of the spider blank. The blank was then attached with screws. While still mounted, all six holes for mounting the spider to the ring wheel were drilled and the parts match marked for later assembly.

The Ferguson Paradox

The motion work of the Strutt, or the absence thereof, Figure 6, is another interesting thing about the clock. In about 1750, a Scotchman by the name of James

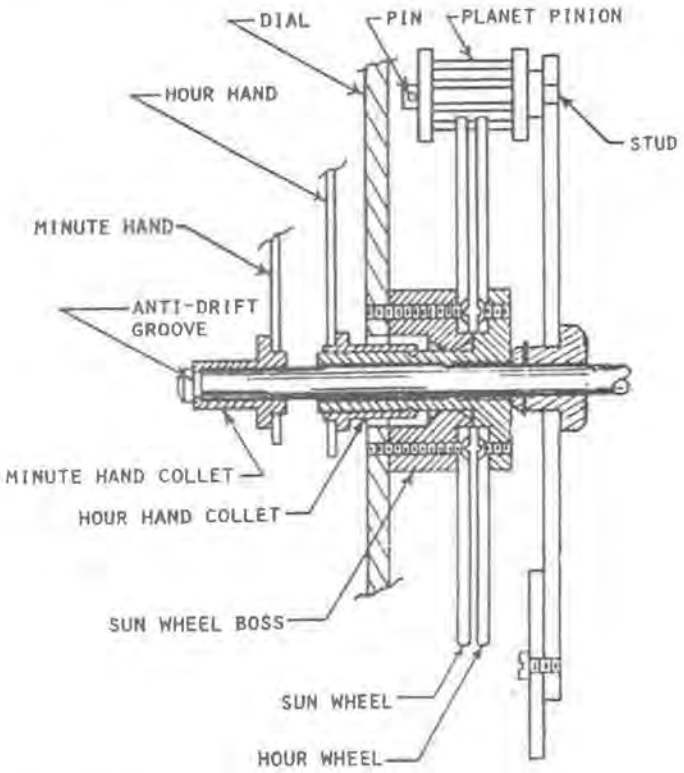


Figure 6. The motion work.

Figure 7. Front view of the completed epicyclic trains showing the center pinion, sun wheel, hour wheel, planet arm, planet pinion, planet wheel and ring wheel and its six-leg spider.

Ferguson invented a mechanism, which has since become known as the Ferguson Mechanical Paradox. It is likely that some 80 years later, Strutt employed a principle from the paradox for his motion work.

The planet pinion engages the fixed sun wheel and an hour wheel mounted on a free-to-rotate cannon that carries the hour hand. Both wheels are of the same diameter and cut with the same cutter. However, the sun wheel has 66 teeth and the hour wheel has 72 teeth. As the center arbor sweeps the pinion around the sun wheel to which it is engaged, it is forced to rotate. As each pin of the pinion enters the tooth space of the sun wheel, it encounters a portion of an hour wheel tooth and pushes it forward. In one revolution of the center arbor, a total of six teeth of the hour wheel are pushed forward, moving the hour hand 1/12 revolution to indicate 1-hour.

Axial Hand Movement Problem

Lacking the 12 to 1 gearing of normal motion work, each hand of the Strutt must be set separately. This demands that each be free to rotate on its mounting. To avoid axial motion of the hands, a groove had to be cut into both the center arbor and the hour wheel cannon. A one-half donut in the end of each hand collet engages these grooves, as shown in Figure 6.

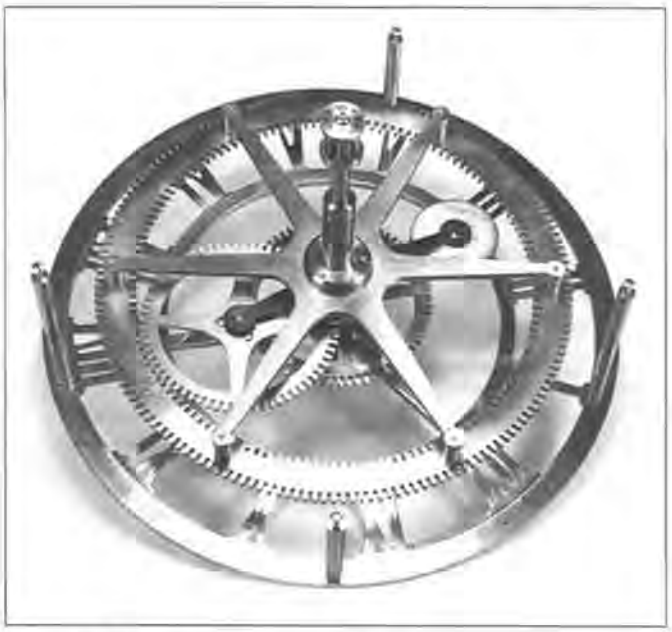


Figure 8. Rear view of the epicyclic trains.

Figure 7 is a front view of the completed epicyclic train. The boss sets the sun wheel away from the dial when mounted. The boss, hour wheel cannon and center arbor are coaxial. Figure 8 is a rear view of the epicyclic train assembly. Note the extra length of the spider's collet to prevent tilting of the ring wheel.

The Escapement

The clock uses a typical recoil escapement, as shown in Figure 9. Note how the external teeth of the ring wheel drive the escape arbor pinion. The pendulum hangs from the support at the top of the shield containing the pallet arbor eccentric pivot hole.

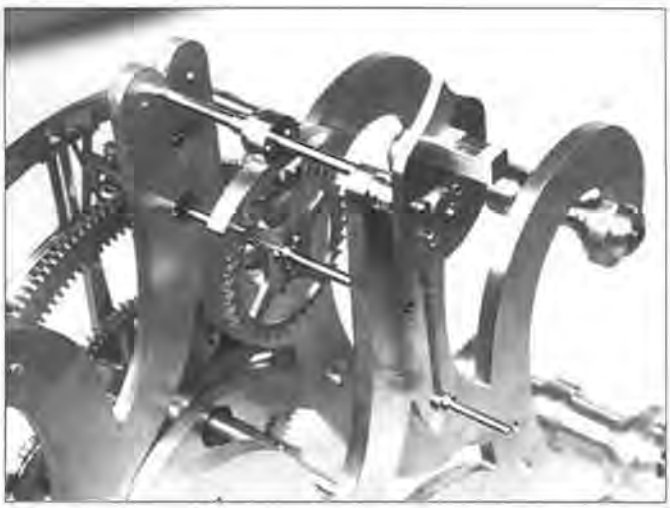


Figure 9. A view of the escapement. Note how the ring wheel drives the escape arbor pinion.

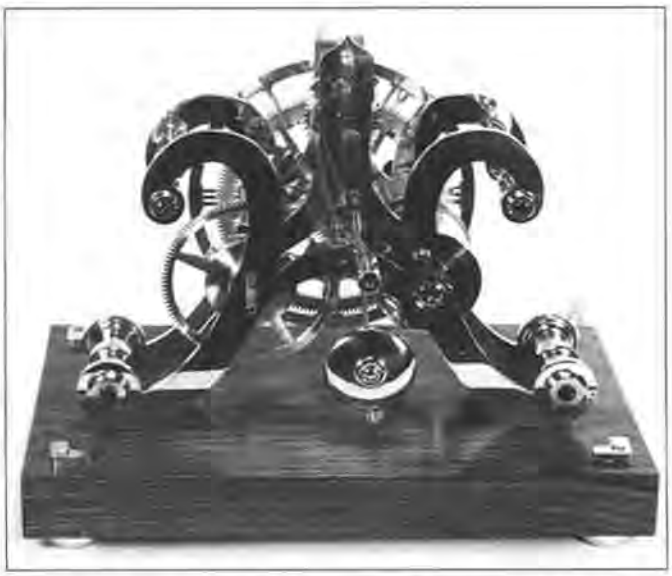


Figure 10. Rear view of the completed clock. Note the pendulum lock.

Figure 10 is a rear view of the clock and Figure 11 is a right side view of the clock. A book and video for building the clock is available from the author at: 8049 Camberley Drive, Powell, TN 37849. Phone: 865-947-9671.

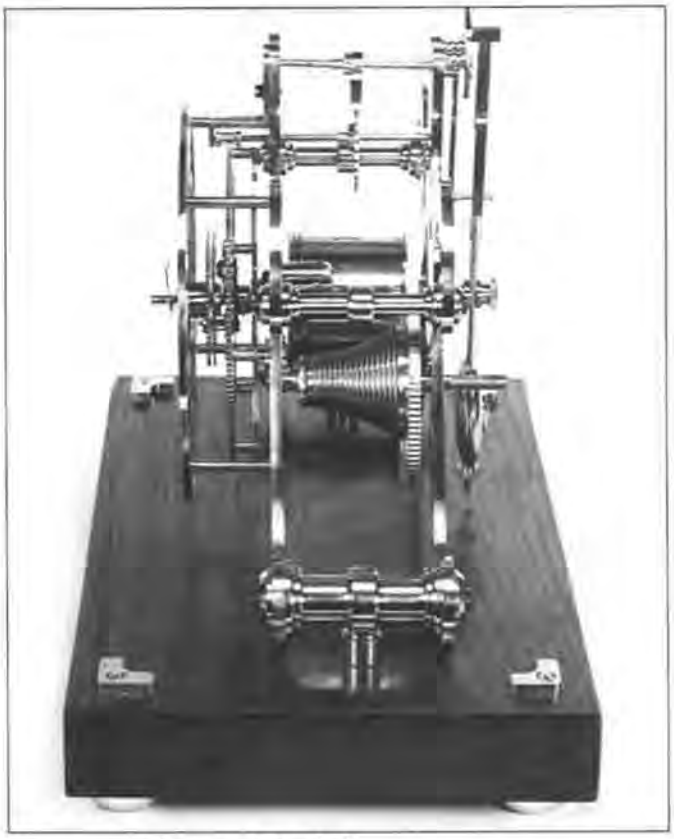


Figure 11. Side view of the clock.

Horological Times **Committee Message**

(Continued from page 2.)

For our part as the *HT* Committee, we would like to revive a "Letters to the Editor" section, which of course, is dependent upon letters from the readers. Letters would be subject to editing and if any were received with obscene language or vicious personal attacks, they likely would be rejected—otherwise, all shades of opinion are solicited. Please let us know what you like, and what you do not like about the magazine (we'll try to be thick-skinned), ask questions, and offer erudite commentary on esoteric horological subjects. The organization could probably benefit from a more communicative membership.

Additionally, we are considering the inclusion of a Watchmakers' Q & A section as a regular feature. We have David Christianson's column, which deals with mostly historical questions, and J.M. "Huck" Huckabee's column with technical clock questions, there would seem to be a need for a watchmakers' technical column. Again, without the contributions of our readers, it would not be a success.

There have been reports from members submitting material to the magazine, for which no acknowledgement of receipt was given. The committee considers this unacceptable. If anyone has had such an experience, we wish to know about it. If any member makes a submission in the future, which is not acknowledged within one week, contact the AWCI headquarters and ask if your submission was received. The committee suggests you use the organization's toll-free phone number for this purpose (1-866-367-2924). E-mail submissions, which are preferable because of the ease of converting them to print, are especially vulnerable to loss simply because of the somewhat less than perfect operation of the Internet; such losses are neither the fault of the sender or the intended recipient. Obviously, one should retain copies of all submitted material.

Recently, the *Horological Times* "Contributors Guide" was posted to the "files" section of the *awimatters* Yahoo! Website. We urge all members who are "Internet enabled" to join "awimatters" regardless of your intent to contribute to the magazine. It is an excellent source of technical discussion, obsolete parts location, and just general information about the AWCI.

The "Contributors Guide" is intended to outline what sort of material the *HT* Committee seeks for publication. It is not all-inclusive, nor is it the final word as to what is accepted or rejected. We consider it a work in progress. If you have an idea for an *HT* submission and are uncertain as to its acceptability, by all means ask the committee through Donna Baas the *HT* Editor, or by e-mailing directly to the *HT* Committee (htcomm@awi-net.org). Again, expect a timely response and if it is not received, get on the telephone.

Lastly, if you have an idea for an article that would be of general interest to the membership, but are hesitant about your ability to present it properly, it is quite possible that the committee can either assist you with editing or illustrative expertise, or find a member who would be willing to assist.

