

HOROLOGICAL TIMES

January 1998



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through Friday 8:00 AM to 4:00 PM (Eastern Standard
Time). Closed national holidays.

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HOROLOGICAL TIMES (ISSN 0145-9546) is published
monthly and copyrighted by the American Watchmakers
Institute, 701 Enterprise Drive, Harrison, Ohio 45030.
Subscription price for the public is \$45.00 per year (\$4.50
per copy) in the United States and \$50.00 per year (\$5.50
per copy outside the U.S.), members subscription is \$14.63
paid with annual dues of \$45.00. Second-class postage
paid at Harrison, Ohio. POSTMASTER: Send address
changes to *HOROLOGICAL TIMES*, 701 Enterprise
Drive, Harrison, Ohio 45030.

HOROLOGICAL TIMES CONTENTS

VOLUME 22, NUMBER 1

JANUARY 1998

CLOCKS & WATCHES

- 12 **Repairing Mechanical Watches & Clocks**, By Henry B. Fried
Dial Repair and Adjustment, Part 3
- 18 **Technically Watches**, By Archie B. Perkins
Antique Watch Restoration, Part CXXXXV, Making Watch Hands
- 28 **A Practical Course In Clock Repair**, By John P. Kenyon
The Recoil Escapement
- 30 **Repeater, Petite And Grand Sonnerie Clocks**, By Leo A. Jaroslaw
George Graham Bracket Clock, Part 29

DEPARTMENTS

- 2 **AWI Up Front**
By Charles Cleves &
William J. Ewbank
- 4 **Questions & Answers**
From the Henry B. Fried Library
- 8 **Letters To The Editor**
- 10 **As A Clockmaker Turns**
By J.M. Huckabee
- 14 **Pickle Barrel**
By Marshall F. Richmond
- 24 **From The Workshop**
By Jack Kurdzionak
- 26 **Material Matters**
By Peter W. Eckel
- 34 **Affiliate Chapter Column**
By Dennis Warner
- 40 **Ask Huck**
By J.M. Huckabee
- 42 **Classifieds**
- 46 **Advertising Index**

EDUCATION

- 36 **The 1998 Lathe Program**
By Roy A. Hovey

SPECIAL INTEREST

- 6 **A One Minute Tourbillon By**
Gene Clark
By Ron DeCorte
- 41 **Let's Help Ourselves**,
By Jack Kurdzionak
- 46 **Survey**

ON THE COVER: This month's feature is a tourbillon pocket watch by
Gene Clark of Colorado. See page 6 for details.

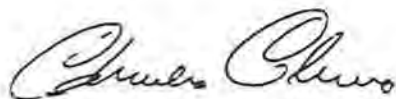
President's Message

Once again the mid-year meeting is upon us. It is time to send all of your correspondence and last minute additions to the proper committees. Your ideas are greatly appreciated.

I recently read a book on pricing jewelry repairs and quickly decided the information applied to anyone doing repairs. The first step was to analyze what the other professionals in your area are charging. The idea is to make sure that you are being paid at least that much. Now start timing how long each particular job takes in order to come up with an average. Now multiply that time by the hourly wage you decided upon to arrive at the labor part of the job. Everyone deserves a profit on the materials they supply and it must be added to the labor for the total cost of the job. If you are personally driving and picking up parts two to three times per week in order to get jobs done more quickly, look how much extra this costs you in time. Consider all of these factors before deciding how much you are going to charge for each job. For simplicity's sake, if you pick \$60 an hour as your price needed to cover overhead and labor then each of those little five-minute jobs is actually a \$5 job. Sixty dollars an hour is \$1 per minute.

After reading all of this material I've decided to review all of my pricing each January and start the new year off right.

I hope all of our members have had a good Christmas and a Happy New Year.



Charles Cleves

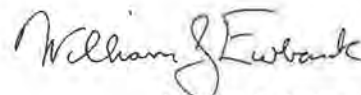
Executive Director's Message

Happy New Year! As you may have noticed, we have started out 1998 with a little difference in staid old *Horological Times* format. For the first time in most folks' memory, the American Watchmakers-Clockmakers Institute's journal of record has a picture of a timepiece on its cover. Better yet, it is a timepiece made by one of our homegrown American masters, Gene Clark of Colorado. Please see Ron DeCorte's article about the cover picture for more information.

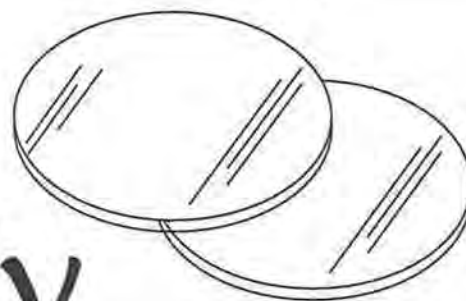
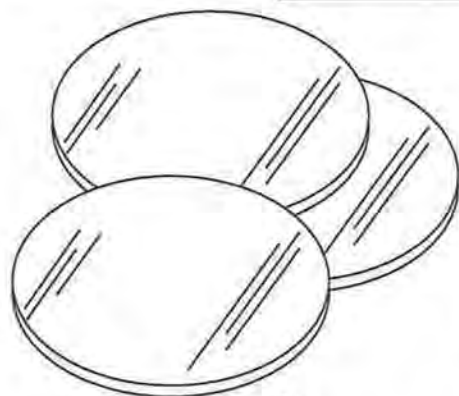
The main item of business this month is our annual readers' survey. This year we are asking a lot of questions about YOU, the reader. One of the most remarkable facts about our organization is that we have very little real data about the people who constitute our membership. I think that a certain comfort level had set in, where the management and leadership of AWI felt it knew all it needed to know about the members and that we could safely make assumptions about what AWI could do (or didn't need to do) on behalf of its members.

A few years of such comfort can lead to the truly harrowing possibility that we could wind up like the old cartoon character Wile E. Coyote, standing with a lit stick of dynamite in hand and a "sadder but wiser" look on our faces, whilst our membership, in the guise of the Road Runner, zooms off into the distance.

Last year's survey about *Horological Times* was a real eye-opener, and led to some continuing editorial changes in the magazine. This year's survey will hopefully provide the AWI Board of Directors with some real insights into what the average AWI member is like, and what the member wants from us in return for his dues. Please take a few minutes to clip out the survey on pages 47-48 of this issue, complete the questionnaire and return the survey to AWI Central. Please note that the survey form can be folded and stapled into a postage-paid return letter. For those of you who are worried about us asking for a lot of personal information, please remember that this is a voluntary exercise and that only the gross data will be preserved, with no personally identifiable information retained.



William J. Ewbank



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QUESTIONS

& ANSWERS

From the Henry B. Fried Library

QUESTION

My question concerns the Regula 30-hour musical cuckoo clock. I have two of these clocks with the same problem. The hands stop moving when in the process of activating the music mechanism but the clock keeps running. Any help would be appreciated.

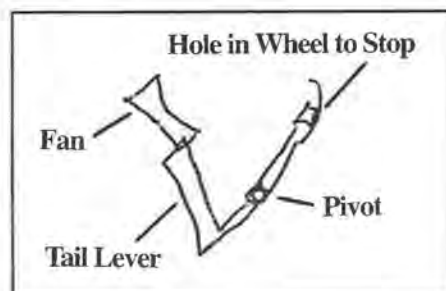
Arthur E. Seidl, Wausau, Wisconsin

ANSWER

Though there are more reasons than one that could be causing your problem, I will tell you the most likely reason. I believe the trouble is in the music box. You can reach up and trip the music lever and the hands will move again until the half-hour and hour. When the music stops, the tail lever must hit the fan at that moment

and the lever must be in the hole of the wheel. If this doesn't happen at the same time you can trip the music with your finger and turn the hands.

Jim Williams, AWI Instructor



QUESTION

repair. I have tried to obtain replacement parts without success. The brass bar that has the two cupped-out jewels in which the two points rest (see Figure A) has the jewels missing. Can I get the jewels or will I have to get a whole new bar?

J. Moody, Rockdale, Texas

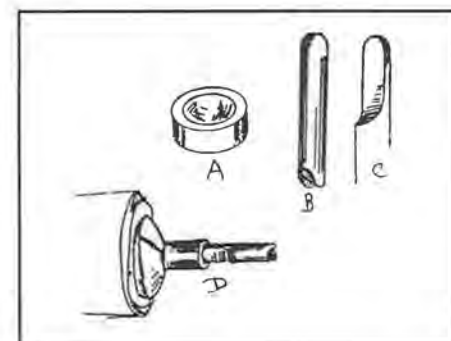
ANSWER

These jewels cannot be had and it is impossible to obtain the complete bar. I

suggest you make steel replacements to take the place of the jewels. Follow these directions.

Obtain a drill rod the same diameter or a little thicker than the recess into which the jewels fit. With a fine-pointed graver, mark a true center into the flat end of this metal while it is spinning in the lathe. With a piece of the same metal turn a round-ended piece (as shown in Figure B), finishing it off with fine emery and crocus. File off just a bit more than half of this round-end piece (see Figure C). Heat this to a red heat and plunge it vertically into cold water. This will render it dead-hard. Now replace it in the lathe and polish the remaining part of the dome. The flat part, which you previously filed away, should also be polished. This will become the cutter for the steel cup which takes the place of the jewel. The more highly polished the cutter, the better cut the surface will be. Replace your first steel piece in the lathe and use the round cutter to cut the cup (see Figure D). When the cupsink has been cut, cut back a thin neck on the rod, but do not part the metal. Next, heat this end red hot and harden by plunging into cold water. Then polish the inside of the cup with moistened rouge on the end of a pegwood stick. Have the lathe chuck grip the rod at the very end, not behind the neck of the metal. After polishing, the piece can be easily broken off by the thin neckpiece. Another method of making the round-bottom steel cup is to take a round-bottomed, solid staking punch and forge it into the flat surface of the steel piece. This will form the proper contour. It will also surface-harden the piece, although more hardening and polishing will still be necessary.

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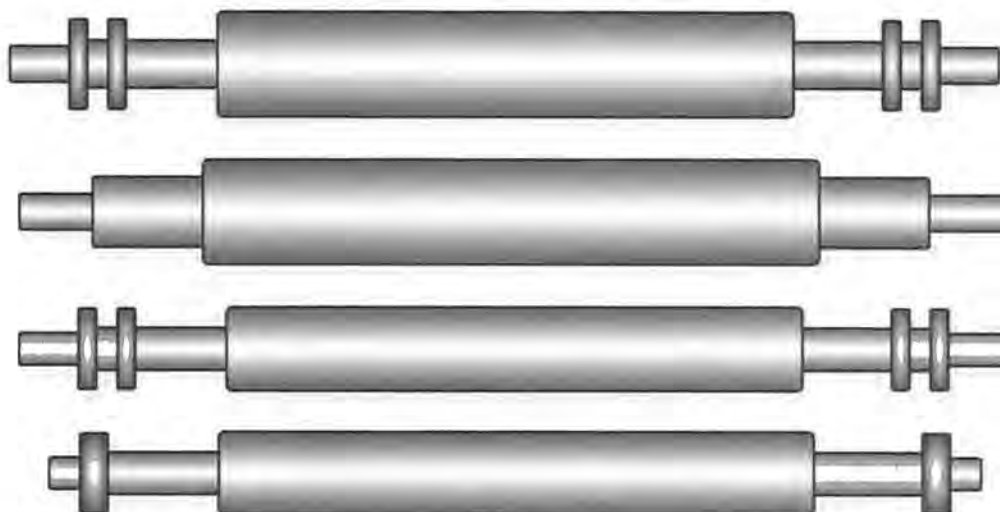
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A One Minute Tourbillon

By Gene Clark

Article by Ron DeCorte, CMW

Certainly many of you were surprised when you opened the envelope that contained this month's *Horological Times*. Many of our members had indicated that a change of cover format would be appreciated, well here it is! Therefore, it seemed only fitting that an American Horologer be featured on this month's cover. Obviously there are many interesting horologists from around the world who's work is worthy of our attention and we will feature them in the future as well.

This month's cover features a tourbillon pocket watch, #5, by Mr. Gene Clark. The watch was completed in 1994 at a cost of approximately 2,000 hours. Mr. Clark is responsible for fabricating the complete watch including the movement, case, dial, hands, chain and key.

The 18K pink gold case measures approximately 52 mm across. A matching chain and key accompany the watch. All of the gold used in the watch case, chain and

key was smelted by Mr. Clark in order to achieve the exact color.

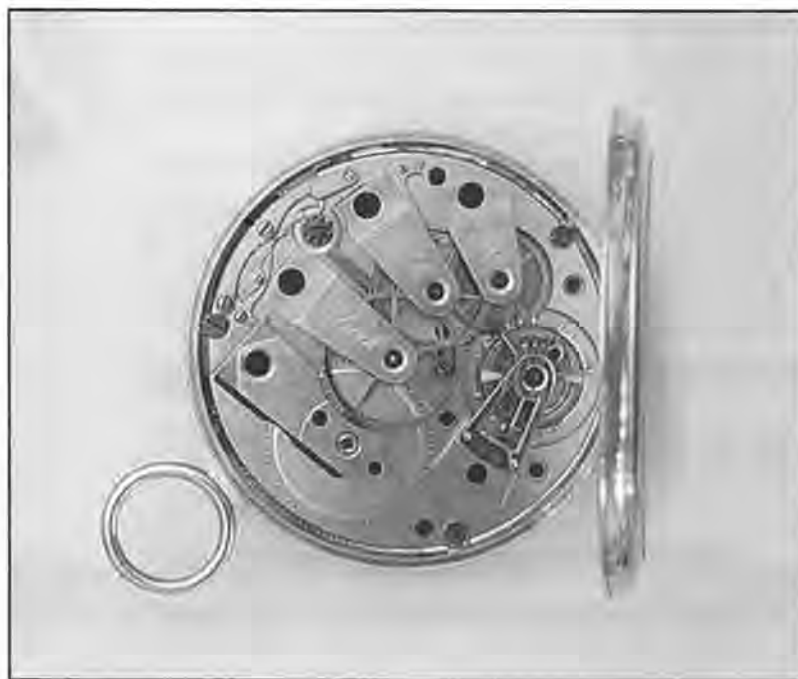
A very unusual and clever way of using the tourbillon was implemented in this watch. In most tourbillons, the tourbillon cage is driven by the third wheel and thus the cage is considered the fourth wheel, rotating once per minute and carrying the seconds hand. In

benefits in the process. Most importantly, a much weaker mainspring can be used allowing for a longer spring length which in turn gives the watch a running time of more than 56 hours while still maintaining a steady amplitude. The acceleration and deceleration of the tourbillon cage, five times per second, is also more controlled using this process.

A complicated stopping (hacking) device is employed that stops the seconds hand exactly on the second. This allows very precise synchronization of the watch to a master time signal.

Mr. Clark started his watchmaking career in 1976 after leaving the gunsmith trade. He spent the next ten years doing expert repair and restoration work. In 1986 he started mak-

ing his own watches. His horological skills are self taught using a lot of books and thousands of hours of practice. He works alone in his Colorado workshop doing what few other people are capable and many are envious, including myself.



this watch, however, there is a standard fourth wheel that carries the seconds hand and the tourbillon cage is driven directly by the fourth wheel at a 1:1 ratio. This arrangement requires less power than would be expected with a normal tourbillon and delivers several

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Fax (513) 367-1414 or

Horological Times, "Letters to the Editor," 701 Enterprise Drive, Harrison, OH 45030

Dear AWI Members:

Welcome to the new and improved *Horological Times*. As chairman of the *HT* Advisory Committee, it gives me and the other committee members great pleasure to be a part of the changes that you have already seen and others that are planned for the future. Your comments, either pro or con, would be greatly appreciated. After all, this is "your" magazine!

One of our major goals is to make the *HT* a user friendly publication. Member participation in the way of feedback is the only way to make that a reality. If you have comments or ideas about anything that is related to our organization and/or profession, please send them along so that they might be addressed through the magazine.

Another of our goals is to seek new contributions for the magazine in the form of articles for publication. There are currently about 6,000 members in our organization. Obviously, there are many qualified people who have ideas

and information that would make for interesting reading in our magazine. We would very much like to hear from anyone who is interested in writing an article(s) or even if you just have some ideas for the future.

Certainly the most obvious change to the *HT* is the new cover format. Since we are an horological publication, it only seemed proper that the cover reflect the content of our magazine. Once again, we would like for the membership to help in this area by furnishing color slides of watches, clocks, restoration projects, interesting tools, etc. If you or someone you know has material that might be suitable for our cover, please send it to us for consideration.

Ron DeCorte, Chairman
Horological Times
Advisory Committee

Dear Editor:

President Cleves has recognized and written about the shortage of quali-

fied people to work in our existing repair shops (November 1997 "President's Message"). He suggested that owners of shops might consider subsidizing the tuition of a young person at a watchmaking school in exchange for that person contracting to work for that shop for a period of time after graduation from watchmaking school. He has had limited success in hiring experienced watchmakers for his own shop. His goal is to identify a qualified person who could benefit from advanced training in the craft of watchmaking. He and many shop owners do not have the time to dedicate to training a young person in the craft. But he, and he hopes others, would be willing to advance some tuition money to provide advanced training for a quality person. The details of such a program need to be worked on.

Every problem we face is also an opportunity. Our own shop in the Boston, Massachusetts area has faced the problem that President Cleves wrote

about. Please let me share how we have turned this problem into a new opportunity. I agree with President Cleves assertion that we don't have the time in a workday to train a watchmaker. Your business must come first during the workday. You would do yourself and your business a disservice to divert your attention away from it. There is no reason why you and other members of your guild cannot provide watchmaking lessons in the evening or on a Sunday morning to a number of qualified students. The staff at our shop has done this for a number of years. The people attending the classes have ranged from age twenty something to folks in their mid seventies. We have had professional people including surgeons and attorneys as well as tradesmen from other crafts in our classes. Some of the students have gone on to open their own repair shops. Others have gone to work in shops in our area.

