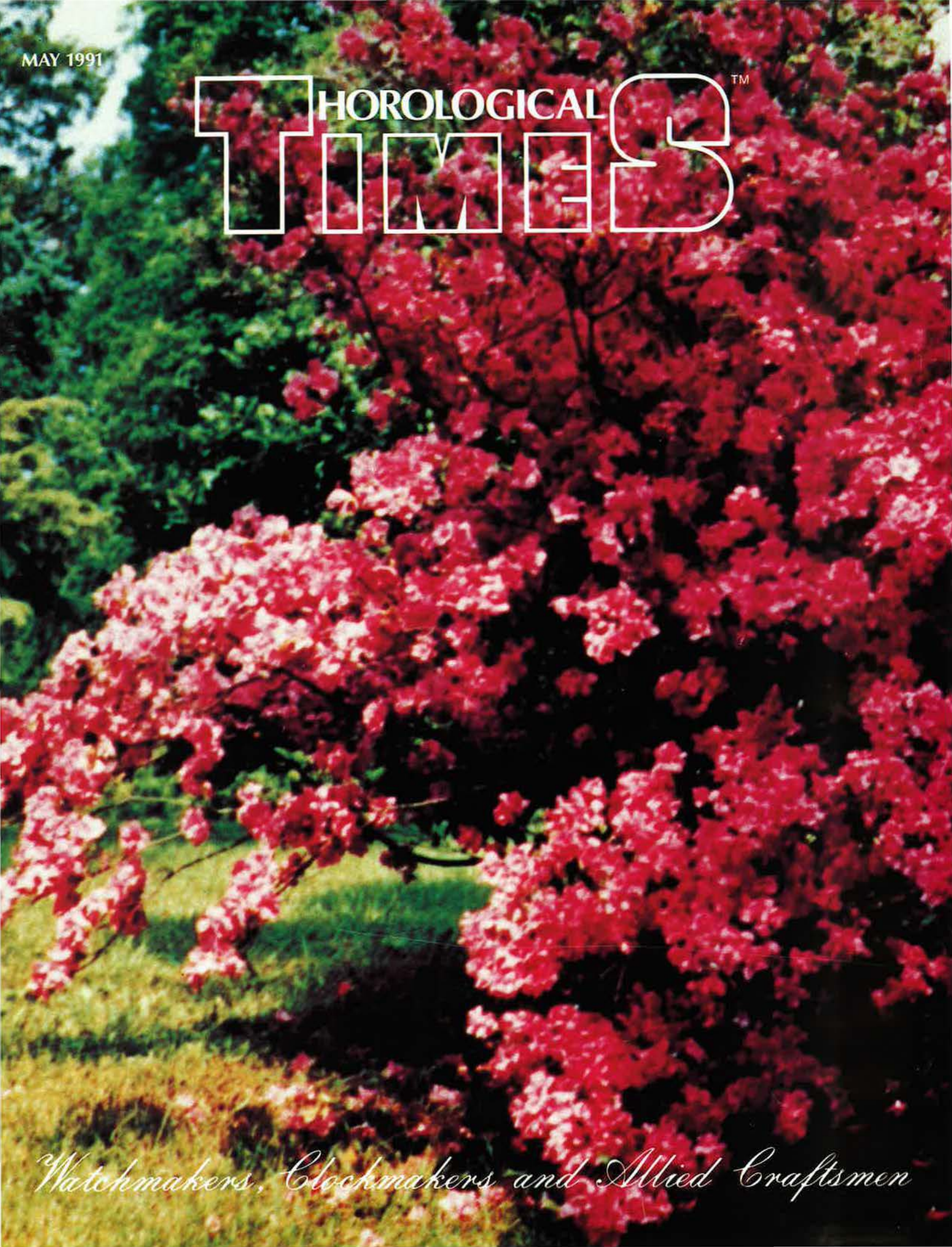
MAY 1991

HOROLOGICAL TIMES™



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President's Message

I'd like to talk to you this month about Project Extend. Even as you read this, some of the classes will have already been held.

These classes have been set up with the intention of helping the experienced craftsman extend his/her skills in certain areas. I guess each one of us develops spots in our vocation at which we are not as efficient as we should be, perhaps because we don't do them every day. As electronic timepieces became more popular, I became aware that I was doing less and less staffing. Now I find that people are bringing old watches out of the woodwork to be repaired, so I have had to renew my acquaintance with my staffing tools (the staking set, poising tool, and the truing tool).

The Project Extend will also help the self-trained person to fill in the gaps in his/her training. I was apprenticed, and one of the things I was never taught was to vibrate hairsprings. I watched my father do it, but he never got around to allowing me to do this. I could probably accomplish this task on my own, but with a little hands-on training it would be considerably easier. (I must look into the requirements for attending this class by Hal Herman.)

It would also benefit newly trained persons by helping them to gain speed so they could be more proficient. My one problem with our schools is that we try to teach so much in such a short time. Most of the horology schools have a program that lasts from one year to two years. This means that while the newly graduated student is perfectly capable of accomplishing the tasks he was taught, he must practice for a period of time in order to pick up speed. These classes will be a bonus for those persons.

I must point out that not one of these classes is for the novice. In no way are these classes intended to be a substitute for a qualified school of horology. I sat in on the meeting that was held by the committee when this was being set up. I have read the requirements for each class. All of the class requirements specify that you must be a practicing repair person and have some proficiency, whether a graduate of a school, self-taught, or served an apprenticeship. This is exactly what the name implies--a project to extend the knowledge and skill of the practicing repair person.

If you will consult your last *Horological Times*, on the outside back cover you will see that there are three classes set up that will take the student through a period of review, and then be administered the certification examination for the watch, the clock, and also the electronic watch programs. This is a good way to take the certification exam. For one thing, some equipment will be available in the laboratory that might be difficult to obtain in the field, such as a quartz timer, a gear cutter, etc.

The great thing is that there will be no tuition! There will be a $50 deposit required to register, but that will be returned when you attend the class. Each person will be responsible for their own transportation and their room and board. There will be a limited number of grants available for those who need help with room and board.

If you plan to attend, it would be to your benefit to register as soon as possible because several of the courses are already full.

Many of us will have to schedule our vacation during the time the course we want to attend is scheduled. What better way to spend our vacation? My only problem is that I'd like to attend so many, and I only get a limited amount of vacation time.

Alice B Carpenter

ON THE FRONT: Submitted by Josephine F. Hagans, FAWI, of Denver, CO.

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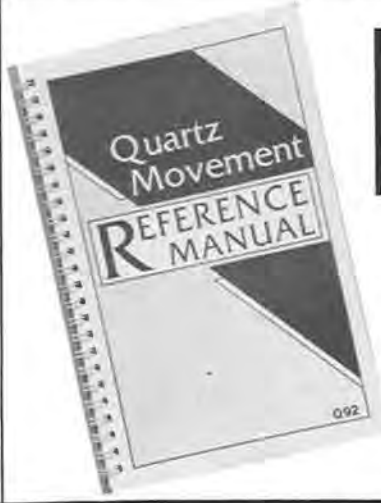

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Up Front

PROJECT EXTEND

Since the last issue of *Horological Times*, the planning came to an end and classes began at Project Extend. Project Extend is AWI's program designed to help horologists at every level extend their present skills by participating in intense one-week classes in a variety of subjects. For many years the industry cry has been, "Why doesn't somebody do something to improve the skills of the technician?" Project Extend does just that.

The first Project Extend class was Clock Repair I, an introduction course, taught by James Lubic.

Housed in a new, modern 1000-square foot building, small group instruction is offered to members. Best of all, the courses are free! The AWI Education Center is conveniently located off of I-74, just a few miles from AWI Central on Harrison Avenue. Participants have available a variety of affordable motels and a host of eating places.

At the time of writing this column, we have completed the two courses shown in these photos, Clock Repair I and Clock Repair II, and Watch Repair I which involved mechanical watches and the skills of staffing, poising, truing, timing, and watch escapements.

The course Watch Repair II was just recently held, teaching hairspring vibrating, finishing, and dynamic poise. Thanks to many members who donated hairsprings, we are able to proceed with this training. Because hairsprings are not readily available, Project Extend will continue to solicit and welcome donations of hairsprings of all kinds. Following Watch Repair II was Watch Case Repair.

Participants in Clock Repair II gather around Roland Iverson, instructor, during a recent class at Project Extend.

The classes have been full and enthusiastically received. One participant wrote on the evaluation form completed at the end of each course, "Project Extend is something I have looked for for a long time. The only thing wrong is that it should have started before now!"

There are many more classes scheduled for the coming months. A fall schedule will be developed before long. See the *HT* cover for a listing. Write AWI Central for a brochure describing those classes which interest you. If transportation and housing costs are a problem, you may qualify for financial assistance. Ask for details. The ELM Trust will gladly accept your cash donation to help fund students needing assistance. Your gift is tax deductable.

IRS FORM 720

Recently, the long-discussed Federal Excise Tax was approved and immediately implemented by the Internal Revenue Service. Some members, those who have sold jewelry items having a value of $10,000 or more, are required to report these sales on Form 720 beginning the first quarter of 1991. Thus, we agreed to inform our members of the law's requirements. Any trade association worth belonging to will inform members of new legislation that may affect them.

Since the mailing, AWI has been deluged with phone calls from some members who think only of their own self-centered interests. Some were irate that AWI made this mailing to the membership. They forget that there were other members who needed this information! If these "short-fused" individuals had taken a couple of minutes to read the announcement, they could have quickly determined whether the new legislation applied to them. If it didn't, all they had to do was use the nearest wastebasket, cheaper and easier than making a long distance phone call.

Probably some were concerned that AWI may have given or sold its mailing list to the IRS or spent AWI funds for the postage. Neither is true. The IRS paid the postage directly to the post office, AND AWI NEVER SELLS OR GIVES OUT ITS MAILING LIST! Any mail members receive with the AWI imprint has been addressed and mailed directly from AWI Central.

All trade associations who have members who might be affected by this new legislation made mailings. Common sense dictates that they should. If you are a member of the Retail Jewelers Association, you, like me, received a Form 720 from them. ❑

J.M. HUCKABEE'S
"Random Clock Talks"

The series of 37 "Random Clock Talks" videotapes listed below are available for loan to AWI members from the AWI Audio Visual Library. The tapes vary in viewing time from 1.25 to 2.00 hours and are available in the VHS format. A service charge of $5.00 each is to accompany requests to borrow a tape; only one tape is loaned at a time. The service charge covers AWI's production and shipping costs. Tapes should be returned to AWI within 7 days after receipt, insured for $30.00. Please order tape by number along with your name, address, and $5.00 service charge. Send to: **AWI Audio Visual Library, 3700 Harrison Ave., Cincinnati, OH 45211.**

TAPE 1: Approximately 2 hours
SUBJECT MATTER: A brief view and discussion of a variety of clocks and tools used in the Huckabee shop.

TAPE 2: Approximately 2 hours
SUBJECT MATTER: Demonstration and discussion on using various tools and lathes to make and fit a clock bushing.

TAPE 3: Approximately 2 hours
SUBJECT MATTER: Discussion and demonstration on lathe operation using the Boley watchmakers lathe and the C&E Marshall watchmakers lathe.

TAPE 4: Approximately 1.50 hours
SUBJECT MATTER: An analysis and work with the Urgos 21/42 8-day trapezoid time only clock.

TAPE 5: Approximately 2 hours
SUBJECT MATTER: A demonstration and discussion about drilling the arbor using Huck's "turning in a box" method and making a pivot.

TAPE 6: Approximately 1.75 hours
SUBJECT MATTER: A demonstration of wheel cutting using clear plastic and a Mosley watchmakers lathe. Huckabee cuts four gears such as those required in the AWI certification examination.

TAPE 7: Approximately 1.75 hours
SUBJECT MATTER: The Birge & Mallory Striker Clock—a complete study and analysis of the Birge & Mallory Striker and the clock with its strap plates and roller pinions, circa 1841.

TAPE 8: Approximately 2 hours
SUBJECT MATTER: Making a great wheel and mounting the great wheel on its arbor.

TAPE 9: Approximately 1.75 hours
SUBJECT MATTER: Making and fitting a replacement pinion for a clock wheel.

TAPE 10: Approximately 1.50 hours
SUBJECT MATTER: Correcting problems caused by an elongated pivot hole by bushing with a solid bushing and the use of a "preacher" to relocate center distance.

TAPE 11: Approximately 2 hours
SUBJECT MATTER: Huckabee discusses the IBM #37 Master Clock Movement and IBM 90 Series Clock Movement.

TAPE 12: Approximately 2 hours
SUBJECT MATTER: Using a custom-made attachment to make wheels and index plates on the Unimat lathe. The custom-made attachments can be made from drawing available from AWI upon request (cost to cover printing and postage is $2.00).

TAPE 13: Approximately 2 hours
SUBJECT MATTER: Cutting clock wheels—a demonstration of cutting the wheels used in the AWI CMC examination.

TAPE 14: Approximately 2 hours
SUBJECT MATTER: Using an inexpensive quartz analog clock movement, Huckabee disassembles the movement and provides an in-depth explanation of each component and their function in the operation of the timepiece.

TAPE 15: Approximately 2 hours
SUBJECT MATTER: Huckabee presents an in-depth discussion on the design of cutting tool bits, both hand-held and those held in the tool post rest. Also a discussion of steel—its composition and characteristics.

TAPE 16: Approximately 1.50 hours
SUBJECT MATTER: Huckabee presents an in-depth discussion about hairsprings. He also demonstrates how to vibrate a clock hairspring.

TAPE 17: Approximately 1.75 hours
SUBJECT MATTER: Huckabee goes through the process of making a knurled nut, one like those used as hand nuts in Early American kitchen clocks. He demonstrates a simple way to knurl the nut.

TAPE 18: Approximately 1.75 hours
SUBJECT MATTER: Huckabee demonstrates the process of inserting a tooth into a clock wheel to replace a broken or damaged tooth.

TAPE 19: Approximately 2 hours
SUBJECT MATTER: Pivot work in the American antique Sessions, count wheel, and clock movement.

TAPE 20: Approximately 2 hours
SUBJECT MATTER: Continuation of work with the Sessions clock used in Tape 19. Complete restoration work on the movement and treating a worn great wheel.

TAPE 21: Approximately 2 hours
SUBJECT MATTER: Making an American clock verge. Huckabee demonstrates how to select and work raw materials into a verge for an Ingraham miniature kitchen clock—time only.

TAPE 22: Approximately 2 hours
SUBJECT MATTER: Completion of making a verge for an Ingraham kitchen clock from Tape 21. Also random tips and cutting a 32-tooth recoil escape wheel for an Ansonia kitchen clock.

TAPE 23: Approximately 2 hours
SUBJECT MATTER: Pivot and bushing problems and their repair.

TAPE 24: Approximately 2 hours
Not available at this time.

TAPE 25: Approximately 2 hours
SUBJECT MATTER: Clock mainspring and barrel work.

TAPE 26: Approximately 2 hours
SUBJECT MATTER: Clock mainspring ends and barrel teeth. Huckabee demonstrates how to replace teeth in the barrel of an Urgos 8-day modern clock. Huckabee also fashions a new hole end for the mainspring.

TAPE 27: Approximately 2 hours
SUBJECT MATTER: Understanding the antique American clock time train and repairs to it and using the Unimat lathe to polish pivots.

TAPES 28 & 29
Not available at this time.

TAPES 30-34: Approximately 2 hours each
SUBJECT MATTER: A series of five tapes designed as a teaching exercise which encompasses every facet of lathe work encountered in the clock shop. Produced in conjunction with a series of drawings which are provided by AWI when you borrow the first tape in the series. Upon completion of the work you have a set of excellent useable lathe accessories for use in your shop.

TAPES 35 & 36: Approximately 2 hours each
SUBJECT MATTER: Two tapes which demonstrate the use of the lathe accessories produced in the Series 30-34. This encompasses all facets of pivot work encountered in the clock shop.

TAPE 37: Approximately 2 hours
SUBJECT MATTER: A companion tape to the Huckabee book "How to Build a Regulator Clock." All components and details for their construction are discussed in detail. It is recommended that the viewer have the book at hand when viewing this tape.

A DETAILED DESCRIPTION OF EACH TAPE IS AVAILABLE FROM AWI CENTRAL.

Questions & Answers

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

An Idler & Pivot Polisher Device

Q Enclosed are photos of a device which was found among the tools of a deceased watchmaker/optician. The family was unable to provide any information about its purpose or use.

The long rod (*A*) fits the bearings of (*B*) from one direction only due to the tapers on the end of the rod (*A*) and the corresponding bearing (*B*). This prevents the rod (*A*) from traveling further laterally than shown in Figure 4.

The pulley (*D*) slips loosely on (*A*), but there is no device (set screw, etc.) for fastening it to *A*. *B* attaches to *C* with a shouldered screw (Figure 3). *E* is similar to a bushing for a lathe shoe. The shaft of *C* is a loose fit in the small hole of *E* (Figures 2 and 4).

Figures 5, 6, and 7 show some brass "doo dads" found in the same small box with the device. There were also some identical brass unfinished pieces apparently identical to *B*, *C*, and *D*, suggesting that this is a "homemade" item or a prototype.

To me, this device is reminiscent of (1) an idler pulley, (2) a pivot polisher, (3) a Clement tailstock accessory tool.

Can you offer any other possibilities?

Bob Callaghan
Rhinebeck, NY

Figure 1

Figure 2

Figure 3

A *I have examined the good photos of your device. I seem to agree with one of your contentions more strongly. That one is that this is a part of an idler and pivot polisher or damaskeening grinder.*

Notice that the very end of the through-bar is tapered, most likely to accommodate the various tin, copper, bell metal, or wood laps which hold the abrasive or polishing agent.

I don't know the exact diameter of the post that assumes the upside-down letter "J," but this might fit into the "T" rest. What appears missing are the ferrules that fit over the long taper-ending bar which will turn the bar and its laps. Also it might fit into a special holder in the tailstock or slide rest. There are other pieces, I feel, that are missing for a pivot polisher to operate efficiently or do raying or decorative work on wheels.

I also believe that this is a manufactured item as it appears to have been cast and polished. Generally, handmade tools or prototypes very seldom resort to casting pieces. None of my catalogs show this. As for being part of a Clement lathe, that is possible, though I don't remember seeing one like this on any of the Clement lathes, but having met Mr. Clement, anything was possible as he never gave up making his lathe more versatile. *Henry B. Fried*

Figure 4

Figure 5

Figure 6

Figure 7

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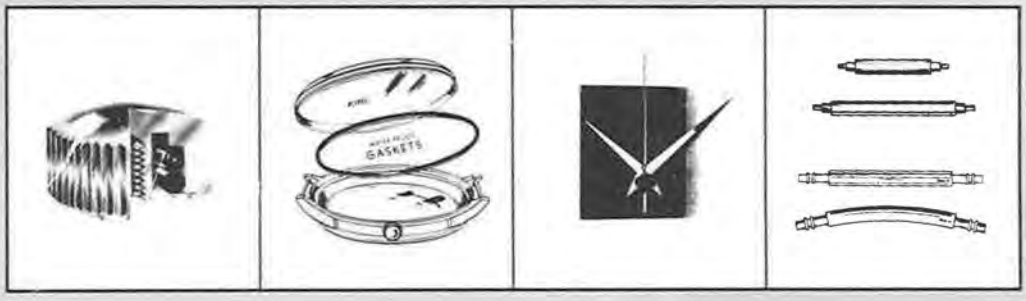

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Bench Tips

Joe Crooks

WD-40

This informative tip is from Joe Verruni of Norristown, PA with reference to removing WD-40 from clocks.

First, your "Bench Tips" column is the first thing I read in the *Horological Times.*

Second, I phoned the WD-40 Company in San Diego, CA. A man by the name of Ray said that you could remove WD-40 from your clock movements with mineral spirits or acetone.

Joe, check the "Bulletin Board" in the April '91 issue of the HT. Your man by the name of Ray is Ray Miles, Technical Director of the WD-40 Company.

Acetone or ketones, which is methyl ethyl ketone (mineral spirits) is about the only thing you can use to remove WD-40 from clocks.

About 50% of the clocks you take in to clean and bush are sprayed with lacquer to keep the brass plates from tarnishing.

The chemicals that will remove WD-40 will also remove lacquer, so after you strip one of these movements to remove the WD-40 you will need to re-lacquer the plates. So don't forget to add this extra charge to the estimate for repairs.

WD-40 is not a lubricant. It's more like a penetrating product. On a clock it would start up a gummy one about the same as using kerosene. As soon as it dries out, you've got metal to metal, and no lubrication.

If the WD-40 is not removed when you clean a clock, your oil would creep away from the pivots and it would be like you overoiled the clock (dry pivots).

WD-40 was not manufactured to lubricate clocks. It's to clean and put a protective film on metal parts to keep them from rusting. It's a moisture repellent, it'll stop squeaks and loosen rusty parts. It was not made to spray on clocks for a lubricant.

□

SEND YOUR TIPS TO:
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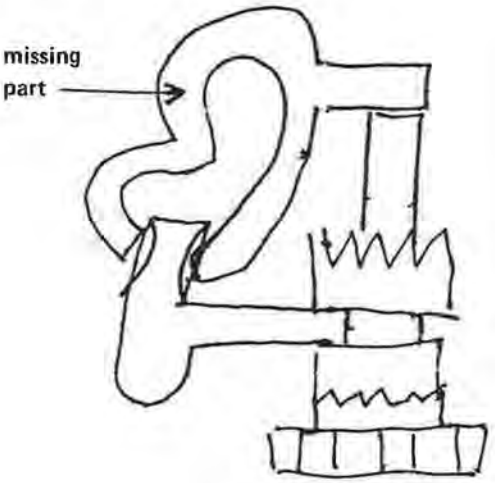
AWI
Material Search Network

EDITOR'S NOTE: This column is designed to work in conjunction with the AWI Movement Bank. If you can supply any of the items listed here, please send details to the Material Search Network. **Do not send the items.** Members requesting these items will be advised of their availability and will contact you direct.