HT Committee:
James Sadilek, Chair
Chip Lim, CMW, CMC, CMEW
Robert Porter, CMW
Manuel Yazijian, CMW

Questions & Answers

(Continued from page 4.)

as a large opening below the dial and above the figurehead. The side openings have brass fretwork pieces to fit them. These pieces were all hand cut with saw marks visible, and when I got the clock they were covered on the back with green satin material. I suspect that there was some type of covering in the opening below the dial because attachments inside the case would indicate this. I first thought the pendulum (which I did not get with the clock) would be visible through this opening but a pendulum of the right length to keep time would not be visible, it would be too short.

The movement is pretty straightforward as you can see from the pictures. My only comment would be that the plates appear to cast. There are imperfections in the plates that make me suspect this.

Gale K. Aune
Boonville, IN

Answer

Your very fine clock says mid-18th century French origin in every outward respect, from its guilt bronze case of the later Louis XV period to its one-piece porcelain dial with its roman hours and large Arabic minute numerals spaced at 5 minute intervals and all radiating from the center of the dial. The hands even have a Louis XV style.

The movement however puts me in mind of the round S. Marti carriage clock movements of the late 19th century. Although there is no name or mark on the movement, the style of the wheel arbors, the count wheel and the suspension bracket all look like something out of the factory of Samuel Marti and Son of Montbeliard in the eastern part of France, not far form the Swiss border, and then later on located in Paris. S. Marti & Cie sold finished and semi-finished movements to clockmakers and retailers who would case them and put their own name on the dial.

S. Marti is particularly known for small round carriage clock movements but he made square ones, also. He received awards in French trade fairs (exhibitions) in 1841, 1851, and 1852 and would have stamped his bronze medal awards on movements that he finished after these dates.

The Brocot pendulum rate adjustment wheel on top of the pendulum suspension block helps to date your particular clock. Achille Brocot of Paris (1817-1878), famous for his "Brocot (pin pallet) escapement," also invented the "Brocot suspension" used on your clock, about 1840. With a linkage rod extending from the suspension block through a hole at the top of the dial, a person could easily adjust the rate of his clock from the front without taking the clock off the wall and opening the back.

With the Brocot suspension and the lack of an exhibition award stamp, I would suggest that your clock was made during the middle of the 19th century. The clock movement was probably finished and sold by a clockmaker named Charles. Tardy, in his comprehensive listing of French makers, shows several Charles' practicing as clockmakers in Paris in the mid to late 19th century. Or...your clock may have been sold by a seller of clocks in Paris named Charles who bought the clock from an unknown maker and had his own name placed on the dial. But I tend to think the former is the more likely.

David Christianson,
CMW, CMEW, FAWI,
Technical Editor

Rock Quarry

Fred S. Burckhardt, FAWI

What a surprise I got the other day. My Irish-Eskimo friend, Nanook O'Grady, stopped by. I haven't seen Nanook since we worked together in the Far North in an Eskimo settlement. We didn't make much money as the main source of income was from thawing out the frozen water in the clepsydras. The rest of the time we mostly just sat around chewing on some whale blubber. I had to give that up when my cholesterol reached 850.

It was good to see Nanook again. We sat around for a while, once again chewing the fat, and talking about our experiences up North. We agreed that things have changed since those cold, but happy days. Nanook was telling me that he left shortly after I did. It seems that the global warming was catching up with him and he couldn't take the hot 40 degrees below any longer. Fortunately, he got a position with a watch company that was specializing in making watches that would hold up under extremely cold weather. He couldn't wait to get to work each day as he sat in a refrigerated room and tested various oils to see which would hold up under those conditions. When he put his okay stamp on the oil, they would use it to lubricate the movements, case them up, and tape them to the outside of a submarine that was heading for six months under the polar ice cap. The first test didn't work too well. When the submarine came back, none of the watches were working. Somebody forgot to put in the batteries!

I asked Nanook how come he was able to stand the warm temperatures, now that he was living in the Unites States. He told me he had to attend a spa. He was put in a special room that was 50 degrees below zero and each day they would raise the temperature a few degrees. He said it took almost a year of suffering the withdrawal before he was released. He still has to wear heavy Eskimo type clothing, as he can't take the chilly weather.

Nanook worked with me for a few months until he was able to find another job. He never lost his touch at the bench. He was the only watchmaker I ever knew who had sparks coming from his tweezers and screwdrivers. After hours he would work on a charger for watch batteries. After perfecting it, he couldn't get any of the battery companies to manufacture it.

He finally had an offer from an upstart company that was making timing washers for quartz timepieces. He called me a few weeks later and said things weren't going too well and he thought he could do better elsewhere. The last I heard of him he was heading up North.

Vince Schrader, CMW

Certification Central

So, You Want a High-End Parts Account?

Welcome to what we hope will become a useful and valuable monthly feature for you, called "Certification Central." The purpose of this column is to give you the latest information regarding our new professional certifications, and to erase any rumors, speculation, or erroneous information, which may be floating about as AWCI, pursues excellence for its membership.

We will also attempt to inform our membership of sites and dates for examinations, examination criteria and procedures, and answer a multitude of questions that we've been deluged with over the past several months, on other topics.

There's a terrific amount to write about in terms of our activity over the past two years. We'll have to take things a "topic at a time" until we get everyone up to speed.

Site of the first pilot exam.

This particular column is about "what's been going on." We'll try to cover the high spots of the past two years. Excuse me if I jump around a little from time to time, because sometimes-chronographic order (no pun intended) doesn't tell you as much as "fast forward" or "rewind."

The New "Standards and Practices"

Let's start with a few important events from recent months. Most significant, in August 2004, the AWCI Board of Directors adopted a document entitled "AWCI Official Standards and Practices for the Certification of 21st Century Watchmakers". This document is now the "bible" regarding what AWCI officially considers "musts" regarding the appropriate knowledge, skills, and attitudes horologists must possess. It also describes assessments, outlines the role of examiners, and the scoring procedures for certifications. It also authorizes the appointment of a Board of Examiners to oversee the certification process, and be responsible for decisions regarding training examiners and assessors. If you wish to see a copy of these standards, they can be downloaded from the "AWImatters" files at the Yahoo website.

The New Board (BOE)

This Board of Examiners was named by the Board of Directors in early October 2004. It consists of 5 members, two watchmaking specialists, two clockmaking specialists, and a certification/assessment specialist. The BOE will meet formally twice a year, and to oversee the assessment process, assuring that test content is up to date, and that it is "refreshed" each year. In addition, the BOE will guide the training of regional examiners, decide upon training content, and analyze both

Joe Schrader preparing movements for the exam.

market and geographic needs around the country. Individuals who qualify to become examiners will be recommended to members to the Education Committee for approval. They will then become eligible to assess/and or score the new certification assessments.

Pilot Examinations

As I write these words, I am proctoring the final component of our pilot examinations for 21st Century Certified Watchmakers. I am accompanied by the other watchmaking examiners, and Executive Director Jim Lubic. An industry representative will join us tomorrow, and we will finalize our scoring methodology this Thursday and Friday.

Two or more of us have conducted testing at 5 different sites. Our goal was to collect at least 30 samples of examinee performance on our examination in order to assure that our assessment discriminates properly, has a low "error of measurement" (we'll save this for a later column), is centered upon the skill attainment of the entry level watchmaker, and provides us with enough information to finalize an assessment which we can use on an expanded scale in 2005.

The candidates in front of me are working on very "modern" timepieces. This last group is made up of experienced bench practitioners who have volunteered to take the examination and offer expert critiques. On Monday, they sat through a 3-hour written exam in the morning. Then they began work on a micromechanical project and an electronic watch. Today, Tuesday, they received an autowind calendar to repair, and tomorrow, they will receive a modern chronograph. If all goes well, they will wrap things up on Thursday morning. Many of the candidates expressed concern about the "theory" (written) portion of the exam. They understood that the written portion would be totally new. Prior to taking the exam they (as have all the other pilot participants) received sample questions. It will take another article to describe how the new exam really differs from the old, and this is upcoming. Suffice to say for now, however, that other than nomenclature, the examination is about problem solving, interpreting technical information. It stresses thinking, analysis and synthesis, over simple memorization.

The total effect is to create a "real-world" written exam, one which does not very much rely on "chance" for measurement.

When it all Started

If we rewind to a few years ago, when the Strategic Planning Committee recommended to the Board at AWCI's annual meeting that the certification structure be "re-thought" and brought up to date, we stand at the beginning of this process. Personally, I'm not sure if anyone had in mind a clear picture of the enormity of what they were asking for at that time. How do you take a profession that's centuries old, is rich with tradition, art, science, and technology, and blend it with the enormous changes of the past 30 years? How do you account for the fact that just when everyone thought watchmaking was a "dead" profession, over a

Vince Schrader ready to use the scope at a pilot exam.

Jim Lubic preparing a movement for a pilot exam.

billion dollars' worth of fine mechanical timepieces began selling each year in America in 1999, and the numbers continue to rise? Combine this with the internet explosion, a surge of interest in vintage mechanical watches, from Gruens to Timexes, and you have a void that needs to be filled. In the 1960s, when mechanical timepieces were the standard, there were abundant resources for watchmakers, both in terms of training, and in terms of parts availability. There were also a lot of watchmakers. Then, quartz technology happened.

I remember vividly sitting in the audience as William O. Smith, Jr., commissioned by AWCI to study the impact of the new electronic watch (remember the Pulsar at $1200?), spoke to us in Indianapolis and concluded that while this new form of timepiece would have an impact on "our" world, it would not replace mechanical watches. Of course we all know what happened next.

What We Didn't Anticipate - How Quartz "Helped"

What we didn't anticipate was while that the incredible new technology of the late 20th century would make cheap, incredibly accurate timepieces possible, something else incredible would happen... the capability to manufacture incredibly accurate mechanical timepieces which would raise the art of horology to a whole new plane. It became possible, through CNC machining, new alloys, new lubricants, and global marketing, to put mechanical works of art in nearly everyone's hands, at reasonable prices. Combined with styling, fashion statement, fine metals and jewelry, a whole new world opened for the horologist.

I believe there's little argument to be made about the issue of how different the world is for 21st century watchmakers. Of course, a major problem is that parts availability has become a problem. Complicated movements now abound. Casing requirements (up to 40 components!) are enormous, and public expectations have changed. Industry has responded by producing timepieces which sell take advantage of these changes. But their products are no longer timepieces with a simple pragmatic function—just telling the time. The new breeds of mechanical timepieces are status symbols, collectors' items, and works of art, complicated "toys" or "trophies" for the wrist. Concurrently, industry standards for the care and service of timepieces have changed. Industry has "raised the bar" in terms of what it expects for those who service their products, and this fact has placed a number of individuals, including a large part of our membership, in a difficult position. Most are willing to meet these standards, but what are they, and how do they get there?

Fortunately (or unfortunately depending upon your point of view) as a horologist, the heart of new mechanical timepieces is a unit, which must compete with quartz accuracy. Of course, we know this is not possible, but we also know that quality timepieces, when manufactured to near "textbook" perfection, can keep incredibly accurate time. Today's chronographs must be able to hold accurate rates for 5 years or more, keep out moisture, be practically bulletproof, and still look like a piece of beautiful jewelry or a work of art. And consumers expect a low maintenance obligation on their part.

So, for Watchmakers, What Needed to Happen?

It was abundantly clear to the Strategic Planning Committee that these changes had occurred. The question was how to keep up as a Certifying organization. This problem was delegated to the (then AWI) Education and Certification committees who were asked to explore, investigate, rewrite, etc., whatever was necessary

Joe Juaire taking the written exam.

Pre-exam condition noted by all examinees.