Our workshop has a number of benches used for repair during the business day that we make available to students during selected evenings and Sundays. The classes do not interfere with the normal business day and are held during the slow business period after the New Year and continue through late spring. The benches are cleared of shop work and repairs in progress are put away when the students come to the shop. Each student brings his own hand tools, loupes, lubricants, and projects upon which to work. Our shop provides the work environment, specialized tools as necessary, and repair parts from our stock such as mainsprings and staffs. Most important, we provide the skilled instruction that makes these classes a success.

There is no reason why this formula could not be duplicated by other members of AWI. In addition to the small extra revenue these classes bring into the shop there is a major fringe benefit. The staff at our shop continually hone their skills by giving them to others. The experience of teaching others a craft at which you are highly skilled is

truly rewarding. This is surely an example of getting more than you give.

Jack Kurdzionak
Stoneham, MA

Dear Editor:

The October 1997 issue of *Horological Times* contains the invitation to write to the Editor. Well, I heard somewhere that 24,648 intend to do just that and I thought I had better "get on my bike" before your systems crashed. I wonder if the story of the last straw (a) is true and (b) is applicable to our e-mail systems.

On a serious note: I wish to congratulate those who produce the *Times* each month. I work mainly in the repair and restoration of watches and antique clocks. Most of the items which pass through my hands are anywhere between 50 and 200 years old, some are younger a few older. All are treasured possessions and demand my care and attention.

Since I joined the AWI a few years ago I have learned much. The articles from such masters as we see every month do assist people such as myself to do our work more professionally. So often do I have a task before me that is not new--maybe I have done the bushing, jewelers, pivoting, shaping of a balance spring before--but every time I do one of these delicate or "one-bite-at-the-cherry" type operations I can, with confidence, jack up my knowledge with something from the *Times*.

The photographs, drawings and diagrams are so clear. It must be a great joy for the person beginning their career in horology to be able to sit at the feet of the masters in this way.

The work that comes from America is very valuable for me. Mostly the items are Elgins and Walthams with some pieces of European origin also. Having the *Times* on my shelf and the knowledge that the AWI has a vast base of available information is reassuring. I have made a number of useful contacts for material purchase in the USA

and Canada and would like fellow readers to feel free to ask me for assistance in buying parts that might be more obtainable here in Britain/Europe.

"Diolch yn fawr." "Thank you" from a Welshman.

Sylvester A. Crowley
Glamorgan, United Kingdom

One of the most interesting parts about being a part of AWI is in seeing just how wide a net we cast. Horology is truly an international language.

William J. Ewbank
Editor-in-Chief

Dear HT Readers:

I hope you are happy with the latest changes in the Horological Times. It is an exciting time at AWI as we initiate the changes you have seen this month. Working with an active HT Advisory Committee has made my job much more enjoyable. I want to thank President Cleves for appointing such a talented group with which to work.

As Mr. DeCorte stated, this is "your" magazine. What do you like or dislike about the HT? Your input is needed. Currently we are working on your requests from last year's Readers Survey. As soon as the Horological Times Advisory Committee was approved by the Board of Directors, they went to work on your requests.

Our job is to provide you with the best technical articles available to help you perform your job in a professional manner. Help us to help you. If you are interested in writing an article or a series of articles, please send us your ideas.

I would like to take this opportunity to wish each and every one of you a happy, healthy and prosperous 1998!

Donna Baas
Managing Editor



AS A CLOCKMAKER TURNS

COLLET PROBLEMS WITH THE WATCHMAKER'S LATHE

PART 3

By J. M. Huckabee,
CMC, FBHI, FAWI

Overview

In this third part of our study of collet problems we will explore the collet-to-lathe spindle fit. The problems usually are size, length, and head shape. With some adaptation, most Moseley, Moseley Conoidal, and WW-style collets can be used in the typical 8-mm lathe. A problem solution can be found in almost every example. Keyway problems will be treated in the fourth part of the series.

Understanding Collet Differences

How do WW and Moseley collets differ? The major items are illustrated in Figure 1. The first two are WW-style—a Peerless and an English-made collet. At a glance they look identical. Let's take a closer look. Length is approximately equal, within useful limits. Head angle and diameter appear to be equal and within useful range. Now look at the threaded end. Diameter and pitch are acceptable. The keyway width and depth are not the same. Study the keyway depth of the Peerless piece where it passes through the threaded region. A spindle key of full depth in the Peerless collet would not accept the English-made piece. And further, a key width that fills the English-made piece would not accept the Peerless collet.

Now study the underhead area of the two WW-style pieces. A spindle that is a close fit at the head-body junction of the Peerless piece may not accept the English piece.

Turn your attention to the third and fourth pieces of Figure 1. The underhead area differs somewhat as with the two WW examples. The underhead problem, if it exists, is solved by removal of a small amount of material from the spindle inside at the point where head angle and body blend. This is an easy job with a small motortool and small round stone. Make the cut with the lathe spindle in motion. Do not touch the mouth region of the spindle.

Study keyway width and length in the Moseley and Starrett examples of Figure 1. You may find a key too long or too wide for these two pieces to interchange. Key length can be shortened by careful grinding; however, the key must be removed to change its width which is somewhat difficult.

The Collet Length Problem

What can be done about different lengths of collets? If your lathe is WW-style, it will use the lower collet of Figure 2. Other problems solved, your drawbar will be too long to close the Moseley collet (see top view of Figure 2). This can be solved by a suitable drawbar spacer, as in the same illustration. On the other hand, a Moseley drawbar will be too short to reach the WW-style collet. Most Moseley drawbars have enough excess shoulder length to permit a shoulder cut-back so as to reach the WW collet. Then a spacer is used with the Moseley collet.

Measure your drawbar diameter (see Figure 3). This one is 0.315" and indicates the collet body area of the spindle bore is the same size (not always true). If true, most 8-mm collets will fit into the spindle bore.

A typical drawbar and spindle is shown in Figure 4. This is a Boley machine and the drawbar shoulder was cut back many years ago for the purpose being discussed. The spacer shown in Figure 5 was made, which now permits use of either WW or Moseley collets.

Drawbar cut-back and/or spacer addition must be determined for your specific lathe. Length should set drawbar

engagement of about 75% of the threaded length of the respective collets.

The spacers in Figure 6 are used with the collets of Figure 1, and the lathe of Figure 4. One spacer is 0.187", the other is about 0.210". This technique easily solves the collet length problem. The end result of this is shown in Figure 7 (with spacer) and Figure 4 (without spacer.)

Some lathes have a spindle bore larger than the drawbar diameter, and use a conical shoulder to center the drawbar. A spacer example is shown in Figure 8. This spacer has one end conical and the other end square. Another example is shown in Figure 9. This spacer has both ends conical—one internal and the other external. The example is used with a Pennant WW-style lathe and uses all of the 8-mm collets illustrated throughout this series.

Collet Dimensions

Throughout this series, I have shown and discussed many exact dimensions, and related numerous stern opinions. This is based on my personal experience over more than a half-century of lathe work. On the other hand, I do not have access to dimensional standards that the lathe builders used to guide construction. Be assured that you will find slight differences in lathes, even in two machines from the same builder.

The only material I know that relates collet dimensions is found in *The Watchmakers Lathe*, by Ward Goodrich. Refer to a table entitled "Table Showing Dimensions of Chucks of Various Manufacturers," 1952 Edition, page 58. This will be a great help to everyone searching for lathe spindle and collet identity. However, use this with caution, as I have found several chucks over the years that indicate some possible table error. These were mostly collets larger than the watchmaker lathe class.

Forward

In the fourth and final part of this series, we will get this mix of alien collets into our lathe spindle and into operation. I'll discuss some methods of refurbishing collets and working methods to achieve good practical accuracy with them. ☛



Figure 1. Relative size of typical 8-mm collets. These are: Peerless WW, English-made WW, genuine Moseley, Starrett made for Moseley.



Figure 4. Joint line of lathe spindle and drawbar shoulder. A spacer is to be used here for collet adaptation.



Figure 7. A Boley lathe with drawbar spacer for use with a longer collet.



Figure 2. Genuine Moseley and an English-made WW collet. This drawbar spacer permits use of Moseley collet in a WW lathe.



Figure 5. The spacer should have square ends and a snug fit onto the drawbar.



Figure 8. An alien drawbar may use a conical-end spacer to locate the drawbar in spindle center.

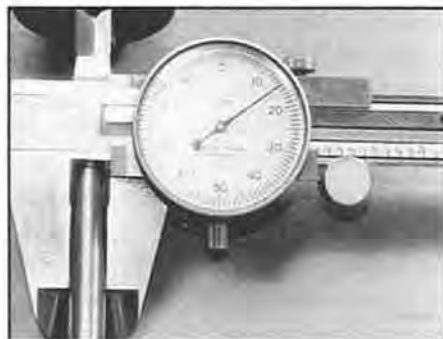


Figure 3. This Boley drawbar measures 0.315", that indicates most 8-mm collets will go into the lathe spindle.



Figure 6. This spacer is 0.186" long. One or two lengths will solve most needs.



Figure 9. This Pennant lathe drawbar has a conical shoulder. The spacer ends are cut to fit that shape.



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By Henry B. Fried,
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Repairing Porcelain Dials

Porcelain dials, used mostly on older watches, are becoming scarcer and more difficult to replace. When such a dial becomes chipped or cracked, it is possible to repair it by filling in the cracks or chipped area with an enamel that comes closest to matching the porcelain on the dial. This enamel is sold by watch supply houses and is available in two types, one a liquid applied with a brush and the other which resembles wax. The wax-type enamel in various colors is sold in little tin boxes marked *Kalte Emaille* or *E'mail Froid*, or "cold enamel," its English equivalent.

Before applying the enamel, clean the dial as thoroughly as possible, leaving no lint or fingerprints near the spots to be repaired. Place over the crack or chipped area a piece of enamel, free of dust and clean, large enough when melted to fill the area. Hold the dial over an alcohol lamp flame so that when the dial becomes warm, the quick-melting enamel flows and completely fills the crack in the dial, as shown in Figure 17.

Remove the dial from the flame as soon as the enamel melts, because the enamel may become thin and will spread if the dial is held over the flame too long. After the dial is taken from the flame, the enamel cools quickly, forming a slight mound over the spot where it melted. Cut away the excess enamel with a very sharp, smooth-edge razor—skimming the

razor over the dial—leaving the enamel level with the surface of the dial.

If the chipped or cracked area is over a numeral or the minute track, paint in the numeral or minute track with India ink or liquid enamel, using a small brush down to a fine point. Do not use a pen for it scratches soft enamel, and tends to spread the liquid coating. Spray or paint the surface of the filled area with a thin layer of clear lacquer to preserve the numerals and keep the new enamel clean. While such a job may not be perfect and slight flaws may be detected with a loupe, it is a great improvement over an unsightly cracked dial.

Also, several thin coats of "Appliance Touch-Up" paint, available in hardware stores is good. Afterwards the excess is cut off with a razor and polished as you would an acrylic plastic.

Shifting Dials

While it is sometimes necessary to file a hole in the dial to shift it to one side to avoid having the hole touch the hour wheel, enlarge the hole only after it is certain that ether methods will not do. Filing a hole is necessary only when the dial is off center, or the center and second-hand holes must be shifted.

If a dial hole crowds the hour wheel on one side, the dial feet are either bent or incorrectly placed. (This may be verified by checking the crown position and the second-hand hole.) If the holes for the hour wheel and the second hand are both off-center in the same direction, straighten the feet of the dial, or fit the dial to the movement, tapping the edge of the dial in the direction that centers it. By this procedure the dial feet will be bent from their former position as shown by the dotted lines in Figure 18. The tapping is done best with a fiber or horn hammer. The balance of course should be removed from the movement before this operation.

Some older watchmakers, and those specializing in watch casing and dial fitting, have special pliers to shift the dial feet, as shown in Figure 19. Those specializing in casing many movements of one kind use a metal block, the shape of the movement, into which two accurately placed holes are drilled for the dial feet. The dial is placed on the block with the dial feet in these holes, and the dial is tapped until it is centered, relieving the watch movement of shocks accompanying this correction.

Cleaning Dials

Almost all dials are made with a brass base upon which a thin layer of silver is deposited. The figures are printed upon the silver deposit with a "soft enamel" paint. The printed surface is sprayed with clear lacquer to protect it from dirt and oxidation. If

the lacquer peels or becomes porous after aging, vapors, acids, moisture, dirt, and other matter may discolor the dial.

Many chemicals used to remove dirt, grease, and oxidation from plates and wheels cannot be used on watch dials because the chemicals may damage the painted numerals. Watch cleaning solutions composed of ammonia and soap, and a water base, may be used to remove dirt or tarnish if the solutions do not contain acetone, alcohol, or benzol (which may attack the dial figures). If this chemical content of the solution is slight, the dial may be dipped into the solution and swished a few times; but dry by blotting gently (do not wipe). Do not use alcohol; it dissolves paints and lacquers.

Cyanide solutions remove tarnish from a dial although their use is discouraged for anyone but those thoroughly experienced with them, as they are deadly poison.

Do not wipe dials with radium fingers after cleaning, as the radium compound is softened by cleaning liquids and may be smeared. Blot such dials with a clean chamois or clean linen cloth.

Solid silver dials with hard enamel figures may be "refinished" by placing the dial in a copper pan filled with a solution of 10% sulfuric acid and water, as shown in Figure 20. This solution is heated with the dial submerged in it until the dial becomes snow white, after which it is removed, dried, and lacquered. Some watchmakers prefer to heat the dial and then drop it into this solution; however, the immediate quenching may crack the enamel figures. Heating the dial up to about 700° F will not harm the hard-baked enamel figures.

In preparing the sulfuric-acid-and-water solution, be certain to place the water in the pan first and then add the acid. If the reverse is attempted, a great heat will be generated with accompanying hazards that could be exceedingly harmful to the watchmaker. In any case, no one should attempt to work with chemicals until he has become thoroughly familiar with their working properties and dangers.

Some watchmakers achieve the same finish on silver dials by using a cyanide solution. The action is much the same, a slight layer of the silver being removed chemically, exposing a bright fresh layer of silver. Lacquering the dial protects the new surface from tarnish.

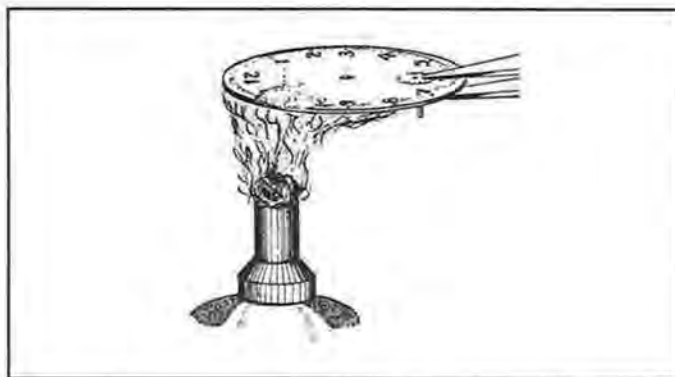


Figure 17. Method of melting white enamel to repair chipped porcelain dials.



Figure 18. Bending a dial foot by tapping the dial with a horn head hammer.

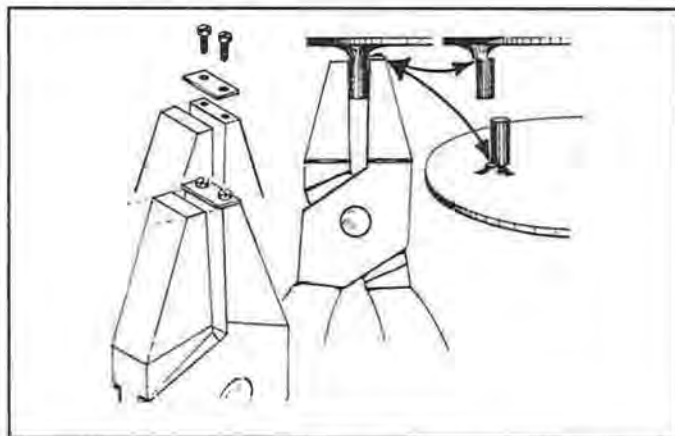


Figure 19. Method of converting pliers which may be used to offset dial feet.

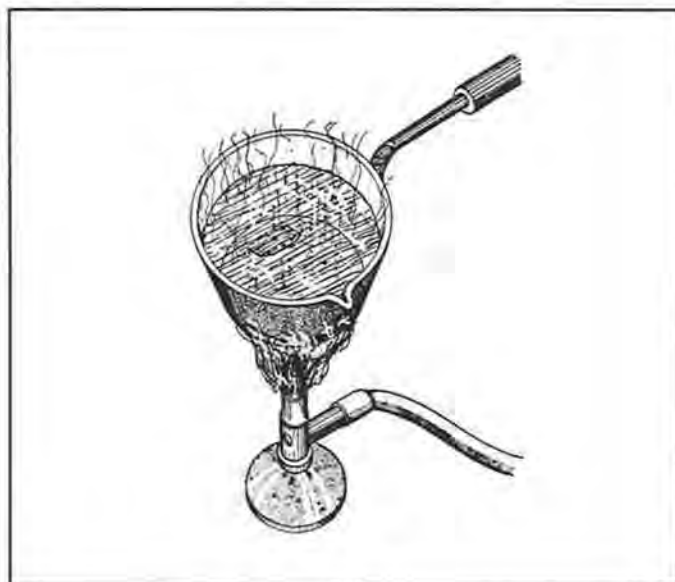


Figure 20. Solid silver, hard-enamel dials may be renewed by boiling in weak sulfuric acid solution.