Q1 Blancpain 46 fourth wheel.

Q2 Manistee 16 size setting cam.



Q3 Longines 30CH minute recorder jumper spring, part #8325.

Q6 Record 435C escape wheel, part #702/418.

R3 Longines 13 ligne, caliber 13.82, center wheel and pinion, part #7503 or a movement complete.

R4 Landeron 24 pallet fork and arbor, part #710/1158.

If you can supply any of these items, please contact: ***AWI Material Search Network, AWI Central, P.O. Box 11011, Cincinnati, OH 45211; Fax (513) 661-3131.*** ❑

WATCHES Inside & Out!

Robert D. Porter, CMW

REWORKING A RATCHET WHEEL

Worn ratchet wheels can often be easily reworked by using our lathe as a shaper to restore the teeth to a safe profile. Figure 1 shows a typical setup on a six-inch bench lathe. The main wheel arbor is being held in a three-jaw chuck. A tool bit has been ground to a shape that nearly matches the ratchet teeth and is shown mounted on its side in the tool holder.

Figure 2 illustrates the tool bit at work as it begins its cut into the ratchet. The chuck is held steady with the left hand as the hand wheel on the lathe carriage is used to move the tool bit into the work. Only a little material is shaved off with each pass, as pictured in Figure 3, until each tooth has been restored to a safe profile.

Figure 1

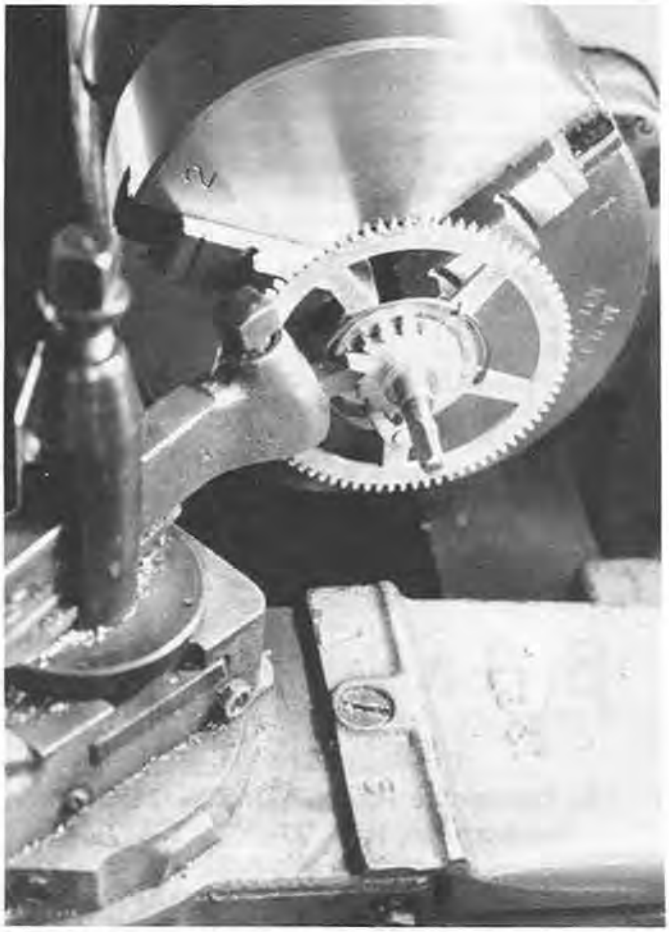


Figure 2

Figure 3

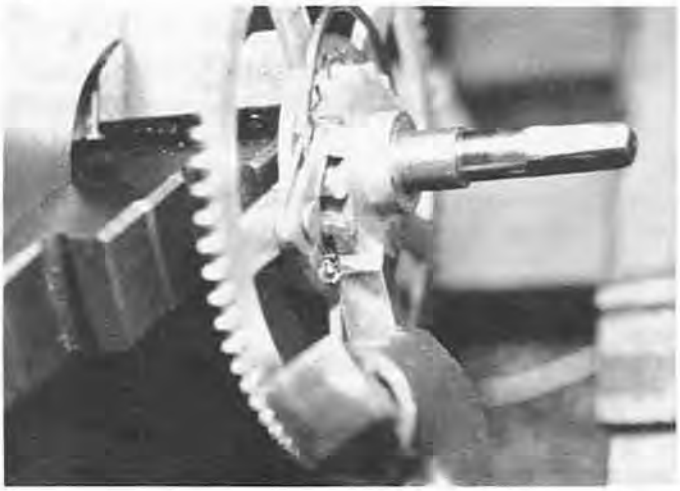


Figure 4

Figure 4 shows the newly restored ratchet wheel after it has been brass brushed to remove burrs. The end of the click has also been filed to restore a sharp edge to match the ratchet and assure a safe action. The arbor front bearing surface has also been polished. After the rear bearing is polished, this main wheel will be ready for cleaning and reassembly with its mainspring and the clock. ❑

ROCK QUARRY et tu

Fred S. Burckhardt

EVERYONE SHOULD HAVE A HOBBY

I think every watchmaker and clockmaker should have a hobby. It should be something entirely different from what they do all day long. You'll find if you do begin a hobby it will improve both your physical and mental capabilities.

What kind of hobby will improve my physical and mental capabilities, you ask? Beings you asked, I will tell you of some of my own selections for a hobby.

First, since I like music, I thought a nice hobby would be to learn how to play a musical instrument. After months of deliberation, I finally made my decision. With the help of several music teachers and the fellow from the music store, it was decided the only instrument I was qualified to play was the kazoo. After several years of lessons, my teacher told me to stick with fixing watches and forget the musical stuff. Of course, I was devastated. My work suffered from this horrible defeat but I dragged myself up from this tragedy and selected another hobby to help erase it from my mind. By the way, if you are looking for a good used kazoo, let me know.

With the help of a phrenologist, Skull Wiensdorfer, my next selection was perfectly clear. He said my skull had many waves, sort of like the waves of an ocean. That was it! My hobby would be skin diving.

After work the next day, I went to the store that sells skin diving things and bought a complete outfit. Several thousand dollars later, I took all the equipment home and practiced in the bath tub. I could hardly wait for the weekend when I would be able to dive into the depths of the sea. The only problem was that I live several hundred miles from water, except for the local lake.

The day arrived! I would leave the bench and relax in the cool waters of the lake searching for sunken treasures and enjoying my new-found hobby. Early that morning I made my way to the lake. As the sun came up I started to don my outfit. Then everything was ready. The moment of truth had arrived. Flapping my way to the water's edge, I looked around to make sure not to step on any broken glass. There, about two feet away, was a cottonmouth snake about three and a half feet long. Needless to say, I didn't tarry too long. It wasn't easy running with those rubber flappy things on my feet, but I don't think my feet ever touched the ground. I have a nice skin diving outfit for sale, very complete and hardly ever used.

Not being the type to give up easily, I started to ask my customers for suggestions concerning a hobby. A few were very helpful. One told me to forget the hobby deal and get his blankety-blank watch repaired. Another was a little more explicit. He was upset anyway because his clock wasn't ready when I said it would be. When I asked him what he thought would be a good hobby for me to pursue, he told me to do something that is anatomically impossible. One little old lady gave me a great suggestion. She said gardening would be the best hobby for me. It would get me outside in the fresh air and would allow me to communicate with Mother Nature. This was it. I finally found my niche. Gardening it would be.

I didn't realize there were different types of gardening, for example: vegetable, flower, fruit, shrubs, and trees. My first choice was a nice vegetable garden with all kinds of fresh vegetables. I could picture myself walking to the garden to hand pick the lettuce, tomatoes, and rutabagas for supper.

It took almost a month to dig up some ground in the back yard. I did everything by the book; turned the soil and mixed in organic mulch and some fertilizer. I must admit, it was backbreaking work. I bought some plants and some seeds and carefully planted them all. Watering and weed pulling became

the only things I did in my spare time. Nobody ever told me that sun was very important in growing vegetables. My only crop was two cherry tomatoes and a sickly looking lavender colored eggplant. As far as I could figure, they cost me about $235 each. Of course it's just a guess, but I think I could have bought them cheaper at the store.

It was time to decide whether or not to cut down the trees for more sunlight or try some other type of gardening. My choice was flowers. This time I was a little smarter. In case you don't know, there are flowers for the shade and flowers that need sun. I carefully selected some of each and planted the shade plants in the part of the yard that was shaded by several large trees. If you could only have seen what a beautiful garden it turned out to be. *House and Garden* magazine wanted to feature it in one of their issues, but I told them no because I didn't want to act like a showoff.

Everything was fine. I would come home from a hard day at the bench and go out and enjoy my garden. Then it happened. A storm passed by in the middle of the night and blew down two trees. Guess where they landed. Right. Now where there used to be shade, there is sun. Whatever was left of the shade plants died from the sunlight. So now it's time to start over again.

Maybe it's not such a good idea to have a hobby after all. What's wrong with fixing watches and clocks all day and flopping down in front of the TV at night? After all, it's a proven fact that sunlight causes cancer and exercise can cause a heart attack. ❑

Novice Watchmaker

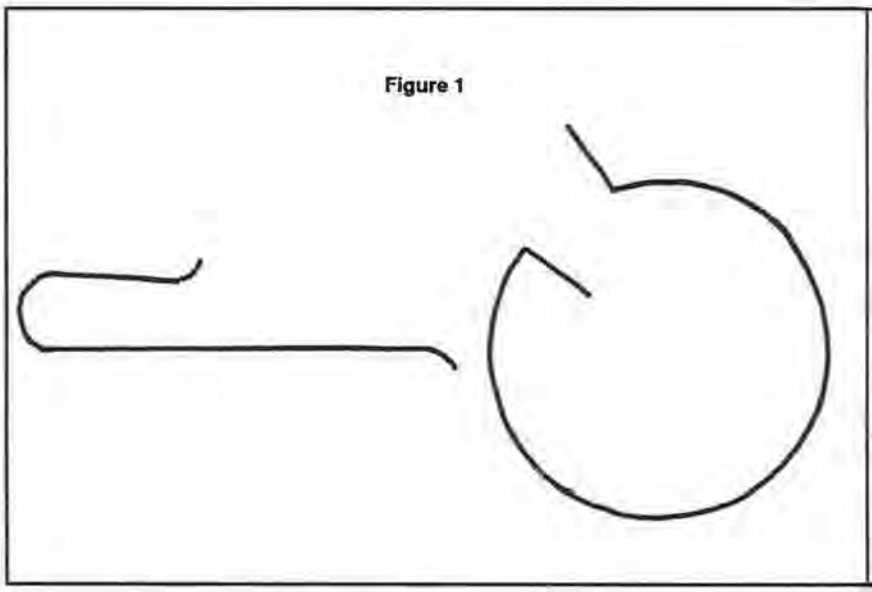
James Adams, CMW, FBHI

SPRINGS
Little Springs and Things

There is an up-and-coming young, talented watchmaker in South Carolina wanting an article on click springs. O.K., here we go, but let's call this profound technical dissertation "little springs," including the click variety. Little springs were designed to perform two functions: first, to activate parts to recoil; and second, to be lost.

Let's start by talking a little about what they are. Even the simplest mechanical detached lever movement has at least three little springs--a click spring designed to activate a ratchet device designed to maintain the power wound into the mainspring, a set lever spring designed to set tension on a set lever to return it from the setting position, and then there is the rather stout spring arm built into the set bridge. This, as you know, holds the winding and setting mechanism in proper place. Simple analog quartz movements generally contain at least two little springs--one to hold the power cell in place and the other in the setting mechanism. These springs are devices used to secure parts in their proper working attitude . . . to push one part against another part to retain the second part in its working position. For instance, a click spring pushes a click into the ratchet wheel to hold the ratchet wheel in place. The ratchet wheel is directly attached to the mainspring and barrel assembly. They control parts' motion. Little springs are also found in calendar mechanisms and are used as the jumper spring itself or to place tension on a jumper. Some little springs are made of tempered flat wire, round wire, or are machined out of solid metal. These are used, for the most part, in chronograph assemblies and in movements using disk moon phases, disk day displays, disk date displays, etc. Now, you're thinking, "Hey, fella, this I know, so get on with it." Well, novice, you would do well to afford these little rascals their just due. Virtually, all the little guys are hidden under something such as bridges or clicks. Let me give you a piece of advice, do not take these for granted. If you do, you're looking for trouble--trouble in losing them and trouble in putting them back in place, backward or upside-down.

A very elementary thing to learn, which many old-timers have failed to learn, is to study the movement very



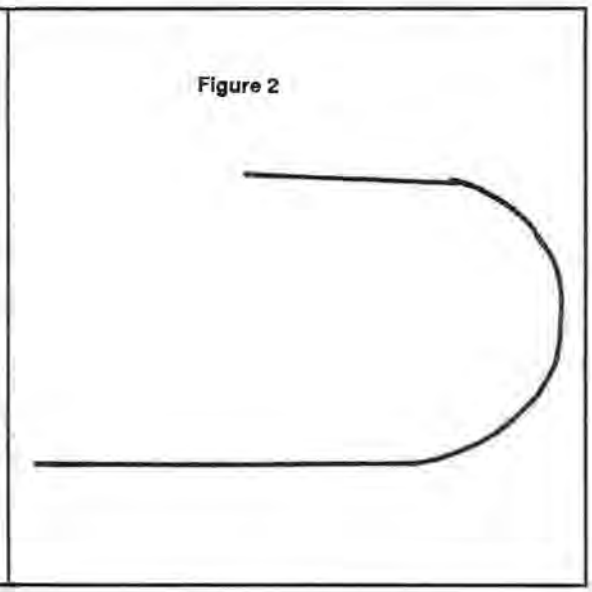


Figure 3

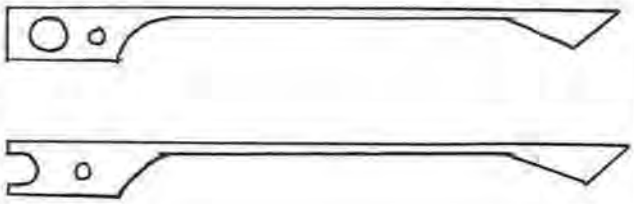
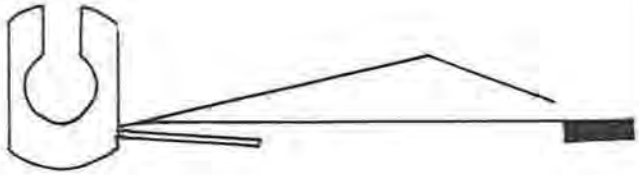


Figure 4

Figure 5

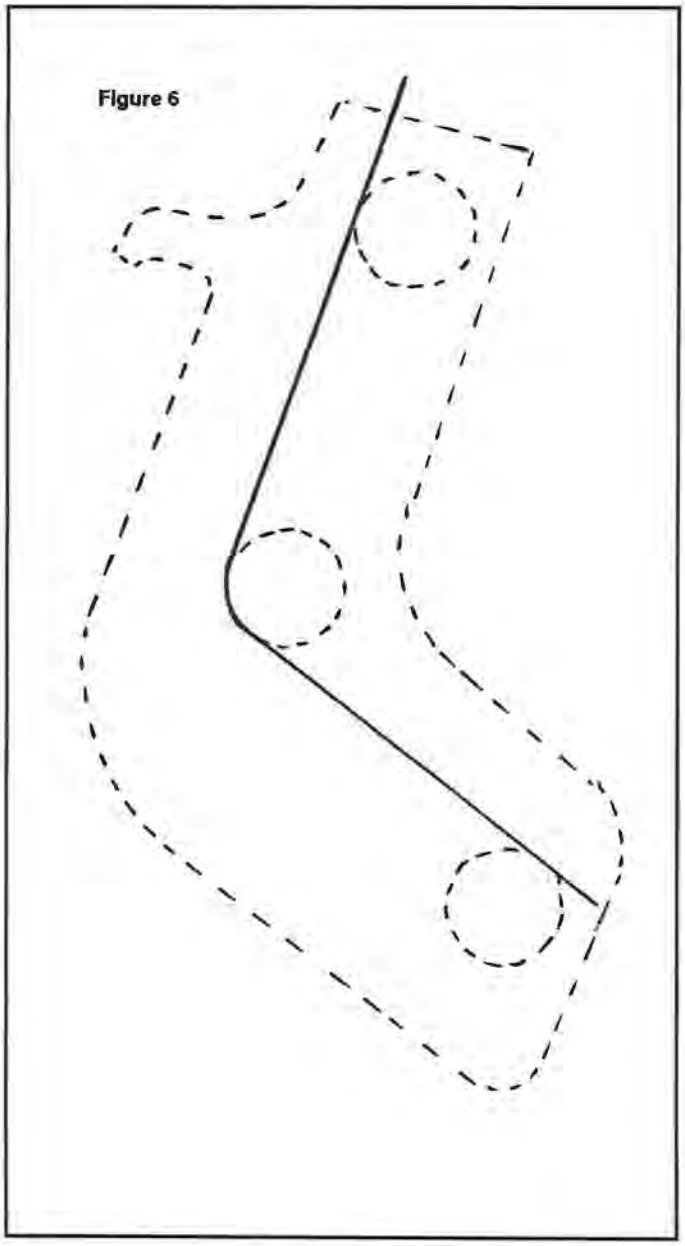


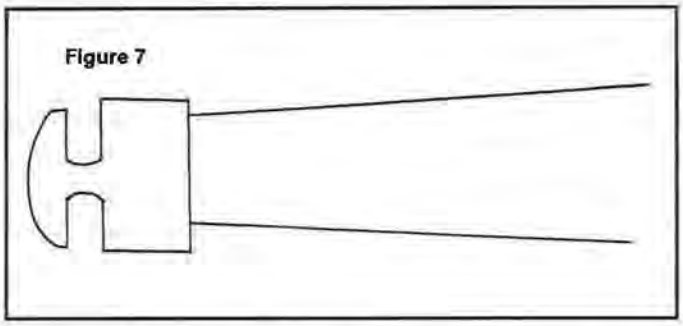
carefully before you start to take it apart. When you feel there may be a reassembly glitch with a spring, draw a picture of both the spring and the part it activates. Sometimes (most of the time) you cannot see the entire spring due to it being covered by a bridge. Draw what you can see. When it is determined there is a spring under a bridge, loosen the bridge. I'll repeat that, loosen the bridge, and lift it up slightly, keeping your finger over or very near the hidden spring. Allow the spring to disengage, if possible, without it and its lever flying off into the great blue yonder. Novice, it *will* happen to you as you get complacent about your work. It happens to the pros with painful regularity.

As you get into the professional mode, you will learn that what you take apart today, and think you know how it goes back together, isn't always so. A disassembled movement may lay there days on end waiting for parts. Or you will get pulled away from one job to do three or four other jobs in between. Your mind may have three or four different things going at one time. It's either draw the picture or fiddle around and chance putting springs in wrongly, bending other parts in the process like thin bridge plates or calendar disk cogs, and on and on. Without a picture, can you remember if the short leg of a "U" spring lay against the jumper, or was it the long one? Along with the drawn pictures, I also use tech manuals to refresh my mind

on these matters. Copies of tech manuals can be secured from AWI Central. As a member of AWI, this is a service available to you.

Somewhere down the road you are going to lose a spring. It happens to all of us. It's a bad scene at best, but many times you can order a replacement from the material house. And here is where a tech guide comes in handy. They will supply you with proper names and, in many cases, parts numbers. But there are those situations where no tech guide is available. Now what do you do? Listen up, gang. You have on hand an assortment of click springs and some spring wire. It is possible to reform existing click springs within reason to various altered shapes. To begin, draw a picture of a probable spring shape as it relates to its click or jumper, and also as it relates to where it fits in or on the movement. Go slow with the picture. Draw in the shape of the click or jumper and also the recess or the seat of the spring body. Examine the movement and determine the physical size of the spring--its height, shape, and probable strength in relation to what it does. Picture in your mind how





the spring assembly works. While the assembly is in motion, is there sufficient space for the spring to develop its designated tensions? Will the spring work without binding? In forming the main body of the little guy, leave the ends of the spring longer than the finished article. In other words, start forming the spring in the middle and work outward. This is the easiest way to do it. As mentioned earlier, it is possible to reshape click springs to conform to new and different tasks.

Novice . . . tell you what . . . as we are in a learning mode, let's learn. Once we have practiced spring making in a controlled situation and gain a degree of confidence, being confronted with a real problem won't seem so bad.

Secure a practice movement, preferably a German or French day/date type. Why German or French? Well, it's been my experience that these will no doubt contain hidden springs of unknown shape until they are removed. Their removal and insertion can be a tricky deal sometimes. Anyway, somewhere in the calendar work is a spring or springs. To begin, carefully remove one (or more) and store it away. Reassemble any bridge work removed while getting to the little guy. Why? Well, there will be times you may flip and lose a spring before you know what happened. We want to simulate this event by having a spring or springs missing from the movement. Lay the prepared movement aside for several days or a week and do something else. After a passage of time, you will have only a hazy idea of what the spring looked like. That's good.