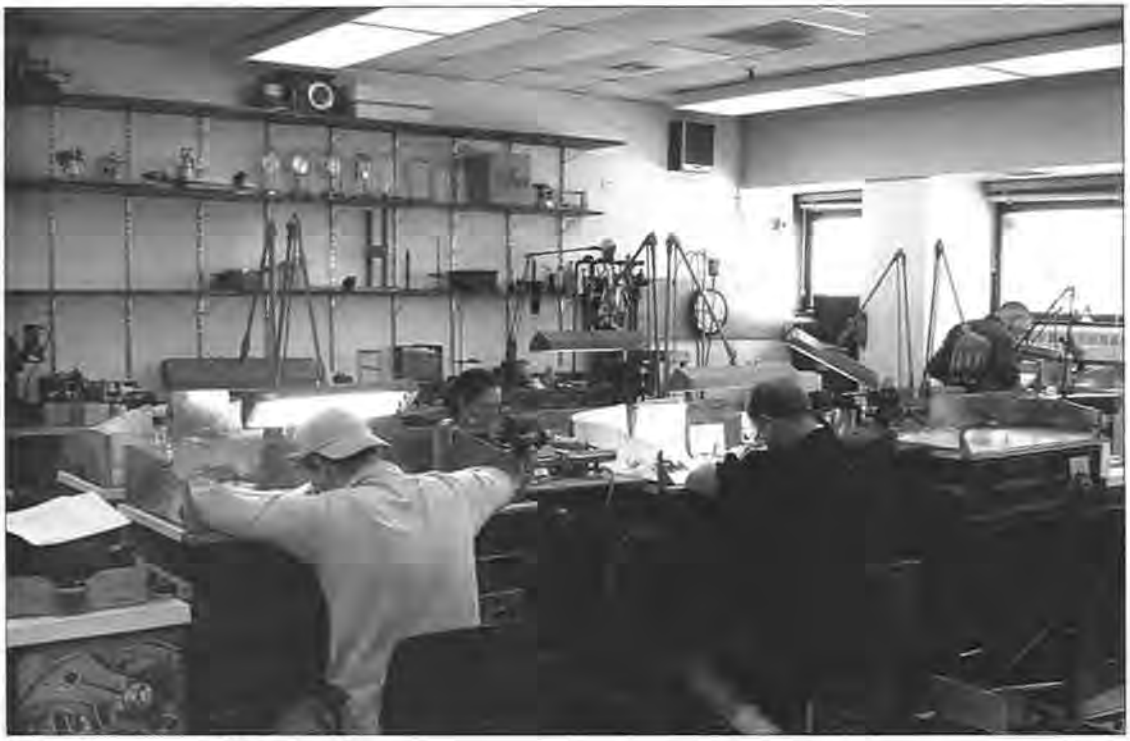
Examinee preparing a movement for cleaning.

to bring recommendations forward to the Board which would propel AWCI into the new century.

For months, the new education committee, appointed by then president Jack Kurdzionak, wrestled with the problem. Many of the stumbling blocks to early progress were marked by a "cart before the horse" mind-set. Everyone wanted new certifications which reflected the times, but couldn't get past the "conceptual hump" that the certification process today is a long and involved task and that modern assessment is now a science thoroughly rooted in psychology, and not your father's "pop quiz."

The committee decided that the following had to happen:

1. Experts in modern watchmaking must determine the critical knowledge needed for certified specialists to fulfill today's needs, and,



Examinees at work during a pilot exam.

2. Do research to encompass everyone's need for this a new body of horological knowledge.

3. The body of knowledge must be formally adopted.

4. Measurement tools for skills and knowledge that reflect certification applicants' abilities must be developed.

5. Experts must decide what constitutes the "minimum" amount of knowledge (passing standard) a candidate must possess before earning a certificate level or title, e.g. Certified Watchmaker.

6. Logistics must be developed for methods for examining candidates.

7. New assessments must be statistically reliable, have valid content, target the right audience, be reliable, and have predictive value.

8. Well-qualified assessors must be recruited and trained.

9. The entire procedure must be legally defensible.

10. The entire process must satisfy industry needs.

11. .... and everything musts be done "yesterday."

If you think this seems like a lot, you are correct. But tremendous activity in each of these areas has taken place over the past two years, and end products, (standards, examiners, pilot examinations) have been generated. There has NOT been a vacuum in this enterprise, and much has been accomplished.

What Has Happened

In brief, here is specifically what has happened through the work of AWCI's Education Committee on each of these points.

1. Fall, 2002, new members of the education committee are appointed, and discussion of critical knowledge areas begins. Several rough drafts, (mostly lists) are written.

2. Early 2003, industry weighs in, showing interest, and offering support and encouragement.

3. Three AWCI committees, along with industry representatives, meet and:

a. Certification categories are defined, redefined, and finally subjected to the question "What must a competent (watchmaker, clockmaker, master Watchmaker, etc.,) know and be able to do?

b. Standards (critical knowledge statements) are circulated for comment among key representatives of the horological profession.

c. An assessment process is fleshed out.

d. Debate occurs over whether the "old exams" can be converted to modern use, or whether they should be scrapped altogether.

e. A decision is made to solicit schools and candidates to participate in a "pilot testing" who will incorporate performance and written tasks built around the new paradigm.

3. Late 2003, AWCI executive director Jim Lubic contracts with an assessment and credential specialist to help develop the technical components of various assessments, as well as assist in writing "standards and practices" which will serve to generate the content of examinations.

4. Early 2004, new assessment document is developed.

5. New performance tasks are developed

6. Pilot assessments are initiated.

7. A "Standards and Practices" document comes into full bloom, going through at least 11 major revisions.

8. July 2004, a set of "Core Beliefs" which summarizes the Standards and Practices is developed. It meets with industry approval.

9. Industry leaders show even more interest. AWCI meets with key figures to exchange ideas, and explore the possibilities of industry partnership, or ways in which industry can help facilitate the process, without being intrusive into the needs and professional status of AWCI members.

10. The Board of Directors approves the hiring of a horological specialist to help coordinate the new certifications effort, and to handle logistics for the new assessments. The specialist is to be responsible for teaching classes in chronograph repair, and possibly brand specific training at Harrison (AWCI headquarters) or regionally as needed.

11. Pilot assessments are conducted and completed.

12. AWCI's new assessment and certification for 21st Century Certified Watchmakers becomes ready to go "on-line" with Board approval in 2005.

What about the Clockmakers?

Thus far, we haven't really talked about the clockmaking side of the new certification process. The clockmakers have been busy, too. New classifications have been adopted, new standards are being written and new assessments are in process. Pilot examinations will be occurring soon. As time goes on, we'll keep you posted on what's happening, when, where, how, or why. Rest assured, that for an organization that has to depend upon volunteer work to get things done, you are certainly getting your dues' worth.

More, much, much more, to follow.

Upcoming Topics:

- What's the new assessment like?
- How do I prepare for the examinations?
- When will AWCI be testing in my area?
- What about other certification categories? Where are we?
- How will the new certifications help me as a professional in getting parts accounts?
- What makes a "good assessment"?

The Modern German Clock Movement

Part 50

Murphy's Laws of Clock Repair

Mark Butterworth

It has always been my hope that I could provide readers with material that is educational, "timely", pertinent, and hopefully interesting to read. On this 50th article I would like to take some literary license from something purely technical to share some very humorous thoughts from Ronnie Bowen of Texas. I hope you will read them several times as I did, because then one realizes there is some very serious advice contained in these nuggets of truth that we ignore at our peril. These apply to both our business and our technical practice—enjoy.

An Irish bartender named Murphy is credited with a large and still growing (despite his death) number of laws relating to the likelihood of difficulties. Some say Murphy was a pessimist. True Pessimists feel he was unduly optimistic and fear that things are really much worse. Here are a few of the laws that apply to Clock Repair

A broken clock will always work when demonstrated for the clocksmith on a service call.

The clock will stop working again the minute the clocksmith leaves.

The only thing you didn't check for a malfunction will be the source of the problem, but you won't find it until you are called back.

Whatever the customer has told you to prepare for, the service call will be wrong.

A dropped part will always roll to the exact geographic center of the largest available object for it to roll under.

The probability of the loss or breakage of any part is directly proportional to the difficulty of getting a replacement part.

Irreplaceable parts will always break or be lost, and at the worst possible time.

Replaceable parts will only become available after an important deadline has passed.

Parts that are difficult to install will freely fall out on their own.

Parts that go in easily will be extremely hard to remove, and removal will be necessary to accomplish the needed repair.

The part you need will be the irreplaceable part you threw away last week because there are no more clocks of that type around.

The number of customers who visit your shop is inversely proportional to the number of employees you have to wait on them.

When your entire staff is available no one will come.

When you are there alone, everyone will come and they will be impatient.

The probability of a service call varies directly with the intensity of the rain.

The length of time it takes to get to the service call varies directly with the intensity of the rain.

The possibilities of a white carpet are directly proportional to the mud or rain you encounter on the way to the service call.

The length of time it takes to service a clock varies directly with the number of on-lookers making fun of how long it takes you.

The length of time it takes to service a clock varies directly with the number of times your purple-haired old lady customer claims her Uncle does it in only a few seconds. (There is a dispute as to whether it

actually takes longer or whether time just seems to drag when certain customers are around.)

The number of witnesses available is inversely proportional to the skill you demonstrate.

There will never be anyone around to see you do something brilliant.

When you really screw up, you will get network coverage with a 40 share.

The probability of having someone spinning the dial while you have the back of the clock off will vary directly with the square of the number of people you tell not to touch the clock while you get something out of the truck.

The probability of having someone spinning the dial while you have the back of the clock off will vary directly with the square of the number of parts that will come loose if someone spins the dial.

The more elaborate the precautions you take the more likely they are to spin the dial while you have the back of the clock off. {Nothing is foolproof because fools are too ingenuous.}

The probability of arriving at the job site without a needed tool or with the wrong hardware is directly proportional with the square of the travel distance.

You will always have what you need when the job is next to your shop.

The clock will always need a special part and it is not field reversible when the job is more than a half hour travel.

Any written specification you have been issued by the customer will be the old one that has since been revised after you left the service call.

Any clock OEM part that you have with you will not match any of the clocks in the building.

The harder it is to obtain matching OEM parts, the more the customer will insist on an exact match.

If you do have an exact match the customer will say "Matching isn't important, don't you have anything cheaper?"

When a customer has a large number of specialty clocks, those clocks will require very expensive service parts available only from the manufacturer.

When you buy the repair parts, incidentally available only by the dozen, you only get to use them one time, or you find that something you already had can be used instead.

When you don't buy the repair parts, nothing else that you have will work instead, and you will have constant problems that would have been avoided by buying the repair parts.

By the time you finally buy the repair parts your lost time will exceed the cost of the repair parts by ten fold. Then your customer will go elsewhere.

The harder you try to get to a call quickly, the more impatient your customer.

The more impatient, the less likely you are to get paid.

They complain about the price they have to pay, even though they were quoted that price before they told you to come.

No matter how low you bid the job there is always an idiot out there willing to do it for less.

The more you cut your price to get business, the more likely you are to go out of business.

The more you try to compete on a price basis the lower your prices will go.

Your income will follow.

The bigger your yellow pages ad, the more low-priced calls from non-repeat customers you will get.

Increasing the ad size and cost increases the percentage of low profit calls you get.

The prize for beating out all other clocksmiths for the biggest most expensive advertising in all the different yellow pages books is bankruptcy.

The more you advertise that you have 24-hour service the more security guards and insomniacs will call you in the middle of the night with request for price quotations.

You will get angry calls from people who stopped by your shop at midnight and you weren't there even though you advertised 24-hour service.

You will get calls after midnight from people who saw your 24-hour service claim and want to have you meet them at your shop immediately to estimate a repair using your free coupon special. {On this loss Leader you lose your mind and your sleep.}

Your best clock repair apprentice will quit and open a shop across the street and cut your prices. Your wife's brother who is totally un-trainable will stay with you forever.

"The School Watch" Machined Hands

Ron Landberg

Making hands takes more thought than you may expect. The balance and weight of the hands, the thickness, the length, the hole size, and the tubes all affect not only the look but the functionality as well. Consideration of length is important for the overall look of the watch, it is also important that the hands fit within the case dimensions. Thickness affects the clearance from the dial, between hands, and to the crystal. The length of the hour wheel tube, and cannon pinion must be taken into consideration as well. It all starts with a creative idea of how you want the watch to look.

Figure 1 shows the Delta Cad drawing that is the beginning of the hour hand to be machined. The hand is going to be machined rather than hand filed. In order to machine the point and have the post hole centered correctly a jig was made to hold the material for the hand off centered.