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PICKLE BARREL

REPAIRING STONE SET AND ENAMELED JEWELRY

By Marshall F. Richmond, CMW

There is much to know about the repair of all kinds of jewelry. The more we know the better equipped we are to make these repairs efficiently and with the least chance of getting into difficult or impossible situations.

A good place to start is to put jewelry in three general categories: extra fine jewelry, fine jewelry, and costume jewelry. Each of these could have sub-categories but I will try to impart as much information on each of these as I can. I have been practicing this trade for over fifty years. I should know a lot about it, but the fact is what I *do not* know would probably fill a much larger book than what I do know. After fifty-plus years, I still consider myself a student and will as long as I am able to practice this trade.

Extra Fine Jewelry

This category of jewelry is made of platinum or 18K gold and set with diamonds and/or genuine colored gemstones such as the extra fine quality rubies, emeralds, sapphires, pearls, or others of gem quality. Most jewelry pieces are finger rings, earrings, bracelets (both wrist and ankle), necklaces, pins, and broaches. Some pieces of extra fine jewelry are plain but most are ornately designed and made by fine crafts people. In fact, some pieces of jewelry have such fine workmanship they are not even set with stones or diamonds.

Most extra fine jewelry requires little or no repair for it is crafted for durability as well as beauty and is worn by people who do not abuse it. Usually any repair needed is caused by some mishap, not wear or abuse. When a piece comes in for repair, carefully analyze the repair needed. Identify the stones, if any, and whether or not heat is required to make solder or weld repairs. If using heat, make sure any stones that will not stand heat are well shielded or removed.

In dealing with gemstones, jewelry repairmen who are not gemologists should follow the guidelines on stones from charts that list the stones and their characteristics. Although all charts do not list all known stones, they do list the most popular ones, their refractive index, specific gravity, and hardness and toughness. They list stone reactions to various jewelry procedures such as ultrasonic, steaming, acids, boiling, torch (heat), setting, and polishing. One chart I have grades each stone for reactions—with E for excellent, F for fair, G for good, GF for good to fair, VG for very good, and P for poor. It also lists enhancement methods used for some stones, care required for all listed stones, and special handling for some stones and cautions.

OVERALL THERE IS ONE CAUTION: On any stone that you are not sure of always use a positive shielding from heat method or remove it before applying heat. Any stones that have had special treatments to enhance color require special handling as do stones with cleavages, inclusions, or internal fractures. Any jewelry that is in this "Extra Fine" category should be handled with extreme care because many of the genuine stones of gem quality can cost hundreds of dollars per carat if they should need to be replaced. Even before starting a repair, these pieces of jewelry should be cleaned well and the color of the stones noted as well as any flaws, scratches, or chips. Also, the method used in cleaning should be considered because some stones are sensitive to strong chemicals, ultrasonic, strong light or sudden temperature changes. When it is possible, the customer should be informed of risks involved before making the needed repairs.

Fine Jewelry

The biggest percentage of jewelry that comes into most shops for repair probably falls into this category. It does not require quite as much caution as is needed in the "Extra Fine" because most of the stones, even though many are genuine, are less than gem quality and the cost of replacement is not so great as to prohibit taking a chance. There is risk in applying heat to any stone but there is also risk in damaging stones when removing or resetting them.

Most karat gold jewelry is of good quality being die struck or shaped by casting. It has been my experience that good-quality cast or die-struck jewelry usually has stones that are good quality. These usually are durable and rarely need repair but in today's competition for low prices to compete with the so-called discount houses, there is much jewelry on the market, even found in reputable jewelry stores, who also have to compete for sales. Some of these

die-struck or cast mountings and settings are very thin and even the metal is porous. When bent or shaped during sizing or prong repair, it may break or is left weak. The genuine stones are of poor quality and are not cut uniformly with different diameters (some not perfectly round), different thickness overall, and some with thicker girdles than others. Many of these lightweight finger rings have many stones and when a prong is broken on one stone, all the stones must be removed before a new prong can be gold soldered to the setting. In removing the stones often other prongs may break. When resetting the stones, due to the variation of the sizes and shapes, they must be put back in the setting from which they were removed and in the same position. When resetting even more prongs can also break. Time for removal, repairing the broken prongs, then having to remove them again runs the time and material cost so high that it will greatly exceed the original cost of the ring. Another good example of this promotional-type jewelry is hollow chain. The wire this is made from is hollow and it makes the chain about half the weight of an identical in appearance solid karat gold chain. Most jewelers will not accept these for repair. When applying heat, the hollow chain will melt before solder will flow. I have repaired some of these and I never felt the repair was

of a quality with which I felt satisfied.

Much of this fine jewelry is made with synthetic stones and many of them are more attractive than the genuine stones they are made to look like. They are uniformly cut and the rounds are available as small as 2 mm in diameter and in half-sizes like 2-1/2 mm. They are gauged in millimeters and are available in many fancy cuts such as oval, emerald cut, square, marquise, pear, heart, and rectangular, with the lengths and widths.

When mothers' rings first became popular they were made in 14K gold with synthetic stones. Many of them were made so more settings could be added by gold soldering them in without removing any of the other stones. Later some manufacturers started to offer promotional-quality mothers' rings made in 10K gold and even in sterling silver and started to market rings that would take settings with the stones already set and held by a screw from the inside of the shank. These could have settings added without the use of heat or gold solder. Later mothers' rings were introduced to the market using genuine stones. Advertising campaigns tried to create a desire for "Genuine Stones." There was no mention of all the qualities of genuine stones being available or the cost of repairs being much greater due to the irregular sizes and the fact that these stones would not take

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heat. I have received some of these for repair and the quality of these genuine stones leaves a lot to be desired. I have replaced or added many synthetic stones and found them to be uniform in color, shapes and sizes, even when purchased from different sources.

Enameled jewelry is usually found in this class of jewelry and is very attractive and durable. The enameling process uses finely powdered glass, mixed with water, and placed in an undercut design (generally karat gold), and placed in an enameling oven and baked to a temperature that causes the glass to melt and flow in the gold object. After cooling, the surface can be stoned with a fine abrasive stone such as hard Arkansas to remove any surplus enamel to a level with the surrounding surface. The heat required to flow the enamel is less than the heat to melt the metal being enameled. The powdered glass is available in many colors, so when finished can make a very colorful and attractive design on jewelry. Hard enamel has been used on better-quality fraternal, high school, and college rings. This calls for caution when sizing or repairing these enameled rings. In re-rounding the ring, either larger or smaller, the circle of the ring is changed and the hard enamel will not bend with the metal in the rings. There is now available a plastic hard enamel called "Ceromit." It appears to be an epoxy type of substance that is mixed with a

catalyst in 2 to 1 proportion. It can be applied with a brush or spatula. It can be cured at 200° F for one hour in a kitchen oven, by infrared lamps, or forced air dryers. When cured it has a hardness of 60-75 on the sward scale (as compared to kiln fired enamel 65-80 which required 1500° F to flow and cure). There are thirty colors and it is excellent for filling in places where enamel is damaged when making repairs. With thirty available colors almost any enamel can be matched. In recent years the manufacturers of college and high school rings have been using these plastic enamels. When applying heat to these rings these enamels must be shielded for they can be damaged. They are less apt to be damaged when making the rings larger or smaller for this substance will bend a limited amount when rounding out the ring after sizing.

Costume Jewelry

There are different qualities of costume jewelry varying in price from \$1 per item to \$100, or in some cases even more. Artificial pearls are a good example of the variation of quality of costume jewelry. Artificial pearls are glass beads coated with lacquer. The lower quality pearls use inexpensive lacquer and soon turn yellow when worn. They are strung on inexpensive cord and the catches are made



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of inexpensive materials. The good-quality artificial pearls use high-quality lacquers, silk or nylon cord for stringing, and sterling silver bead tips and catches. They retain their beauty even after much use and over a long period of time.

Rhinestones are cut-glass imitations of colored gemstones with a foil (mirror) back to reflect the light. There are several qualities of these stones. Rhinestones are used in costume necklaces, earrings, bracelets, pins, and even in low-quality finger rings. The better quality rhinestone jewelry uses prong settings made of a base metal, rhodium-plated for white and gold-plated for yellow. There is one particular brand of rhinestone jewelry that I am familiar with; their stones are of the highest quality and their electroplating is also top quality. Lower quality rhinestone jewelry is made of low-quality material with low-quality stones which are cemented (glued) into the settings.

Today much of the costume jewelry is sold through cosmetics sources. Although it is not made of gold, gold-filled, or even sterling silver, it is well finished, brightly polished, and electroplated. It wears reasonably well. The cost of this jewelry is not really inexpensive, so some of it is practical to repair.

Throw away and replace rather than repair seems to be the motto these days, but people are entitled to have anything repaired if they are willing to pay the cost. The repair person should make these repairs if they can be made durable, attractive, and as near to original as possible. If it appears that this cannot be done, the repair should not be attempted.

In repairing stone-set jewelry or, in fact, any jewelry from the finest to the very inexpensive, a good rule to follow is to first clean, then dip in boric acid and alcohol, and burn off. This is true especially on costume jewelry that is electroplated. When heated, this coating keeps oxides from forming. This can be removed by pickling, soaking, or boiling in water. When oxides do form on gold or silver plating and need to be polished off usually the polish will remove the gold or silver plate exposing the base metal. It should then be electroplated. This will make the cost of the repair prohibitive unless the workman wants to absorb the cost of the electroplating in most inexpensive costume jewelry.

In closing, it might be good to put a thought down to share my feelings with my readers. To me, costume jewelry of low quality is considered "junk jewelry," but the word junk should never be used when talking with a customer. Their piece of "junk jewelry" may be a treasure to them and calling it that could be an insult.

The next article will be a discussion about jewelry fasteners, catches, buckles, etc.

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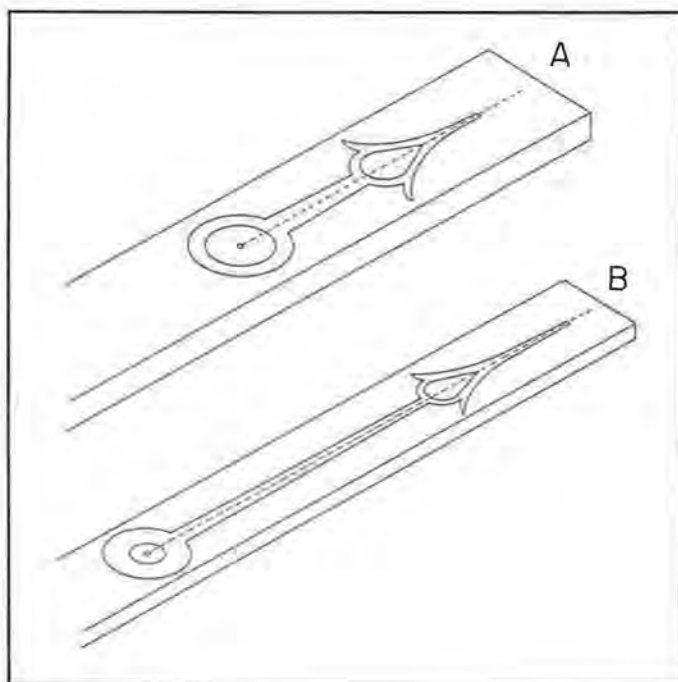


Figure 1.

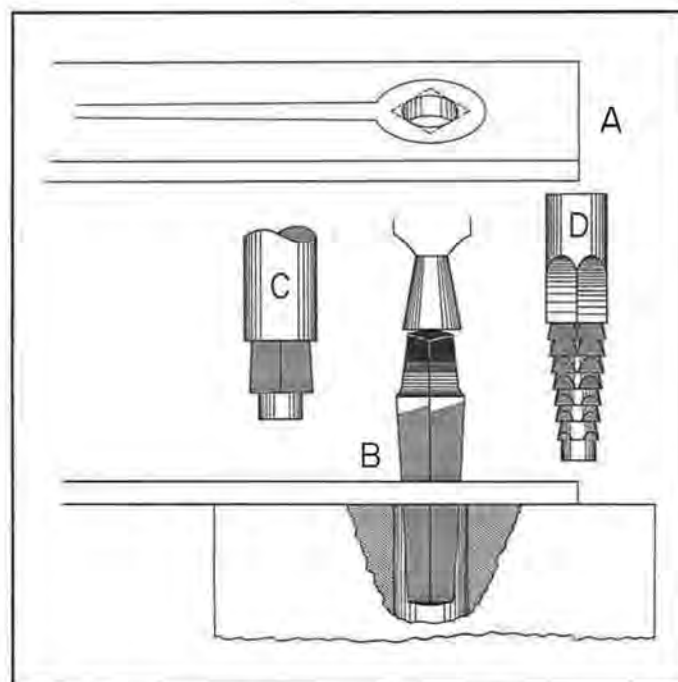


Figure 2.

TECHNICALLY WATCHES

ANTIQUE WATCH RESTORATION, PART CXXXXV

MAKING WATCH HANDS

By Archie B. Perkins, CMW, FNAWCC, FBHI

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When restoring antique watches, it sometimes becomes necessary to make replacement hands for some of the watches. This is due to the fact that duplicate hands are not available to match the original hand or hands.

When making watch hands, they should be made from the same type of material as the original hands. When making steel hands, the steel used should be high carbon water hardening steel. If hands are made from gold, brass, or copper, the material should be hardened by hammering or rolling. If this is not done, the hands will be soft and difficult to make and manage due to the softness of the metal.

Figure 1 shows the hands scribed out on the hand material. The material used for the hour hand is shown in View A. The minute hand, scribed on another piece of material, is shown in View B, Figure 1. Note that the material for the hour hand is thicker than is the material for the minute hand. This is

because the material for the hour hand needs to be thicker due to the long tube on the hub of the hour hand. Some minute hands also have a short tube on the hub which requires thicker material for making the hand.

When drawing the hand design on the material, a center line is first scribed on the material. Then, a center is spotted on the center line. Next, the hand pattern is drawn on the material.

If the minute hand requires a square hole to fit the cannon pinion, the square hole is made as shown in Figure 2. The size of the square hole is determined by measuring the square on the cannon pinion. Then, a hole is drilled in the center of the hub part of the hand pattern, as shown in View A, Figure 2. The size of the hole is equal to the size of the square across two flat sides. The corners of the hole are removed with a square hole punch or broach to form the square hole. This is shown being done in

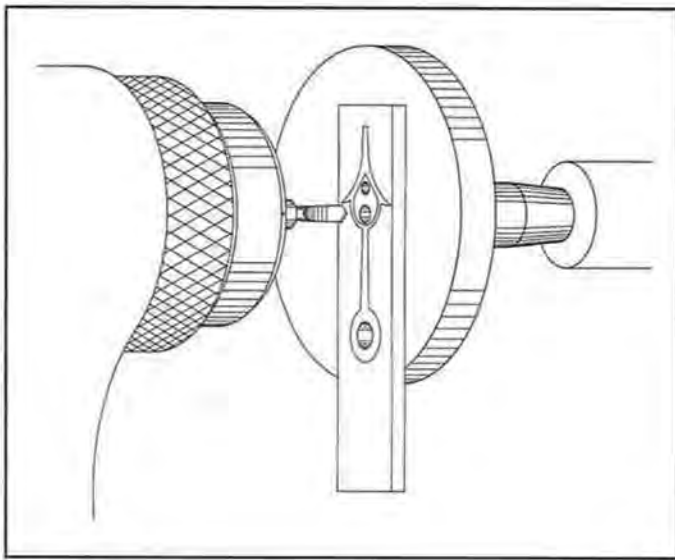


Figure 3.

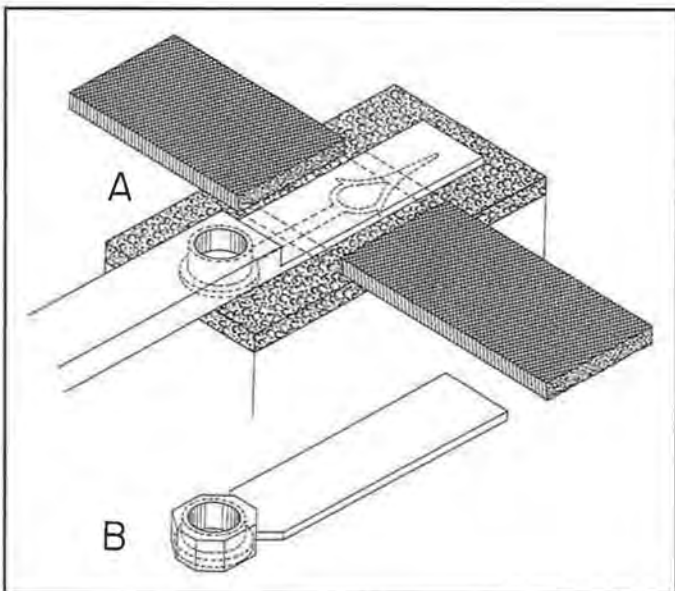


Figure 4.

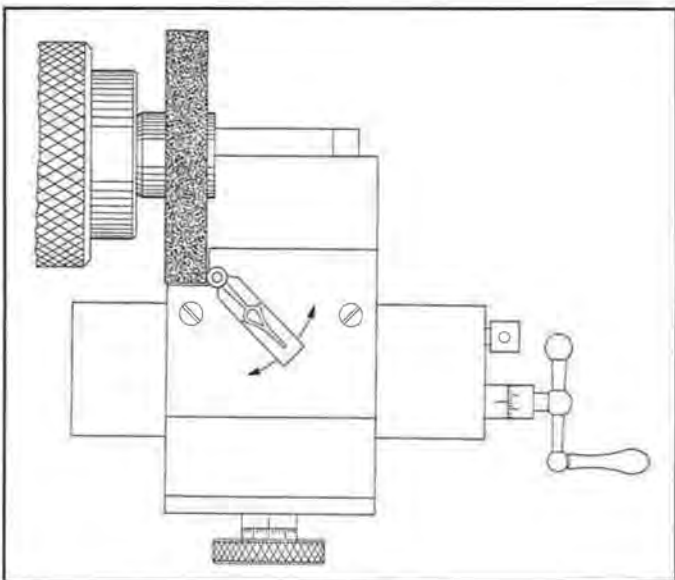


Figure 5.