Now, let's get down to the business of making a replacement spring either from spring wire or reforming to a click spring from your bulk assortment. First, with a clear mind and without any mental adjustment, picture mentally how the jumper or lever functions and which way it moves to perform its job. Then, how much space is available, to the best of your knowledge, for the body of the spring to function? If you can, and I know you can, draw an oversize picture, to scale, of the jumper, probable spring space, and any posts or supports the spring works with. Now you can draw in a logical probable spring shape. If you are using spring wire, as mentioned, start bending center shapes first and keep all bended ends parallel flat. Then work your way outward. The actual calendar bridge work is removed now, so as to use the actual spaces available to form the spring shape to actual size, all the while referring to your drawing. It goes without saying, you have predetermined whether the spring was of flat wire or round wire and that its height and strength dimensions are compatible to the physical area available. Now, novice, this seems like a tedious assignment, and it is. It's a learning experience. Once

Figure 8

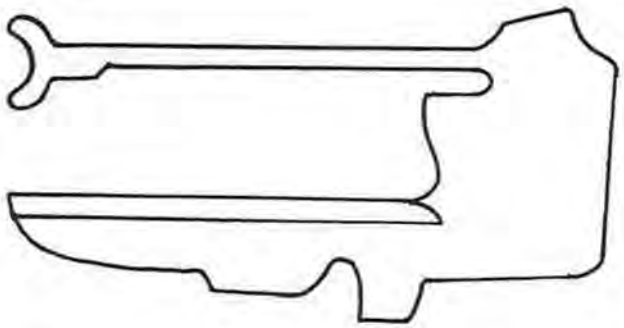
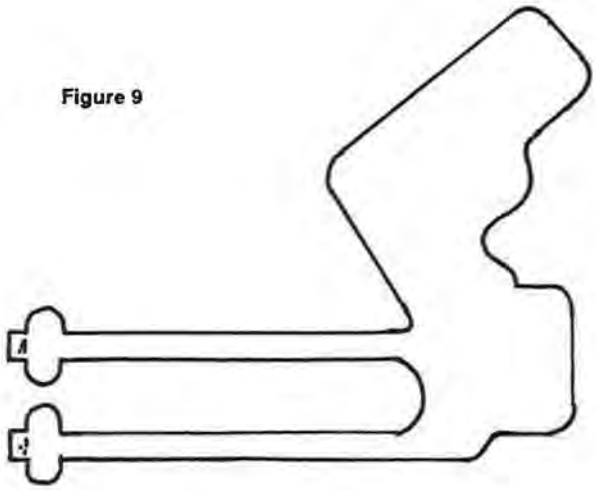


Figure 9



mastered, you have climbed up one more rung on the ladder to professionalism.

In this exercise, you've learned patience, manual dexterity, and you have an intimate understanding of the mechanics of that movement function, and maybe more importantly you've learned NOT TO LOSE THE SPRING IN THE FIRST PLACE! However, it WILL happen. So just remember, draw pictures of how springs and levers relate to each other and the sequence of reassembly. Most of the more successful watchmakers dealing in grand complication movements do this, as does the same watchmaker when servicing and restoring abused antique movements. In these articles my goal is to make you the professional other professionals look to for guidance. Don't laugh, little one, I'm serious. The more you study and practice, the better you become. The future is brightest for those who are true watchmakers as opposed to parts changers. It does take work, but truly, good things are not acquired without a corresponding effort.

Gang... have you noticed how serious I was in this article? You can thank the South Carolina watchmaker for that. I'll get even though, you just wait and see. ❑

SHOP TALK

Wes Door

Watch Crystal Management

PART 2

To be cost effective in managing a watch crystal inventory, we need to consider many factors.

ONE OF EACH

Figure 1 shows some choices of numbers of crystals to stock. Figure 1-A shows our choice being the purchase of just one crystal at a time as we need it. At first glance this method makes sense. After all, we already have this crystal sold, and therefore we have no money tied up in a lot of stock. We have immediate profit and a 100% turnover.

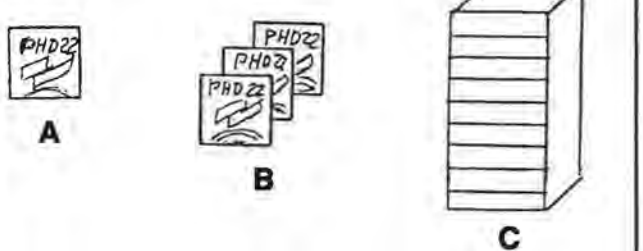
The disadvantages include the fact that the cost of just one may be higher than a larger number, and even if not, the extra postage may be a factor, unless our order includes other items. Also, the time necessary to order just one crystal is the same as the time it takes to order more and our customer must wait longer.

THREE OR MORE

It has been a common practice to order (or we should say to reorder) crystals in lots of 1/4 dozen, especially for the more popular numbers. Suppliers have discounts for reorders of 1 dozen, so if we reorder 4 numbers of 1/4 dozen each, we can take advantage of this better 1 dozen price. Figure 1-B indicates the choice of 1/4 dozen.

If there is a quantity discount, then the normal method of pricing used by many suppliers is to use 1/10 of the 1 dozen price as the single price. For example, if the crystal price per dozen is $48.00, then the price for one is $4.80 (which is 1/10 of the 1 dozen price). The 1/4 dozen price would be three times this $4.80 which is $14.40. Generally we can mix the numbers and still be given this discount. Many crystals are not discounted, and if they are the more expensive ones we may choose to reorder just one.

FIGURE 1



CRYSTAL CABINETS

Figure 1-C shows a cabinet containing several drawers of crystals. Last month we also showed several crystal cabinets which would hold a large number of crystals. It is nice to have all of these cabinets and have them filled with crystals so we can give immediate customer service without depending on the mail person to deliver them (a few days from now). From a practical standpoint, and especially if we are just starting in business, we may hesitate before going "all out" with our crystal purchases.

HOW TO DECIDE WHICH CRYSTALS TO BUY FIRST

Figure 2 shows numerous styles of crystals, shown in the G.S. chart which we have reprinted here with their approval. This is not to preclude that they are the only source for crystals. Since they are an American manufacturer of a complete line of crystals, it was easy to obtain their permission to use these charts, etc. Please note that each company may use a different numbering system, especially on those crystals that are not using just the metric system. Even if we have crystals in stock from a company who is now out of business, we must have their catalog to follow their numbering system. I say this knowing that sometimes we are able to buy a retired watchmaker's stock with some of this discontinued merchandise, and it may be a bargain if we have the appropriate companion catalog. Of course we must realize that we will not be able to reorder to restock these crystals.

Now let's look at Figure 2 again. Note: I placed the numbers 1 through 27 on this chart so you and I could discuss them by referring to these numbers. **(These are not factory numbers.)**

Some of these crystals are used quite frequently and it would be nice if we had them in stock, while others are seldom used and therefore we may decide they are not necessary or it is not practical to stock at this time. We can order them as needed.

Now let's look at this chart in more detail. First, we notice that all of these crystals are plastic except two. These two are number 24 and number 22. Number 24 is thin mineral glass (1 mm thick); number 22 is a thick mineral glass. They come in a cabinet drawer assortment or may be individually purchased. Both of these glass crystal styles are round, as are most of the crystals shown in Figure 2. Crystals that are shaped other than round are referred to as fancy shapes. Numbers 18 and 15 are fancies. These pictured here are just an example of two of the available

FIGURE 2

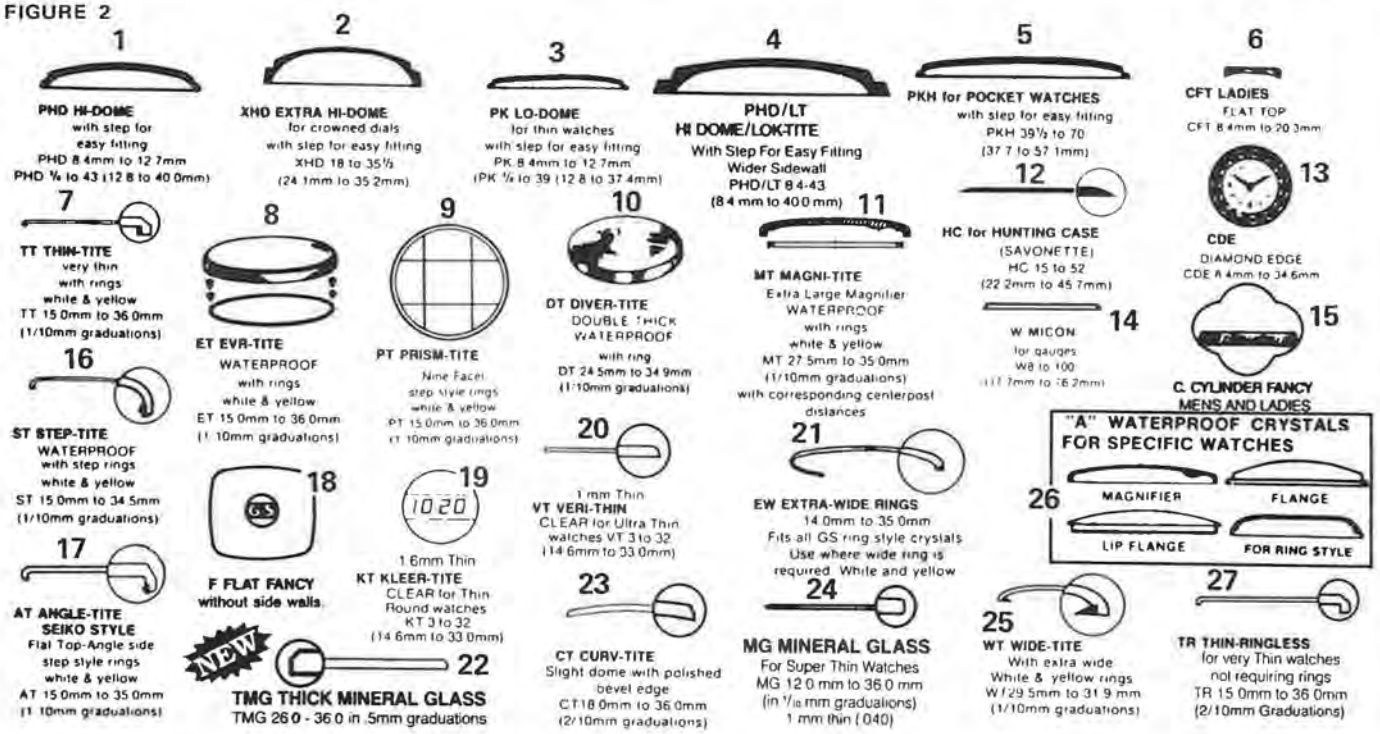


Illustration courtesy of Germanow-Simon Corp.

(Please turn to page 31)

By John Plewes

CLOCK STRIKE SYSTEMS

After a clock movement has been cleaned, repaired and reassembled, certain adjustments must then be made before it will run. For example, the escapement in the time train must be set up, and the gears in the strike train must be "phased in," as it were; it is not sufficient to simply fit them in their correct places.

Certain basic ideas in the control of striking are found in all clocks, but the specific arbors involved vary according to the type of movement. In German clocks, there may be six arbors in the strike train, whereas in an American Ogee, there are rarely more than three. The general principles can be understood by considering two very typical American movements: the weight-driven 30-hour ogee and the spring-driven 8-day; both employ the count-gear system of striking. To get to know the rack-and-snail type of striking, it is best to study the old English

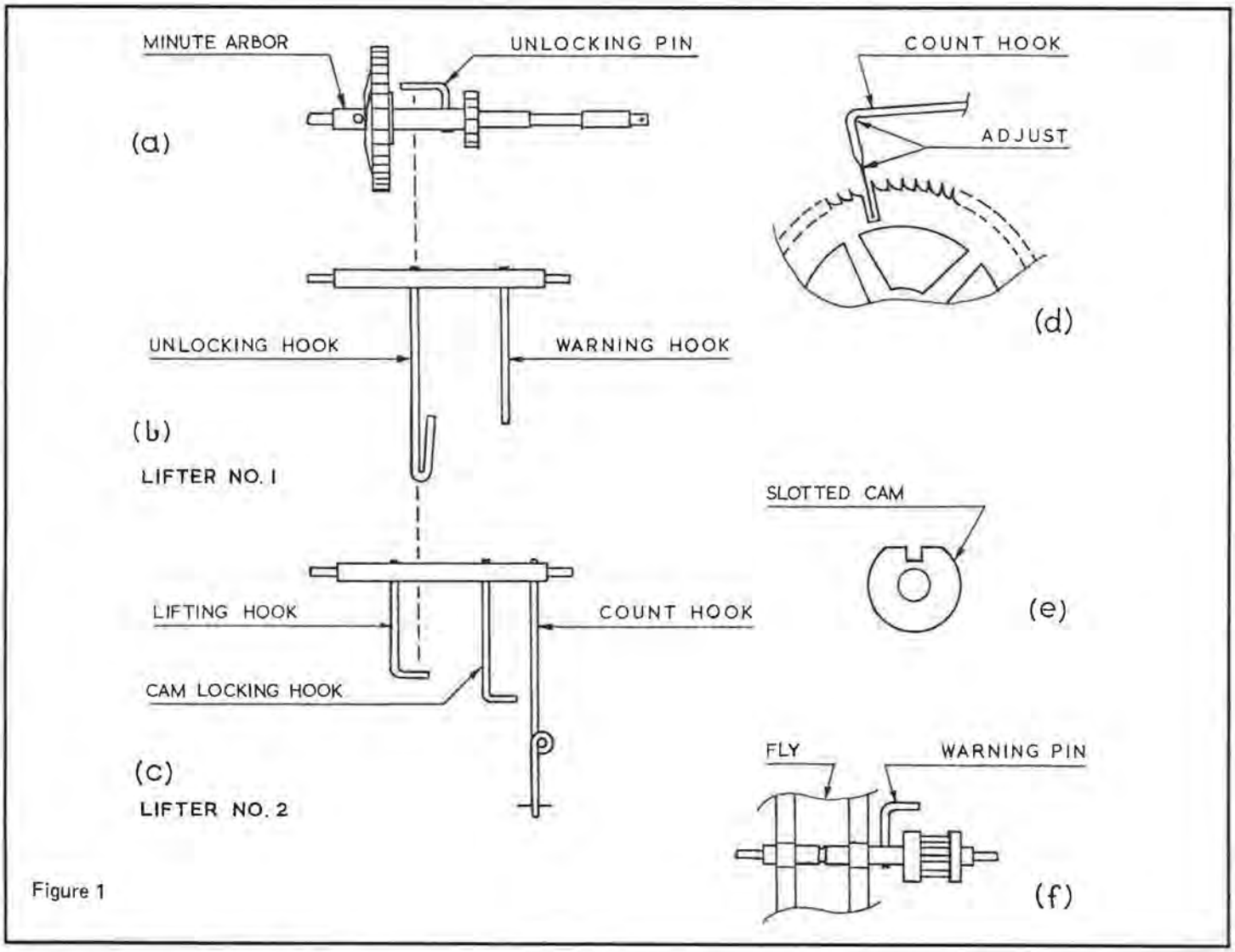


Figure 1

longcase movement, where this arrangement is so often found.

It is always intriguing to see if you can get off the strike setting hook (no pun meant, of course) by setting up the strike train components in their approximately correct positions as you set the arbors in place during reassembly. Sometimes you may win; more often you do not, because the arbors almost always rotate a little before meshing occurs. However, an approximation is helpful, even though the strike train still runs continually because it is unable to lock itself at the intended position. Because of its relative simplicity, it is as well first to deal with:

THE OGEE STRIKE TRAIN

After assembling the ogee movement, leave out the two strike side pillar pins--those at the top center and bottom left pillars. Turn the minute arbor until the lifters fall and see that they do not interfere with subsequent operations, for example, the unlocking pin must not hold up the unlocking hook. Now push the S1 gear until the tail of the hammer has just fallen off one of the 13 lifting pins, and keep the S1 gear steady in this position. The slot in the cam on the S2 arbor should now be under the cam-locking hook (see Figures 1[c] and [e]). If this is not the case, gently pry the plates just far enough apart to remove the fly and to disengage the S2 pinion from the S1 gear. Rotate the S2 arbor until the slot is under the cam-locking hook and then re-engage the pinion with the S2 gear. During extraction and replacement of the S2 arbor, care must be taken to avoid bending the pivots. Repeat this operation, as required, until reliable locking is achieved.

The cam-locking hook may be unable to drop because the count hook, Figure 1[c], which is on the same arbor does not fall between the teeth of the count gear. The end of this hook must then be carefully bent until the flat blade thereon falls centrally in the deep, hour-marking slots in the count gear; Figure 1[d] shows the bending points. Note that the count hook blade cannot be adjusted to enter the count gear slots accurately and repeatedly if the pivot holes of the count hook arbor are worn--this point is sometimes overlooked. When properly adjusted, the blade of the count hook will coincide with a radius of the count gear, as shown in Figure 1[d].

Turn the S1 gear and allow the train to run and lock. With the train thus locked, carefully replace the fly, without disturbing the S2 arbor, so that the warning pin, Figure 1[f], points in the general direction of the count-hook blade. The full operation of the strike train can now be tested. Install the verge so that the time train cannot run freely, and set a minute hand in place on the square of the minute arbor. Apply finger pressure to the S1 gear and slowly turn the hand until the cam-locking hook rises, allowing the fan arbor to turn until the warning pin hits the warning hook. This completes the warning. If necessary, the hand should now be removed and repositioned to indicate about 5 minutes to the hour.

Check that the hammer is still down; it must not be even slightly raised at this stage. Now continue to turn the hand until striking occurs, followed by secure locking. If the locking is at all doubtful, small adjustments of the lifters may

be required.

The difference in the depths of the slots in the count gear enables the cam-locking hook to determine whether or not the train shall run. The angle between the arms of the count hook and the cam-locking hook is critical. It can be adjusted by inserting a scriber or small screwdriver between these two parts to gently lever them farther apart or closer together, as required. This enables the correct depth of locking to be obtained.

Should striking commence too early or too late, the end of the unlocking hook must be raised or lowered relative to the unlocking pin on the minute arbor. It is of no avail to open or close the hook, and only a small adjustment can be obtained by twisting the unlocking pin slightly out of alignment with the minute arbor. No great changes are necessary, but such adjustments must be made carefully.

When all is satisfactory, the four pillars must be secured permanently with tapered pins or short Z-shaped wires.

It is not feasible to describe all of the problems that might obviate setting up the strike, but the foregoing portrays the essentials. When the action is understood, the remedies suggest themselves, and a little judicious bending or "gear shifting" usually suffices.

THE 8-DAY SPRING (OR WEIGHT) STRIKE TRAIN

Although most 8-day strike movements have four or five arbors as against the ogee's three, they are sometimes easier to set up; this is because, very often, only two arbors have to be synchronized. This is due to the fact that the strike pins, which are only two in number, are mounted on the slotted cam itself and so cannot get out of synchronism with the cam's slot.

Aside from minor differences in layout and gear trains, the chief variation amongst 8-day T & S movements is in the way in which the strike train locks. In one type of spring movement--I'll call this version No. 1--the slotted cam actually does lock the train, as in the ogee. However, it is good engineering practice to control clock gear trains at points of minimum force (that is, as high up the train as possible). It is better, therefore, to use the warning pin on the S4 gear as a stop-start device, than the cam on the S3 arbor. Despite the increased speed of the S4 arbor, the force required to lock and unlock the train is very much less. This principle is used in what I shall term version No. 2.

Synchronism between cam and count gear is obtained as before, by bending the end of the count hook

Figure 2

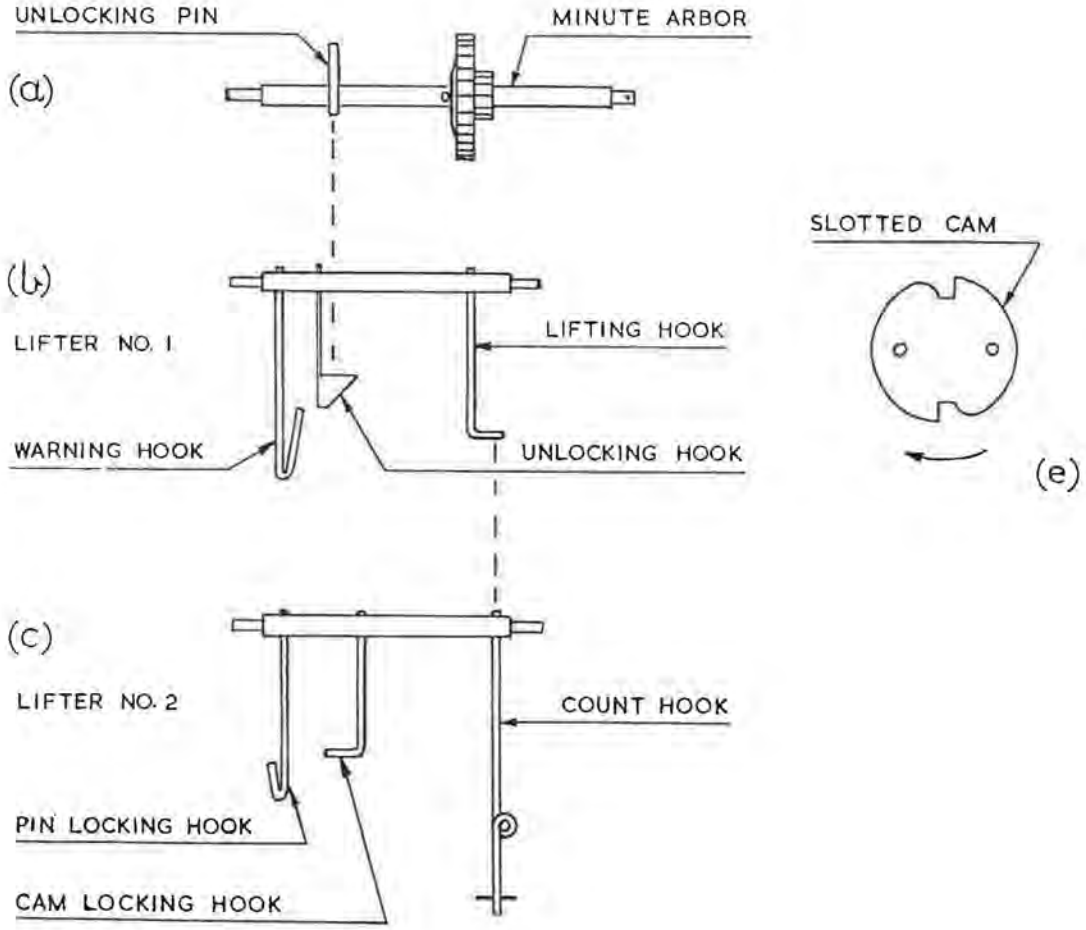


Figure 1[d]. As in version No. 1, lifter No. 1 (Figure 2[b]) raises lifter No. 2 (Figure 2[c]), but there are now six hooks instead of five, and they are located differently. Also, in most models of version No. 2 the unlocking hook is designed so that damage no longer occurs when the hands are turned backwards.