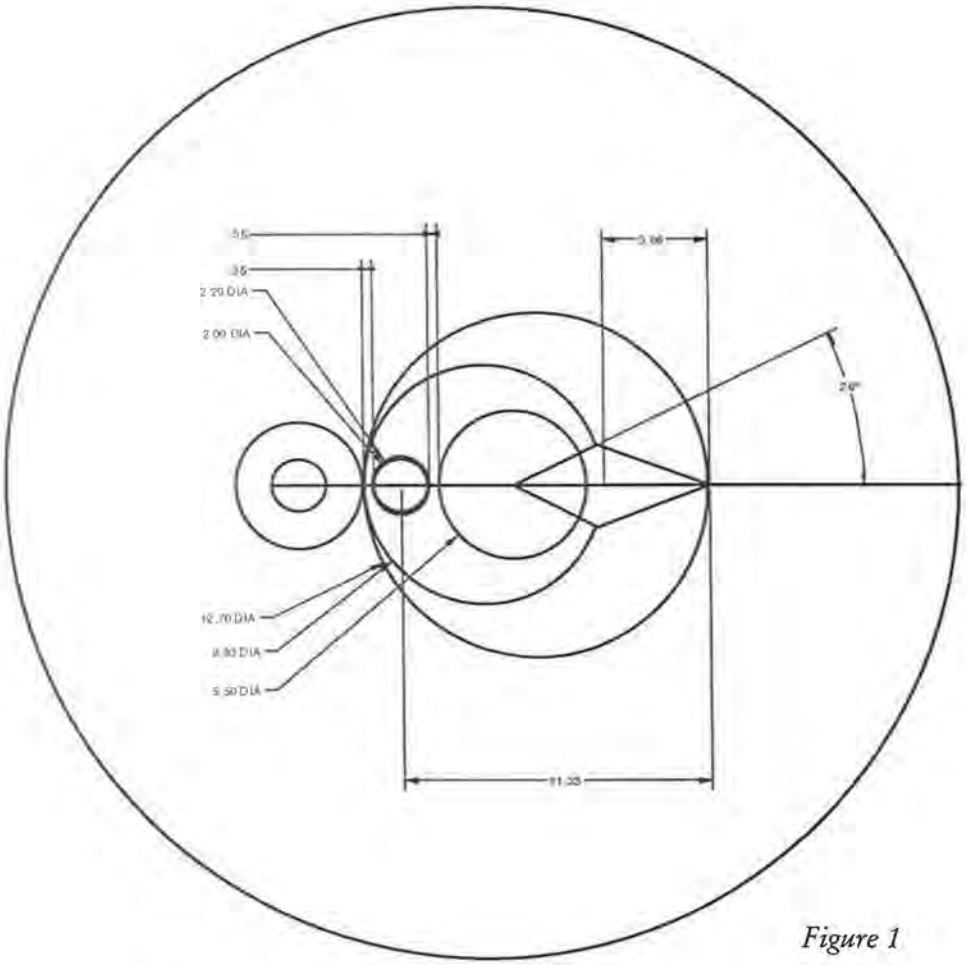


Figure 1

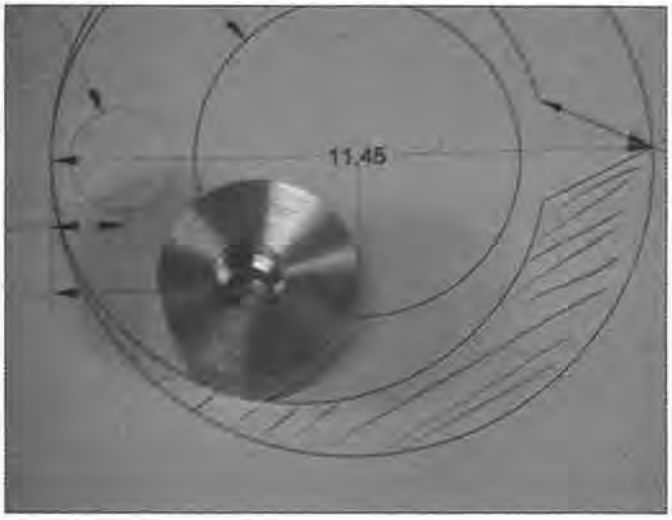


Figure 2

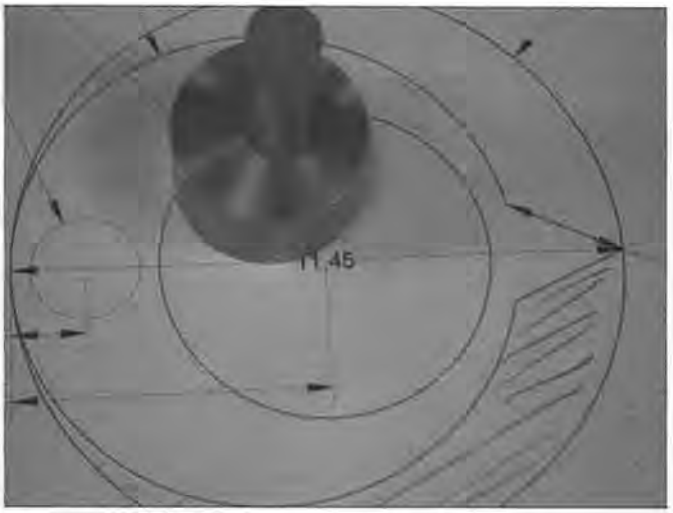


Figure 3

The brass jig to hold raw material for the hour hand is shown in Figure 2.

Figure 3 is the brass jig with raw material friction fit and shellacked in place.

The brass jig with raw material for the hour hand is chucked up and ready to mill excess material away (Figure 4). The index wheel was used in order to control the angle of the material removed.

First the steel was turned to slightly larger than the largest final dimension (Figure 5).

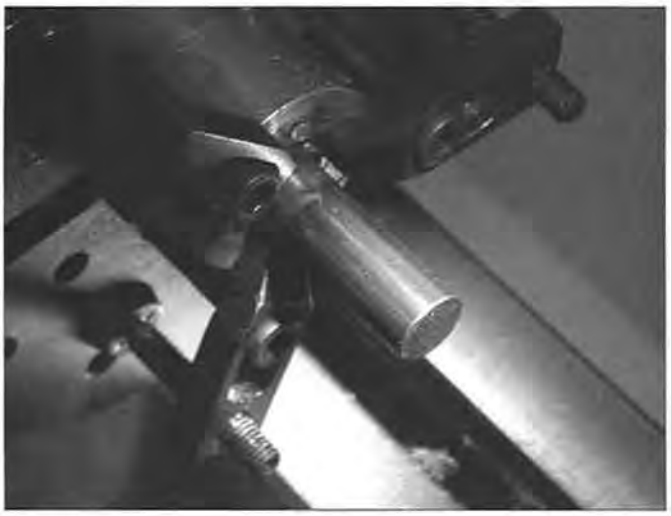


Figure 4

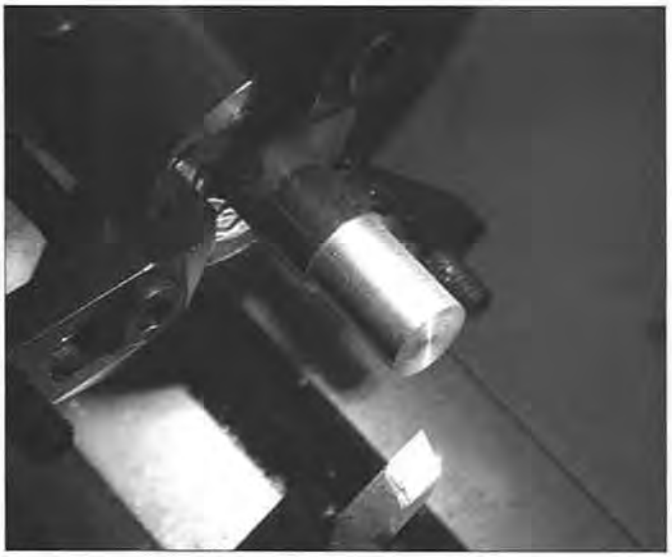


Figure 5

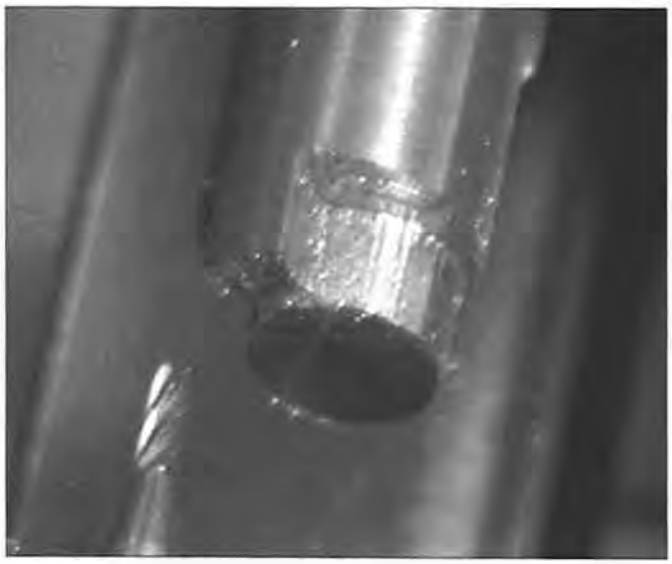


Figure 6

Excess material was milled away. The thickness of the hand is not important at this point, but excess thickness is left in case another hand needs to be made. (See Figure 6.)

Figure 7 shows the point milled out after the outer diameter is reached, creating the final shape.

The next step is to drill out the center of the hand, and the post hole. All of these steps are done without removing the jig from the lathe.

Once the post hole is drilled the post tube can be turned. This is where thickness and tolerances start to become important.

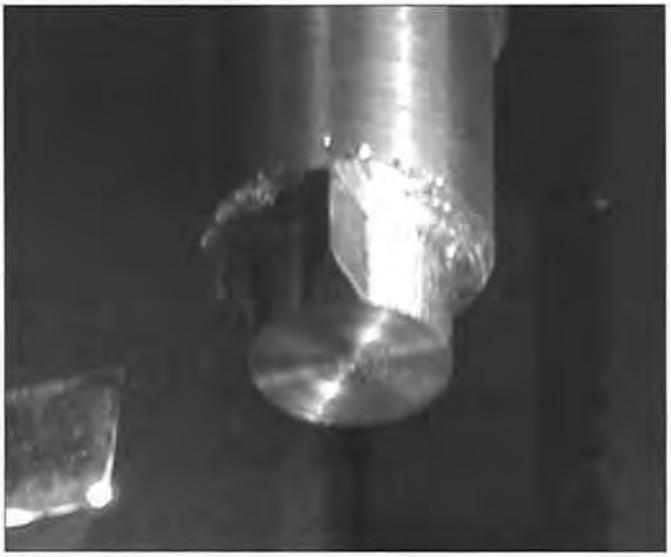


Figure 7

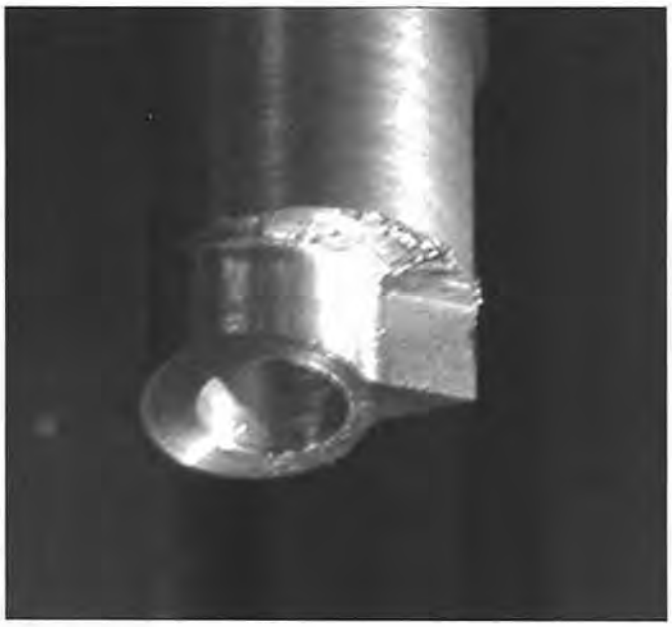


Figure 8

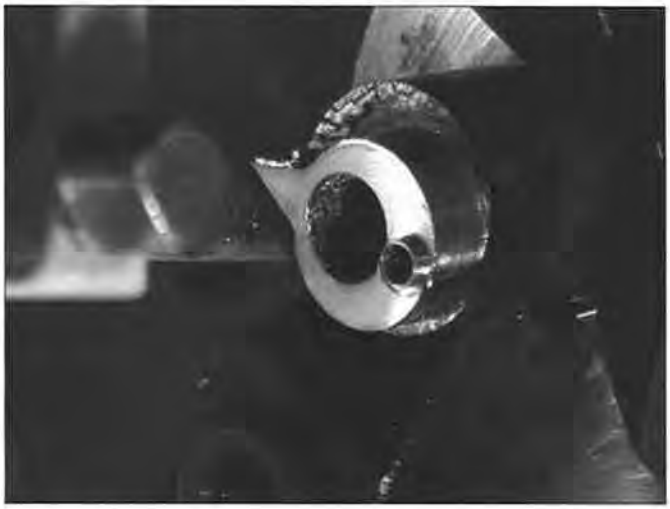


Figure 9

Figure 10

After the post tube has been turned the hand can be parted from the remainder of the raw material. Excess thickness should be left for proper surface finishing. The hand is shellacked to a brass plate with a hole drilled to accommodate the post tube. The hand can now be surface finished without fear of bending. After the hand has a "black" polish it is extremely important to clean the hand to perfection in order to achieve an even color during bluing.