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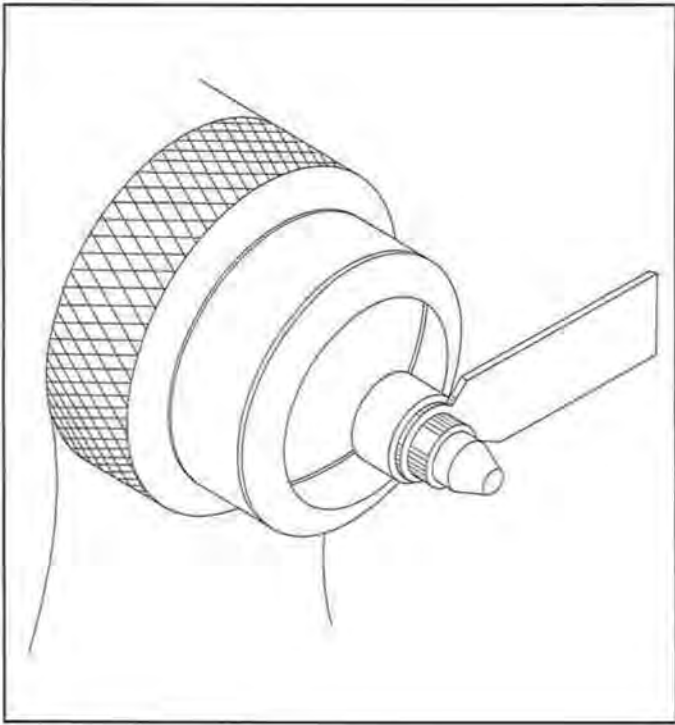


Figure 6.

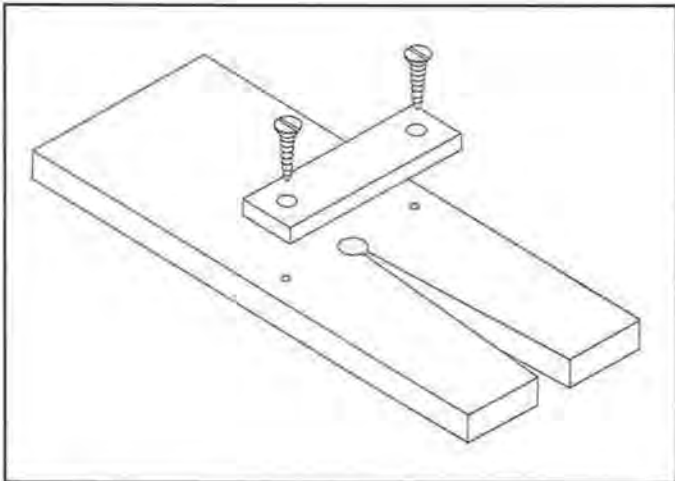


Figure 7.

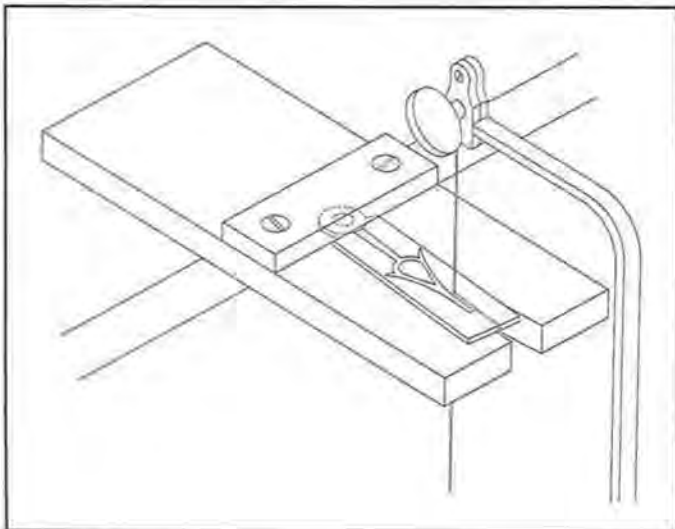


Figure 8.

View B, Figure 2. The broach being used has been made from a small square needle file. The broach is being driven into the hole with a small hammer while the hand material is supported over a hole in a bench anvil. The broach should be driven into the hole from both sides of the hand material until the hole is the correct size.

Another type of square hole broach is shown in View C, Figure 2. This broach has a pilot at its end that fits the hole drill in the hand material. The square on the broach has some back taper to prevent it from getting jammed in the material. The end of the square is undercut to make it sharper for cutting out the square hole.

View D, Figure 2 shows the best type of square hole broaches. This type is more difficult and time consuming to make. Graduated diameter shoulders are turned on the rod, each having some back taper. The ends of the shoulders are undercut with the graver. A pilot is made at the end of the rod as shown. Then, the four sides are milled or ground to the intended square size. After this, the broach is hardened and tempered to light straw color. This broach is usually pressed through the hole to form a square hole. Each step on the broach removes more material from the hole as it passes through the hole.

Making an Hour Hand

Figure 3 shows the first steps used in making an hour hand after the pattern has been drawn on the hand material. This illustration shows how the holes are drilled in the pattern for the hour wheel tube and for sawing out any openings in the hand. This is done before the hand is sawed from the hand material. The drilling can be done in the lathe. The hand material is held on a drill pad in the tailstock spindle while the drill is held in the headstock of the lathe. The material around the hand pattern is used for support while the holes are drilled and the openings are sawed and filed to size and shape.

Filing the Step on the Hand Material

Before sawing the hand from the hand material, other operations must be done to form the watch hand. The next operation is to file a step on the under side of the hand material so there will be enough material for making the hub of the hand and its tube. The filing of the step is shown being done in Figure 4, View A. The material is held on a flat block of hardwood in the bench vise for filing the step. The top of the block can be covered with a layer of cork. The cork allows the material being filed to stay flat against the file.

After the step has been filed, the hand material is cut away, as shown in View B, Figure 4, in prepa-

ration for turning the hub and its tube of the hand.

The first step in making the hub is to file or grind the round shape of the outside of the exposed edge of the hub. An accurate method of doing this is shown in Figure 5. This method uses a slide rest on the lathe bed. Mounted on top of the slide rest is a flat block of metal that is thick enough so its top is on center with the lathe center. The corner of the block is cut out to enclose the side and edge of a grinding wheel as shown. A vertical post is planted in the block near the edge of the cutout for the grinding wheel. This post should fit the hole in the hand without excess shake. The hand is placed on the post and brought against the grinding wheel by turning the slide rest screw. Then, the hand is pivoted on the post and moved back and forth, as shown by the arrows, to grind the material to the circle scribed for the hub. *Note: If a slide rest is not available for this job, a saw table can be used instead by planting the post in the top of the saw table near the edge of the table.*

Turning the Tube

Figure 6 shows how the hand material is held on a mandrel in the lathe headstock for turning the tube on the hub of the hand. The reason for turning the tube before the hand pattern is sawed from the material is to prevent damage to the delicate hand in case it should get caught on something during the turning of the tube. *Note: The same method is used for turning a tube on a minute hand.*

Sawing Out the Hand

The next operation is to saw the hand from the hand material. This is done with a fine saw blade in the jewelers saw. The hand material is held on a sawing board for sawing out the hand.

Figure 7 shows the design of the sawing board. The board has a narrow "V" slot sawed in one end of the board. At the back end of the slot, a hole is drilled to fit the tube on the hand. This hole is to allow the hand material to rest flat on the board. A wood clamp can be used on top of the hub of the hand to hold the hand solidly on the board. The clamp is held in place with wood screws as shown.

Figure 8 shows the hand being sawed out of the material. The sawing board can be clamped to the bench with a "C" clamp or it can be fastened to the bench with screws. The hand material is pivoted on the board to allow the saw blade to work in the "V" notch of the board when sawing out the hand. The saw blade should be placed in the saw frame so it will cut on the downward stroke.

Filing the Edges of the Hand

Figure 9 shows how the hand is held for filing

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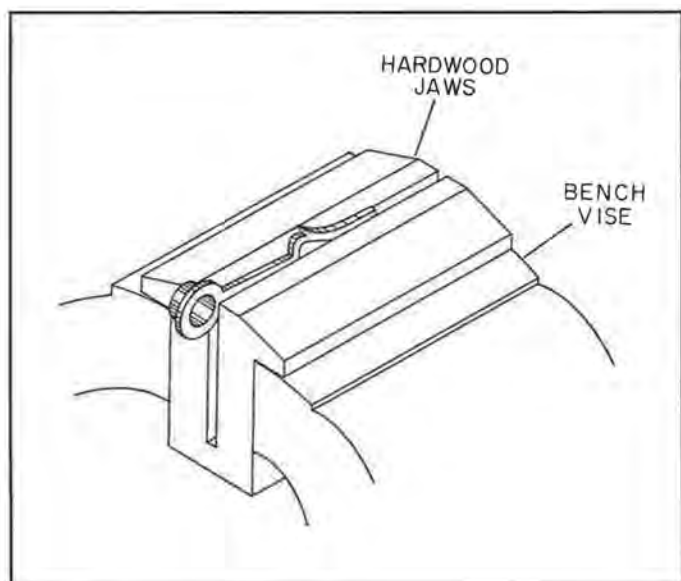


Figure 9.

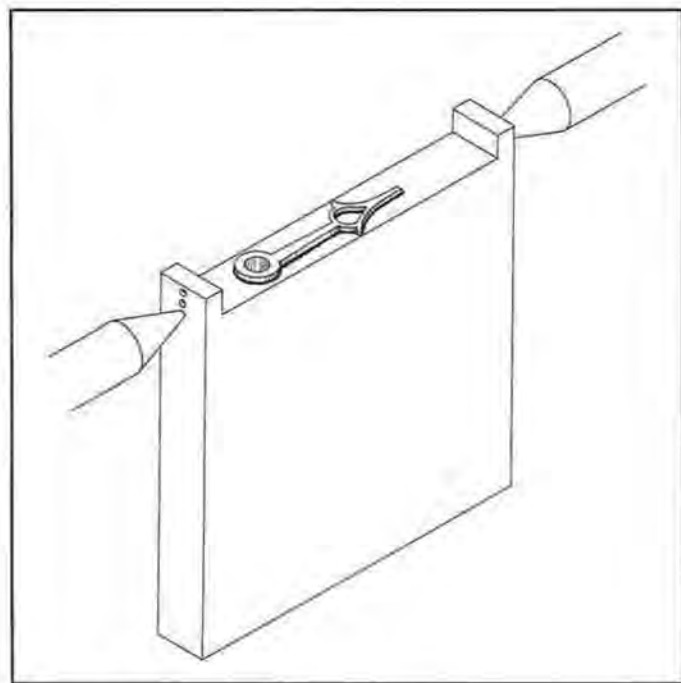


Figure 10.

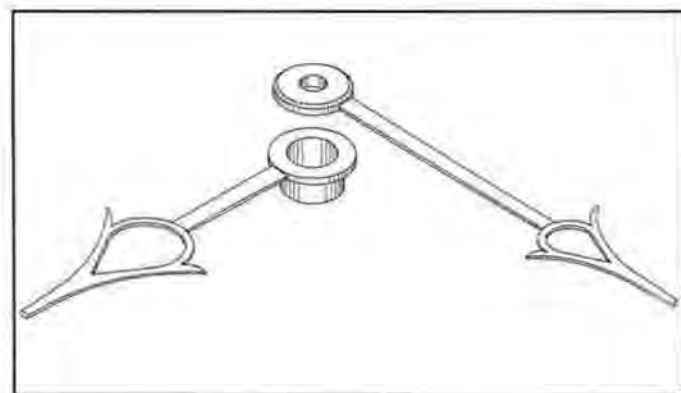


Figure 11.

the edges of the hand. A set of hardwood jaws is used in the bench vise for holding the hand for filing. The hardwood jaws hold the hand securely without damaging the hand. The edge of the hand is first cross filed just to the line and then finished by draw filing.

Shaping and Finishing the Top of the Hand

Figure 10 shows how the hand can be held for shaping and finishing the top surface. This is done on a swing tool. This particular swing tool does not have jaws as does the typical swing tool. The hand is shellacked to the top edge of the swing tool. In order to shellac the hand to the tool, a hole must first be drilled in the top edge of the tool to clear the tube on the hub of the hand. This allows the hand to rest flat on the top edge of the tool. Different height centers are made at the ends of the swing tool for the lathe centers to work in. These centers are made on a center line running down the ends of the tool. The pair of centers selected must allow the swing tool to remain still as the file or polishing slip is moved across the hand. The top of the hand hub is usually given a flat finish and the rest of the hand is usually given a curved or rounded finish. When giving the hand hub a flat finish, the swing tool must not swing back and forth with the action of the file or polisher. When giving the hand a rounded finish, the swing tool is swung back and forth with the fingers as the file or polisher is being used on the surface of the hand.

Hardening and Tempering Steel Hands

Steel hands need to be hardened and tempered to give them more strength, especially if they are delicate in shape. Delicate hands are difficult to heat uniformly for the hardening process. It is difficult to prevent overheating the material. If the steel is overheated, it will be damaged permanently.

One method that can be used to help avoid overheating is to heat the hand on a steel plate. The heat is applied underneath the plate. To use this method, place the hand on the steel plate and heat the plate until the hand is warm enough for powdered boric acid to adhere to the hand. When the hand is warm, it is dropped off of the plate into a container of powdered boric acid and is moved around in the powder until a uniform coating of the powder covers the hand. Then, the hand is placed on the steel plate and heated uniformly until the hand becomes a uniform medium cherry red color. At this point, plunge the steel plate with the hand attached end first into a container of cold water to harden the hand.

After this, the hand is very brittle and must be handled with care. We now must temper the hand to

eliminate the brittleness. Using great care, make a bright spot on the hand with fine emery paper so the color will show up when the hand is tempered. Then, place the hand on some clean white sand in a tempering pan and heat the pan uniformly until the spot turns to first blue. After this, the hand must be polished and cleaned prior to reheating the hand to obtain the desired color on the completed hand.

A Finished Pair of Hands

Figure 11 shows the completed pair of hands. The minute hand is made using the same methods as used in making the hour hand except some minute hands have a square hole. Also, the top outside corner of the hub needs to be bevel turned and polished as shown in Figure 11. This is done while the hand is chucked on a mandrel.

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FROM THE WORKSHOP

By Jack Kurdzionak

Another Way to Hammer Home a Point

It is gratifying to receive comments from the readers of this column. In the November issue we published a suggested method to replace leather inserts in strike hammers. Our thanks to Bob Macomber, CMC, for his timely letter with his suggested method for replacing those worn out leathers.

Bob writes: Most leather shops carry Horsehide leather. This is the hardest. A leather punch (they come in various sizes) will give the usual size plug needed for a hammer. I have used this procedure for years. Put a small amount of Duco Cement in the brass hammer head, then press the leather plug which you have cut with the leather punch between the vise jaws and this will seat the plug correctly. The ce-

ment will care for any minor variation in the plug size. If there is any excess leather length, it can be cut off with an X-Acto knife. To harden if necessary, heat a piece of scrap iron red hot and press the leather onto it quickly. It gives a flat surface to the leather rather than a rounded one from an alcohol lamp.

Don't Get Burned

Every repair shop has its share of fire hazards. They include torches, soldering irons, space heaters, and flammable solvents. We usually have everything needed to start a conflagration and frequently no equipment to stop one. Steve Boynton of Massachusetts, has sent the following suggestion which applies to all of us. No time-piece will be repaired better or faster if we follow his suggestion, but his basic wisdom should be heeded by anyone with a repair shop

One very important, but often overlooked piece of equipment is the fire extinguisher. No shop is complete without one, and just like every other tool it requires maintenance. The one I own is good for A,

B, and C fires and was originally purchased for use in a large bakery.

For some reason the other day, I examined the bright red dust collector in the corner of my shop. The tag indicated it was last serviced in 1989. I called a local extinguisher company to service it. They put on all appropriate tags and labels, and delivered it for about \$25. They will now come by to inspect it at regular intervals. While a bright red dust collector doesn't help solve those troublesome clock repairs, it may save your clocks, business, or even your life. Please take the time to familiarize yourself and or employees with its location and operation. Also play it safe with space heaters, torches, and flammable liquids, and try to avoid ever needing to pull that fire extinguisher safety pin out.

Mainsprings, Mainsprings, and Mainsprings

We have all heard the old saying that the three most important factors in real estate are location, location, and location. During a recent four-day class given by ETA in Grenchen, Switzerland, the



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instructor, Mr. Betti, emphasized the importance of a good mainspring in the operation of a watch to such an extent that the participants kept repeating the word mainspring when asked about the most important part in a watch repair. When a watch has been properly cleaned, lubricated, and adjusted without attention given to the mainspring and its barrel, all of that work is for naught. To avoid problems arising from the mainspring and its barrel, Mr. Betti made the following suggestions to watchmakers in his class.

Make certain that the arbor in the barrel has the correct endshake and an absolute minimum of side shake. If the side shake is excessive, he recommends replacing the barrel if a new one is available. If not, carefully close the barrel holes with a staking tool. Excessive side shake reduces power output from the barrel.

Wipe the mainspring with a soft cloth to remove old lubrication from its surface. If the mainspring is not smooth for its entire length, discard it for a new one. Check its end piece for security and cracks. If it is not perfect, discard the spring. Do not lu-

bricate the new one. It has received a surface treatment during its manufacture which makes it self-lubricating. If using the old mainspring, lubricate it by passing its entire length through a small cloth moistened with a good grade of mainspring grease.