In both versions, the cam has two slots, which have either flat or rounded exit corners to enable the train to run when the unlocking hook drops.

The first thing to remember when setting up any spring-driven strike train, however, is to let down both mainsprings into the care of C-rings or wire loops, making certain that there is absolutely no energy left in them whatsoever.

To proceed with a version No. 2 movement, set the count hook up as for the ogee, but with the cam-locking hook centrally located in the cam slot. In this position the warning pin on the S4 gear must again be at 12 o'clock (i.e. close to the top of its circle). This positioning is slightly more critical than in version No. 1, as the pin must rest against the pin-locking hook to lock the train.

This situation is obtained in the same way as used in the ogee by removing the fly and adjusting the meshing of the S3 gear and the S4 pinion. The train can be checked manually, with perhaps half a turn of wind-up on the spring to prevent it from unhooking. When the train locks correctly every time, set a minute hand in place and check and adjust the whole striking procedure as done for the ogee. Note that an unlocking hook of the flat strip type shown in Figure 2 is distinctly fragile where it leaves the arbor and it is a good plan to soft solder it at this point to give it more support, even though it is apparently okay.

When both trains are correctly set up and ready to run, wind up both mainsprings until the C-rings or wire loops are loose and can be removed or cut, respectively. Never cut a spring-retaining wire loop whilst it is under tension because damage is highly probable if you do.

The striking trains of the ogee and the 8-day spring (or weight) movements, as dealt with above, are markedly similar in that they both use the count gear type of striking system in one variation or another. It is an old and reliable method, but if it does get out of kilter, it stays out of kilter; there is virtually no chance of its correcting itself. And if, in days long gone, you had wined and dined and whatever unwisely, and so could not sleep, you couldn't reach out of bed and twitch a string on such a clock to hear a repetition of the last hour struck. This would only have put the clock in the same state as your charming self--out of kilter in the morning. Naturally, this lack of self correction and repetition is far less important today than it was in, say 1676, or thereabouts, when the rack and snail type of striking was devised. (You couldn't just switch the light on back then, like man.) The new mechanism was probably designed more to overcome lack of repetition than self correction, but it does

both; and Messrs. Barlow and Tompion, who are credited with its invention, were undoubtedly two very smart men. Figure 3 shows a frontal diagram of an old English longcase movement, and thus the main components of:

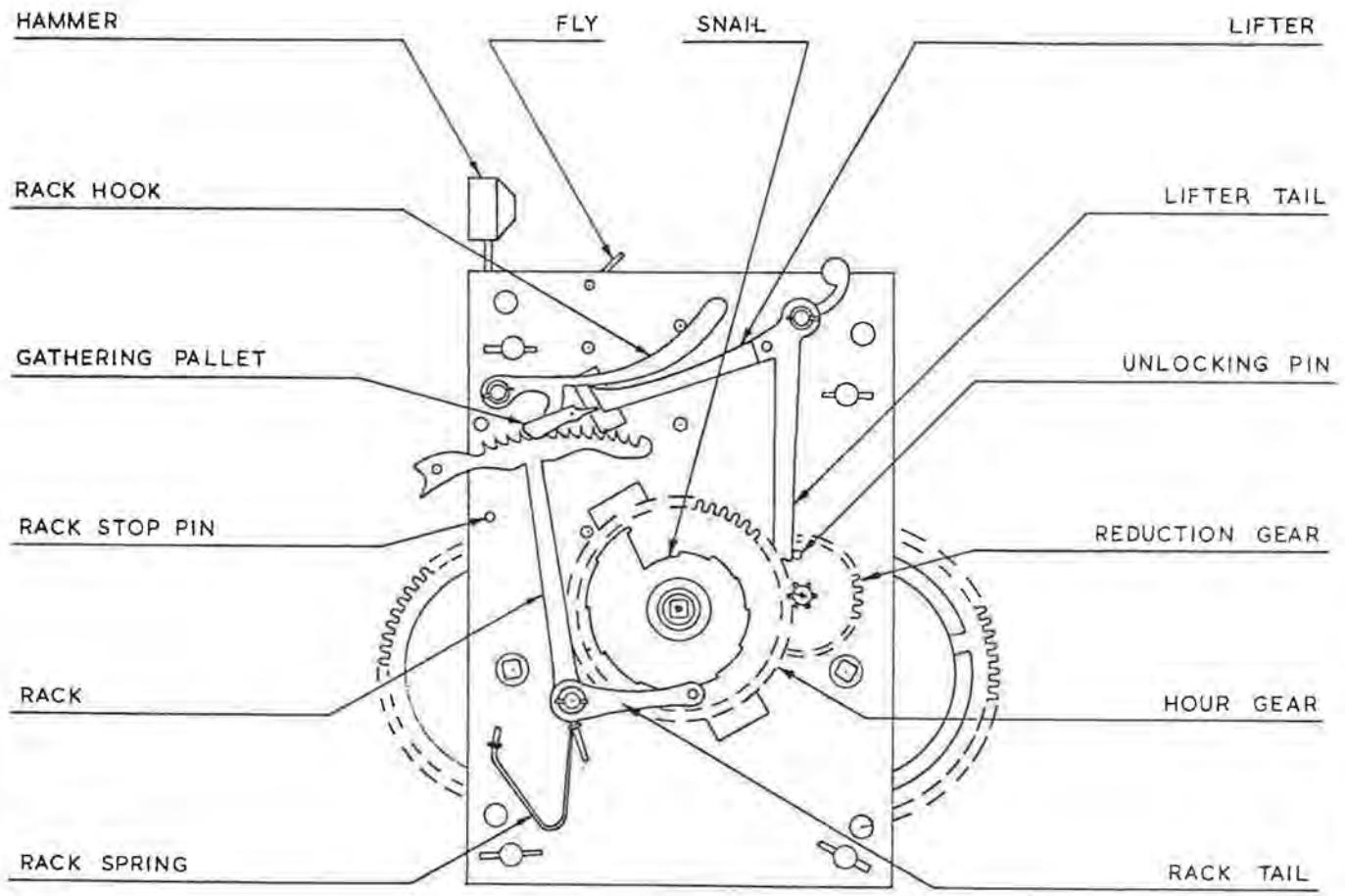
THE 8-DAY RACK AND SNAIL STRIKE SYSTEM

Although reliable enough when operating properly, the rack and snail system may occasionally be a little more troublesome to set up than its count gear counterpart. Assuming that the movement is correctly repaired and assembled, straighten the minute hand to equalize its curves each side of its centerline and fit it on its arbor and turn it to 12 o'clock. Ease the reduction gear forward so that it no longer meshes with the cannon pinion, and rotate it until the unlocking pin allows the tail of the lifter to fall. Push the gear back into mesh again, and check that the minute hand is vertical when the drop-off occurs. It may be necessary to repeat this, moving the meshing a tooth either way. If insufficient accuracy is obtained, put the minute hand in one of its three other positions and repeat the procedure. There is no need of a dial for this; the eye is perfectly adequate.

Pin the reduction gear in place when it has been thus synchronized with the cannon pinion. With the minute hand vertical, bring the hour gear and snail assembly forward until it unmeshes from the reduction pinion. Lift the rack hook, and turn the snail until the pin on the rack tail contacts the center of the 12 step. Maintain this position and slide the hour gear back into mesh.

Fit the gathering pallet lightly on its tapered square arbor (see Figure 3). Then run the strike train by hand, checking that it strikes 12 o'clock correctly. If the gathering pallet lands on top of a rack tooth, a slight lengthwise twist of the rack tail will usually correct things. If the count is more or less than 12, however, the angle between the rack and its tail must be changed. As the tail is often soft-soldered on its pipe, heat must be applied before the angle can be corrected. It may be necessary to repeat this adjustment a time or two, because this angle is critical. Unless accuracy is achieved, the clock will strike erratically or not at all. When the counting is satisfactory, pin the rack on its arbor. An S-shaped wire is as good as or better than a tapered pin for securing the four strike-train components on their arbors.

Figure 3



Pin the minute hand on with its collet and check the counting action around the 12 positions; when 12 o'clock and 1 o'clock are set up correctly, the rest usually falls in line, unless the rack teeth are erratically spaced. If a problem arises, do not be tempted into filing the steps of the snail, for they are almost never at fault.

Twist the lifter tail until it allows the unlocking pin to slide under it when the minute hand is turned backwards. There are bevels on the 12 o'clock-1 o'clock step on the snail, and on the rack-tail pin, to prevent damage should the hands be turned backwards. Unfortunately, these measures are not always effective, for if the rack tail does not distort, its pin will score the snail. For these reasons it is not advisable to turn the hands backwards on this movement, certainly not past the 12 o'clock mark. However, when the lifter tail has been twisted, as described above, and the action is visible during setting up, it is very useful to rock the minute hand back and forth; as long as the rack is moved when necessary, no harm is done.

When the rack is fully counted, the tail of the gathering pallet hits the rack pin and stops the strike train. In this position the hammer tail should have just dropped off one of the lifting pins on the S2 gear. If this is not the case, pull the gathering pallet off and refit it in another of its four possible positions, continuing this procedure until the best one is found. Remeshing the S2 gear with the S3 pinion gives a finer adjustment, but this is often necessary.

When striking is over, and the hammer tail is free of the lifting pins, the warning pin on the S4 gear must be close to the top of its travel--that is, at 12 o'clock. If it is not in this position, take out the top two pillar pins and pry the plates apart far enough to remesh the S4 pinion with the S3 gear so that the warning pin is at the top.

Bring the minute hand to the 45-minute mark, and then apply finger pressure to the strike train. Slowly advance the hand until warning occurs; if the hammer moves at all, repeat the last two procedures until it remains at rest during the warning. Push the hand up to the 60-minute mark and allow striking to occur; continue around the dial, counting each hour in turn until all the steps in the snail have been checked. If all is well, rest the end of the rear pivot of the S3 arbor on an anvil or vise, and gently tap the gathering pallet on firmly, using a hollow punch. Insert the tapered pin, if a hole is provided for it. Usually, however, no such hole exists, in which case a small set-screw collet is a good way to secure a pallet with a tendency to loosen.

Although there are several adjustments on the front plate, and the S2, S3, and S4 arbors have to be synchronized, the longcase striking mechanism is very reliable when set up along the lines indicated above. Even when all seems well, however, it is best to resist any pressure for an early delivery; retain and run the clock for at least two weeks, in case an intermittent fault develops, the following example is typical.

When the gathering pallet has counted itself out of business, striking ceases and the tail of the pallet comes to rest on a pin at the left-hand end (the 9 o'clock side) of the rack. The angle at which it does so is important. Should the tail land tangentially on top of the pin, a shallow pit will develop over many years (decades). As this pit slowly deepens, the rack spring, which may weaken slightly over the same period, may be unable to swing the rack out from under the pin when the rack hook lifts at warning. The clock will then fail to strike, either intermittently or consistently. The remedy is to file the end of the gathering pallet tail to the kind of shape shown in Figure 3, and to ensure that this sloping ramp butts against the pin in such a fashion that it tends to push the pin away at all times.

Generally, the gathering pallet is in front of the rack, and the locking angle of its tail against the pin can be readily seen; however, it is occasionally installed behind the rack and so cannot be seen. In either case, the release can be checked out by gently pushing the rack, when locked, from left to right, and noting that the gathering pallet tail rises slightly, clockwise, against its usual rotation. Such faults justify a delivery delay--which can then save an unwanted comeback. ❑

MOVEMENT BANK DONATIONS NEEDED

Your donation of vintage watch movements to the Movement Bank will insure its ability to provide this valuable service for present watchmakers and watchmakers of the future. When you no longer need them, be sure your collection of vintage watches comes to the Movement Bank. Your gift is tax deductible.

Pickle Barrel

Marshall F. Richmond, CMW

A BEGINNER'S COURSE IN JEWELRY CRAFTING & REPAIR

Prongs, Tips, and Setting Stones in Prong Settings

Prongs and tips on prong type settings must be considered one of the most difficult repairs in doing jewelry repair, judging from the few retail jewelers who do it in their own shops. Today to me these are routine repairs. However, years ago when I started experimenting with prong replacement while taking a course in jewelry repair at the watchmaking school I attended, I thought it was not only difficult but bordering on the impossible. There are many different situations that we are faced with in making prong repairs, and after 40 years of doing jewelry crafting and repair, I'm still learning something new every time that I make one of these repairs. My intent in writing about this subject is to impart the know-how so any craftsman with good common sense and a good mechanical aptitude will be able to figure out how to make most any prong repair that may be encountered.

One basic rule that I learned long ago is that if there is metal of the prong over the edge of the stone, it is possible to build up the tip with gold solder. By moving the heat, the solder can be pulled down over the edge of the stone, making it stronger where the prongs get thin and weak. Whenever in doubt, always replace the prong as well as any other prongs that appear to be badly worn or weak.

The next rule is to make sure that the stone will take heat without damage. If in doubt, remove it. In order to insure good solder joints, the ring should be pre-cleaned. I usually boil in pickling solution first and then put it through the ultrasonic cleaning tank using a strong soap, detergent, and strong ammonia solution; or I use a commercial ultrasonic jewelry cleaning solution, then rinse and dry. If there are side stones they also should be checked to see if they will stand heat. If they will, the ring can be dipped in a solution of boric acid and alcohol, the ignited and burned off, leaving a protective coating of boric acid on the ring mounting and on any stones that have not been removed. Solder tips are not practical; if for any reason the stone must be removed, then a prong should be replaced.

Now that we've covered preparing the ring for tipping the prong(s), we'll start setting up the job. Grasp the bottom of the shank in the heavy-duty tweezers and place on the bench heat pad with the prongs up. Weigh the tweezers with a steel bench block so it will not move when the heat and solder are applied. Figure 1 shows the top half of a ring with a four-prong setting and one prong worn on the edge of the stone. Also shown is a solder pick and a small square of solder with the solder on the end of the pick in a ball after it has been heated and picked up. Heat the prong to be tipped and flux only the tip where you want the solder to flow. Use batterns flux applied with a piece of sharpened pegwood. Heat again till the flux turns white. Then while applying heat to the prong, place the solder that is on the pick on the prong (Figure 2). After removing the pick, continue to apply heat or re-heat until the solder flows and is pulled over the edge. Remove the heat and slow cool. *DO NOT QUENCH, FOR DAMAGE CAN BE DONE TO THE STONE!*

After it is cool, it can be shaped with a fine-cut needle file to match the other prong tips (Figure 3). I usually leave the one prong a little heavier than the others for identification in case the ring is returned with another prong broken off. If all the

Figure 1

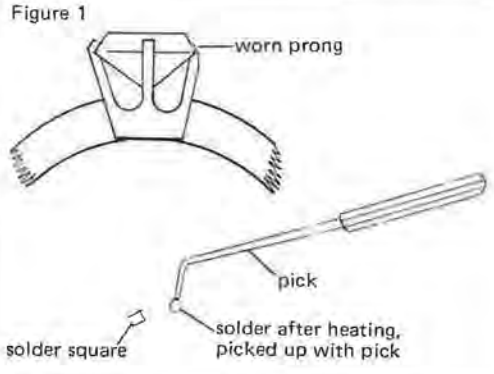


Figure 2

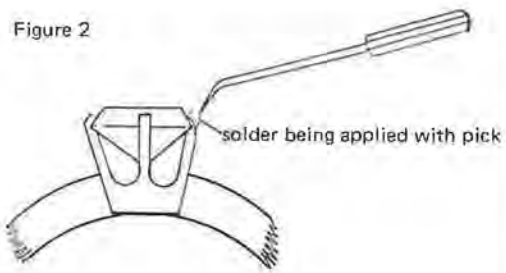
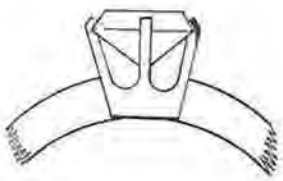


Figure 3. Finished prong after shaping and polishing. The black area on prong tip represents solder



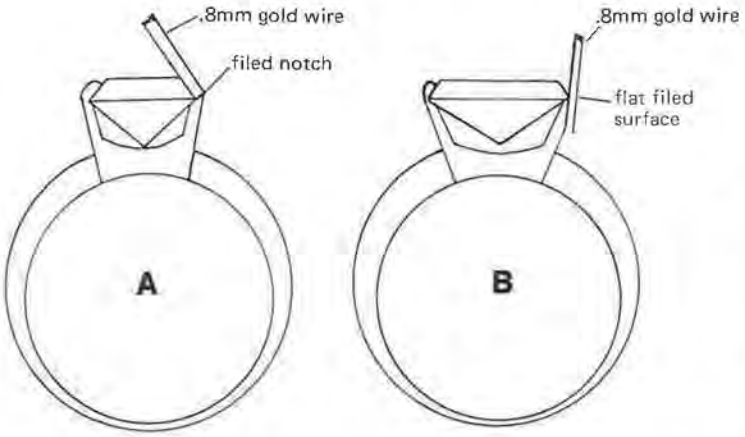


Figure 4. Four prong settings.

prongs can be replaced at one time this will never be a problem, so if all prongs show wear they should all be replaced. To finish, the boric acid coating should be removed by soaking or boiling in water or pickling solution. Then start with a bronze wire bristle brush wheel on a polishing motor and polish out, using first tripoli and then jewelers rouge on bristle or cotton buff wheels (as needed). Complete by cleaning in an ultrasonic tank with soap and ammonia or a commercial solution, or clean with a brush if no ultrasonic is available. Rinse in water and dry with a heat lamp or a dryer.

Figure 5. Soldering on prong.

REPLACING PRONGS

Replacing prongs can be done in more than one way, often without removing the stone. If the stone is a diamond, ruby, sapphire, or most any synthetic stone that will stand enough heat, the stone need not be removed when flowing solder on the prong. However, when more than one prong is to be replaced, it can make it easier to shape and finish the sides of the prongs so they can be filed with a thin file. Metal for prong replacement can be obtained in several ways. A roller mill helps greatly, for a piece of wire can be sawed from most any metal (even old ring shanks), then rolled to desired thickness (.8 mm wire in yellow and white can be used for most all prong replacement, and can

easily be slightly flattened if needed in the rolling mill. Or it can be hammered flat with a steel chasers hammer on a steel bench block.)

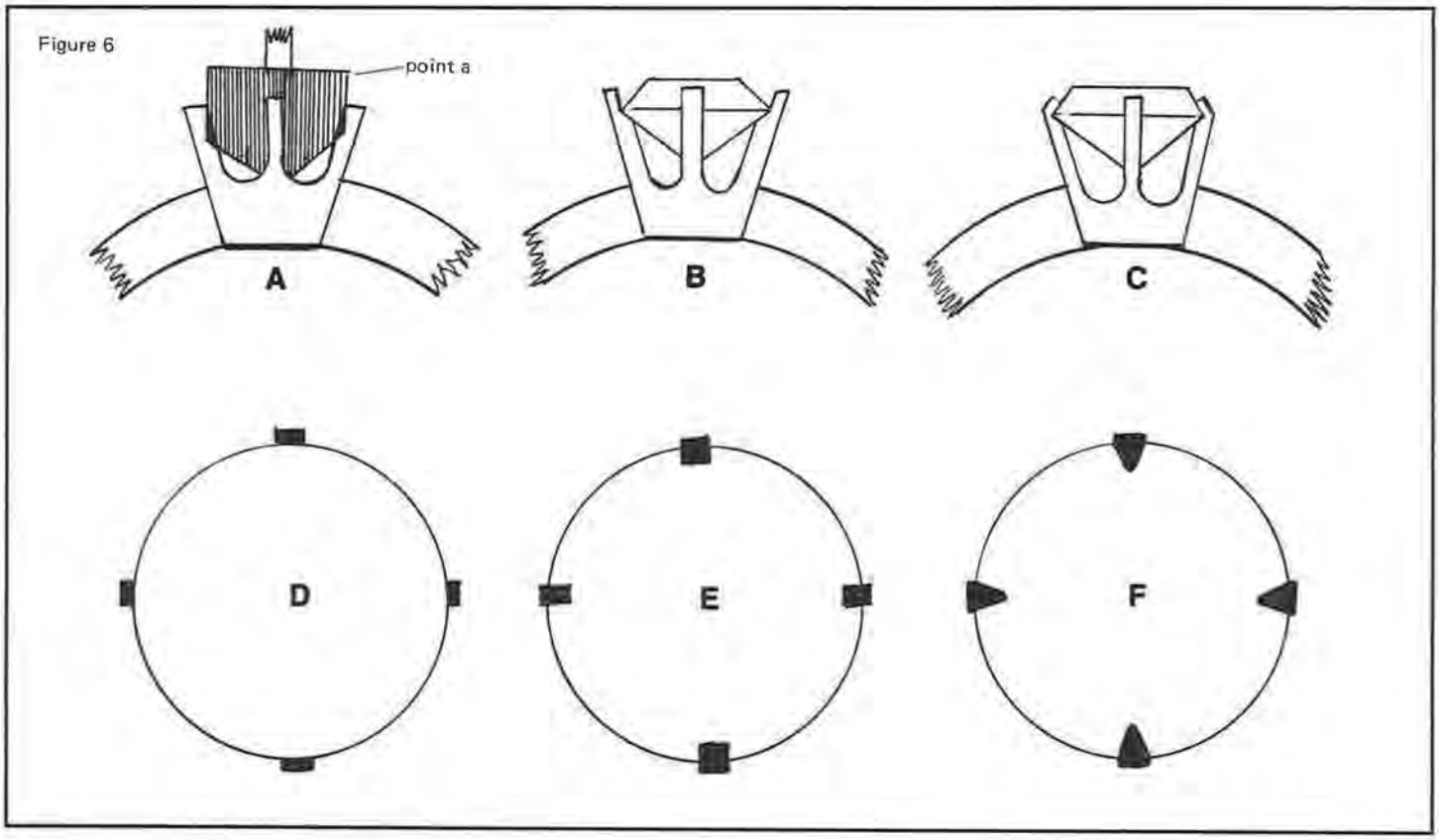
Figure 4A shows one method of replacing a prong which actually only replaces the tip over the prong. Figure 4B shows filing the side of the prong flat and soldering a piece on that goes about half the length of the prong. The second method puts new metal on the bend over the stone, leaving good metal thickness on the girdle, which makes a stronger and more durable prong replacement. This method also works well with the stone removed.