The minute hand is machined as well, but all processes are performed in a different fashion in order to experiment with different techniques.

First, holes are drilled for the post and the cosmetic hole near the end of the hand.

Once the holes have been drilled the steel is chucked up in a collet and the hand shape is turned by hand.

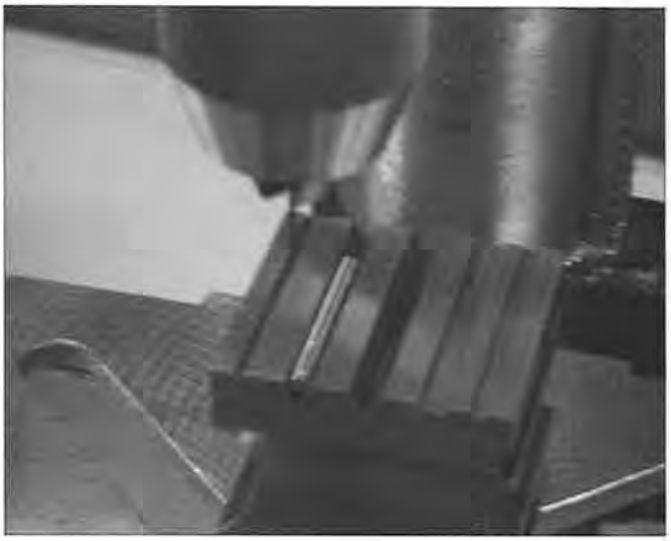


Figure 11

Figure 12

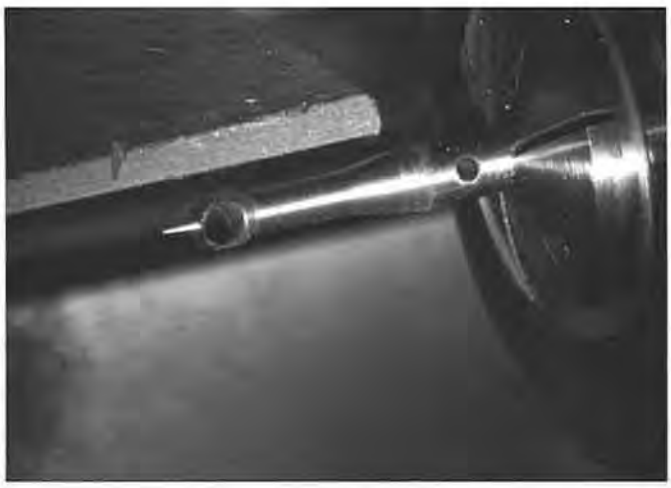


Figure 13

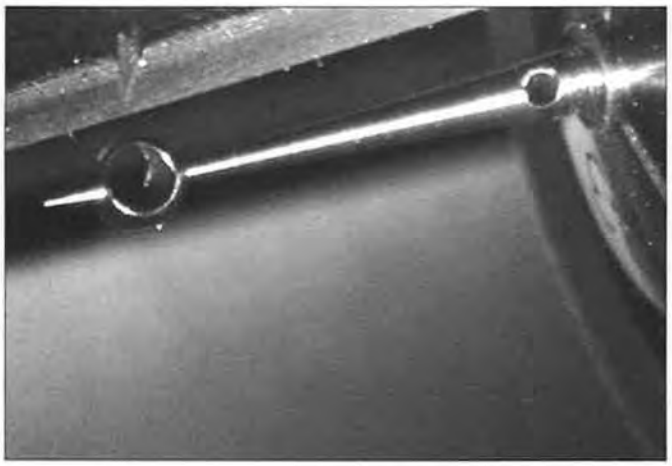


Figure 14

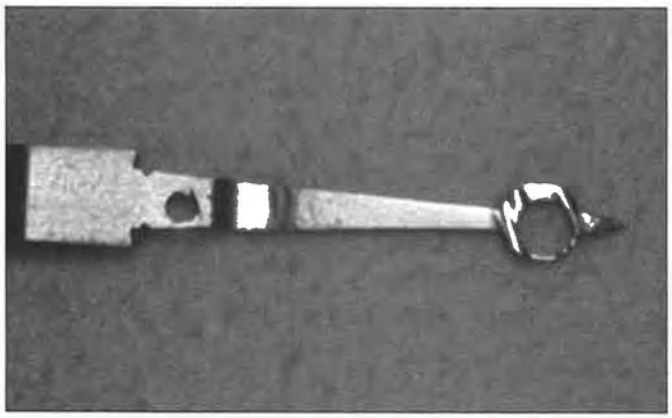


Figure 15

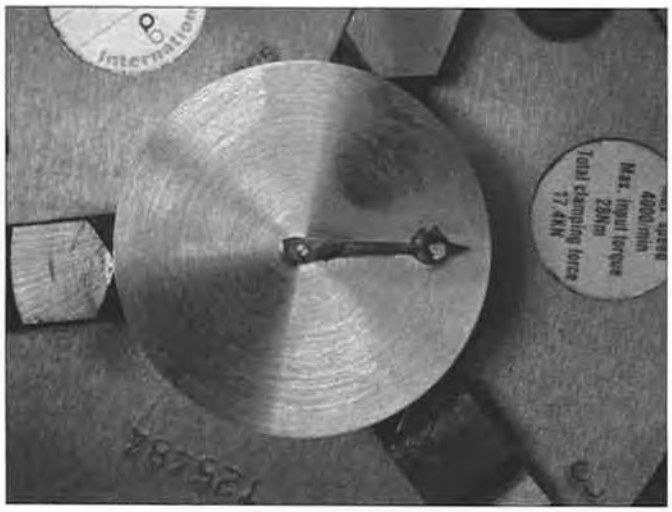


Figure 16

Figure 17

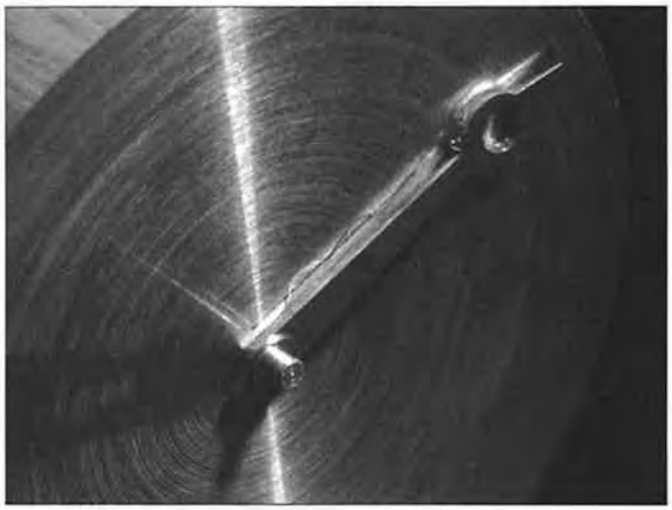


Figure 18

Figure 19

Figure 20

Sometimes you have to persevere when you're not sure how something is going to turn out.

After the final shape has been achieved the collet is locked with the drilled holes perpendicular to the milling cutter used to machine the hand flat.

After the hand is roughed out flat the excess raw material can be removed and the hand can be shellacked to a jig for finish turning, and turning the post tube.

Here the minute hand is shellacked to a brass jig ready to turn to the correct thickness.

As the minute hand thickness is reduced the post tube is created from the excess thickness.

Another picture of the minute hand being turned to correct thickness.

Once the machining is completed burrs are removed and the surface finish to "black" polish is completed before bluing.

Bluing the minute hand in a draught free environment.

The finished minute hand. Patchy color is caused by even the smallest trace of grease or dirt, even the left over residue from the benzene or alcohol.

Some early attempts.

Figure 21

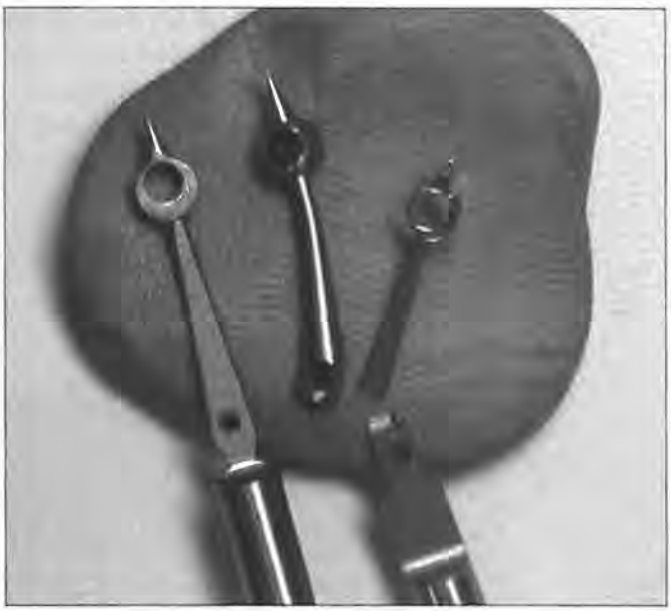


Figure 22

As A Clockmaker Turns

Arbor Repivoting Simplified
Part 2

J.M. Huckabee,
CMC, FAWI, FBHI

Introduction
This is Part 2 of a series on repivoting an arbor used in a small clock. It will be well to restudy Part 1 before you continue with this article.

This is called "Repivoting Simplified." It is a method I developed over 30 years ago and is so easily accomplished that even the novice can do the job with ease. It is the easiest and most fail safe job of lathe work.

The Job Process
Continuing from the previous article, Figure 13 shows how I prepare the new pivot. I make all of my pivots from commercial music wire (spring wire). This is sold by hobby stores in short lengths (about 30 inches), is very hard, and has a nice finish. Sold in wire gauges, you can match almost any pivot size. This saves time, in that the pivot is "prefinished." The material is too hard to cut. I make the cuts with a thin stone in a small motor tool. The operation in Figure 13 is a soft back grinding disc. The material is ground to a slight taper, then cut to about 5-6 diameters length.

Figure 14 shows inserting the pivot. Now we will discuss the arbor hole that the pivot

Figure 13. Grind a slight taper on the spring steel pivot material. Then cut to about 5 diameters length.

Figure 15. With the arbor in motion, cut away excess length and finish the arbor tip.

Figure 14. Insert the ground-tapered end into the arbor. Tap in place with a small steel hammer.

Figure 16. Here is the finished job viewed through a 10-X glass.

fits into. Remember that drill sizes and wire gauges are sized equally.

Now the arbor hole. Use the magic center finder to spot arbor center. Then drill about one diameter deep with a drill of the same number (size) as the pivot raw material. Next drill another 5-6 diameters with the next smallest drill. We have a "step" in the hole. From Figure 13, we have a clean stop line where the material taper ends. Use a thin stone and cut the ground material to about five diameters long. Cut the other end to about ½ inch long. This is used as a guide and handle to insert the pivot. Study Figure 14. The inside end should almost reach hole bottom.

Our next step will be to run the lathe slowly, and observe pivot wobble. In most cases, it will be none. If so, straighten with smooth-jaw pliers.

If this is your first exercise with this method, I suggest you use your pliers and attempt to pull the new pivot out. You may need to make another one with slightly less surface grinding.

Study Figure 15. Use a thin stone and cut the pivot material to its finished length. Recall the one diameter deep first drilling. The unground portion of the new pivot seats in that portion of the hole; and the joint line is closed to near zero. Most subsequent workmen will be unable to detect the repivoted job. Now take a careful look at our job in Figure 16. This was photographed through a watchmaker's double glass.

Rethink this work, and ask the question of how to handle each end of the wheel and arbor of Figure 17.

Figure 17. We will break away theses pivots and re-pivot each end of the arbor.

Let's study a commercial steady rest. Figure 18 shows a typical after market steady rest for a typical watchmakers lathe. I drilled the support rods, large end, and press fit wood dowels in the holes. On a seemingly impossible job (Figure 17), I support the work piece by a "cuff", shown in Figure 18. Machine the cuff, or ream a large bushing that the pinion will just slip inside. Now we support the work adjacent to our drill entry.

Figure 18. A commercial steady rest with hardwood tips in the support rods. Our pinion will be supported in a bushing-like cuff.

Let's repivot each end of an escape wheel arbor. This is somewhat more delicate than the specimen in Figure 16. Set up the escape wheel job as exampled in Figure 19, and another example in Figure 20. The drilling operation is depicted in Figure 21, and inserting the pivot is shown in Figure 22. The final finishing is completed as in the previous work steps.