Do not lubricate the barrel wall of a manual wind watch. Do lubricate the barrel wall of an automatic watch with black moly lubricant. Place a small amount of the black lubricant in each of the recesses in the wall of the automatic watch barrel. Lubricate the barrel arbor with a good quality oil such as Moebius 9020.

Do not insert the mainspring in the barrel with your fingers. Do not wind the mainspring with your fingers. Use a mainspring winder to wind and insert the mainspring into the barrel.

Make certain that the mainspring you have inserted is the correct height for the barrel. It must not be too high for the barrel, otherwise it will generate internal friction on the barrel cover as it unwinds. The mainspring requires about .05 mm clearance under the cover of the barrel to prop-

erly function. A bit more than this is OK but if the clearance approaches .20 mm, the mainspring is not high enough.

The strength of the mainspring must be appropriate for the model watch you are repairing. The general rule is that the mainspring's strength (thickness) must be between 1/28 and 1/32 of the diameter of the barrel arbor.

The mainspring's length must be such that the mainspring must occupy 1/2 of the available space in the barrel when the barrel arbor is installed.

The barrel is the motor of the watch. If a watch is in good order, cleaned, lubricated, and properly adjusted and does not have acceptable balance wheel amplitude, Mr. Betti says to replace that mainspring. You cannot visually examine a mainspring and determine that it will properly power a watch. It may not have the proper resiliency (elasticity) and yet pass all visual examinations. The best procedure is, when in doubt, throw it out and replace it with a factory fresh spring.

Jack Kurdzionak



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MATERIAL MATTERS

By Peter W. Eckel

Since this is my first column for the *Horological Times* and, depending on your feedback, hopefully not the last, I should probably explain what this column is all about and introduce myself.

"Material Matters" is about watch material, also widely known as parts, and the people who supply the watchmaker with it. Whether you are a hobbyist, novice watchmaker, or a seasoned master watchmaker sooner or later you are going to need parts. In fact parts are a day-to-day necessity. That is where we, your watch material suppliers, come in. Material is something that no one talks about but everyone needs. The watchmaker and the material person are joined at the hip; whether we like it or not we need each other and I hope to make your next encounter with one of us more pleasant. I trust that with a little humor mixed with some information, I can help that to happen. First of all who am I and what qualifies me to talk to you about watch material? I am a material person with a little over twenty-one years experience. I began my career with the McCaw Company in Toledo, Ohio, in high school and am now one of its principals. That is one thing you'll notice about us, we material people tend to have been at our craft for a very long time. There is a very good reason for this. There is no school on earth, or any where else I know of, where you can learn to be a parts person. You have to learn it by doing it. That's where you watchmakers have us beat. You come out of school with a clue as to what you're supposed to be doing!

The first thing I would like to accomplish with the space I have left is to explode some myths that I've heard circulating about material people.

Myth #1. Material people are actually from another planet which explains their rather odd behavior. I can neither confute or deny this rumor but I believe

it's unlikely. Let's face it, what other planet would have us?

Myth #2. Parts people get a real kick out of sending watchmakers the wrong parts on purpose. I know for a fact that this is not true. The only time we would do such a thing is when you, the watchmaker, have an irate customer breathing down your neck and absolutely have to have a particular part the next day to save yourself from bodily harm.

Myth #3. Everybody knows what you mean when you order "the wheel next to that other wheel that is next to the plastic wheel, under the dohicky spring." Believe it or not, this type of description is common but we really don't know what you're talking about without more specific information about what the part does.

Myth #4. If you hold the part you need up to the phone we can see it and find it for you. This is something we've all tried. So far I have been unable to make it work. I'm still trying though and I'll let you know when I get the bugs out of it.

Myth #5. If you can fax orders in we should be able to fax the parts back, eliminating shipping charges and delays. Once again, I've tried this but the parts get damaged when I try to run them through the fax machine!

With those myths well dispelled we can now get on to some serious business. What is it that we material people need from the watchmaker to make things go more smoothly? The first thing that might be helpful is quite high tech but I'm sure everyone can get the hang of it with a little practice. The high-tech instrument of which I speak is a device known as a pencil and paper. Not too tough you might think, but you have no idea how easy it will be to take your phone order if you have written *everything* down ahead of time. I realize that everyone in this industry is looking to save time and making a list may seem like a bother, but look at the benefits. You won't forget anything ever again. Okay, well maybe you'll forget something once in a while but it will not be very often. Think of how many times you've placed an order and remembered something else you needed. You quickly call your material house back and hope against hope that they can add the item to your order so you won't

get charged for postage twice. Also, case numbers and movement numbers are much easier to read when you don't have the pressure of one of us breathing heavily while you track down your loupe to read the number. Not only that but you get the satisfaction of knowing that we did not hear you opening and closing each and every battery drawer while on the phone giving us your battery order.

I realize that this is beginning to sound like I'm picking on you right from the start, but I have to get these shots in before I have to respond to your pet peeves about us, and if you write I promise I will. So, help us help you. Please remember, case numbers for case parts, movement numbers for movement parts, crowns and some crystals have a color, staffs can be shock or regular, pocket staffs can be single or double roller, pivots can be conical or straight, balances can be flat or overcoil, and last but not least, cannon pinions and hour wheels may come in different heights.

Here are some helpful hints about your order that have nothing to do with the parts themselves. Most companies that you buy from use some type of account number. It is a good idea to keep this number or numbers by the phone or write it on your order if you fax it or mail it in. You may not realize how many of your stores and watch shops share very similar names. Also, it is a good idea to let the person taking the order know how you would like it shipped, such as first-class mail, ground (UPS, RPS, etc.), overnight, or second-day delivery. Last but not least, it's a good idea to let us know with each order whether you would like items that are out of stock back ordered or not. We realize that many watchmakers use more than one supplier and that's fine with us, but please do not back order items from more than one supply house and return whichever one comes in second. For those of you who order by fax or voice mail, these suggestions are even more important because we are not there to ask questions.

Now that we've been introduced, next time I'll tackle a subject that vexes us both, comebacks, yours and ours.

That's all for now and remember, material matters!

AWI Board of Directors Approve Committee Appointments

Immediately following the AWI Board of Directors meeting in June 1997, President Charles Cleves appointed chairmen and members to serve on the AWI Committees. After three ballots and numerous Option 3 comments, the committees have been approved by the AWI Board of Directors. The final ballot results are printed below. Y = Yes N = No O = No Vote (See page 45 for more Board voting information.)

Committees → Directors ↓	Constitution & Bylaws	Finance	Nominating	Area Reps	Certification	Contracts & Legal	Education	From the Workshop	Honor Awards	Identification Mark	Material Distributors Liaison	Membership	New Chapter Development	Publicity & Public Relations	Seminars & Workshops	Visual Aids	Adjunct Historian	Battery Number System	HT Advisory	Vendor Display	Project Extend	Technical Book Review	Technical	Strategic Planning
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Broughton	Y	N	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	Y
Burckhardt	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
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Carpenter, B.	N	N	Y	Y	Y	N	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	O	N
Cerullo	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	O	Y	Y	Y	Y	Y	N	Y
Christianson	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Cleves	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O
DeCorte	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Door	N	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Hartman	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y
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THE RECOIL ESCAPEMENT

By John P. Kenyon, CMC

The recoil escapement is one of the most common types found on clock movements. This type is notorious for running under adverse conditions where most other escapements would falter. It is designated as "recoil" because of the fact that with each supplementary swing of the pendulum, the escape wheel backs up or recoils slightly. The recoil is caused by the pallet moving further in between the teeth of the wheel after a tooth has dropped on it, changing the angular relationship of the pallet to the impulse angle of the wheel.

Verge Design

There are two variations of recoil escapement verges. The strip pallet verge illustrated in Figure 1 is frequently found in American short pendulum spring-driven clocks. The solid anchor verge illustrated in Figure 2 is found in some of the early English and American weight-driven grandfather clocks.

Operation

In Figure 3, a tooth of the escape wheel on a solid anchor recoil escapement is in contact with a pallet. Another tooth has just escaped from the opposite pallet. Between the time the tooth dropped from one pallet and another tooth locked on the other pallet, the escape wheel went on a brief free run called *drop*. It is the angular movement of the wheel after the impulse is completed. It allows clearance for the pallet to move in between the teeth without scraping down the back of a tooth, while the wheel is giving impulse to the other pallet. The drop should be about one degree.

When one tooth escapes from a pallet and drops, another tooth comes to rest against the opposite pallet. The overlapping of the tooth on the pallet is called *lock*. The wheel will move the pallet through an angle of about four degrees before it escapes. This is called *impulse*.

After the completion of the impulse, the wheel will immediately make a short quick drop and then lock on the opposite pallet, which has moved into position between the teeth to receive another tooth. This action is illustrated with broken lines in Figure 3.

In Figure 4, an escape wheel tooth on a strip pallet recoil escapement has just locked on a pallet. When it drops from this pallet, it will enter the space between the two pallets. This pallet is referred to as the *entry pallet*. Another tooth can be seen to have

just dropped from the other pallet. It will leave the space between the two pallets. This pallet is referred to as the *exit pallet*.

Adjustment and Repair

This escapement is one of the simplest to adjust. There are two adjustments: inside drop and outside drop. Lock is created in the design and when the drops have been correctly adjusted, the lock is in conformity. Inside and outside drop are adjusted separately.

Drop should be fixed at 1 to 1-1/2 degrees of wheel movement. A greater drop than this would result in excessive wear at the locking site on the pallets. The drops should be equal on both pallets; otherwise, they are too deep, shallow, wide, or narrow. It is not practical to measure drop. The distance must be estimated based on experience, but to conserve energy it should be as small as possible.

A condition that occurs when there is insufficient drop of a wheel at the exit pallet is known as close outside drop. Adjusting for outside drop is done by altering the center distance between the escape wheel and the verge.

Wear at escape wheel pivot holes will cause the wheel to drop closer to the verge, causing the action to be too deep. The contact of the wheel teeth on the entrance pallet takes place early, resulting in little or no drop at the exit pallet. To remedy this situation and prior to any other adjustment, pivot hole wear must be repaired, so that the center distance of the escape wheel and verge arbors can be corrected.

On movements with the escapement outside the plates, the pallet rides on a steel pin that is fitted into a brass arm that is riveted to the outside of the front plate. To adjust the center distance, the arm can be turned on the rivet.

On some movements with the escapement between the plates, the verge may be attached to an arbor pivoted between two moveable brass arms. Adjustment for the center distance is provided by slightly rotating the arms on their rivets.

Other movements may use different fixtures to adjust the center distance. In the case of an anchor bridge assembly, screw and pin holes may have to be elongated, and/or new pins installed. On a French clock movement (which frequently has a solid pallet anchor recoil escapement) an eccentric nut is adjusted.

Close inside drop is a condition that occurs when there is insufficient drop of a wheel at the entrance pallet. In this predicament, a tooth of the escape wheel contacts the entrance pallet late, and the drop at the exit pallet is in excess of the correct amount.

If the inside drop is in error, it can be corrected by closing or opening the pallets. Opening the pallets will increase the inside drop, and closing will decrease it.

To close pallets, place the verge with pads up on the open jaws of a vice as shown in Figure 5. Apply a few light taps with a hammer and brass punch placed at the mid-point of the verge. If the pallets are closed too much, they can be corrected by turning them over and punching the other side. The correct technique to use for opening pallets is to lay the verge with the pads or nibs across two short lengths of drill rod, placed across the open jaws of a vice as shown in Figure 6. As illustrated, punch the back of

the pallets at the mid-point.

Solid recoil anchor escapement pallets can be opened and closed by the same method, but with a little more difficulty.

Always check for hardness before adjusting pallets. Usually verges are hardened at the nibs with only the center section left soft for adjustment, but some are glass hard, especially those found in high-quality clocks. If necessary, anneal them before making the adjustment and then harden them again after.

Pallets are sometimes opened by grinding off the entry pallet, using care to maintain the same clearance angle.

Occasionally, pallets will be deeply pitted or grooved from wear. Any deep grooves that are present should be removed before adjusting for drop. This can be done using a coarse (#4) emery stick, followed with a medium (#2) emery stick, and then a fine grit (#4/0) emery stick to polish the surface. To avoid a cross action of the teeth sliding over fine ridges left by the emery sticks, grind in the direction conforming to the sliding action of the escape wheel teeth.

An approved method for building up worn or grooved pallets is to solder bits of a thin razor blade on the worn surface. Using this method, the old surface does not have to be removed since the metal thickness of a razor blade is almost negligible and just about enough to make up for escape wheel wear.

I will continue next time with the dead beat escapement. ☺



Figure 1. Strip pallet verge.

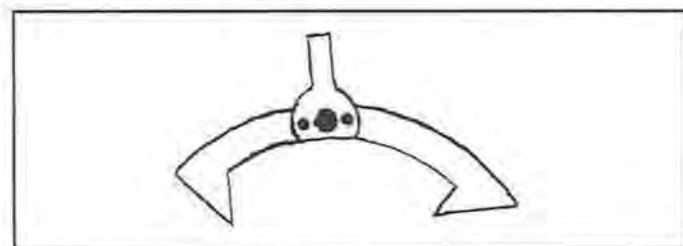


Figure 2. Solid anchor verge.

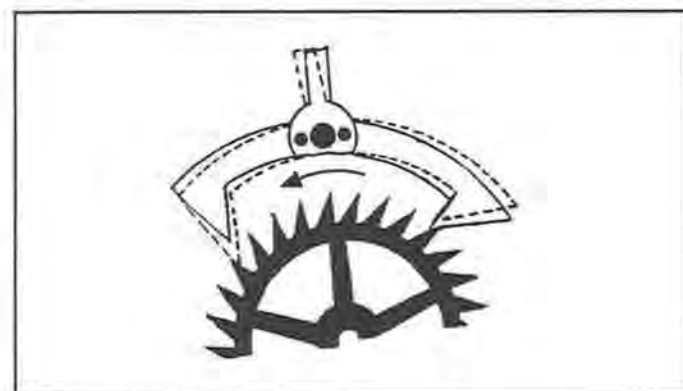


Figure 3. Solid anchor recoil escapement.

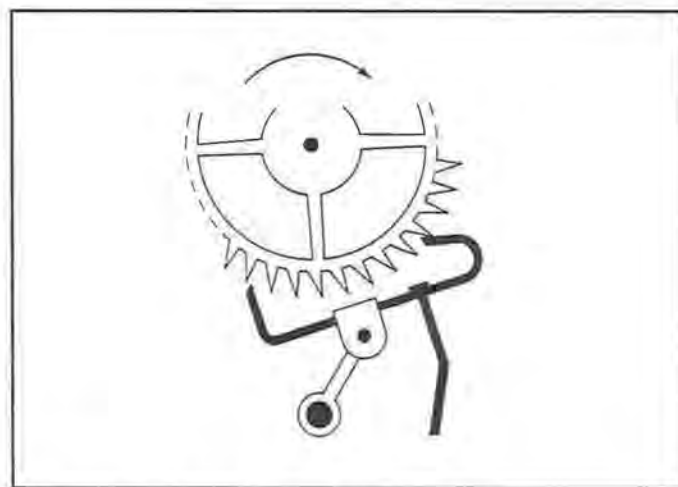


Figure 4. Strip pallet recoil escapement.

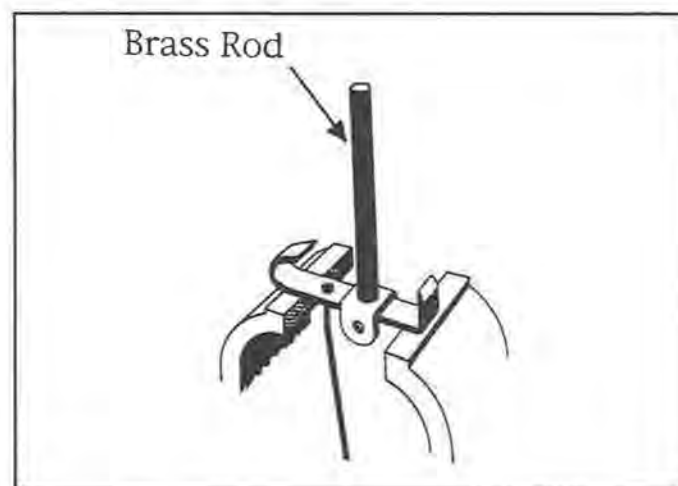


Figure 5. Closing pallets.

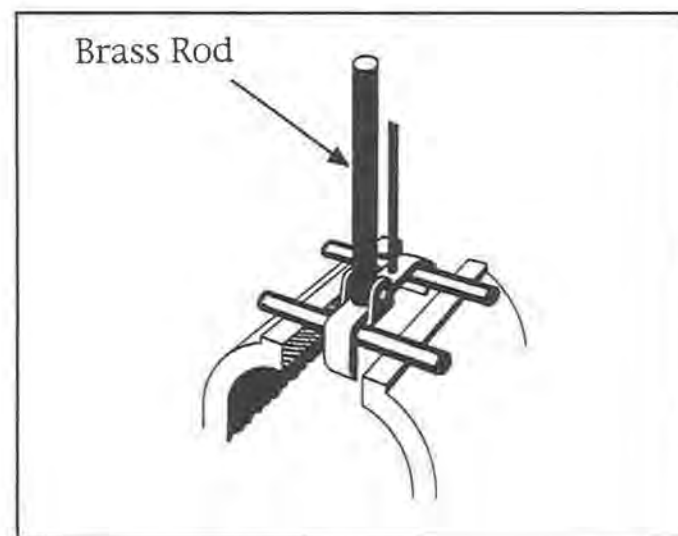


Figure 6. Opening pallets.

REPEATER, PETITE AND GRANDE SONNERIE CLOCKS

GEORGE GRAHAM BRACKET
CLOCK, PART 29

By Leo A. Jaroslaw

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Introduction

In this part we will briefly discuss the chime and strike trains. Then we will get into the chime and strike controls.