To prepare the work for prong replacement the usual pre-cleaning needs to be done by removing all foreign matter in the setting. Soap or detergent buildup can be removed by boiling in pickling solution if ultrasonic or hand brush cleaning doesn't make the mounting and stone(s) perfectly clean. Anymore I always boil the rings in pickling solution before cleaning in the ultrasonic tank. I find that it saves time because the ring comes out of the ultrasonic tank clean on the first try--so I don't have to boil it after cleaning it in the tank. When the ring and stone are clean, then a notch should be filed in the prong to be replaced at the girdle of the stone (see Figure 4A, filed notch). Next, dip in boric acid and alcohol solution, and ignite to burn the alcohol off; this will leave the ring coated with boric acid. If .8 mm round wire is used, flatten and make sure the end is filed square. Flow a small amount of solder on the end of the wire and hold in position while applying heat. When the solder has flowed, cut the wire off slightly above the top table and reapply heat which will allow the end of the wire to seat tightly against the filed notch. Pull the prong tightly against the stone, and with a jewelers saw cut it so the same amount of prong is over the stone as the other prongs. The prong can then be shaped with a small needle file, and the ring is ready to polish and clean.

In putting the new prong on the outside of the existing prong (Figure 4B) after pre-cleaning, the side of the prong should be filed flat to the edge of the stone. The ring should be coated with boric acid as was just described for the other type of prong. Again using .8 mm round wire, it should be flattened on the end to be soldered, fluxed, and a small amount of solder flowed on the surface to be soldered to the prong. Flux the prong with pegwood after pre-heating it, then hold the solder-coated wire in place and apply heat until the solder flows. Remove heat, and with side or end cutting pliers cut the wire off about 1/8" to 3/16" above the girdle of the stone. Then reapply heat, and notice that the new prong will move tight against the filed surface, making a good strong bond, and leaving good metal outward from the edge of the stone. For beginners it is often difficult to hold the wire steady while making the first solder flow.

Let me describe first how I usually do it, and then an alternate version for some jobs that doesn't require a steady hand. On most jobs I hold the wire in locking tweezers with about one or two inches of wire protruding below the jaw of the tweezer. This lets me rest the heel of my hand on the bench to steady the wire in place while the heat is applied; the solder flows enough to hold the prong in place while cutting it off before reheating it to seat it tightly against the filed prong. The other way that can be used (and I do use it on occasions) is to use the third hand tool. This tool is merely a base with a double ball socket adjustment that holds a pair of heavy-duty locking tweezers so that the tweezers can hold objects the same as a hand, and can be adjusted to hold most any small article in most any position needed (Figure 5). This can compensate for an unsteady hand, or enables one to have both hands free for other

Figure 6



purposes.

Setting a stone in a prong type setting is about the easiest of all stone setting jobs. The first consideration in setting the stone is the size of the stone and if it can be made to set in the setting you are to use. This requires common sense and good judgement. I usually start by measuring the diameter of the stone at the girdle with vernier calipers, then go to my graduated set of setting burs, and choose one the same diameter for the girdle of the stone. (Figure 6A, point "a" shows a setting bur and how it is used to cut a seat.) The bur can be held in the chuck of the flex shaft tool or used on prong seats by using a handle chuck and turning it by hand. This method is somewhat slower than using a power tool, but there is much less chance for making an error which can damage or ruin the head. Figure 6A shows the seat cut in a four-prong head with the bur still in place. Prongs can be bent in so a smaller stone can be used, or bent out to accommodate a larger stone, although it is best to use the correct size setting for the stone. Six-prong heads can be repaired and the stones set in exactly the same manner as with a four-prong setting. With the seat cut, the stone should fit tightly when set in the seat (Figure 6B).

With setting pliers or flat nose pliers, the two prongs opposite each other can be brought slightly over the edge of the stone by putting pressure on the ends of the two prongs at the same time. Do the same with the other two if this is a four-prong setting, or the other four if it's a six-prong setting. By using setting pliers with the long jaw under the setting and the short jaw over the tip of the prong, it can be pulled tight against the top of the stone. Do the same on the opposite prong until all the prongs are tight, then go over all of them again and make sure they are all tight. The stone can be checked for setting straight by looking under the stone at the culet of the stone; make sure that it is centered between all the openings (Figure 6C). Figure 6D shows top view of stone setting in the seat before the prongs are bent over the stone; Figure 6E shows when the prongs are set over the stone; and Figure 6F is after they have been shaped with a needle file. Polishing and cleaning is the same as was described for tipping.

A GOLD SOLDER TIP

A tip came in from Jim Osborn on transferring gold solder from the bench heat pad to the work with a solder pick. Sharpen an ordinary hard lead pencil to a point and remove about 3/4 inch of the wood. Now dip the tip in batterns flux, and you can pick up gold bits for soldering. Because it's carbon, you can move the chip around while the gold is moulten. No carbon inclusions will result. You may have to remove some charred wood from time to time.

CORRECTION

In a letter from Richard Porter, an error was pointed out in the January '91 issue ("Pickle Barrel"). An angle was referred to as having 120 degrees when it should have been 60 degrees.This was also noted in Figure 1 as being 120 degrees when it should have been 60 degrees. The same error was made in the March 1991 "Pickle Barrel" article in Figure 2. It referred to the angle left by a triangular file in cutting a ring shank for a "V" solder joint. My apologies if I have misled anyone.

In next month's article we will discuss setting diamonds in flat settings. ❑

Archie B. Perkins, CMW, FNAWCC, CMBHI

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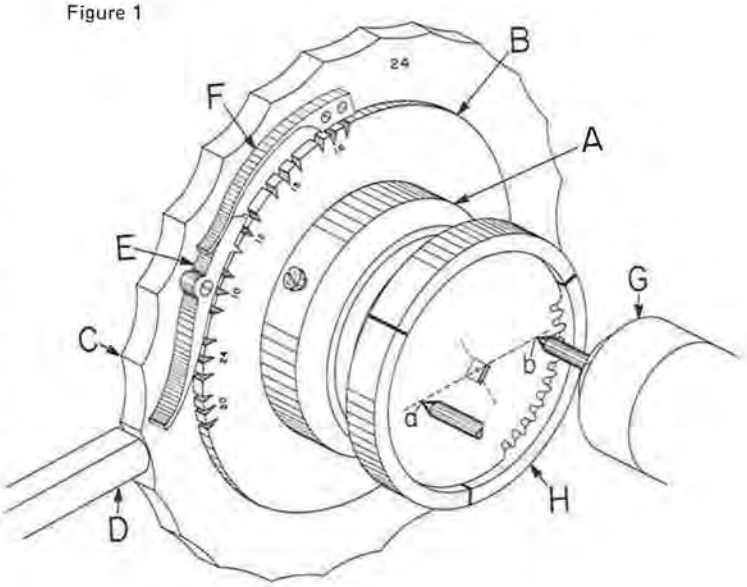
PART LXV

USING THE ROSE ATTACHMENT TO DECORATE WINDING WHEELS

The rose attachment for the watchmaker's lathe is shown in Figure 1. It is shown as it would be fitted to the end of the spindle of the watchmakers lathe, although the lathe is not shown in the drawing. View A shows the hub of the attachment; View B shows the index plate which is part of the hub; View C shows the rose (sometimes called a rosette); and View D shows the rose follower which can be made from a piece of slide rest cutter stock, or the follower can be made of a framework which holds different diameter rollers. View E shows the index latch, and View F shows the latch spring. The latch works in notches in the index plate. This allows the rose to be indexed for one-half of a cycle for overlapping the pattern on the work. View G shows the spindle of the grinder which holds the lap used for making the decorations on the winding wheel or article being worked on. View H shows a wheel chuck used to hold the ratchet wheel while working on it. The rose attachment is held onto the end of the lathe spindle with a set screw. Views "a" and "b" show the the two positions for the lap to the left and right of the center of the wheel or work.

When making some patterns on a winding wheel, the lap is required to be to the left of the wheel's center and other patterns require that the lap be to the right of the wheel's center. In either case, it is important that the height of the point of the lap is on center with the height of the lathe center. It is also very important that the center of the follower be the same height as the lathe center. If this is not the case when one is making multiple patterns of the same shape, the pattern is likely to go askew.

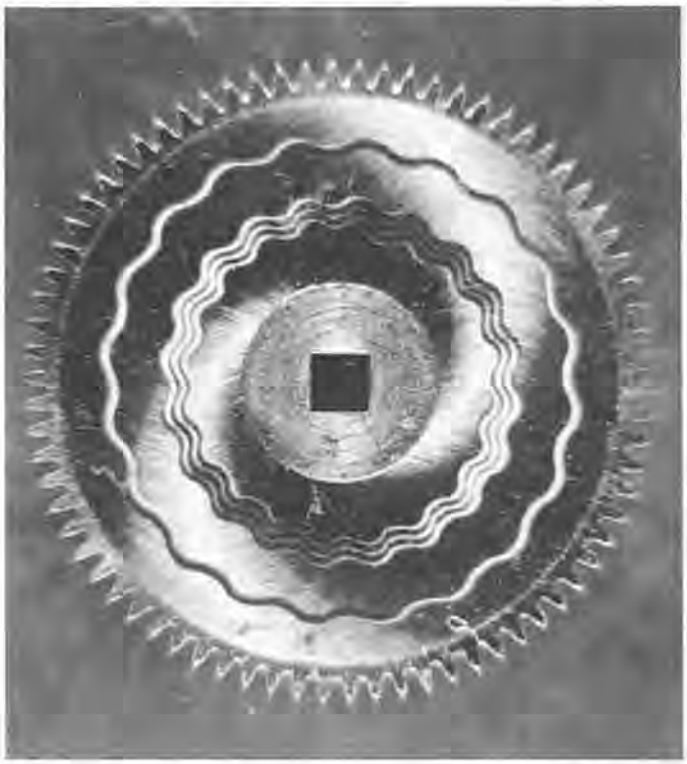
Figure 1



FINISHING WINDING WHEELS WITH THE SINE WAVE TYPE PATTERNS

Figures 2 and 3 show winding wheels decorated with sine wave type patterns. Both of these wheels have 20 repetitions in each circle, which require a rose with 20 repetitions. The wheel that is shown in Figure 2 is a Hamilton ratchet wheel. This pattern can be made by using a rose like the one shown on the rose attachment

Figure 2



in Figure 1. The rose needs to have very shallow depressions around its outside edge in order to make such a low profile on the waves shown on this wheel. The radius on the rose follower should be one-half of the radius of the depressions on the rose. If this is not the case, the curves on the pattern will be unequally shaped. If the radius on the follower is larger than one-half of the radius of a rose depression, the outside curve of the wave will be wider and rounder than the inside curve. The reverse will be true if the radius on the follower is smaller than one-half of the radius of the depression.

The tool used to make the pattern on the winding wheel can be made from a steel rod which is turned down at an angle to form a point. The point is flattened at the end so it makes a pattern which is the proper width. Oilstone paste or silicon carbide paste can be used on the lap for making the pattern. Better yet, diamond paste can be used which is faster cutting and more positive in its action. The pattern can also be milled onto the wheel by using a carbide drill bit which has been ground at an angle to form a sharp point, then flattened slightly at the point. When this is done, no grinding compound is needed. The lap with grinding compound makes a more subdued pattern than does the carbide cutter. The carbide cutter makes a sharp bold pattern. For making this particular pattern, the lap or tool is set to the left of the center line.

When making the design shown in Figure 2, one would first make the outside circle. Then, the other three circles are made. After the first of the four circles is made, the screw on the top slide of the slide rest is turned so the lap moves toward the center of the wheel enough to locate the lap to the proper position for making the second circle. Then this circle is made. Next, move the lap in the proper amount for making the third and fourth circles to complete the decorating job.

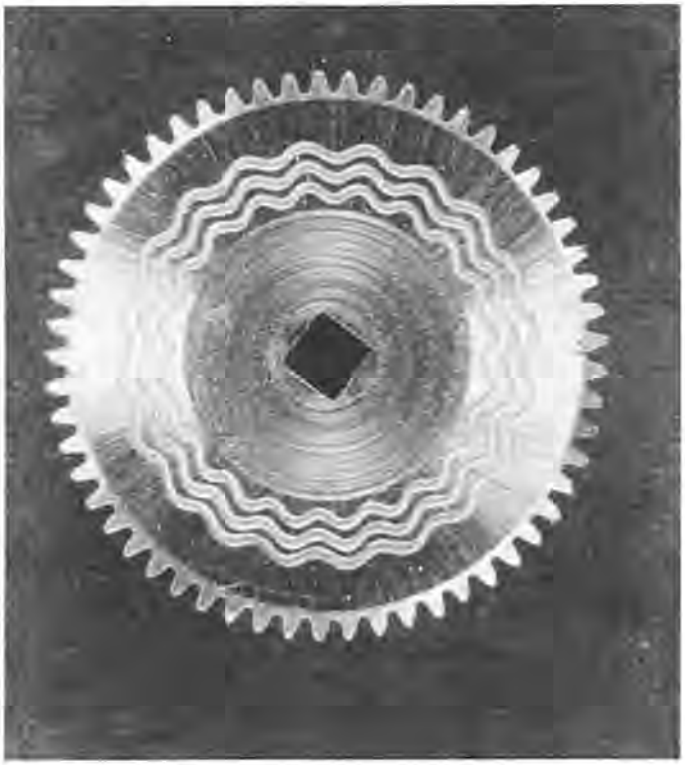


Figure 3

SHOP TALK
(Continued from page 19)

fancy shapes. As we said, any shape (other than round) is called fancy, so this includes squares, rectangles, tonnals, ovals, and many more. Number 15 is marked cylinder which indicates it is a thicker crystal than the really old thin ones. When the first thicker crystals came on the market, many referred to them as a "rock" type crystal or cylinder crystal. The word cylinder included those with profiles (cross section) that were actually cylindrical in shape as well as all other thick ones including the flat top, beveled edge one shown in Figure 2 at Number 15. This one crystal is shown here to represent the several hundred available in various sizes and shapes. The G.S. catalog that accompanies these crystals shows the metric measurements, actual shape, the actual profile amount of curve (height), and the number to represent the assortment supplement release. Also, the first letter in each of the crystal numbers in the G.S. catalog is the letter "C" which means "cylinder." We will explain more about these fancies later.

ROUND CRYSTALS

Figure 2, number 26, shows several styles that come with the "PA" series of round watch crystals. A cabinet of these would be a good start, as there are several pages of these shown with the exact metric measurements, shape, and even the brand name that they were originally designed for.

Probably the most used round crystals are the PHD crystals (plastic high dome crystals) shown in Figure 2, number 1. Figure 2, number 2, shows XHD crystals (extra high dome crystals). They are available as an assortment if desired, or can be special ordered if we find that we need more clearance than the PHD gives us.

Most suppliers will have available a crystal gauge which will show the standard rounds and also metric.

As we mentioned, we are using Germanow-Simon Company's terminology. They are an American company which has a large inventory of crystals available and it was easy to contact them for permission to quote from their catalog, etc.

We need to remember that there are others who manufacture crystals, such as the BB Crystal Company with crystals made in Holland. Their "Stella" brand round crystals use the round number and their metric number is shown as a three digit number. For example, a metric of 28.2 will be shown as 282 on the crystal envelope. Also, XHEC means extra high dome.

I hope we are not getting too boring with all of this crystal talk. For those just starting out who are looking at charts like Figure 2 trying to decide on which to buy, it can be difficult.

Next month we will continue. I'll try to remember to tell you which crystals I stock and we will discuss crystal turnover, how to order, etc. ❑

Figure 3 shows a Waltham ratchet wheel which also has the sine wave type of design on its surface. The design on this wheel is somewhat coarser than the Hamilton design shown in Figure 2 and the space between the circles is wider, but this design is made in the same manner and with the same rose as the Hamilton design. Three of the circles are touching each other at their edges on the Hamilton wheel, whereas the three circles on the Waltham wheel are spaced apart at an approximate .40 mm (.016 inch). The dial on the lead screw of the top slide is used to gauge the distance when the lap is set for each circle. Note that the wheels were first given the snailed or rayed surface finish before the circles were made on the surface of the wheels.

MAKING PLAIN CIRCULAR AND CONVEXED PATTERNS

Figure 4 shows a Waltham ratchet wheel which has two different circular patterns over its rayed surface. The semi-circular pattern is enclosed by two plain circles. One of the plain circles is near the base of the wheel's teeth, and the other plain circle is near the center of the wheel. The plain circles can be made by using a plain round disc on the rose attachment for the follower to rest against while the lap or tool makes the plain circular design on the wheel. The semi-circular pattern is made by the use of the rose that is shown in Figure 5. This rose is made up with 24 flat repetitions on its outside edge. The lap must be set to the right of the wheel's center to make this semi-circular pattern.

MAKING CONCAVED PATTERNS

Figure 6 shows a Hamilton ratchet wheel that has a concaved pattern which is repeated four times. Each circle has 16 repetitions; therefore, the rose must also have 16 repetitions. The repetitions on the edge of the rose are made up of flat surfaces meeting at their ends to form sharp corners. The rose for this pattern is shown in Figure 7. When making the concaved design on the wheel, the lap is set to the left of the wheel's center. After the outside circle has been made, the slide rest screw is turned to move the point of the lap in the proper amount to make the second circle, and so on.

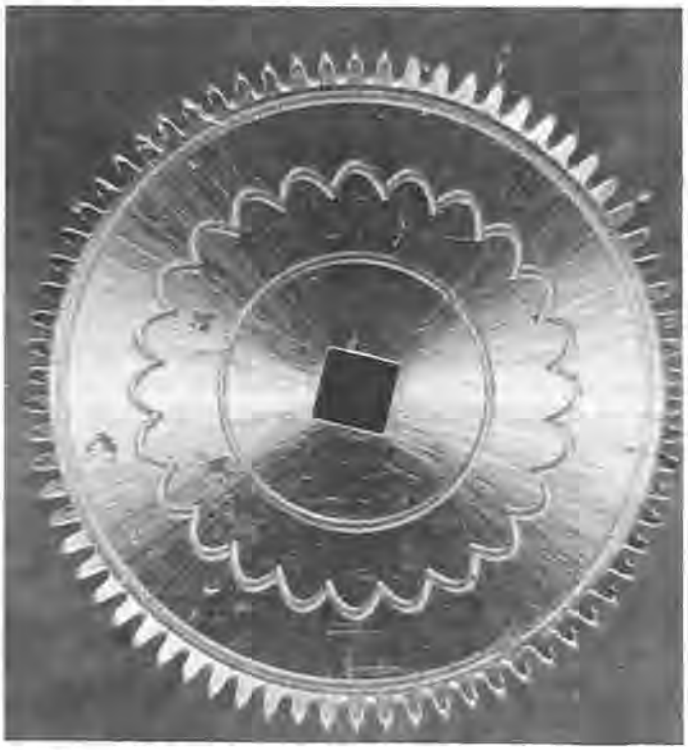


Figure 4

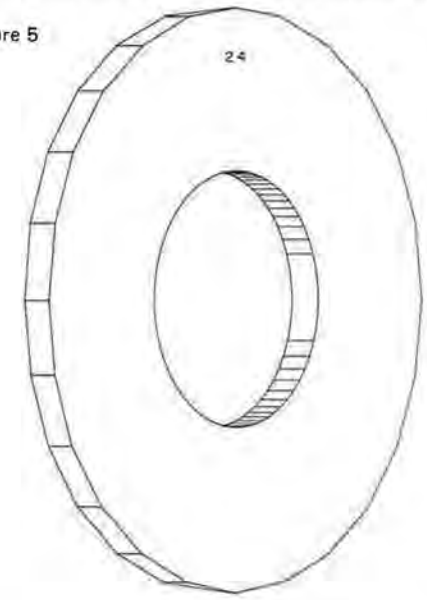
MAKING OVERLAPPED CONVEXED AND CONCAVED PATTERNS

Figure 8 shows crown and ratchet wheels made by the South Bend Watch Company. These wheels have an overlapped convex and concaved pattern. Both of these patterns can be made with the same rose. These patterns have 12 repetitions which require the rose to have the same number of repetitions. The rose is the same shape as the one shown in Figure 7 except for the number of repetitions. First, the three convexed circles are made on the wheel. When this is done, the lap is set to the right of the wheel's center. Then the one concaved circle is made with the lap set to the left of the wheel's center. For overlapping the pattern, the index latch is moved one notch in the 12 index section of the index plate. *NOTE: Before one starts to decorate a wheel, the index latch should be set in the first notch of the section on the index plate which corresponds to the number of repetitions on the rose used. This allows for overlapping the pattern if there is the need.*

MAKING AN OVERLAPPED CONVEX AND FLAT BOTTOM PATTERN

Figure 9 shows a Waltham ratchet wheel which has an overlapped convexed and flat bottom pattern. The pattern has 12 repetitions. The rose used to make this pattern is shown in Figure 10. The edge of the rose is made up of 12 flats that are separated by 12 lands which were part of the outside edge of the plate before the flats were made. The width of these curved lands is approximately one-third of a repetition. When using this rose to