In the escape wheel job, I held the arbor in a lathe collet to seat the new pivot, and, while in the lathe collet, I made a final cut-to-length of the pivot. I often hold the arbor in the smooth jaws of a small drill press vise.

Now let's critique our work. Study Figure 24: This pivot is ¾ mm diameter or about 0.030 inch. The

Figure 19. Here is how an escape wheel is supported for drilling.

Figure 21. Drilling a cuff supported job.

Figure 20. Another cuff and pinion supported job.

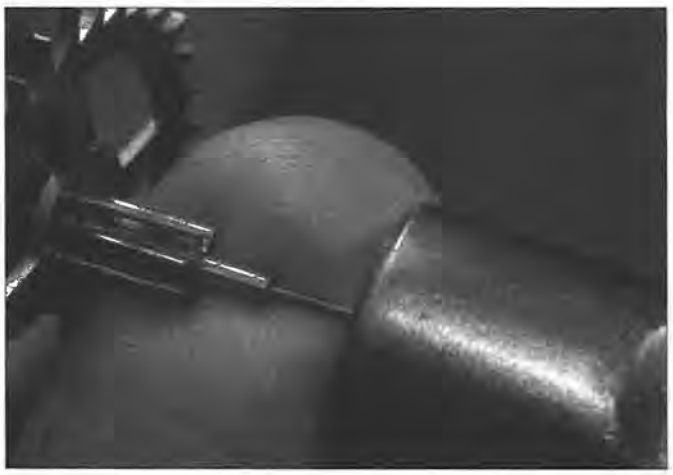


Figure 22. Inserting the pivot. This is the escape wheel from Figures 19 and 21.

Figure 23. Cut away excess pivot length and finish the end.

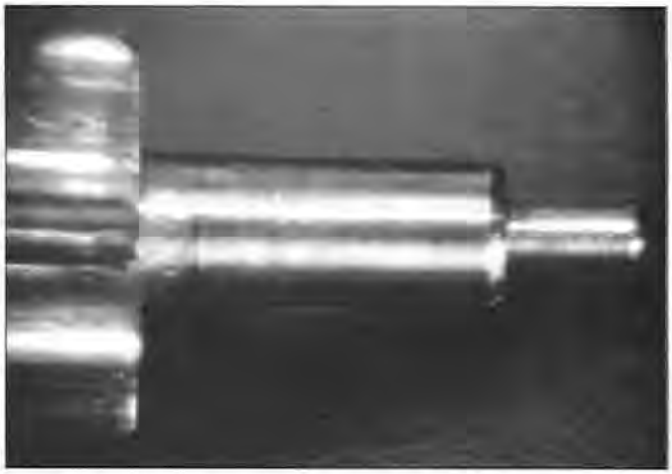


Figure 24. This is the job of Figure 23 when finished. Photo is via a 10-X glass.

photograph is through a watchmaker's glass. This is a job that is almost impossible to identify! And, the pivot finish is as the spring wire was purchased. Compare pivot finish to surface finish of the arbor and pinion.

Future

The third and last article in this series will repivot the escapement anchor arbor. In the meantime, imagine how you would work an arbor, which has an anchor and crutch attached. It will be easy.

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 AWCI <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. The ideas, tools, techniques and products presented in this column are suggested by the author and contributing members and are not endorsed by any manufacturer, supplier, advertiser or AWI itself.

"No Man Can Serve Two Masters"

This New Testament teaching has been around for two thousand years, yet many watch makers and clock makers in the secular world of business ignore these words of wisdom, which apply to some situations presented to us. Specifically, a few situations come to mind. Someone brings a timepiece to a shop for repair on behalf of someone else. It can be the son or daughter, niece or nephew, or friend of the actual owner of the watch or clock. The person bringing the timepiece in says a third party, who wants it repaired, owns it. The person's name associated with the repair may be that of the actual owner or the person who brought it in. Regardless of whose name is associated with the repair order, it can lead to trouble. If the person authorizing the repair is not the one responsible for payment, one party (the repair shop) loses in case of a dispute. The best defense for a repair shop is to initially ascertain who is responsible for payment for the repairs and accept the repair in the name of that person. In addition to determining who is responsible for payment, an up front deposit by cash or check is in order for all repairs. In lieu of a deposit, a credit card guarantee of payment will prevent a dispute over who is responsible for payment when the repair is complete.

Another situation, somewhat similar to the one outlined in the first paragraph, occurs when a couple (married, partners, etc.) brings a timepiece in for repairs and do not agree on the price or what the repair to the clock or watch should encompass. Again, the shop representative should ask the couple which person is in charge of the repair project. In that way, the other party can advise but the responsibility for approval and payment is assigned to that one person only.

A third situation is encountered by trade shops that provide repairs to retail outlets. The retailer deals directly with the end consumer and the trade shop deals only with the retailer. Each transaction is a two party transaction. That is: trade shop to retailer and retailer to end consumer. Problems occur when the retailer who is the common party to both transactions cannot competently deal with the repair shop or the end consumer or both. The retailer then asks the repairer to contact the consumer and have them deal with each other. Neither the consumer nor the trade shop is fully aware of statements made by the retailer to the other parties. The result can be an unpleasant situation for all three.

It is best to have a clearly defined protocol, adhered to by all, that allows all parties to a repair understand their respective positions. Deviations from protocol are sure to cause more troubles than they solve. The New Testament writer's advice about serving two masters is sagacious and still timely.

Jack Kurdzionak

Dry Cells Are Not Really Dry

Dry cells used to power clocks frequently leak corrosive chemicals when they are discharged. Leaky cells can damage the connections to the clock movement as well as the movement itself and in the worst cases can damage a clock case. When an AWCI member recently asked about salvaging a clock movement powered by three cells that had its cell connectors badly corroded by leaky cells, I gave him the following advice.

The best solution to a corroded connector is to replace the entire movement. That will eliminate the possibility of having to deal with damage to the movement done by the leaky cells but not apparent until the clock is placed into service again.

If movement replacement is not an option, check with Radio Shack to purchase a battery pack that will hold three cells in series, assuming that the original movement had the cells wired in series rather than parallel. These battery packs have both positive and negative leads, that when attached to the original movement with alligator clips, will serve as a substitute battery pack. If you use this method don't forget to solder the alligator clips to the battery pack leads to assure a good connection. The substitute pack can be attached to the case near the movement with double-faced mounting tape or a few small screws.

Any future cell leakage will be isolated in this easily removable and replaceable battery pack. The damage will be confined to the battery pack and the movement will be protected from damage.

Jack Kurdzionak

Changing Needs, New Techniques, And Evolution

Many of AWCI's senior members can recall the days when a watchmaker routinely replaced several balance staffs per day. This job involved numerous skills including lathe work, truing, poising, parts, etc. The mid twentieth century watchmaker routinely fit staffs, adjusted escapements, replaced jewels, and trued hairsprings just to recite a few customary tasks that had to be mastered by the journeyman watchmaker of that era.

That watchmaker seldom dealt with water resistant issues, self winding problems, calendar troubles, Epilame, high frequency escapements, bracelet sizing, six or more lubricants for one movement, and chronometer ratings for wrist watches. Never did that watchmaker deal with sapphire crystals, titanium or ceramic cases and bracelets, helium valves, forty atmosphere pressure tests, or sapphire dials. Battery powered watches were found in magazine articles predicting future technology. Only Dick Tracy, in his comic strip, had a watch that could be used as a communication device. The standard watch of today is now powered by a cell and watches that double as telephones are now here.

Watchmaking skills required in the past, although still required for certain niche markets, no longer make up the complete repertoire of the watchmaker for the twenty first century. The watchmaker must continue to grow and evolve with the changing technology just as he has in the past. This column will continue to address the watchmaker's skills as they continually evolve.

Jack Kurdzionak

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Director	AWCI E-mail Address
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Laurie Penman

Making a New Barrel Ring

I must make an apology, I promised this continuation at the end of 2003 and have not got around to it until now. So... I am sorry.

I was dealing with the correction and repair (the two are not synonymous) of a mainspring barrel and I ought to point out here that in the penultimate paragraph I state that the barrel ring (working with calculated dimension) was checked to make sure that when fitted to the barrel tube, it would not rub. I should have made it clear that this was a drawing exercise - the ring had not yet been machined.

The dimensions of the winding arbor and the assembled barrel are shown in Figures 1 & 2, since the dimensions in Figure 1 were taken from the actual arbor Figure 2 simply establishes that if the new barrel ring is fitted to produce these dimensions for the inside of the barrel, the arbor will fit and have clearance between the shoulders of the 10mm diameter portion and those at the center of the cap and barrel ring.

This barrel is not made in two parts, but is either a casting or a drop forging - it really does not matter which - the point is that the old barrel ring which bears the gear teeth cannot be removed by heating. (Most 19th century barrels are made by soldering the barrel ring onto the tube that forms the body of the barrel.) The old teeth must be removed by turning and the tube that is left must have a length of 21.25mm, as shown in Figure 2.

When we make the barrel ring it will have a short bore that corresponds to the turned diameter at the end of the tube and is 2.35mm deep (21.25mm - (23.90mm - 5mm))

The ring finishes at a diameter of 45.93mm, which must be concentric with its pivot diameter of 6.65mm, a fact that stipulates that both these diameters must be turned without re-setting the work, if at all possible. It is possible, but the use of a mandrel is ruled out as a consequence. A mandrel can be used, but concentricity will not be so precise.

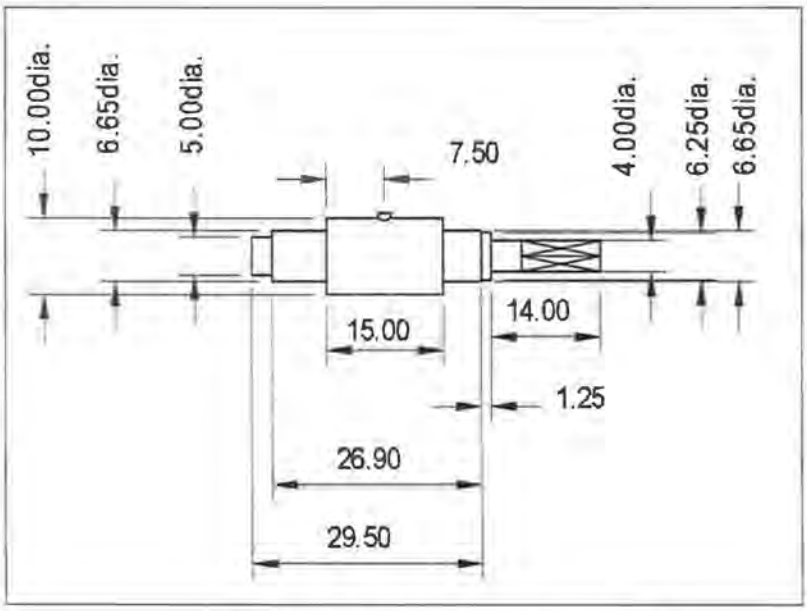

Figure 1

The first method of turning the barrel ring is really only convenient for barrel rings of one and a quarter inches diameter or less, because the ring is turned

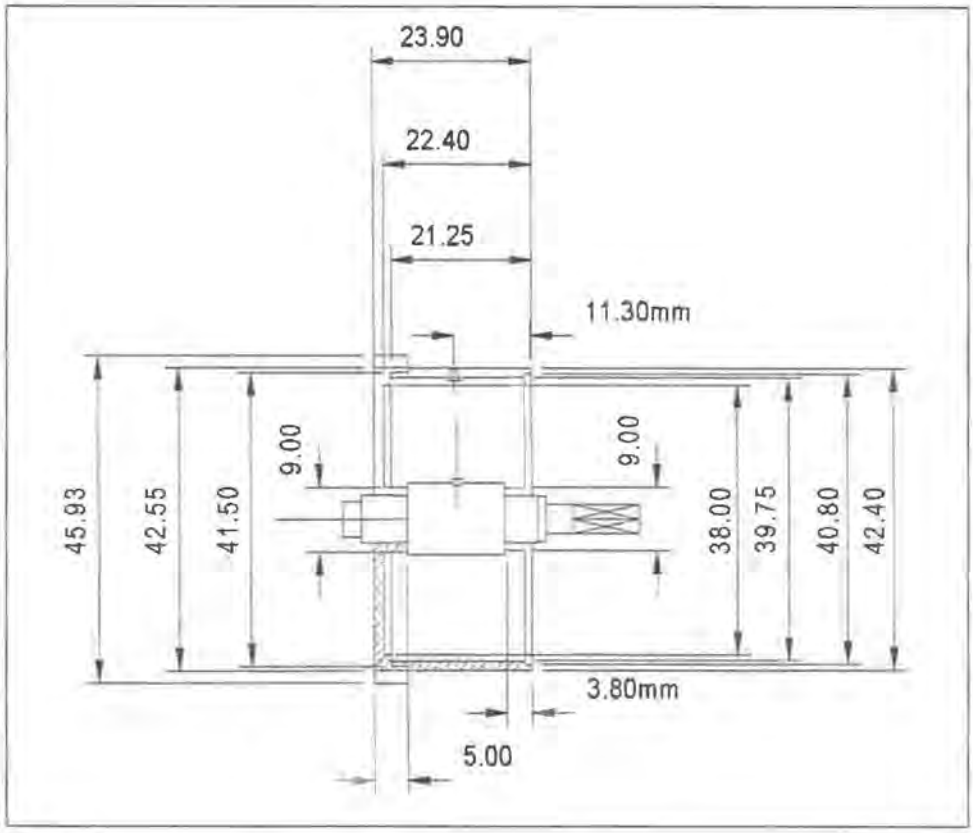

Figure 2

from the solid bar and must be parted off. Two things have to be considered, the hole in the body of the chuck - is it large enough to allow the bar stock to enter and be held firmly? And the length of the blade on your parting tool. As you can see, the diameter of the ring in Figure 2 is too large for turning on the bar, but let us imagine that it is 25mm outside diameter. A piece of bar that allows a small amount of metal to be turned from the outside (to negate any inaccuracy of the chuck), is held so that enough metal protrudes for the later operation of gear cutting to proceed, without the cutter hitting the jaws of the chuck (Figure 3).