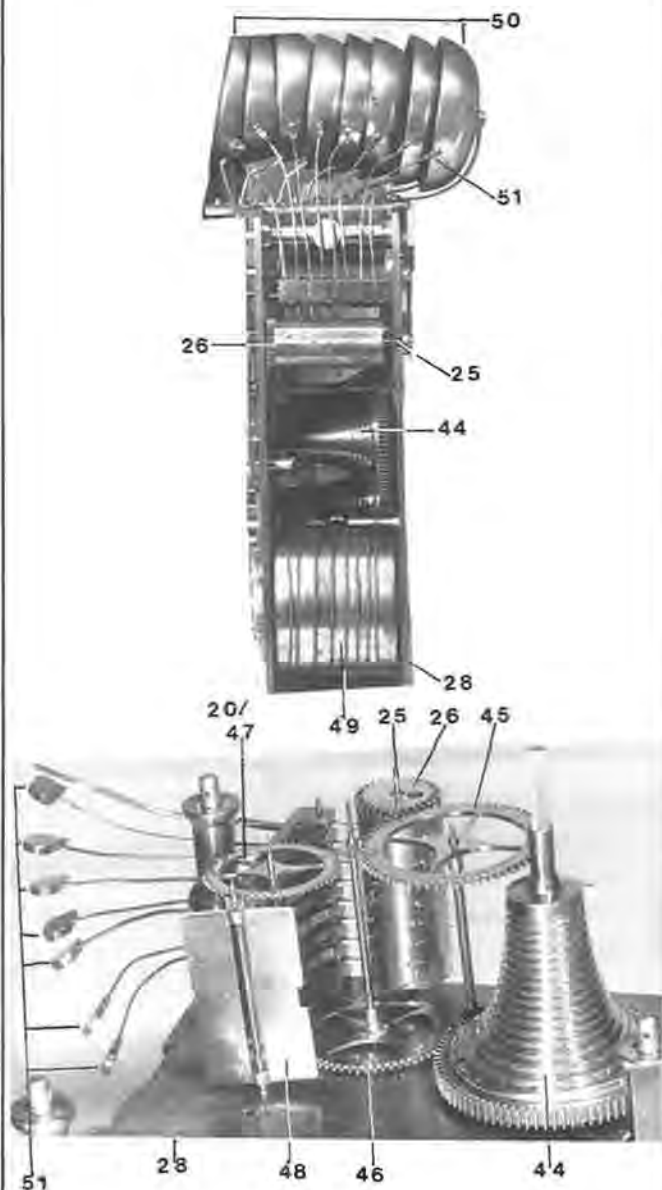
Chime Train (Figure 29.1)

As in the time train previously discussed, the chime train is powered by a fusee (44) and a fusee-type very heavy spring. The spring is in a barrel (49). The second wheel (45) drives both the chime cylinder (26) and the third arbor pinion. The third arbor extends through the front plate (20). The gathering pallet is mounted on the third arbor extension square. One rotation of the third arbor and the gathering pallet rotates the chime cylinder through an 8-note run on the scale. The chime cylinder has five rows of pins or scales. It is geared to rotate two revolutions in an hour; or ten revolutions of the gathering pallet. First quarter - 1 rev., second quarter - 2 revs., third quarter - 3 revs., and fourth quarter - 4 revs., for a total of ten revolutions of the gathering pallet. The fourth wheel is the warning wheel and also drives the chime train fan.

One problem in the design of this train is that there is no independent intermediate wheel to adjust the position of the cylinder pins in relation to the hammer tails. Prick punch timing marks are used for proper assembly. However, on this particular clock the timing marks were off. See more on this later in the series when we are assembling the movement.

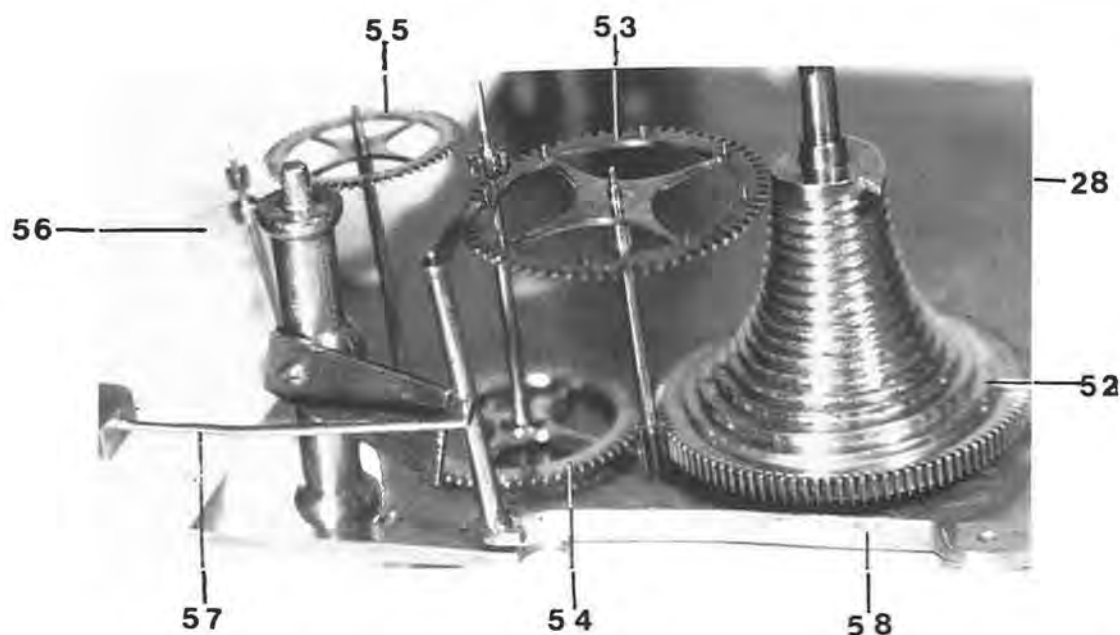
Strike Train (Figure 29.2)

This train like the other two is powered by a fusee (52) with a heavy fusee spring in a barrel (not shown). It is a normal strike train. The second wheel (53) has the hammer lift pins. The third wheel (54) arbor goes through the front plate (not shown). The gathering pallet is mounted on the square of that arbor's extension. The fourth wheel (55) is the warning wheel and also drives the strike train fan.



- | | |
|---------------------------|------------------------|
| 20 Front Plate | 46 Third Wheel/Arbor |
| 25 Chime Cylinder Arbor | 47 Fourth Wheel/Arbor |
| 26 Chime Cylinder | 48 Chime Fan |
| 28 Rear Plate | 49 Fusee Spring Barrel |
| 44 Chime Fusee/Main Wheel | 50 Bell Stack |
| 45 Second Wheel/Arbor | 51 Chime Bell Hammers |

Figure 29.1. Chime train components.



28	Rear Plate	53	Second Wheel/Arbor	55	Fourth Wheel/Arbor	57	Strike Hammer
52	Strike Fusee/Main Wheel	54	Third Wheel/Arbor	56	Strike Fan	58	Hammer Spring

Figure 29.2 Strike train components.

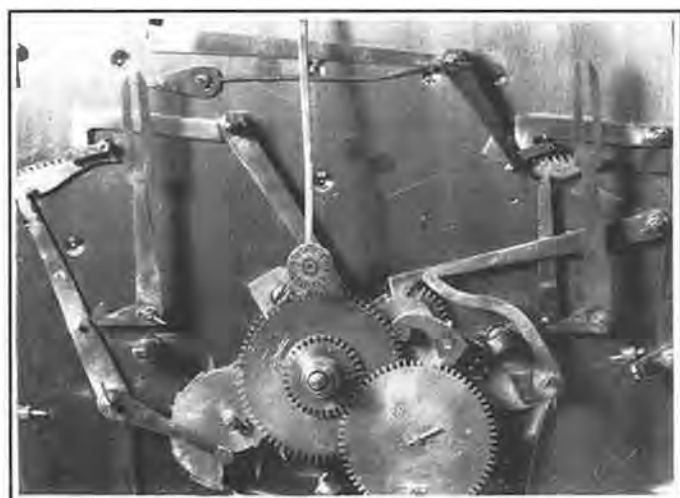
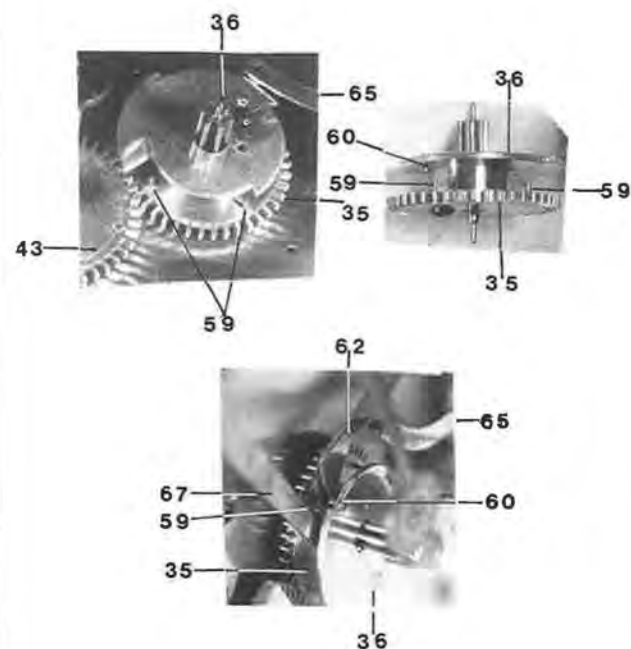


Figure 29.3. Behind the dial.

Chime Operation (Figures 29.3, 29.4, 29.5, 29.6, 29.7)

Control of the chime or quarter strike train starts with the minute wheel (35). The minute wheel has four lifting pins (59) mounted 90° apart. The quarter snail (36) and the pinion (not numbered) which drives the hour wheel are mounted as an assembly with the minute wheel on the same arbor. The hour lift pin (60) is mounted on the underside of the quarter snail. The warning lever (63) and the lift lever (62) are attached and make up the quarter warning assembly (61).

As the minute wheel rotates counterclockwise (CCW), the lift lever is contacted by one of the lift pins. As the pin



35	Minute Wheel	60	Hour Lift Pin
36	Quarter Snail	62	Lift Lever
43	Cannon Pinion	65	Quarter Rack Tail
59	Quarter Lift Pins	67	Hour Rack Hook Tail

Figure 29.4. Minute Wheel/Quarter Snail assembly.

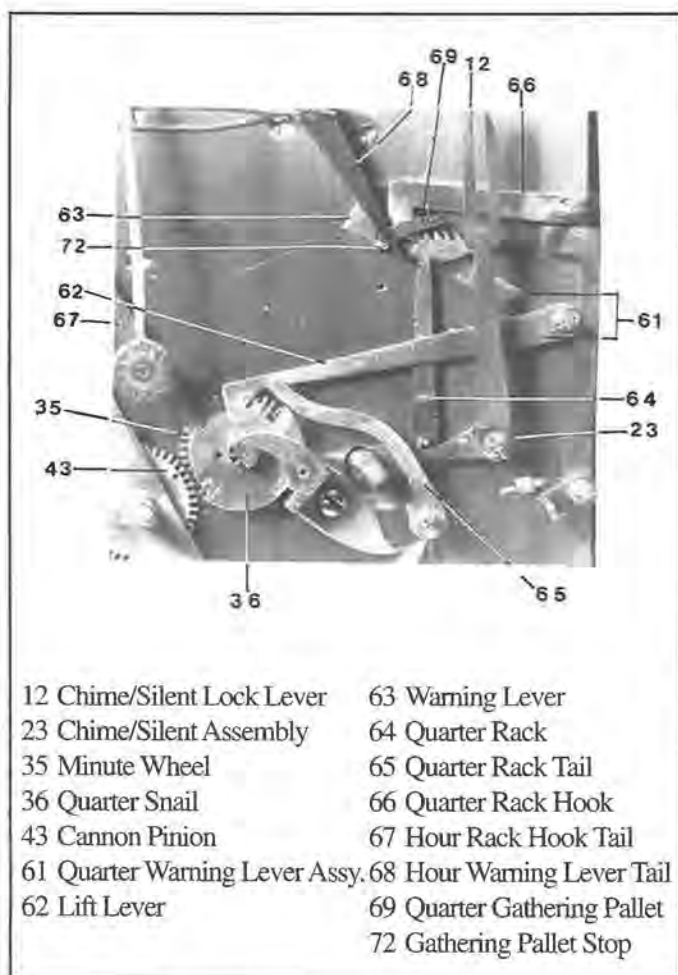


Figure 29.5. Chime control components.

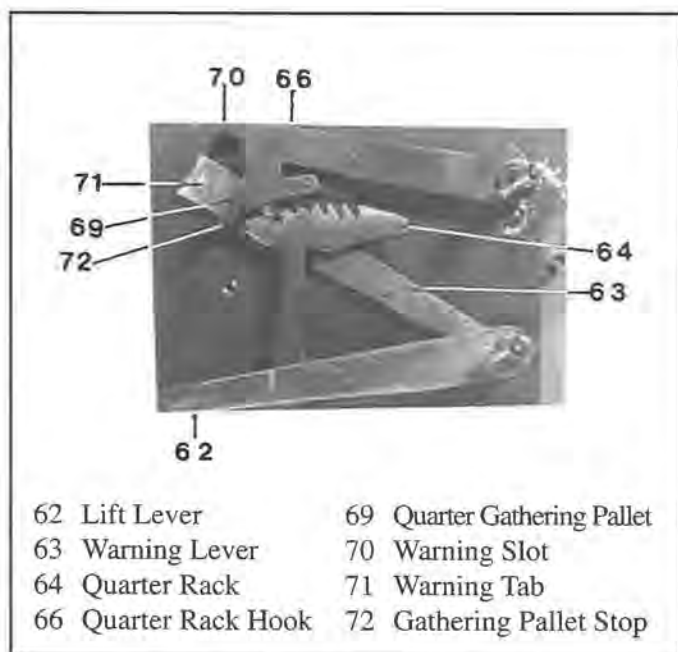


Figure 29.6. Chime control details.

lifts the lift lever, the assembly rotates clockwise (CW). A pin (not shown) attached to the backside of the quarter rack hook (66), rests on the upper edge of the warning lever. As the assembly is rotated, it lifts the quarter rack hook by the pin, initiating several almost simultaneous actions: 1- The quarter rack is released. It rotates CCW until the rack tail comes to rest on a step of the quarter snail. 2- The movement of the rack releases the gathering pallet, which starts to rotate CCW. 3- The quarter train starts and runs until the stop pin on the warning wheel contacts the warning stop tab on the warning lever. The warning stop tab by this time has been lifted into the path of the warning wheel stop pin. The chime or quarter strike train is now waiting in warning. 4- The hour warning lever tail (68) is released by the quarter gathering pallet stop pin (72) which was holding the tail in the run position. 5- The hour warning lever (76) and its tail (68) is rotated CW by the hour warning spring (79) to the warning position.

During the first three quarters, even though the hour warning is shifted into the warning mode, the strike train does not go into warning. The rack is still held by the rack hook and the gathering pallet is not unlocked. This provides the petite sonnerie action rather than the grande sonnerie, where the hour would strike after each quarter.

Shortly after the quarter rack is released for the fourth quarter, the hour rack hook tail (67) is contacted by the hour lift pin (60). The rack hook is rotated CW releasing the hour strike train. It runs until the hour warning wheel pin contacts and is stopped by the hour warning tab (78) which is mounted on the end of the warning lever (76). The tab protrudes through the slot (77) in the front plate (20). The warning lever has been released by the quarter rack stop pin and is now in the path of the warning wheel stop pin. The hour strike train is now in warning.

As the minute hand approaches one of the quarters, the lift lever (62) drops off the lift pin (59). This results in several simultaneous actions. 1- The warning lever (63) drops, moving the warning tab (71) out of the path of the warning stop pin. 2- The chime train runs. 3- The gathering pallet gathers the quarter strike until it is stopped by its stop pin, completing the cycle.

Sonnerie Hour Strike (Figures 29.4, 29.5, 29.6, 29.7)

Upon completion of the quarter strike, the gathering pallet stop (72) contacts and rotates the hour warning lever tail CCW. This removes the hour warning tab (78) from the path of the strike warning wheel pin. The hour strike train then runs.

Note: There is a fault in this design. Now that you know how it works, when I describe it you will understand why. The system works fine as long as the "chime/silent" and the "strike /silent" are both in chime-strike or both in "silent." It also works well with the strike in "silent"

and the quarter strike in "chime." However, with the quarter strike in "silent" and the hour strike in "strike," at about three minutes before the hour the strike train is activated and strikes continuously uncontrolled. The striking stops when the minute hand goes past the "12." It therefore is impossible to determine the hour being struck.

In this condition the quarter rack is locked (silenced) in its stop or gathered position with the gathering pallet against its stop. The strike warning lever tail (68) is lifted by the pallet stop. In this condition the hour warning lever (76) is in the run position with its tab (78) out of the path of the stop pin on the strike warning wheel. As the minute wheel approaches the hour position, the strike rack hook tail (67) is depressed by the hour pin (60). This lifts the rack hook. Since the "strike/silent" is in "strike" the rack is released, releasing the gathering pallet. As the warning lever is in "run," the strike train runs, rather than going into warning. The running and therefore the striking continues until the rack tail drops off the hour pin on the hour. At that time the rack hook,

rack, and gathering pallet revert to normal active counting the hour and stopping upon completion of the count. In this condition there is no gap between the uncontrolled and the controlled striking.

If the hour strike is in "silent," the quarter strike (chime) is not affected and works as it should.

The number of strikes is controlled by the position of the hour strike snail (39). The snail is shifted by the starwheel (40) which is part of the same starwheel/snail assembly. Just a few minutes before each hour, the starwheel and therefore the snail is shifted by a pin (not shown) on the underside of the cannon pinion wheel (43). This of course rotates at one revolution per hour. The positioning of the starwheel and snail is controlled by the spring loaded jumper (41).