Figure 5



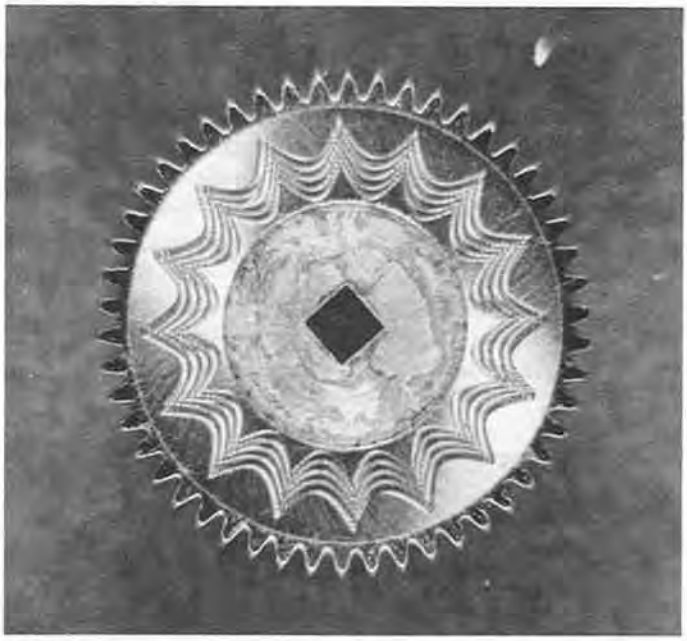
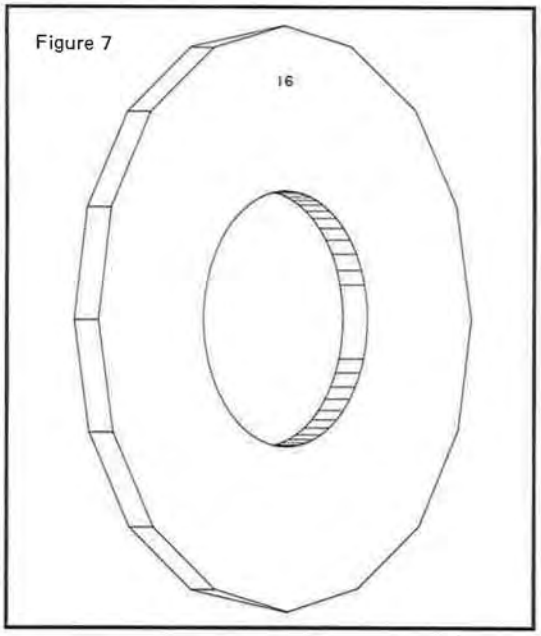


Figure 6



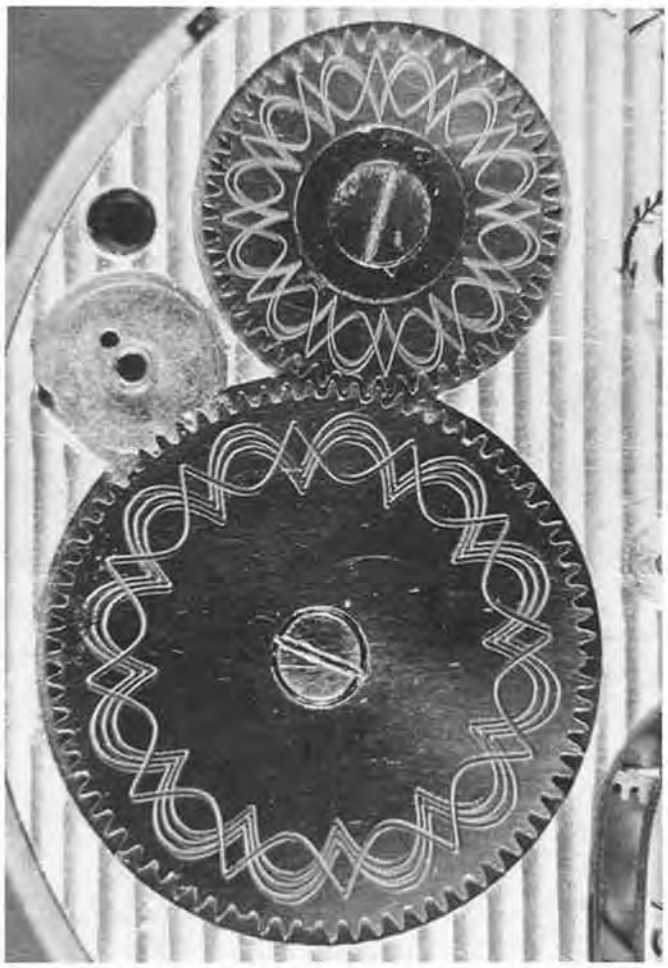


Figure 8

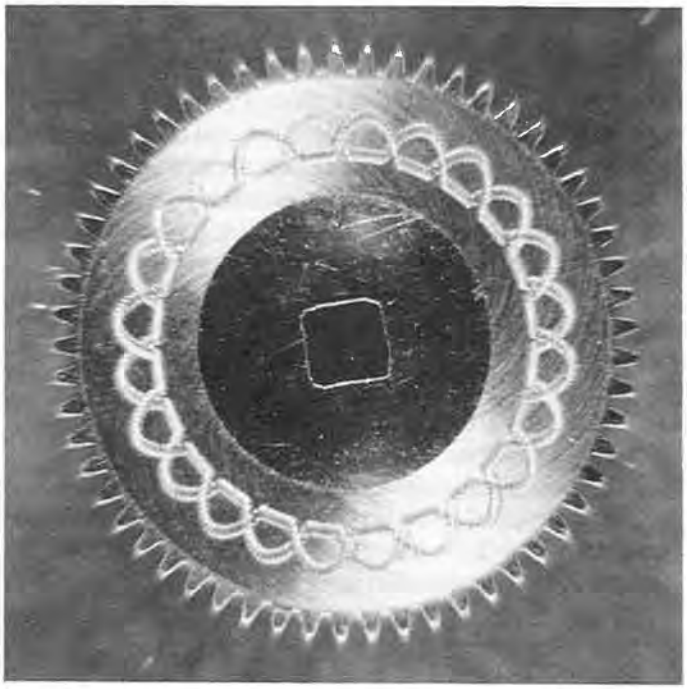


Figure 9

make the pattern shown in Figure 9, the lap is set to the right of the center of the ratchet wheel. After one circle has been made, the index latch is moved one notch to overlap the pattern. Then the second circle is made which overlaps the pattern of the first circle.

MAKING A POINTED FLAT BOTTOM PATTERN

Figure 11 shows an Elgin ratchet wheel that has a pattern with pointed repetitions which have a flat bottom. There are 20 repetitions in this pattern. The rose to make this pattern is shown in Figure 12. The edge of this rose is shaped with flats which form "V" notches on each side of a land which is the outside edge of the disc before the "V" notches were made. To use this rose to make the pattern, the lap is set to the right of the center of the wheel.

MAKING POINTED DESIGNS WITH POINTED BOTTOMS

Figure 13 shows a Hamilton ratchet wheel that has a design which has pointed tops as well as pointed bottoms. There are three circles in this pattern with 24 repetitions per circle. The rose used to make this pattern is shown in Figure 14. There are 24 "V" notches on the edge of the rose. When making this pattern, the lap is set to the right of the center of the ratchet wheel.

MAKING "m" SHAPED PATTERN

Figure 15, View B shows a South Bend ratchet wheel which has a continuous circle of "m"s in the pattern. The design has 24 repetitions. If one should need to make one of these wheels or even restore a rusty wheel, the design could be reproduced by using the rose shown in View A, Figure 15. The edge of the rose has alternating large and small concaved depressions. When making this pattern on the wheel, the lap is set to the left of the wheel's center.

IMPORTANT INFORMATION

When making the roses shown, it is very important to make their diameter as large as the equipment will allow to be used. The larger the rose, the smaller any errors will be. It is also important to make the repetitions on the rose as uniform as possible. For a given rose, the pattern that it makes depends largely on the radius of the follower and which side of center of the work the lap is used on. The relationship between the speed of the work and the speed of the lap is also very important. One should do some practice work on scrap metal before actually trying to decorate a wheel. Perhaps one could use old wheels with broken teeth to practice on before actually doing a good wheel. The rose attachment can also be used to decorate watch barrels, watch plates, and watch dials.

"Antique Watch Restoration" will continue next month.

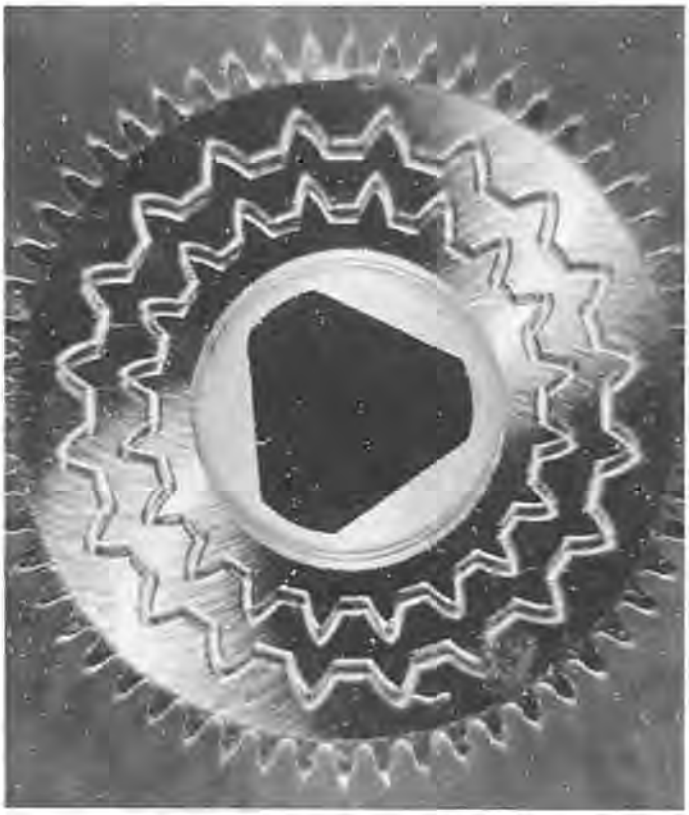


Figure 11

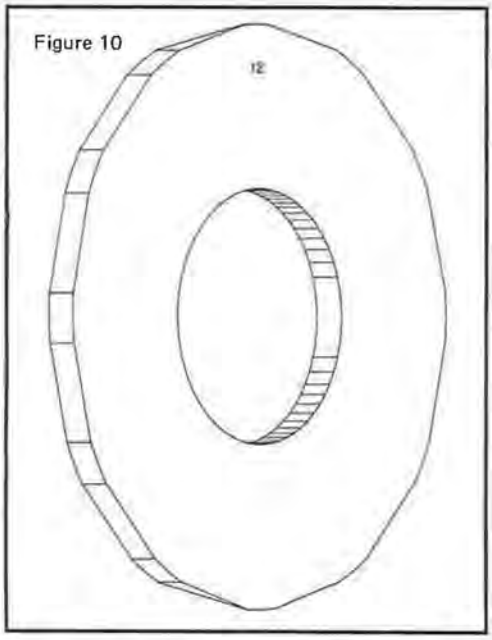


Figure 10

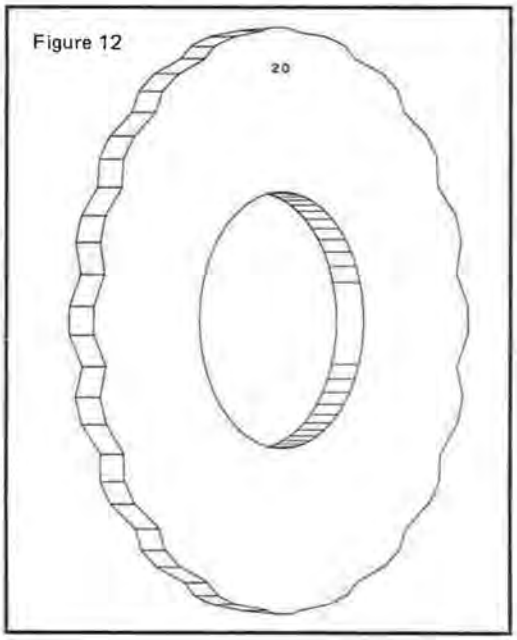


Figure 12

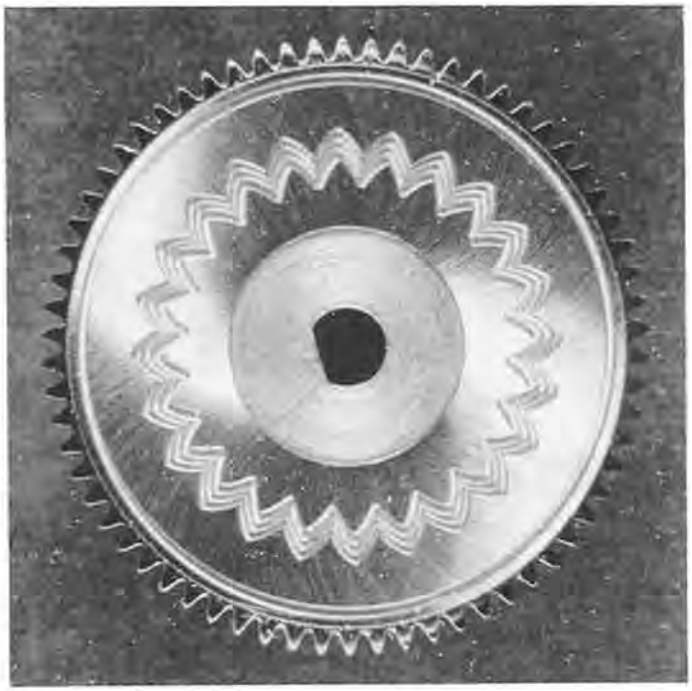
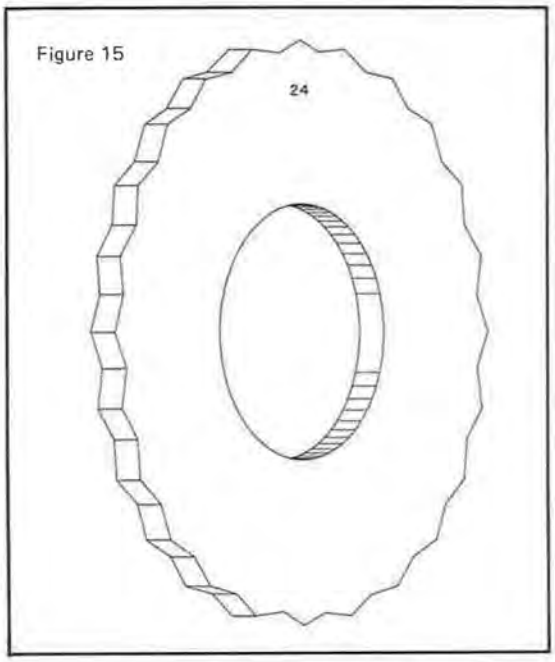
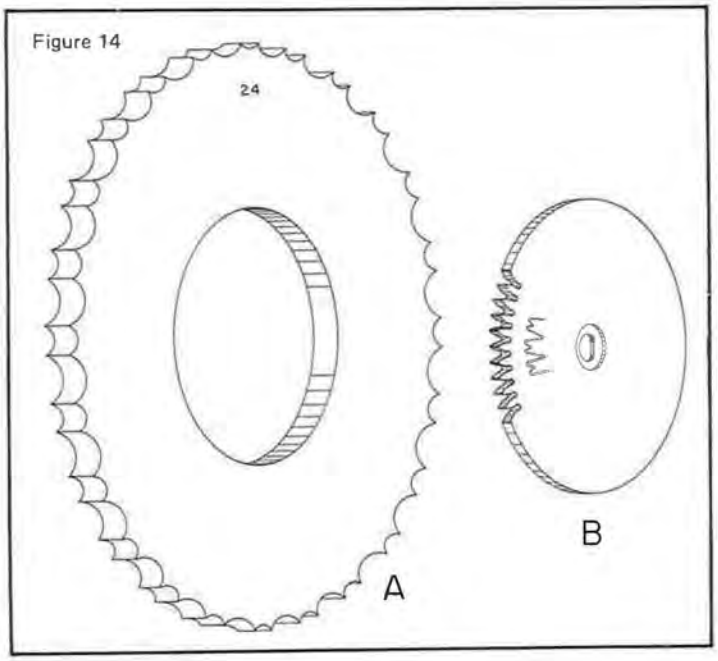


Figure 13





ATTENTION "BULLETIN BOARD" READERS:

Due to printer error, the negative of the Waltham watch face on page 35 of the April 1991 HT was inserted backwards.

AWI REFERRAL SERVICE

Mobility aptly describes the current population of the United States. People are retiring earlier and moving to new locales, and businesses are moving their employees all over the country.

Many customers who are moving wish to know of a reliable clockmaker or watchmaker to care for their timekeepers. In moving a clock, for example, proper packing is essential to insure safe arrival and proper set-up at the new location. Grampa's heirloom pocket watch which many people are using will need periodic servicing. Who can our customers turn to? How about AWI members?

A Referral Service has been established which you can offer to your customers. The formation of the Service depends entirely on you, the AWI member. Here is how the Service would work:

1. Each AWI member who wishes to be included should write to AWI Central providing their name, address, telephone number, specialty, and certification if appropriate.

2. A file by zip code would be established at AWI. Upon inclusion in the file, AWI Central will send you confirmation of your participation in the Service. An appropriate counter card advising your customers of the Service will be provided for your shop or store.

3. Upon a request from your customer for a reliable clockmaker or watchmaker, ask for the customer's new zip code. Then you contact AWI for a listing of AWI members in the zip code and adjacent zip-coded area.

4. Give this listing to your customer and wish him well. It should be explained to the customer that this listing carries no recommendation but rather signifies that the name is that of an AWI member who has access to the latest technical information necessary to perform reliable service work.

Robert L. Macomber
CMC

TIMELOCKS

David A. Christianson, CMW, CMBHI

Sargent & Greenleaf Timelock Movements

Part 1

The first practical timelock was built by James Sargent about 1873. His company, the Sargent & Greenleaf Company of Rochester, New York, was not only a pioneer in the field, but quickly became a principal supplier to timelock users throughout the U.S. and the world. Although it discontinued its U.S. production of timelock movements in 1953, Sargent & Greenleaf, Inc. continues to be one of three principal factors in the industry today.

All of the S & G movement styles produced since the 1920s are still encountered in the field on a regular basis. These movements can be listed as follows:

1. S & G Large Type
2. S & G Medium Type
3. S & G Small Type
4. S & G New Model Small Type.

Figure 1. Sargent & Greenleaf large type timelock movement with suspended balance (or inverted balance).

S & G LARGE TYPE (Figures 1 & 2)

Disassembly Procedures (Figures 3 & 4)

1. Remove the dial pointer, dial, and the dial pinion.

2. Remove power wheel cam.

3. Check the power wheel for freedom and see if the screw is tight.

4. Hold back the main train of wheels at the escape wheel, remove the lower pallet fork bridge (Figure 5), remove the pallet fork and let the movement run down slowly by releasing pressure on the escape wheel. Remove the top plate and main train of wheels—the center wheel, third wheel, fourth wheel, and the escape wheel.

Figure 2. Close-up of the S & G large type showing the suspended or inverted balance style.

5. Remove the ratchet wheel from the mainspring barrel and remove the mainspring barrel from the bottom plate.

6. Loosen the hairspring stud screw, remove the stud from the top plate, and remove the balance wheel bridge and the balance wheel.

7. Remove the upper balance hole jewel and cap jewel, along with the lower cap and hole jewels.

8. Inspect hole jewels for cracks and/or chips.

9. Inspect wheel pivots for scoring, pitting, or excessive wear.

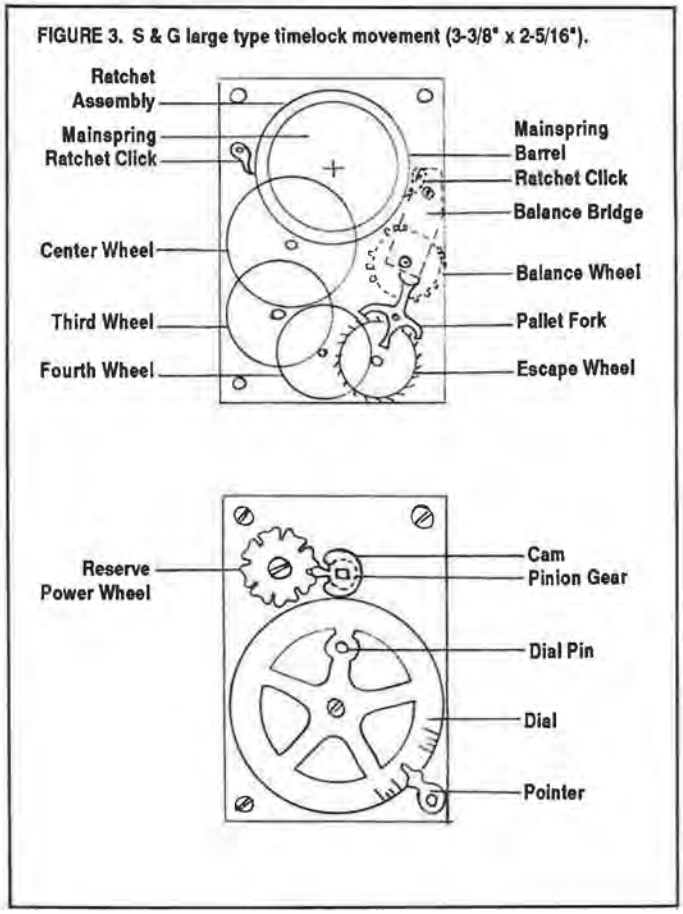
10. Inspect brass pivot holes for wear.