The pivot hole is drilled and then bored, (drilling does not reliably produce a hole concentric with the center line), the cavities for the tube (slightly smaller than the tube outside diameter), bored out. The finished outside diameter of the gear is turned for a length that exceed the finished thickness of the barrel ring. This last dimension is obtained with a parting tool, which is taken below the root diameter of the gear teeth. No allowance is made for later facing, the purpose behind the use of the parting tool is to avoid any need to machine the face of the cut teeth with a turning tool, and possibly bending them a little, or producing fraze, or burr. These stages are illustrated in Figure 4.

Gear cutting is to be carried out without rechucking the work.

The set up for gear cutting is as shown in Figure 5. A motor, or milling quill are mounted on a vertical slide

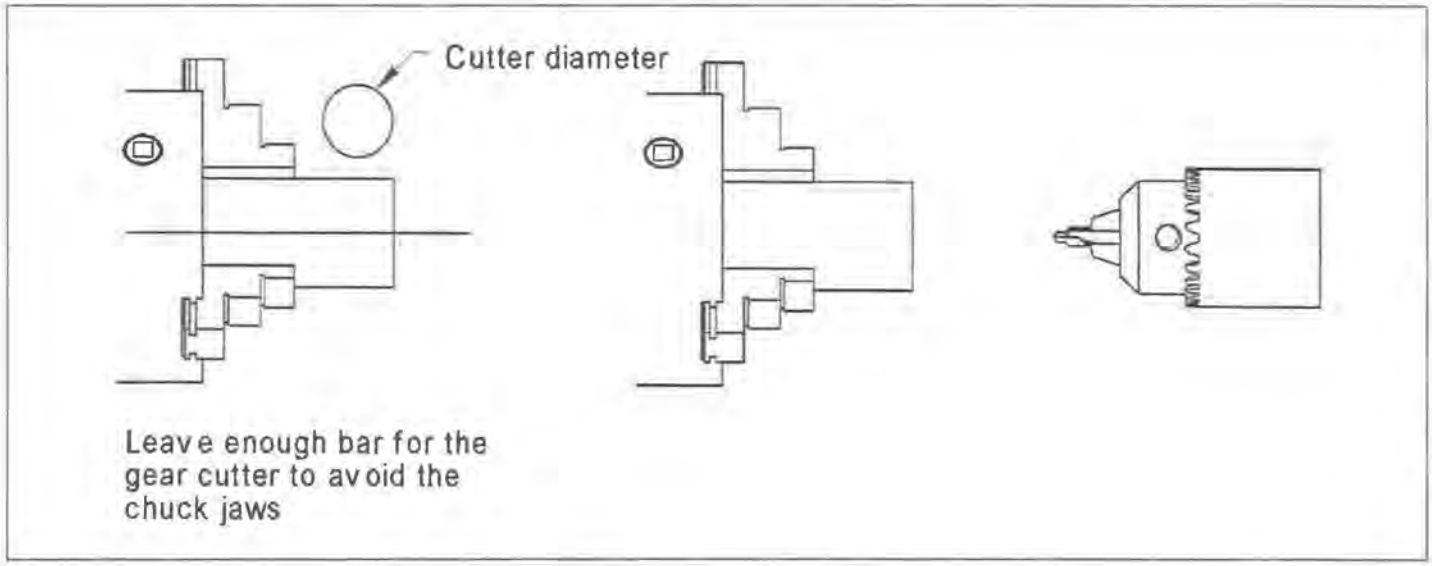

Figure 3

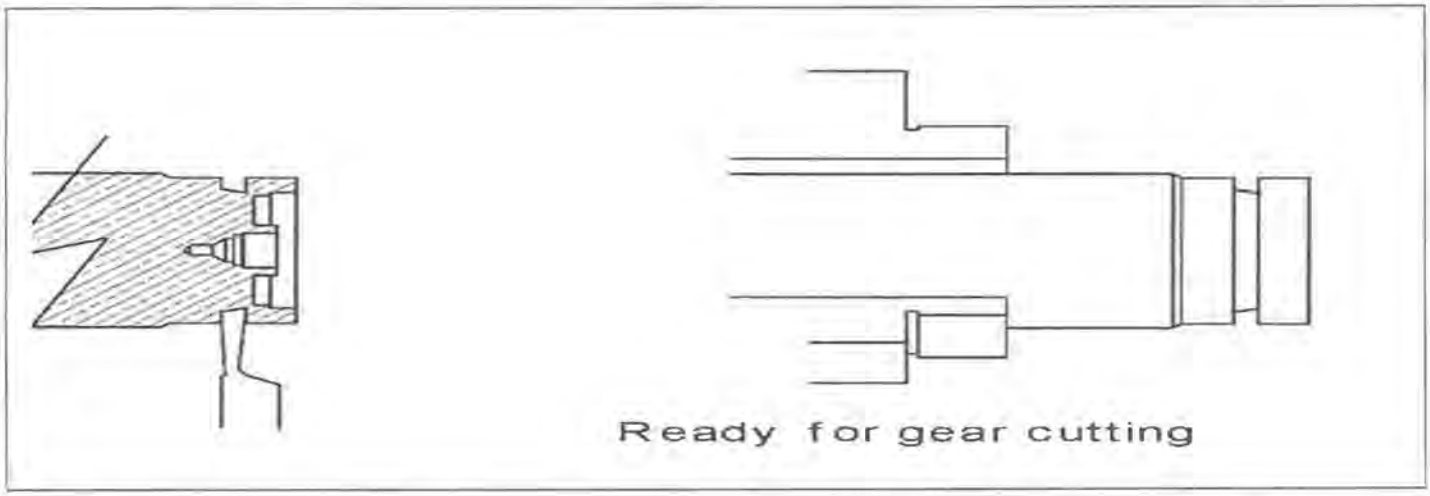

Figure 4

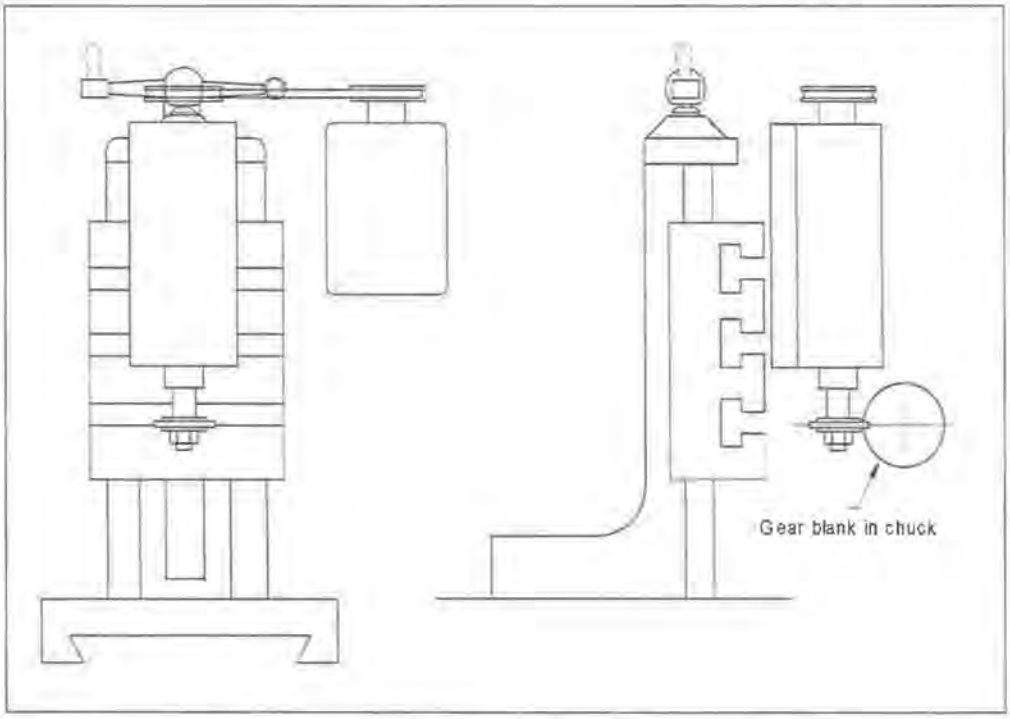

Figure 5

on the saddle of the lathe so that the cutter can be traversed parallel to the axis of the chuck and passes through either the vertical or horizontal center line of the blank (you can see that the cutter could be held either way). The proper depth can be assessed when the outside diameter is correct, by increasing the cut until adjacent tooth spaces produce a form with a tiny amount of the outside diameter still showing. As help towards achieving this, paint Spectra or a similar marking ink, over the circumference of the uncut barrel ring, the blue should show as lines, the thickness of those on a good steel rule, at the top of each tooth.

It is clear that if there is a small flat at the top of the tooth, the pitch circle diameter (pcd) of the gear form is affected. The form of the individual teeth have been moved out very slightly from the center. This can be allowed for by considering what effect flats of different widths have on the true outside diameter of the gear and adjusting the diameter that the blank is machined to.

The proportions of the modern gear form are shown in Figure 6, these are the proportions that Thornton cutters use and I have shown them as millimeter dimensions. For a given module, these proportions are simply multiplied by that module to produce true dimensions.

Below that drawing is the tooth form with two flats, one that is 0.005" wide and one that is twice this. The amount by which this has reduced the height of the form is 0.002" and 0.003" respectively. It is easy to see that if a gear was turned to its correct outside diameter and had flats of 0.005" at the top of each tooth, the pcd would be greater by 0.004". The relationship between the widths of flats and the amount they reduce tooth height by, is not affected by the module used.