The hour strike system on this 1751 Graham movement is comparable to many modern rack and snail count movements.

This concludes Part 29. In Part 30 we will start disassembling the movement.

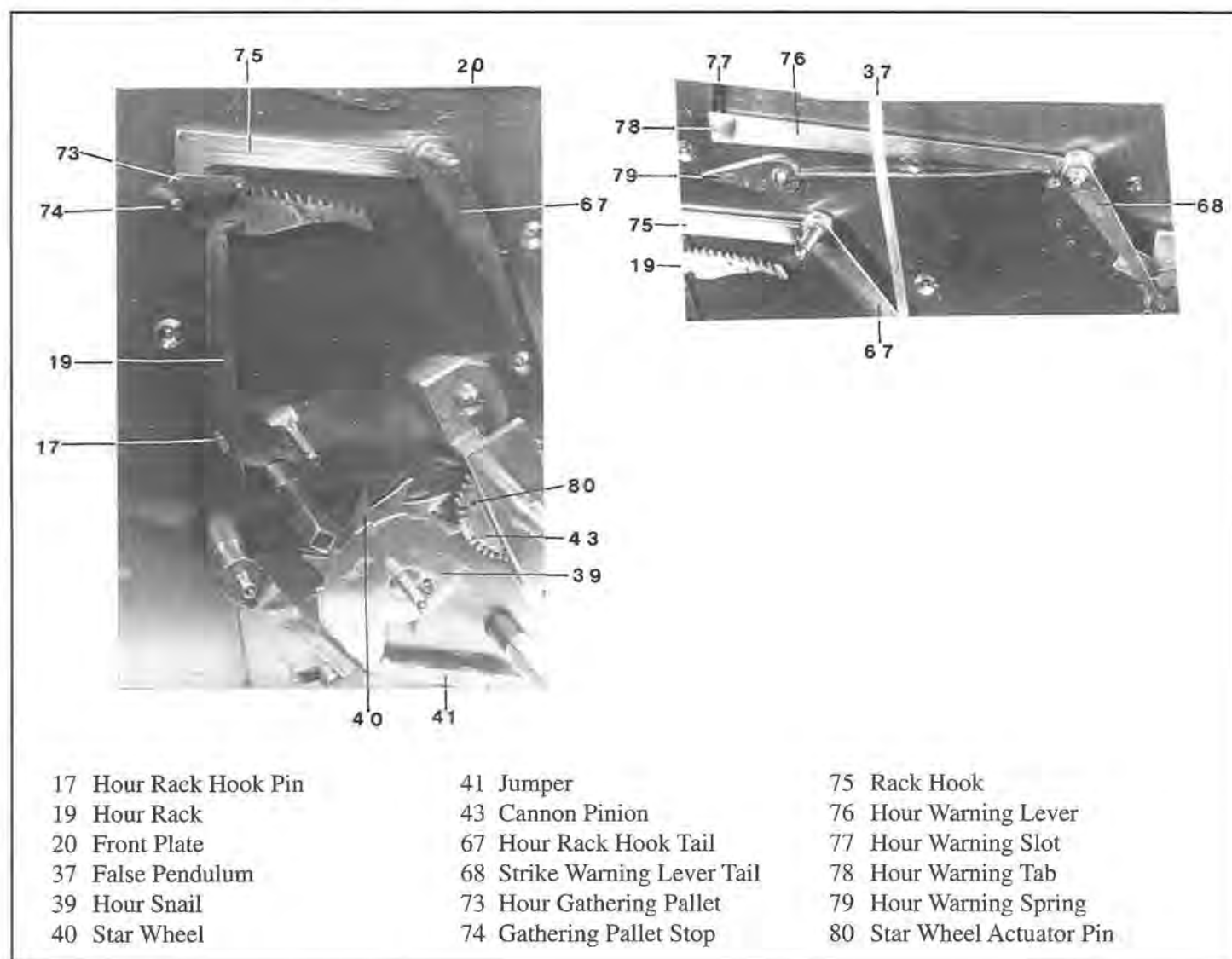


Figure 29.7. Strike control components.

AFFILIATE CHAPTER COLUMN

By Dennis Warner

As I have traveled across the United States I have been fortunate to visit some very interesting and successful AWI Chapters. In 1996 I attended the North Carolina Watchmakers Annual Convention in Charlotte. Great southern hospitality and a wealth of information was in abundance. I was made to feel at home from the time I was picked up at the airport to the time I departed. I would like to thank all the officers of NCWA and their Interim Editor, Mack Shuping for information supplied to all through their monthly newsletter *WATCH WORD*. A very special thanks goes to Emilio "Herb" Aponte for preparing the feature article and photos that follow.

North Carolina is a unique Affiliate Chapter consisting of seven independent guilds across the state. Each guild has its own separate organization with its own officers and membership; each sends four representatives to the quarterly Affiliate Chapter meetings. At the East coast we have the Crystal Coast and Coastal Plain Guilds, in the center of the state the Cape Fear, Golden Triad, and Triangle guilds and in the Western part of the state the Unifour and Metrolina guilds. During the 1930s watchmakers and jewelers from the Charlotte area decided to organize and have regular meetings. Their goal was to share information and help their peers. This also led to inquiring as to the latest technology of the time. They organized the North Carolina Watchmakers and Jewelers Association. Some years later they renamed the Affiliate Chapter the North Carolina

Watchmakers Association. Another part of their long range plan was to help the state set up a licensing law for watchmakers. In 1958 a watchmaking and jewelry repair school was established at Wayne Community College in Goldsboro. Through the ensuing 31 years, many good watchmakers and jewelers were trained and all took the licensing examination offered annually at the college.

In 1968 the Association became an AWI Affiliate Chapter. With the help of AWI, the traveling courses and the law, the members took advantage of all the help available and improved their skills.

In 1975, the Cape Fear Guild addressed a growing and widespread situation in North Carolina — trades persons were retiring, stores were closing and tools, parts, and equipment were being stored and forgotten. So, in 1976 they created the first (watchmakers and jewelers) auction. It was held outdoors in the July sun beside a baseball field. Despite the dust and heat it was a great success. After that first year, the guild rented the American Legion Building the third Sunday of each July. Yearly attendance has grown to about 150 from five states.

There still existed a need to recycle used tools and equipment. After much planning the Golden Triad Guild held their first auction in November 1991 in Ashboro. Both auctions continue to be successful and provide North Carolina watchmakers and jewelers with valuable services.

From its inception the NCWA has held a three-day annual convention. The purpose of which has always been to help upgrade skills and teach the latest techniques of the trades. The convention begins on Friday evening with an "old tool" auction to raise funds for the Association. Saturdays begin with at least three lectures scheduled, followed by an awards banquet and entertainment in the evening. Two more lectures are slated for Sunday morning before the convention wraps up with a luncheon and

installation of new officers. The officers have always arranged for lecturers and guest speakers to provide classes in jewelry repair, watch and clock repair, and the latest innovations in our industry. Since 1995, an all day AWI bench course has been offered on Friday as an extra for the convention.

In 1996 the first roundtable discussion was held. At the roundtable, three guests are invited to lead the discussions. As questions are asked, the guests answer, then all in attendance are given the opportunity to share their views and experience.

The officers and representatives meet each three months to plan and finalize the program for the convention. Hotel arrangements must be made, speakers booked, meals and entertainment planned, plus all the small touches that make an association and convention successful.

I hope that new chapters and long standing ones will glean ideas from strong chapters like the North Carolina Watchmaker's Association. Their success is reflected in the persons who have contributed to AWI for many years.

Emilio Aponte, Jr.



Speakers at the 1996 meeting (L-R): Bernhard Stoeber, August Cornell, Dennis Warner, and Robert Porter.



Eric Parris conducted the auction at the 1996 annual meeting.



August Cornell and Mack Shuping.



Display room gathering (L-R): Rick Dunnuck, S. LaRose, Inc.; Greg Murray, Murray Jewelry Supply; Henry Livesay, Livesay's Inc.; and Bill Tolbert, Cas-Ker Co.



Gerald G. Jaeger lectures on the Atmos clock.



June 1996 meeting (L-R): Bernhard Stoeber, August Cornell, Robert Porter, Buddy Carpenter, Dennis Warner, and H.B. James, Jr.



Installation of officers for 1996-1997 (L-R): Bill Tolbert, Past President; H.B. James, Jr., President; Scott Lemons, First Vice President; Truett Underhill, Second Vice President; and Alice Carpenter, Secretary-Treasurer.



Charles Smith and Randy Lowrey, instructor for a jewelry course.

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RICOH

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KIP

LANCO

IOVINO

LONGINES

MARVIN



THE 1998 LATHE PROGRAM

Instructor—Roy A. Hovey

The 1998 Lathe Program has been designed with the following objectives in mind:

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

The 1998 Lathe Program will retain all of its traditional characteristics. Several improvements have been made in both the bench courses and in the Project Extend Resident Program. As of last fall, all members interested in attending specific lathe courses while the 45-week Academy of Watchmaking is in session are welcome to do so on a space available basis.

Each of the Watchmakers Lathe Program blocks of instruction are shown in Table I. These courses are normally offered in blocks that make it economical to conduct them in the Project Extend Education Center or as part of the AWI Bench Course Program. Individual members, representatives of state organizations, affiliate chapters, and schools interested in scheduling these courses are welcome to contact AWI Central.

Considerable progress has been made in providing a program of instruction for micro lathe owners that parallels that of the 1998 Watchmakers Lathe Program. These courses are shown on Table II. Because of the considerable differences existing between watchmakers lathes and micro lathes, an appropriate series of projects that are particularly well suited for both types of machines has been developed.

For those interested in obtaining a general overview of the 1998 Watchmakers Lathe and Micro Lathe programs, a one-day introductory course is available. This course lends itself to being conducted in conjunction with state conventions and annual guild meetings. Attendees registering for this course can expect to learn how to prepare and use cutting tools suitable for use on both the watchmakers lathes and micro lathes. Affiliate chapters and state

organizations are welcome to make arrangements with AWI Central to have this course included in their convention program.

Every effort has been made to provide the student with something worthwhile at the end of each block of instruction in the 1998 Lathe Program. Most of the material has been pre-machined so very little class time is required to assemble a variety of student projects. The tools and lathe accessories the student makes during these courses are his to keep and their value far outweighs the cost of the materials. Students will have the option of bringing material to make their own cutting tools or it can be purchased as needed while the course is in progress.

Considerable success has been experienced with the teaching concept being used in the current lathe program. This concept is designed to provide a learning experience that instills confidence in the student. It is accomplished by using a progressive building block pattern. In the basic courses, the student learns new skills using fairly large work pieces. As the program progresses, the student continues to refine the skills already learned while working with smaller and smaller components to develop his confidence. Each block of instruction is designed to add new skills while providing continued reinforcement of those already mastered.

The participation of directors and those in the local community where AWI bench courses have been conducted has always been a major part of the lathe program. Special recognition is extended this year to Jack Kurdzionak, Bill Burnley, and Bill Carson for their support of the Phase IV course conducted in Chelmsford, MA in January of 1997. Another special word of thanks is extended to Nino Gonzales for the outstanding display of AWI Lathe Course projects at the Fiftieth Anniversary Texas Watchmakers Association that students in the Austin area made during Phases I - IV. Another word of thanks is well deserved by Jim Huckabee for his presentation as a guest instructor during the Introduction to the Lathe Program course conducted in conjunction with the Texas Watchmakers Convention in August. Others who have generously given of their time and expertise include Mike Mishou, Jeff Pomeroy, and David McClellan.

Each block of instruction offered in the Project Extend Resident Program will be made available to those who elect to participate in the 1998 Bench Course Lathe Program. Phase I, Phase II, and Phase

III will be broken into four-day segments. The instructor will return to the same city three times to present each of these segments. Phases IV and V will normally be offered in a six-day configuration in both of the resident programs. When these courses are taught as part of the AWI Bench Course Program they will be abbreviated into four-day blocks of instruction.

Individuals or groups interested in making arrangements to have the Lathe Program presented in the resident or bench course configuration should make inquiries regarding scheduling and fees with AWI Central. Group spokesmen or individual members interested in obtaining illustrated publications which present a pictorial account of what is to be accomplished during each day of instruction may obtain a copy of *The Watchmakers Lathe Program* or the companion booklet, *The Micro Lathe/Micro Mill Program* from AWI Central. Brochures for each major block of instruction shown on Table I and Table II are available to members interested in information pertaining to specific courses.



Truett Underhill cuts a watch wheel during the Phase IV Wheel Cutting course conducted in Charlotte, NC, February 14-17, 1997.



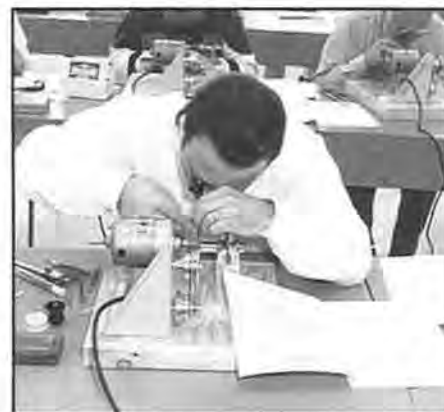
Dennis Warner works on a project during The Introduction to the Lathe course conducted in Austin, TX, August 15, 1997.



Richard Zielike grinds a wheel cutter during the Phase V course on Making Wheel Cutters conducted in Eagan, MN, April 4-7, 1997.



Guest instructor Jim Huckabee demonstrates how to make a bushing during The Introduction to the Lathe course conducted in Austin, TX, August 15, 1997.



Toby Witherspoon from Kilgore College makes a balance staff during a special Turning Between Centers class conducted for REC Council instructors, April 13-14, 1997.



Nino Gonzales organized a special exhibit showing examples of work accomplished during Phases I through IV by students in the Austin area. This exhibit was a highlight of the fiftieth anniversary convention of the Texas Watchmakers Association held on August 15, 1997.

TABLE I

THE 1998 WATCHMAKERS LATHE PROGRAM

INTRODUCTORY COURSES		
Introductory Courses (One Day) Only held in conjunction with a convention.	WATCHMAKERS Introduction to the Watchmakers Lathe Program The student will receive an overview of the lathe program, turning theory and cutting tools.	CLOCKMAKERS Introduction to the Clockmakers Lathe Program The student will receive an overview of the lathe program, turning theory and cutting tools.
SKILL DEVELOPMENT COURSES		
PHASE I (Four Days) Request Phase I Brochure	WATCHMAKERS Basic Lathe Operations for the Watchmaker The student will prepare steel and carbide cutting tools. He will make a set of jewel pushers and six staking tools.	CLOCKMAKERS Basic Lathe Operations for the Clockmaker The student will prepare steel and carbide cutting tools. He will make a boxwood chuck arbor and a set of five clockmakers punches.
	Lathe Accessories for the Watchmaker The student will construct a set of brass cement chucks, a precision grinding arbor, a tailstock drilling pad, and a filing rest with a micrometer adjusting mechanism.	Lathe Accessories for the Clockmaker The student will make a lantern pinion drilling guide, a precision grinding arbor, a tailstock drilling pad, and a filing rest with a micrometer adjusting mechanism.
PHASE II (Four Days) Request Phase II Brochure	Watch Wheel Blanks and Arbors The student will make an arbor and a wheel blank. These components will be mounted to make a watch wheel ebauche. He will also make a chronograph idler wheel ebauche.	Clock Wheel Blanks, Hubs and Arbors The student will make an arbor, a hub, and a wheel blank for a clock. These components will be mounted to make a clock wheel ebauche. He will make a lantern pinion to include the arbor, shrouds, and trundles.
	Winding Stems and Spring Barrel Arbors The student will make a winding stem and a winding arbor for a pocket watch.	Winding and Function Control Arbors The student will make an arbor to regulate the time keeping function and a winding arbor for a clock.
PHASE III (Four Days) Request Phase III Brochure	Turning Watch Staffs Between Centers, Repivoting and the Use of the Jacot Tool The student will cut a balance staff for an English pocket watch between centers, learn to repivot two sizes of watch wheels, and burnish pivots using the Jacot tool.	Turning Large Marine Chronometer Staffs between Centers, Repivoting and the Use of the Jacot Tool The student will cut a balance staff between centers for a large marine chronometer, repivot two sizes of clock wheels and burnish pivots using the Jacot tool.
	Jeweling and Cutting Staffs The student will make a setting and secure a jewel in place. He will cut a staff for a small pocket watch using a cement chuck.	Jeweling and Cutting Staffs The student will turn a large jewel setting for a marine chronometer balance and secure the jewel in place. He will cut a staff for a small marine chronometer using a cement chuck.
PHASE IVA (Four Days) Request Phase IV Brochure	Cutting Watch Wheels Using Commercially Produced Cutters The student will make a large and small watch wheel using specialized equipment provided by the instructor.	Cutting Clock Wheels Using Commercially Produced Cutters The student will make a large and small clock wheel using specialized equipment provided by the instructor.
	Cutting Watch Wheels Using Fly Cutters The student will make fly cutters to make large and small watch wheels on equipment provided by the instructor.	Cutting Clock Wheels Using Fly Cutters The student will make fly cutters to make large and small clock wheels on equipment provided by the instructor.
PHASE IVB (Four Days) Request Phase IV Brochure	Cutting Watch Pinions The student will make a brass and steel pinion for a watch and place a smooth surface on the leaves.	Cutting Clock Pinions The student will make a brass and steel pinion for a clock and place a smooth surface on the leaves.
	Note: The six-day Phase IV Resident Course ends and Phase V begins at this point.	
	Making Escape Wheels The student will be introduced to several methods of making escape wheels for watches.	Making Escape Wheels The student will be introduced to several methods of making escape wheels for clocks.
PHASE V (Four Days)	Making Cutters for Train Wheels The student will be introduced to several methods of making cutters for restoring modern and antique watches.	Making Cutters for Train Wheels The student will be introduced to several methods of making cutters for restoring modern and antique clocks.
ADVANCED WATCHMAKERS LATHE SPECIAL INTEREST COURSES		
Cross Slide Operations (Four Days)	WATCHMAKERS The student will make a general purpose cutting tool and a boring bar. These tools will be used to make a key set center wheel, a winding ratchet, a spring barrel, and a fusee ebauche for an antique pocket watch using a cross slide.	CLOCKMAKERS The student will make a general purpose cutting tool and a boring bar. These tools will be used to make a center wheel, a winding ratchet, a spring barrel, and a great wheel using a cross slide.