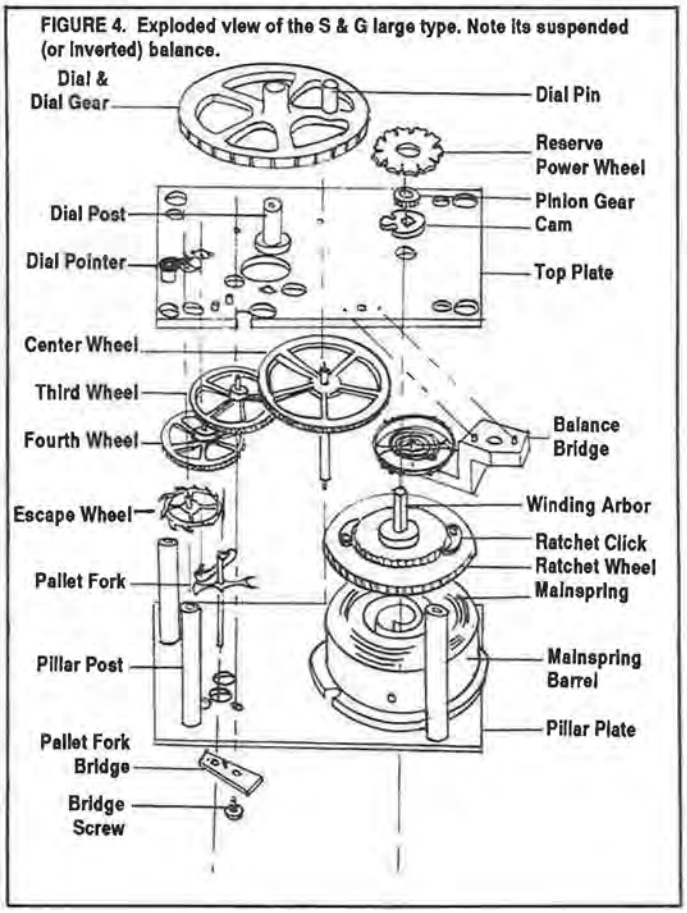
Cleaning Procedures

One cleans these movements following accepted watch cleaning practice. However, it is imperative that all the pivot holes be pegged (whether brass or jewel) and the balance cap jewels be pegged. These movements have usually been in service far longer than they should have been between cleanings, so you can be assured that the old, dried lubricant is caked on so hard that even the cleaning solvents aren't able to dissolve all of it.

Reassembly Procedures

Reassembly of these movements is quite straightforward; there should be no surprises. The balance pivots and escape wheel pivots should be oiled with





watch oil. The rest of the train pivots should be lubricated with a light clock oil. The pallet fork pivots should receive just a very light application of watch oil. Be sure the escapement is set into beat and lightly oil the escape wheel teeth.

Reserve Power

To put reserve power onto the movement and assure instant starting of the movement, hold back the main train of wheels at the escape wheel before reinstalling the pallet fork. Wind the movement fully. Using a bench key, relax the spring half of a turn of the key; place the power wheel cam one notch below the oval tooth of the power wheel. Let the movement run down slowly by releasing your pressure on the escape wheel until the power wheel cam stops against the oval tooth of the power wheel.

To Remove an Overwind

If all the movements are accidentally wound further than the desired opening time, the safe or vault will not open until later on in the day, the next day. If this is going to be a problem for the user of the vault, this overwind must be removed before the vault is

Figure 5. View of pallet fork bridge on lower plate of movement. Removing this bridge, with the train blocked, will allow removal of the pallet fork and the release of train power.

Figure 6. S & G medium type movement.

Figure 7. A close-up of the medium type.

FIGURE 8. S & G medium type timelock movement.

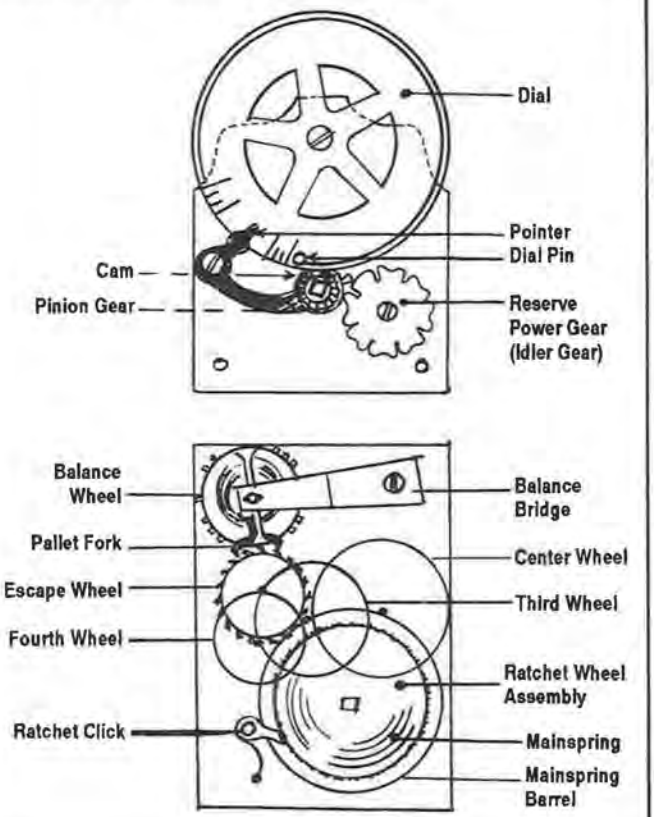
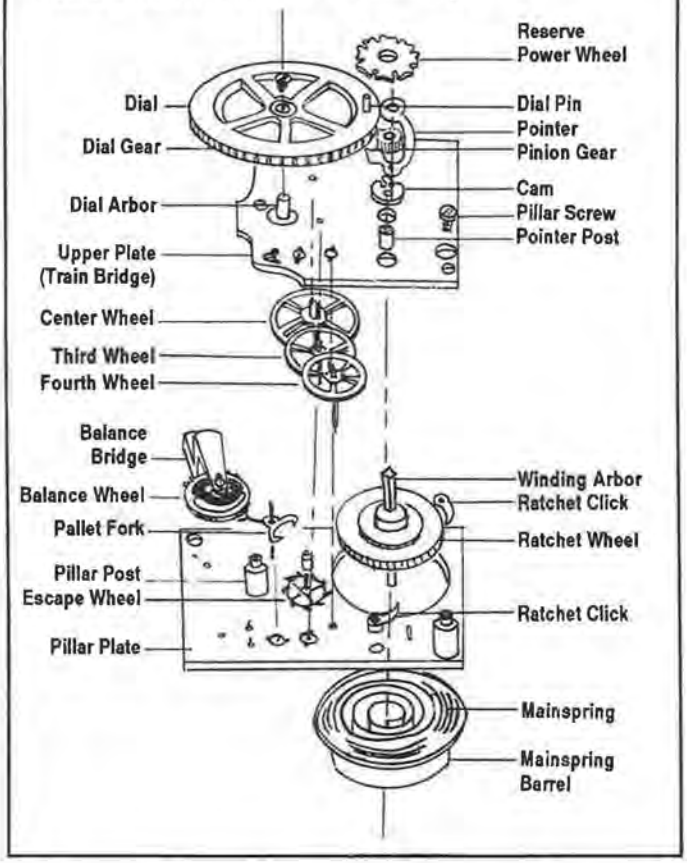


FIGURE 9. Exploded view of the S & G medium type.



locked up for the night.

To remove an overwind, hold back the main train of wheels. Remove the lower pallet fork bridge and remove the pallet fork. Let the movement run down until the power wheel cam hits the oval tooth on the power wheel. Replace the pallet fork and its bridge. Replace the movement into the case and check it for one hour.

Figure 10. S & G small type movement.

S & G MEDIUM TYPE (Figures 6 & 7)

The S & G medium type timelock movement is a smaller version of the S & G large (2-15/16" x 2" as compared to the large's 3-3/8" x 2-5/16" plate dimensions). Although the two movements look entirely different, all procedures for cleaning, assembly, reserve power, etc. are the same for both types.

S & G SMALL TYPE (Figure 10)

Disassembly Procedures (Figures 11 & 12)

1. Remove the dial pointer, dial, and winding pinion.

2. Remove the power wheel cams.

3. Loosen the hairspring stud screw, remove the balance bridge and wheel, and remove the balance wheel from the bridge.

4. To release mainspring power: Remove the two screws holding the upper pallet fork hole jewel, but do not remove the jewel yet. Hold the main train of wheels at the escape wheel. Carefully lift up the pallet fork arbor, pushing the upper hole jewel out of the bridge (Figure 13). This will allow you to remove the pallet fork from the movement (Figure 9). Slowly release power by braking against the escape wheel and letting the train run down.

5. Remove the top plate, main train of wheels, and the ratchet wheel.

6. Remove the main barrel from the bottom plate.

7. Remove the upper balance hole jewel and cap jewel, along with the lower ones.

Cleaning and Lubricating Procedures

Use the same procedures as you would with any fine timepiece. Refer to notes listed under the S & G Large Type movement. Remember to extract the mainspring, clean it in solvent, dry, and finally wipe with a dry cloth before lubricating with a heavy clock mainspring grease.

Reassembly Procedures (Figure 15)

1. Replace the upper and lower

FIGURE 11. S & G small type timelock movement.

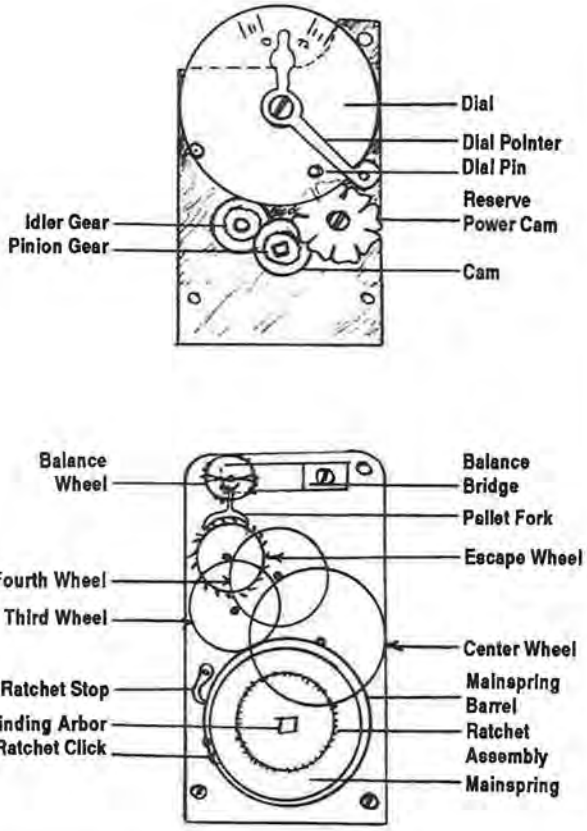
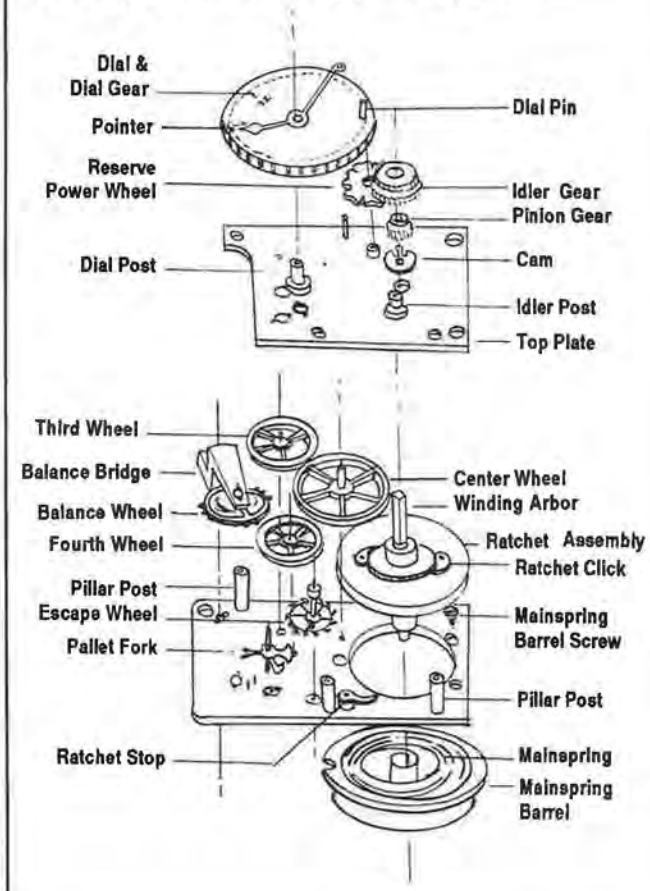


FIGURE 12. Exploded view of the S & G small type movement.



balance hole and cap jewels.

2. Replace the mainspring barrel and spring to the bottom plate.

3. Replace the barrel arbor and ratchet wheel assembly into the mainspring barrel.

4. Lubricate the ratchet wheel teeth.

5. Replace the main train of wheels and the top plate.

6. Lubricate the upper and lower pivots of the main train wheels with a light clock oil (including the barrel/ratchet wheel arbors).

7. Block the escape wheel and apply reserve power (see Reserve Procedure in the next section).

8. With train still blocked, replace the pallet fork and arbor.

9. Replace the upper hole jewel and screws of the pallet fork.

10. Lightly oil three or four teeth of the escape wheel with watch oil.

11. Oil the pivots of the pallet fork very sparingly with watch oil.

12. Feed oil into the upper and lower balance hole jewel assemblies and replace the balance wheel assembly to the balance bridge.

13. Replace the balance wheel and bridge on the movement, making sure that the roller jewel, pallet arbor, and guard pin all align on centers (i.e., the escapement is in beat).

14. Replace the winding pinion.

15. Replace the dial and dial pointer so that they indicate the maximum hours of running time (i.e., 72 hours in our illustration, Figure 16).

(Please turn to page 52)

Figure 13. Carefully lifting up the pallet fork arbor and pushing the upper hole jewel out of the upper movement plate will allow the removal of the pallet fork.

Figure 14. With the pallet fork removed, you can slowly release the train power by allowing the train wheels to slip through your fingers.

Figure 15. The S & G movement partially assembled on its lower (pillar) plate.

BULLETIN BOARD

A. NEW REQUESTS

SCHEMATIC FOR L&R 430G ULTRASONIC CLEANER

R.W. Dietzel, Albuquerque, NM, seeks a schematic and technical manual for the L&R ultrasonic cleaning machine. If you have such information to share with us, please send it to the "Bulletin Board." We will photocopy it and return your copy to you.

QUARTZ CHRON CLOCK

James Campbell, Lowell, NC, is looking for the maker of a quartz clock movement which has "Quartz Chron" on the back. He needs a replacement movement and would like to know who the suppliers in the U.S. might be.

ODD-SIZED CROWN GASKETS

Ray Cherry, Relay, MD, is interested in older watches and is interested in solving the general problem of obtaining odd-sized crown gaskets. Specifically, he would like to know if anyone can name a source for gasket material from which he can fabricate an O-ring; or does anyone have a source for assorted sizes of replacement O-rings for crowns? Also, can anyone share information about how they install replacement O-rings in crowns?

EUREKA CLOCKS

Rodney Councell, Greensboro, MD, writes:

I have two Eureka clocks in for repair. One is serial number 1696, and the newer one serial number 7985. I have made new pin contacts and fixed contacts for both, plus the normal cleaning and general repairs. The newer clock has a coil resistance of 18 ohms and the older is 19 ohms. I have set the gap at minimal and have the contacts opening and closing at the proper time in regards to the swing of the balance. Both balances are free in their travel. On the newer Eureka, as the contact closes you can hear the snap of the coil pull to the base plate.

The older clock, even though all adjustments, etc. appear to be the same, it just does not have the snap or magnetic pull when the contacts close. The balance will just run (approximately 20 degrees) at best. Any help or ideas would be greatly appreciated.

HOW TO TRAIN A CUCKOO CLOCK

The AWI Library had several copies of *How To Train a Cuckoo Clock.* As often happens with books that are no longer available, members who borrow them conveniently lose them. All of our library copies are gone. We would appreciate receiving a copy for the library or one we can copy and return to its owner.

B. RESPONSES

2-MOTOR SESSIONS CLOCK

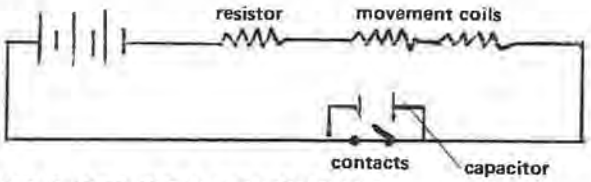
Jarrel Hofer, Macomb, IL, indicates that he has examples of the 2-motor Sessions and is willing to try to help Sam Tipton, Maryville, TN, if he can through correspondence. Mr. Hofer recalls an excellent article published about this movement several years ago; the source escapes him. If anyone can help, we would like information about where this article can be located.

AMERICAN CLOCK COMPANY SELF-WINDING CLOCK

In response to Richard King's request for suggestions as to how to prolong the life of the batteries in these clocks, Jarrel Hofer, Macomb, IL, writes:

Batteries for the American Clock Company are simply two ignition-size batteries (commonly known as telephone batteries) connected in series. If the mechanism is in good shape, the life of the batteries should be a minimum of one year. Two years is not uncommon. On any of the old battery-driven clocks, I connect a capacitor of about 10 across the points so that arcing and pitting of the points are eliminated.

I would be happy to correspond with people needing help if necessary. Batteries should be available at or through most hardware stores. They run over $10 each. An alternate is to use a cheaper CV lantern battery and a resistor to drop the voltage to 3V. The value of the resistor should be a little less than the resistance of the movement coils and connected in series. Battery life will be shorter with the CV lantern battery.



TAP & DIE TO REPRODUCE WW LATHE THREADS

We received a quick response from Pat Cavanaugh, 6824 19th W #182, Tacoma, WA 98466 to J.M. Huckabee's request for a source of a tap and die to reproduce WW lathe threads. Mr. Cavanaugh does business under the name of "Clock Doc" and carries a nice supply of lathes and other supplies, as well as these taps and dies.

WALTHAM WATCH WITH SECONDS OPENING DIAL

Several have responded with fractional information about this watch belonging to B.N. Lange, Cape Girardeau, FL. Jim Osborne, Niland, CA, writes:

Regarding the Waltham watch with second opening of B.N. Lange, I have one in my collection. It is white 14K G.F., only 17 jewels. They were popular in the 30s. Mine has a 1929 serial number. They are also referred to on page 31 of ***The Complete Guide To Watches*** *as a 17J model with digital hour and second window, and the price was $75.00, $100.00, $125.00 depending on condition. A 21J would be higher, so they are not all that rare.*

ELGIN GENUINE PARTS ASSORTMENT #501-836

Mike Hoffman, Eldon, MO, has an assortment of genuine Elgin parts; the assortment number is 501-836. The assortment contains balance staffs, jewels in settings, winding parts, and screws. He is seeking a list that will identify these parts.

W.D. CLEMENT LATHE

Robert E. Brown, Elkhorn, WI, sent a number of catalog type pages and promotional material for the W.D. Clement Lathe. Little by little, we are gathering quite a bit of information about this lathe and the many accessories that were available for it. It obviously was a fine piece of equipment. We still would like information about the course Victor Clark originally inquired about.

OPERATOR'S MANUAL FOR WATCHMASTER TYPE A-IT CLEANER AND SCHEMATIC FOR VIBROGRAF B200

Once again John Hager of Vibrograf U.S.A., 504 Cherry Lane, Floral Park, NY 11001-1696, has come through with information on these two product items. About the Vibrograf B200 he cautions:

It has been our experience that when an inexperienced person tries to repair these circuits they cause more harm than good. In fact, they usually double their repair cost. We suggest the simpler circuit exchange procedure or just sending the machine to us for necessary repairs.

AWI will send copies of this material to interested members who write and enclose a self-addressed, stamped envelope for each item.

BALL WATCH COMPANY BALANCE STAFF

Warren Niebling, Flourtown, PA, writes that the correct staff for Norman Meisel's Ball watch is #3674. He continues that in discussions with Dr. Robert Ravel, a Hamilton parts expert, the standard Hamilton staff (new) number 607047, old number 603, should fit the following models: 999 Ball, also 950E and 992 E & F. The pivot should be .12 mm; it is a friction staff.

LITTLE SWITZERLAND WATCH

John Kurdzionak sent a clipping from *Jewelers Circular-Keystone* which identifies the parent firm to be Town & Country Corp. of Chelsea, MA.

C. ITEMS STILL NEEDED

RONDA STEM SYSTEM CHART

Jim Lindon, Glendale, AZ, has the Ronda stem system pictured here; it contains 664 different stems and has extra drawers for add-ons. He is seeking the chart which will identify the stem positions in the various drawers.

METHODS FOR CLEANING WATCH DIALS

Robert Harp, New Zealand, is seeking methods various watchmakers have found successful in improving the appearance of printed watch dials. He is aware of the baking soda paste treatment for silver dials with black enamel figures; it is the other printed dials for which he seeks information. We will be happy to compile your ideas and make them available to Mr. Harp and other interested BB readers.

LEIGH ELECTRIC CLOCK COMPANY COIL

George Cogley, Natrona Heights, PA, needs a replacement coil for an electric clock which he identifies as Model 2. Leigh Electric Clock Company, Genoe, IL, 24 volts, 60 cycles, synchronous motor, 1 RPM, 5 watts. A replacement or substitute will be welcome.

MAURICE LA CROIX

C. Ron Strom, Sioux City, IA, is seeking to identify the distributor of a watch using the trademark "Maurice LaCroix."

Do you have information regarding this month's requests? Do you need information about one of this month's responses? If so, send a self-addressed, stamped business-size envelope and your request to: "Bulletin Board," c/o AWI Central, 3700 Harrison Avenue, Cincinnati, OH 45211. □

MILITARY TIME

Marvin E. Whitney, CMW, CMC, FAWI

Aircraft Clocks: *Revue Thommen AG*

The Revue Thommen AG Watch Company was established in Waldenburg, Switzerland in 1853 by Gedeon Thommen, where his influence was greatly felt. Thommen designed and manufactured many different styles and types of watches which he displayed at various continental national exhibitions, and where he was a central figure. In 1883 and 1886 he was granted United States patents for watches. The Thommen factory in 1919 applied for a patent for a balance which was based upon the anisotropy principle.