Reducing the outside diameter by 0.004" when making the blank and then leaving a flat of 0.005" will produce

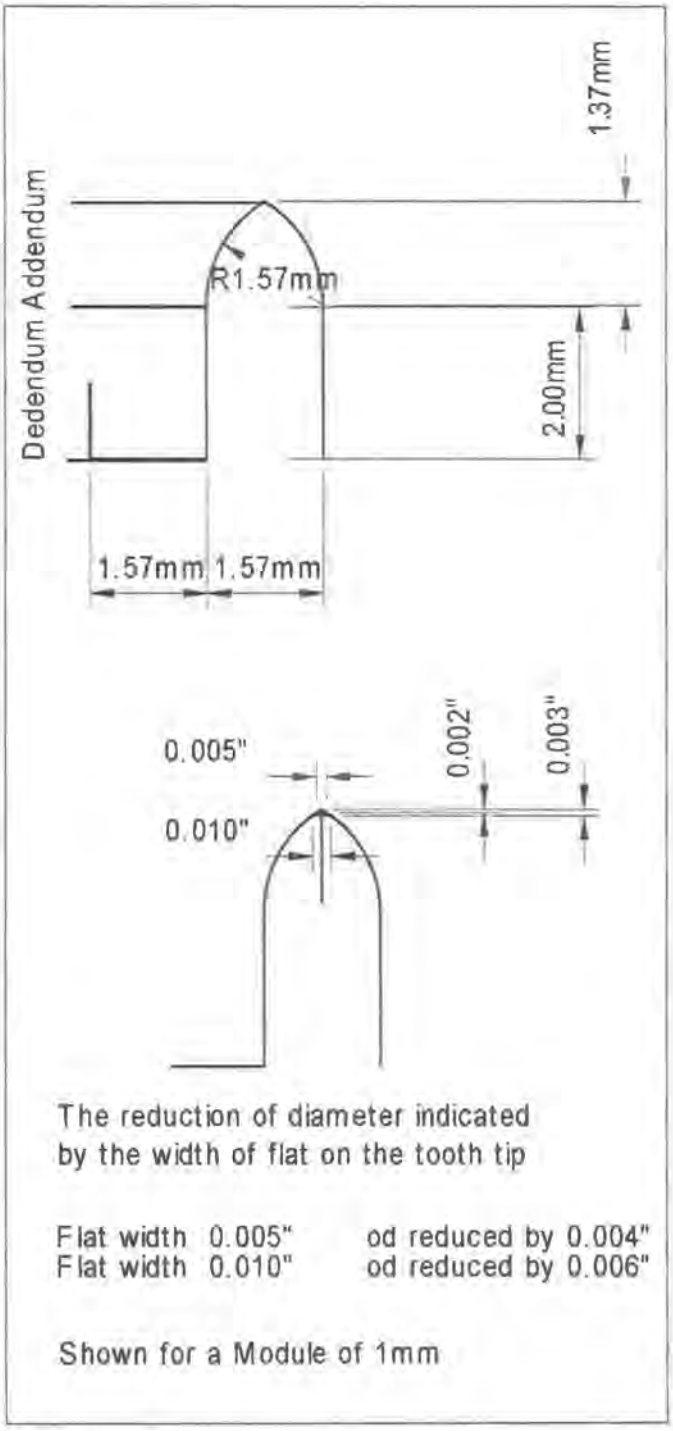

Figure 6

a gear with the correct pcd. The top of a cycloidal gear tooth does not touch the pinion - it has no effect on meshing, except that when the gear is measured, the amount of flat has the effect shown above.

The blank can be parted off the rod when the gear has been cut and put to one side whilst the tube of the barrel is prepared.

I said at the start of this article that the method shown was only suitable for small barrels; so let me show the second method. A disk or square of brass slightly thicker than the barrel ring to be machined has one surface thoroughly cleaned with emery paper and is then "tinned" by fluxing the surface and then applying soft solder with a soldering iron. The use of an iron is much better than simply applying a paste of flux and solder and melting it, because the iron can be used to scrub at the surface and ensure that the solder "wets" the brass completely.

A piece of brass rod is held in the chuck and its face is machined flat. The diameter should be as large as is practicable, but at least half the diameter of the root circle intended and this is tinned across its face also. The face will position the blank for cutting, so make sure that the rod is long enough for the gear cutter to miss the chuck jaws.

The rod is removed from the chuck now, its face is tinned and it is stood upright on the tinned surface of the blank, ready for soldering. Apply more flux between the two surfaces. The loose assembly should stand on a soldering pad and, to make the job quicker, heating pads should be used to reflect heat back onto the work. After centering the rod on the blank, by eye, use a blow torch to heat the rod until a bright fillet of solder appears at the joint, take the heat away and let it cool. As soon as the joint is solid the assembly may be dropped in cold water to clean off residual flux. If the blank is square, take the time to cut off the corners; this will lessen the shock of interrupted cutting when the diameter is being turned. Soft solder is susceptible to tearing under shock loads.

The work is now ready to put in the lathe chuck and the blank machined to the dimensions of Figure 2. There is no need for a parting-off tool of course. When the gear has been formed, the assembly is removed from the chuck and the rod heated up until it falls off. Do not wipe the molten solder off the back of the gear - it is very possible that you will fill some of the tooth spaces with solder. Wait until it is cold and then place the barrel ring, soldered face down, on wet emery paper (about 300 grit), and rub the solder away. It is much softer than the brass and with care will be removed completely without "rounding" the periphery of the gear.

I will deal with the machining of the tube of the barrel and the fitting, next month.

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Affiliate Chapter Report

Gene Bertram, CC
Affiliate Chapter
Vice Chairman

Every year at the Affiliate Chapter meeting, a fair amount of time is spent going over the highlights of the annual reports each chapter is asked to submit. These are filled with lists of activities, accomplishments, programs presented, and a record of what each chapter's membership is, and if it has grown or shrunk. I like to read these looking for things others have tried in order to get more ideas for my own chapter. I'd like to use this space this month to give you an informal report of what my chapter, the Metro-St. Louis Watchmakers Association, has been up to this year.

The best news is we've added seven new members to our ranks. This happened in large part because of the outreach of our President, Mark Woodson, and because of the two AWCI classes we had. Mark is active both in the MSLWA and the local NAWCC chapter, and is both a collector of clocks and watches as well as a skilled repairer. His background as a machinist helps, as well as his job as a quality inspector for Boeing.

Mark was very proactive in recruiting people to attend the classes we had, talking several people from the NAWCC into attending. Having both classes bought by our chapter, then filling them to near capacity not only made for a better experience for all those in attendance, but added money to the chapter treasury as well. As a result, the MSLWA was able to pick up $10 per person for the Holiday Buffet Party we recently had.

The 2 classes presented were Alice Carpenter's "Beginning Pocket Watch Repair" and Roland Iverson's "Clock Repair." Both were well received, and combined with the beginning lathe class Robert Porter presented last year to give us the reputation of "the Education Folks" around here, as the local NAWCC chapter does very little other than have mini-marts every other month and one big regional. We are, however, looking for ways to join forces with the NAWCC that would be mutually beneficial.

Since we are reaching out to the hobbyist as well as the professional, we can draw from a larger pool. Some of our members drive over an hour and a half to attend our monthly meeting, which includes dinner as well as a program. Members frequently present, as well as local businesses of interest. Of course, the dinner table talk contains a lot of problem solving as well as story swapping. We of course invite all AWCI members who find themselves in St. Louis the first Thursday of the month to contact us and join us for dinner.

BULLETIN BOARD

ITEMS STILL NEEDED

Gilbert Mantel Clock Movement
Tim Bale, Ironwood, MI, is looking for a Gilbert Mantel Clock movement with the hammer coming out of the top; 51 mm between arbors and center shaft; 81 mm between winding arbors.

Pocket Watch Crowns
Robert Mohr, Manhattan, KS, is looking for a source for pocket watch crowns for 18 size pocket watches (9.75 mm opening, 10.50 mm diameter), any tap or color.

Levin's Pivot Polisher & Straightener
George Davis, Richland, WA, is looking for a copy of the parts list and user manual for Levin's pivot polisher & straightener Cat.# P500.

Swartchild Friction Jewel Assortment #49004JF
David Pierce, Gambier, OH, is seeking a copy of a chart for the Swartchild friction jewel assortment #49004JF.

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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701 Enterprise Drive
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Phone: (513) 367-9800
Fax: (513) 367-1414
E-mail: dbaas@awi-net.org

New Members

California
Ozuzun, Bedros—Pasadena, CA
Rosenthal, Steven—Roseville, CA

Connecticut
Noga, Bryan—Glastonbury, CT

Florida
Desbiolles, Patrick—Miami, FL
Riedel, Bert C.—Tallahassee, FL*
Solomons, Martin—Boynton Beach, FL *
Stamm, Paul—Bradenton, FL

Georgia
Brown, William—Calhoun, GA

Maryland
Taylor, Stephen—Germantown, MD

Minnesota
Christensen, Mark S.—Saint Paul, MN
Peltzman, William H.—Saint Paul, MN

Mississippi
Vargas, Robert—Guntown, MS

Montana
Ladanye, John—Havre, MT

Nebraska
Pachman, Howard—Omaha, NE*

NewYork
Crawford, Jason—Jamestown, NY

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Keirn, Leander A.—Big Prairie, OH

Oregon
Straight, Jim—Portland, OR
Sponsor: John McElhenny—Ashbill, NY

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Binsfeld, Benjamin E.—Manheim, PA
Hunter, Lovell—Lititz, PA

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Tallant, Thomas—Knoxville, TN

Texas
Contreras, Ed—Katy, TX*
Hanke, Dan W.—Flower Mound, TX

Virginia
Hall, James V.—Norfolk, VA*

International
Dutton, John—Manchester, Lancaster, England

***AWCI welcomes back these individuals who have chosen to re-instate their membership.**

Industry News

Batt-Tronic Celebrates 30th Anniversary

Batt-Tronic Corporation will celebrate its 30th anniversary servicing retail jewelers in 2005.

Started as a local supplier by William Hillson in 1975, Batt-Tronic has grown to be a worldwide provider of all types of batteries—watch, calculator, hearing aid, photo, portable phones and consumer alkaline cells. In addition, they stock a wide assortment of gift wrap, bows, jewelry boxes and tools of the trade.

"For 30 years we believed in 3 basic business principles: superior customer service, factory authorized quality products, and product line knowledge. We aim to follow these same principles to fuel our success well into the 21st century," says Harry Hillson, President of Batt-Tronic since 1990.

Batt-Tronic was the first company to establish the concept of a silver oxide battery inventory cabinet. The Batt-Tronic Drawer Number System, widely used by retailers throughout the country is a registered trademark of Batt-Tronic Corp. This system enables retailers to easily replace watch batteries regardless of manufacturer. In 1989 they expanded their system to included 3 volt BR/CR lithium battery technology. Today, Batt-Tronic carries every watch battery manufactured, including many hard-to-find types. Batt-Tronic is an authorized distributor for Maxell, Energizer, Sony, Renata, Panasonic, Varta, Sanyo, Sylvania, Minigrip and Timex.

Batt-Tronic has had a silver reclaim program for over 25 years. The program properly recycles used silver oxide watch batteries and gives customers credit to their account.

The company recently relocated to modern facilities at 60 N. Harrison Ave., Suites 35-36, Congers NY 10920. For further information contact them at 800-431-2828 or by fax 888-BATT-FAX or on their new website at www.batt-tronic.com.

Vibrograf U.S.A. Corp. Introduces the Elmasonic S-Line

Mr. Joseph D. Presti, President of Vibrograf U.S.A. Corp. announced the introduction of the Elmasonic S-Line of intelligent ultrasonic cleaners.

Eleven units - sizes from .5 quart to 8 gallons are equipped with 37 KHZ industrial transducers. Features include electronic timer, sweep cleaning, degas function, safe adjustable heat. Drain is controlled by convenient knob and lid reduces noise and acts as a drain tray. The S-Line is truly a giant step forward for today's jeweler.

For further information contact: Mr. Joseph D. Presti, President Vibrograf U.S.A. Corp., 504 Cherry Lane, Floral Park, NY 11001-1696; (516) 437-8700.

AWCI Material Search

EDITOR'S NOTE: If you can supply any of the items listed here, please send details to the AWCI Material Search. **Do not send the items to AWCI.** Members requesting these items will be advised of their availability, and will contact you directly.

1W2 Swiss cylinder escapement, pin setting at 11:30 and seconds bit at "6", *movement complete*

If you can supply any of these items please contact: AWCI Material Search, American Watchmakers-Clockmakers Institute, 701 Enterprise Drive, Harrison, OH 45030-1696. Toll Free: 1-866-367-2924, ext. 305; Phone: (513) 367-9800, Fax: (513) 367-1414 or E-mail: mhuff@awi-net.org.

The American Watchmakers-Clockmakers Institute maintains this unique member service to assist professionals in replacing hard-to-find parts for vintage timepieces. There is a fee of $10.00 for each search.

The AWCI Material Search first contacts several dozen material houses and outlets on behalf of the member to determine if the missing part is available from any commercial source in the United States or Canada. If the part cannot be found, the search will be listed in the *Horological Times*.

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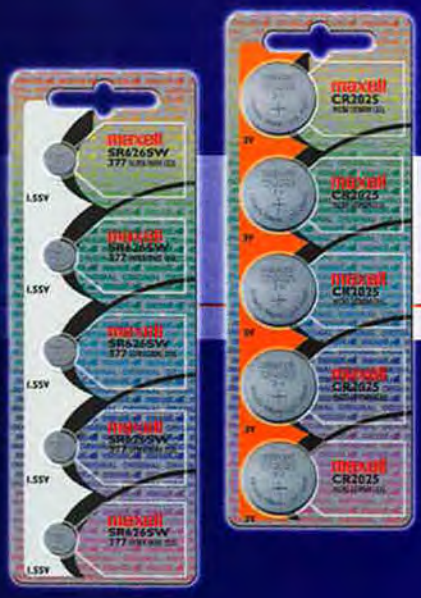

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