TABLE II

THE 1998 MICRO-LATHE AND MICRO-MILL PROGRAM

INTRODUCTION		
PHASE I Introductory Course (One Day) Only held in conjunction with a convention.	WATCHMAKERS Introduction to the Micro-Lathe Program The student will receive an overview of the lathe program, lathe maintenance, turning theory and cutting tools.	CLOCKMAKERS Introduction to the Micro-Lathe Program The student will receive an overview of the lathe program, lathe maintenance, turning theory and cutting tools.
SKILL DEVELOPMENT COURSES		
PHASE I (Four Days)	WATCHMAKERS Basic Lathe Operations for the Watchmaker The student will make several small steel cutting tools and will be introduced to a variety of methods for sharpening them. These will be used to make other tools that will be used throughout the course.	CLOCKMAKERS Basic Lathe Operations for the Clockmaker The student will make several small steel cutting tools and will be introduced to a variety of methods for sharpening them. These will be used to make other tools that will be used throughout the course.
	Micro-Lathe Accessories for the Watchmaker The student will make a filing rest with a micrometer adjusting mechanism and an indexing device from pre-machined parts supplied by the instructor.	Micro-Lathe Accessories for the Clockmaker The student will make a filing rest with a micrometer adjusting mechanism and an indexing device from pre-machined parts supplied by the instructor.
PHASE II (Four Days)	Watch Wheels and Arbors The student will make a large watch wheel blank and mount it on an arbor using the micro-lathe. He will then make a center wheel with a setting device for an antique key wound pocket watch.	Clock Wheels and Arbors The student will make a clock great wheel blank and mount it on an arbor using the micro-lathe.
	Winding Arbors The student will make a winding arbor for an antique pocket watch using the micro-lathe.	Winding Arbors The student will make a winding arbor for an antique clock using the micro-lathe.
PHASE III (Four Days)	Turning Between Centers The student will make a set of coned centers and a faceplate suitable for turning small work pieces.	Turning Between Centers The student will make a set of coned centers and a faceplate suitable for turning small work pieces and will use it to make a center wheel arbor.
	Making Spring Barrels The student will make a spring barrel and cover with the micro-lathe.	Making Spring Barrels The student will make a spring barrel and cover with the micro-lathe.
PHASE IVA (Four Days)	Cutting Watch Wheels Using Commercially Produced Cutters The student will make a large and small watch wheel using specialized equipment provided by the instructor.	Cutting Clock Wheels Using Commercially Produced Cutters The student will make a large and small clock wheel using specialized equipment provided by the instructor.
	Cutting Watch Wheels Using Fly Cutters The student will make fly cutters to make large and small watch wheels on equipment provided by the instructor.	Cutting Clock Wheels Using Fly Cutters The student will make fly cutters to make large and small clock wheels on equipment provided by the instructor.
PHASE IVB (Four Days)	Cutting Watch Pinions The student will make a brass and steel pinion for a watch and place a smooth surface on the leaves.	Cutting Clock Pinions The student will make a brass and steel pinion for a clock and place a smooth surface on the leaves.
	Note: The six-day Phase IV Resident Course ends and Phase V begins at this point.	
	Making Escape Wheels The student will be introduced to several methods of making escape wheels for watches.	Making Escape Wheels The student will be introduced to several methods of making escape wheels for clocks.
PHASE V (Four Days)	Making Cutters for Train Wheels The student will be introduced to several methods of making cutters for restoring modern and antique watches.	Making Cutters for Train Wheels The student will be introduced to several methods of making cutters for restoring modern and antique clocks.
ADVANCED MICRO-LATHE/MICRO-MILL SPECIAL INTEREST COURSES		
MICRO LATHE/MICRO MILL OPERATIONS (Four Days)	WATCHMAKERS The student will make a winding ratchet and a simple rack and snail for a quarter repeater pocket watch using specialized equipment provided by the instructor.	CLOCKMAKERS The student will make a winding ratchet and a simple rack and snail for an antique clock using specialized equipment provided by the instructor.

ASK

HUCK

By J.M. Huckabee, CMC, FBHL, FAWI

THE TIRED AMERICAN CLOCK

PART 8

While this series is in progress, Mr. Huckabee will continue to answer questions on other subjects that may be sent to him by way of this column. Feel free to continue to direct your questions to: "Ask Huck," c/o Horological Times, 701 Enterprise Drive, Harrison, Ohio 45030.

This series continues with a problem of wheel-pinion depthing and damaged pivot holes.

Q. I find pivot holes with damaging punch marks—an effort to close a worn hole. What can be done with this shameful situation? The second problem is a bushing off location that affects wheel pinion depthing. How can this be restored?

A. There is no ideal solution to your problem. However, we must "do what we must do." A satisfactory repair can be made and the damage obscured. Even so, we leave evidence of our repair.

The Damaged Plate

Solder can be removed from a plate. Heat the lower side with a

soft flame (propane torch) and quickly wipe with a damp cloth. A few passes gets everything except a very slight tined surface. Rub that off with a Scotch-Brite Scour Pad.

Punch marks cannot be obscured. I cut a hole in the plate, insert a filler, and place a bushing in the filler. Drill a hole 1/4", 5/16", 3/8" in diameter as damage and space dictates. The hole edges are chamfered on both plate sides. A suitable brass disc with chamfered edges is lathe-turned to suitable thickness. Size the disc about 0.002"-0.003" oversize and press it into the hole. Those familiar with lathe work can do the job in less than ten minutes. The joint line is not obscured, but will evidence a repair of good workmanship.

Use a divider and strike the pivot location. Use measurements from the opposite plate. This repair is about the only way I know to dispose of the punch marks, or a badly off-location bushing.

An Off-location Bushing

For a small degree of relocation, remove the bushing, move the plate hole with a round file,

ream the new location, and install a bushing of larger outside diameter.

Wheel Depthing Tolerance

Liberal backlash in old American clock gearing makes these gear trains very tolerant to depthing errors. The lantern pinions are very free running and small errors in depthing may go without notice. This means that no other clock movement is more tolerant to slight errors in pivot work. These gear trains are the marvel of mechanical industry in freedom of operation. Short pendulum movements may have a step-up ratio of several thousand, winding arbor-to-escape wheel.

Forward

More problems and solutions will continue next month. 

If you have any questions, please write:
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LET'S HELP OURSELVES

By Jack Kurdzionak

I recently saw some disturbing salary statistics for watchmakers and some encouraging ones for auto mechanics, and tool and die makers. The average salary for a full-time watchmaker as published in one of our trade journals was in the low 20K range. According to a recent *Wall Street Journal* article, a good flat rate full-time auto mechanic could expect to earn at least 45K and some go to near 100K annually. Another periodical cited a watchmaker who changed his profession to tool and die making in the upper midwest and he expected to earn in the 40K range.

The above figures would not encourage a young person with good mechanical skills to become a watchmaker. He might truly enjoy his profession but it would be difficult to support himself, let alone a family on the wages earned by the average watchmaker. Those salary figures are grim but the outlook for the future watchmaker is not without hope. The watchmaker of today and the watchmaker of the future, who hope to earn a salary in line with other skilled professions, must examine their situations and alter it to their advantage. The watchmaker who works for a company or store is not in a very strong position to alter his salary or working conditions. He can stay and negotiate a better situation or leave to work for another employer. There are advantages in working for an employer. There will be a paycheck every week, benefits such as paid vacations, holidays, etc., and overtime pay for extra work.

The other watchmaker, the self-employed one, is probably in the majority in our profession. His benefits are small or next to none. He doesn't know a paid vacation from a paid holiday. Sick pay is what

he pays for medical care. He keeps all of the shop income until he pays his bills. Most self-employed craftsmen pay a huge price for the benefits of self employment including a double social security tax called the self-employment tax.

His outlook is not hopeless. The self-employed watchmaker is the one who can make the greatest change in his situation because he has control of his situation. He must recognize what he is doing. He is selling his time and a few parts to his customers. He must charge for every minute he spends working because that is what he is selling. Can you imagine going into the local Megamart with the expectation of receiving free merchandise because you have shopped there before? I don't think it will happen. Yet many watchmakers give their services and products away on a routine basis to customers and noncustomers.

Spring bars are an excellent example of what I have in mind. Do you give them away to customers because they only cost a few cents each or because they only take a minute or two to install? They don't sell them or give them away at the Megamart and why should you? Do you adjust a watch bracelet that you didn't sell for no charge or a nominal charge?

The time, tools, and skills required for that job are ones that you have. You should charge for the time, the skill, and the use of your tools. After all, tools wear out and break, and become obsolete. If you did not make a profit on the sale of the item you should make a profit on its repair or adjustment. The sales clerk at the Megamart made a commission on the sale and only knew how to sell the product. He could not service it or adjust it.

Today's watchmaker must realize that he is in the business of selling parts. Every part must be marked up and sold. Also he must remember that he not only guarantees the labor required to install the part, but he guarantees the quality of the part himself. Did you ever notice that when you buy a replacement movement there is usually a disclaimer from the supply house that tells you that the movement was good when shipped? It also says that there is no guarantee on the movement other than that it was good when shipped to you. You must be responsible for its performance for the

next year or so rather than the manufacturer or the supply house. I cannot think of any other business where the craftsman provides the guarantee on not only his labor but on the parts he bought from a third party.

We paid a plumber \$400 to supply and install a hot water heater with a five-year guarantee. After four years the heater failed and the same plumber cheerfully installed a new one. The supply company exchanged the heater at no charge. However, the plumber did charge \$200 to install the new one. His original labor was not at fault so he was entitled to charge for installing the replacement heater. The heater manufacturer will only provide the replacement heater and not the labor. Unlike the plumber, the watchmaker is expected to do it all. He must guarantee not only his labor, but also the part that he installs. It's all right if we provide the guarantee on the labor and on the parts. We must be aware of what we are doing and charge the correct amount to cover our labor, tools, parts, and guarantee contingencies.

Finally, every job must pay and those that pay the greatest dollars per hour must be given priority. I did not state that the greatest cost work is the highest priority. I said the greatest dollars per hour is to be given the highest priority. The watchmaker who does a large number of high dollar per hour jobs will ultimately earn more than one who does fewer jobs at a higher unit cost. My first employer stated it very simply when I was about 16 years old. He said that it was better to earn the fast \$5 bill rather than the slow \$10 bill. Some work must be turned away. If you do not specialize in antique watches why would you consider working on them? If a profit cannot be made on a repair, why work on the watch? Assess your own set of skills to determine what it is that you do best. Then do that and that alone. You are not required to repair every timepiece that comes to your shop. You should only repair those that can be done at a profit. If you are unsure of the outcome of a repair why would you do it unless the customer is willing to pay for your time and receive a nonworking timepiece. The self-employed watchmaker or clockmaker can control his destiny and for his own sake, he should.

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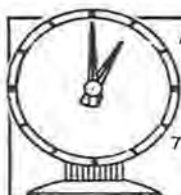
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**AWI Board of Directors Approve
Perpetuation Fund Committee Chairman**

The AWI Board of Directors recently voted on whether or not to retain President Charles Cleves as Chairman of the James M. Dodson Perpetuation Fund Committee. Voting results: Retain Cleves as Chairman.

	Stay	Step Down	Abstain	No Vote Received
Bishop	X			
Broughton	X			
Burckhardt	X			
Carpenter, A.			X	
Carpenter, B.			X	
Cerullo		X		
Christianson	X			
Cleves			X	
DeCorte	X			
Door				X
Hartman	X			
Hostetter	X			
Jaeger	X			
Richmond			X	
Warner				X
Wysong			X	



1998 Survey

Please take a couple of minutes to complete this year's Readers Survey.

Your reply can be folded into a postage-paid letter.

Just cut it out, staple and return the survey to AWI Headquarters!

Deadline for mailing is April 1, 1998.

ADVERTISING

INDEX

Bireley's Engraving 13

Borel & Co., Jules 5

Butterworth Clocks, Inc. 11

Cas-Ker Co. inside back cover

Esslinger & Co. ...inside front cover

Eveready Battery Company .. 24, 25

Grobet USA-Vigor 4

Guenther's 27

S. LaRose, Inc. 16

Livesay's, Inc. 17

McCaw Company, William S. 3

S.T. International Supply 21

Smith Supply House 35

Twin City Supply 19

United Tool & Material Co 23

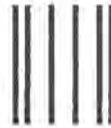
Vibrograf U.S.A. Corp. 15

Witschi Electronics USA Ltd. 23

Zantech 7

-

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- Variable intensity control.
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- Set hands.
- Check battery without opening watch.

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AWI Bench Courses

To register for these courses, please mail, fax or e-mail your registration and payment information to: **AWI Central, 701 Enterprise Drive, Harrison, OH 45030. Phone (513) 367-9800, Fax (513) 367-1414, E-Mail: Educate@awi-net.org** PLEASE NOTE: Registrations are limited and will be selected by the earliest date received. Please include a check or your Visa or Mastercard number, card expiration date, signature and phone number. Registrations cannot be taken by phone. All registration fee checks and charges are processed immediately upon receipt. **DEADLINE FOR REGISTRATION IS 30 DAYS BEFORE THE SCHEDULED DATE OF THE COURSE.** i Indicates Bench Courses held in conjunction with a convention.

DATE	CLASS	INSTRUCTOR	LOCATION	FEE
JANUARY 1998				
23-26	Phase I - Lathe Program	Roy Hovey	Orange County, CA	\$350.00
MARCH 1998				
6-9	Phase V - Making Cutters	Roy Hovey	Charlotte, NC	\$440.00
13-15	Advanced Clock Repair	Ron Iverson	Columbus, OH	\$195.00
13-16	Phase II - Lathe Program	Roy Hovey	Orange County, CA	\$260.00
APRIL 1998				
17-20	Phase V - Making Cutters	Roy Hovey	Austin, TX	\$440.00
MAY 1998				
2-3	Cutting Clock Pinions	Roy Hovey	Eagan, MN	\$150.00
16-17	Repair of the Atmos Clock	Gerald G. Jaeger	Austin, TX	\$130.00

AWI Project Extend

AWI's continuing Education Program offers one-week and two-week classes in various phases of watch & clock repair techniques. Work alongside recognized leaders in the field of horology. See how they handle the everyday situations we all encounter. All Project Extend classes are held in AWI's training rooms in Harrison, Ohio. Call or write for information and details for the classes that interest you! **DEADLINE FOR REGISTRATION IS 30 DAYS BEFORE THE SCHEDULED DATE OF THE CLASS.** To register for these courses, please mail, fax or e-mail your registration and payment information to: **AWI Central, 701 Enterprise Drive, Harrison, OH 45030. Phone (513) 367-9800, Fax (513) 367-1414, E-Mail: Educate@awi-net.org.** Please include a check or your Visa or Mastercard number, card expiration date, signature and phone number. Registrations cannot be taken by phone. All registration fee checks and charges are processed immediately upon receipt.

PROJECT EXTEND CLOCK CLASSES

DATE	CLASS	INSTRUCTOR	FEE
FEBRUARY 1998			
16-20	Introduction to Clock Repair	Jim LaChapelle	\$250.00
23-27	Chiming & Striking Mechanisms	Buddy Carpenter	\$250.00
MARCH 1998			
2-6	French Clock Repair	Ron Iverson	\$250.00
9-13	Clock Case Repair	James Williams	\$250.00
16-20	Antique Clock Restoration	David Christianson	\$250.00
23-27	Clock Escapements	Jerry Faier	\$250.00
APRIL 1998			
20-24	Organize Your Work Habits for Success	Robert Ockenden	\$250.00
MAY 1998			
4-8	Advanced Cuckoo Clock Repair	James Williams	\$250.00
11-15	Clock Repair Operations	David Carlson	\$250.00
18-22	Wooden Clock Movements	David Christianson	\$250.00

PROJECT EXTEND WATCH CLASSES

DATE	CLASS	INSTRUCTOR	FEE
JANUARY 1998			
12-16	American Pocket Watches	Alice Carpenter	\$250.00
26-30	Automatic Winding Mechanisms	Jim Lubic	\$250.00
FEBRUARY 1998			
2-6	Calendar Mechanisms	Jim Lubic	\$250.00
9-14	Phase IV - Wheel Cutting Operations	Roy Hovey	\$430.00
16-20	Hairspring Vibrating & Timing Adjustments	Jim Lubic	\$250.00
MARCH 1998			
9-13	Mechanical Chronographs	TBA	\$250.00
23-27	Precision Timing	Antoine Simonin	\$375.00
30-April 3	Basic Electronics & Meter Reading	Gerald G. Jaeger	\$250.00
APRIL 1998			
15-17	ETA Products	Alessandro Betti	\$150.00
20-24	Advanced Quartz Watch Repair	TBA	\$250.00
MAY 1998			
4-8	Repair of the Bulova Accutron	Henry Frystak	\$262.00
14-16	Shop Management	Fred Burckhardt	\$250.00
18-22	Advanced Turning Between Centers	Ron DeCorte	\$250.00
JUNE 1998			
8-12	CEWT & CMEW Examinations	Jim Lubic	\$250.00
15-19	CW & CMW Examinations	Jim Lubic	\$250.00