Through the years, the company continued to broaden its line of watches. A Thommen Watch Company ad in 1935 stated: "With Revue, precision was producing cheap pocket watches, fancy wristwatches 4-1/2 and 15 lignes, water-tight sport wristwatches, 8-day watches of all kinds, and special watches for aviation."

In the seventies they developed not only a line of one- and 8-day aircraft clocks but also a very fine line of aircraft navigation instruments, such as altimeters, rate climb and airspeed indicators, pilot/static calibrators and

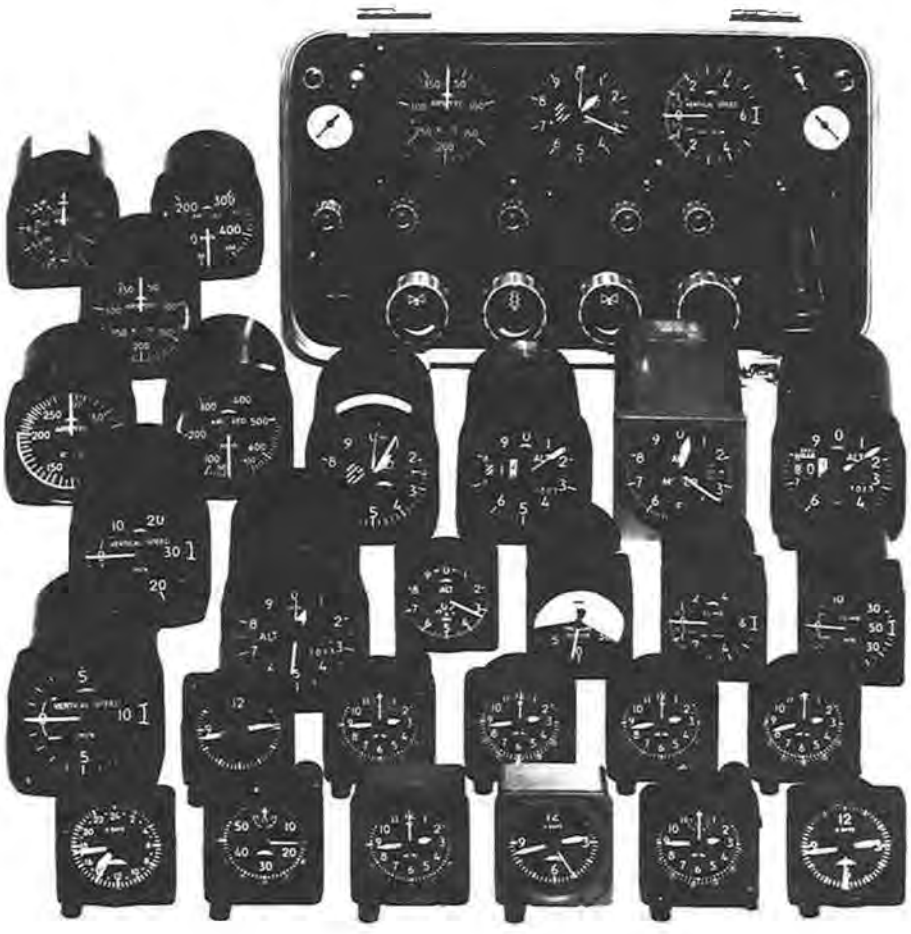


Figure 1. A view of some of the quartz-controlled and mechanical 8-day aircraft clocks and chronographs, seconds counters, altimeters, encoding altimeters, rate of climb and airspeed indicators, pilot/static calibrators, and pressure calibrators. Manufactured by Revue Thommen AG (Tyrolit Co., Inc., New York, NY).

pressure calibrators (Figure 1). Presently, the Thommen's United States representative is the **Tyrolit Company, Inc., 49 West 37th St., New York, NY 10018.**

Thommen manufactures a wide range of mechanical and quartz aircraft clocks. These clocks are available with 12- or 24-hour dials, chronograph and elapsed time functions, with and without integral lighting, two types of cases with various case configurations, and dial finishes of fluorescent white, lusterless white, fluorescent yellow, luminescent green (tritium), dayglow yellow and longtime afterglowing luminescent green. The one- and 8-day mechanical clocks have either 7 or 17 jewels and an 18,000 beat train. The complete series of Thommen aircraft chronographs are available with elapsed time ranges of 12 minutes, 60 minutes and 12 hours, with and without integral lighting and with different dial finishes and case configurations.

Mechanical one-day clocks, chronographs, 17 jewels, 40 hours running time, Types JB 151/152 and JB 153/154 (Figure 2).

These clocks are of modular design and consist of a basic one-day movement with standard three-function push knob operation of start/stop/reset to zero, in a fixed sequence. All types are equipped with an integral revolving time setting bezel.

Types JB 151 and JB 152 are chronographs, both equipped with continuous running seconds and with a 15-minute elapsed time range counter (JB 151) or a 30-minute elapsed time range counter (JB 152).

Types JB 153 and JB 154 are chronographs equipped without continuous running seconds. They are available with a 15-minute elapsed time range counter (JB 153) or with a 30-minute elapsed time range counter (JB 154).

Figure 2. Thommen one-day mechanical chronograph aircraft clock, Types JB (Tyrolit Co., NY, NY).

Type JB 15201X

Type JB 15301X

Figure 3. Thommen 8-day mechanical aircraft clock, Type B4 (Tyrolit Co., NY, NY).

Type B4493222000A

Type B4093122000A

Type B4193122000A

Mechanical 8-day aircraft clocks, 7 jewels, working temperature range -35° . . . +50°C, Types B4 (Figure 3). *Type B40931, MIL-DESIGNATIONS AN5743-2 (A-11) and AN5743L2:* According to MIL specifications, these clocks are intended for use in aircraft for precision navigation. The 8-day movement is housed in an aluminium alloy case and is wound and set by a knurled knob in the lower left corner of the case.

Type B40932 is the same clock with a 24-hour dial.

B41 Version: The above types are available in a version with two red elapsed time dummy hands for the memory of any desired time. The elapsed time hands are manipulated by a knob in the center of the crystal. Turning counterclockwise moves both elapsed time hands, while turning clockwise moves only the minute hand.

B44 Version: A case with integral lighting per MIL-C-38207A (ABU-11/A) specifications for the above types of clocks.

Mechanical 8-day seconds counter clocks, 17 jewels, working temperature range -35° . . . +55°C, Types B14 and B16 (Figure 4). *The basic characteristics and dimensions of both types are in accordance with: MIL-C-6499-E and MIL-C-38207A (ASG) specifications.*

Type B14: These clocks are used primarily to monitor IFR holding. They consist of the same modular movement as the Type B13 chronograph, but without the actual time indication. Seconds counters are available with elapsed time ranges of 6 and 60 minutes and 12 hours.

Type B16: This seconds counter has the same two-function elapsed time operation as the Thommen chronograph type B15. Start and stop are operated by pushing the elapsed time knob as usual. Flyback to zero is operated independently--even while the counter is running--by a slight clockwise rotation of the appropriately shaped elapsed time knob.

Figure 4. Thommen 8-day mechanical seconds counters. Types B14 and B16 (Tyrolit Co., NY, NY).

Type B1494222000A | Type B1494322000A | Type B1494522000A

Figure 5. Thommen 8-day mechanical aircraft chronograph clocks. Types B13 and B15 (Tyrolit Co., NY, NY).

Type B1394122000A | Type B1394422000A | Type B1595622000A

Mechanical 8-day chronograph clocks, 17 jewels, working temperature range -35° . . . +55°C, Types B13 and B15 (Figure 5). *According to the MIL-Specifications, these clocks are to be used as the primary timepiece with an elapsed time capability in aircraft requiring an unlighted clock (A-13A) or an integrally lighted clock (ABU-11/A). They are of modular design and consist of a basic 8-day movement according to MIL-C-7939 supplemented by a chronograph (elapsed time) module according to MIL-C-6499 and MIL-C-38207. They are available in different dial finishes and with or without integral lighting for 5, 14, and 28 V supply.*

Chronographs B13 and B15 are identical to the types B17 and B18 but without integral revolving bezel.

Type B13 has the standard three-function push button operation of start/stop/reset to zero in a fixed sequence.

Type B15 has a dual mode operating knob with a two-function push sequence start/stop and an independent flyback to zero operation by slight turn of the appropriately shaped knob. The flyback to zero is even possible while the counter is running.

Mechanical 8-day chronograph clocks with lighted integral revolving bezel, 17 jewels, working temperature range -35° . . . +55°C, Types B17 and B18 (Figure 6). *The basic characteristics and dimensions of both types are in accordance with MIL-C-6499E and MIL-C-38207A (ASG).*

The integral revolving bezel is used as a second elapsed time function and initially consisted of a bezel ring fixed to the outside of the chronograph. Here the bezel has been completely integrated in the case. However, in a later design, the revolving bezel is set by a knob at the lower right-hand corner, offering a much smoother adjustment.

The chronographs B17 and B18 are identical to the types B13 and B15, except for the integral revolving bezel.

The Type B17 has the standard three-function push button operation of start/stop/reset to zero in a fixed sequence.

The Type B18 has a dual mode operating knob with a two-function push sequence start/stop and an independent flyback to zero operation by a slight turn of the appropriately shaped knob. The flyback to zero is even

Figure 6. Thommen 8-day mechanical aircraft chronograph clocks with lighted integral revolving bezel. Types B17 and B18. (Tyrolit Co., NY, NY).

Type B1794122000A | Type B1894822000A | Type B1895622000A

Figure 7. Thommen quartz aircraft clocks and chronographs. Types Q4 to Q18 (Tyrolit Co., NY, NY).

Type Q4–931.2 | Type Q13–941.2 | Type Q18–946.2

possible while the counter is running.

Quartz aircraft clocks and chronographs, Types Q4, Q13, Q15, Q17, and Q18, quartz-controlled movement. 8 step/s or 1 step/s; number of jewels: Q4 = 8; Q13 to Q18 = 15. Working temperature range -35°C to +55°C, min. running time w/battery 1000 mAh, 75 days. Output for quartz frequency adjustment via frequency counter 64 Hz (Figure 7).

The first quartz-controlled aircraft chronograph with analog display was introduced by Thommen. In so doing, Thommen had set not only totally new standards for time measurement in the cockpit, but also simultaneously fulfilled the longstanding popular demand of civil and military personnel.

The Thommen quartz aircraft clocks and chronographs are by its function application and operation nearly identical to the mechanical 8-day aircraft clocks and chronographs.

Types Q4: According to the MIL-Specifications, these clocks are intended for use in aircraft for precision navigation. Setting is done by a knurled knob in the lower left-hand corner of the case.

Types Q13, Q15, Q17, and Q18: According to MIL-Specifications, these clocks are to be used as the primary timepiece with an elapsed time capability in aircraft requiring an unlighted clock (A-13A) or an integrally lighted clock (ABU-11/A).

Besides the MIL clocks, Thommen produces two more versions: The first has a 12-minute elapsed time range instead of the standard 60-minute range, which is very useful if short elapsed times are to be measured frequently.

The second has a 12-hour counter added to the 60-

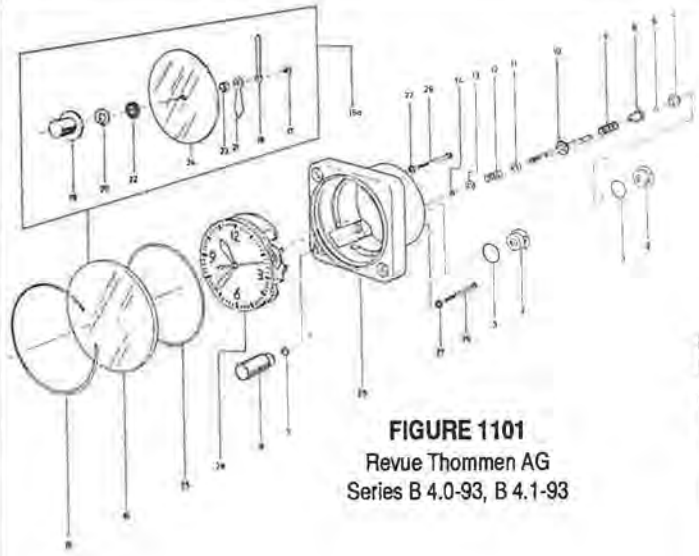


FIGURE 1101
Revue Thommen AG
Series B 4.0-93, B 4.1-93

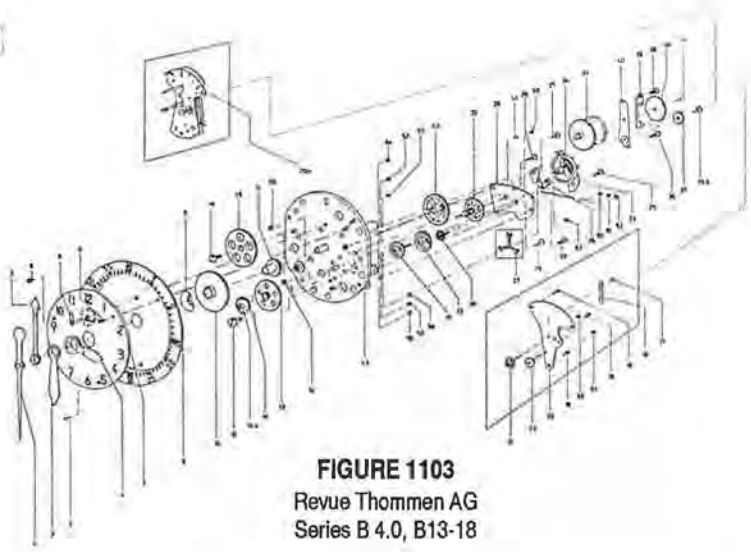


FIGURE 1103
Revue Thommen AG
Series B 4.0, B13-18

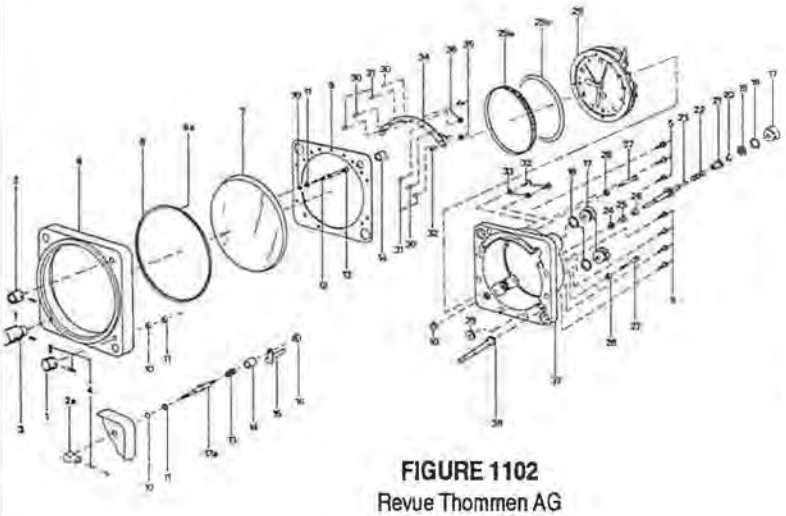


FIGURE 1102
Revue Thommen AG
Series B4.4, B13-18

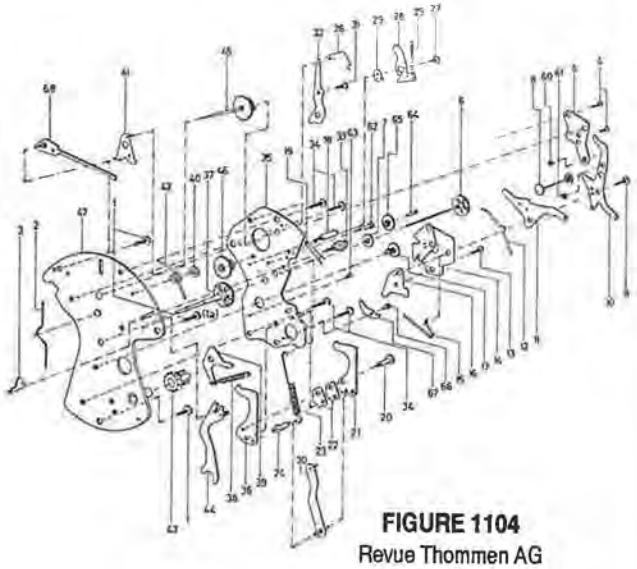


FIGURE 1104
Revue Thommen AG
Series B13-18

minute counter. It is the first miniature aircraft clock having this feature which is highly appreciated on long-range flights.

The Q13 has the standard three-function push button operation of start/stop/reset to zero in a fixed sequence.

The Q15 has a dual mode operating knob with a two-function push sequence start/stop and an independent flyback to zero operation by a slight turn of the appropriately shaped knob. The flyback to zero is even possible while the counter is running.

Chronographs Q17 and Q18 are identical to the types Q13 and Q15, but with integral revolving bezel. The integral revolving bezel is used as a second elapsed time function.

Comparison of Designations

Thommen Types	Military Designations	Military Specifications
Q 4.0-931.23	AN5743-2	MIL-C-7939A (ASG)
Q 4.0-931.23.L	AN5743L2	MIL-C-7939A (ASG)
Q13-941.23	A-13A-1	MIL-C-6499E
Q13-941.22	A-13A-2	MIL-C-6499E
Q13-941.22.05.1	ABU-5/A	MIL-C-26349
Q13-941.22.05.3	ABU-9/A	MIL-C-27298A
Q13-941.22.05.2	ABU-11/A	MIL-C-38207A (ASG)

Thommen mechanical and quartz aircraft clocks, chronographs, and second counters could be had in a so-called semi-ARINC case, with the 2-ATI ARINC shape simulated on the front ring, but otherwise square. The semi-ARINC case is normally front-mounted and the panel cutout is square 58.3 x 58.3 (2.295 x 2.295 inches).

Figures 1101, 1102, 1103, 1104, and 1112 are exploded views of the aforementioned Thommen aircraft clocks. □

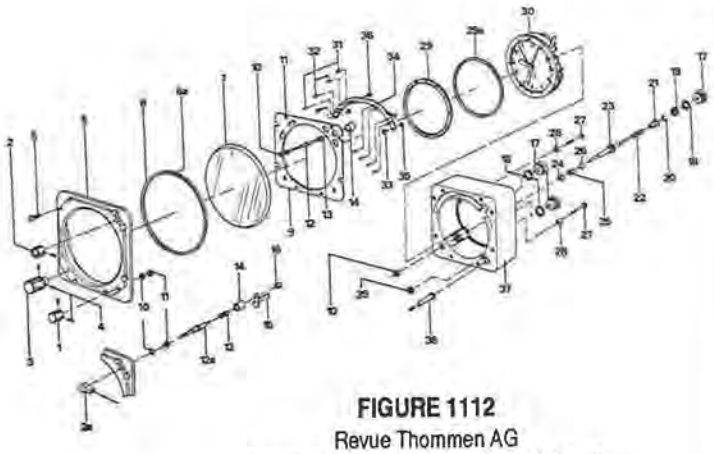


FIGURE 1112
Revue Thommen AG
Series B4.0, B13-18 (Semi-ARINC Case)

BOOK REVIEW

***VINTAGE AMERICAN & EUROPEAN SPECIAL 1991 EDITION WRIST WATCH PRICE GUIDE BOOK 5,* by Sherry & Roy Ehrhardt and Joe Demesy. Soft covers, 6" x 9", 656 pages, 6866 vintage wrist watches pictured. Published by Heart of America Press, 1991, Kansas City, MO 64134.**

This new publication from the Ehrhardts, pioneers in watch identity and price guides, is stated by them to contain "most of the world's collectible watches in one book."

Reading through this book of 656 pages, one gets the impression that it is an encyclopedic catalog of collectible wrist watches together with their current values. As stated by the authors, they have tried to include the illustrations and values only of the more desirable collector pieces of the world's production. While they state that all of the low-end and non-interesting watches have been omitted, one finds some watches (steel heads only) listed for well under $100. However, at the opposite end of the price range there is a James Schulz minute-repeating perpetual triple calendar, chronograph, and moon phase valued at $440,000. Almost all the watches bearing prestigious names such as Agassiz through Zenith are listed in alphabetical order. Mundane named watches are not found in this special issue volume.

There are over 250 prestige name brands represented together with their products, many in more than one view when the features demand these be seen. Breitling has 77 chronograph watches pictured and appraised. Cartier is represented by over 200 different models. There are over 500 Patek Philippe wrist watches pictured with their current appraisals. Vacheron & Constantin have almost 400 models also with prices. Many European makers' products are preceded with a capsule history while others contain a date by the production serial number appearing on the watch movement. These are Audemars Piguet, Longines, Omega, Rolex, and Vacheron & Constantin.

To assist others who have the Ehrhardts' previous editions, 1, 2, 3, 4, and the '87 Update, a fine special section called "Index to Vintage American & European Wrist Watch Price Guide" lists in alphabetical order all watches which appear in these earlier editions and note in which of the previous five volumes each can be found. For example, to find a watch named Gyax, look for book 4 (14) [fourteen watches] page 286.

Also noted in this special section is information on the chronograph explanation, railroad (watch) approval, reserve power indicators, tide watches, military watches, and many other bits of information covered in the previous editions. This current book contains a very good glossary of trade terms and a general comment, "Observations of the Wrist Watch Market," by the authors. This reflects a general softening of the market, especially in the high range of price items, notably those with the Patek Philippe label. The Rolex, they report, is a popular item on the Italian market. The quartz watch popularity is waning, they say.

This book is a product with a quality style of information and together with some others should provide the interested collector and would-be dealer with much more knowledge and allow each to keep abreast of the current market.

Henry B. Fried

Old Watches

Charles Cleves

Military Watches

There is one specialized area of interest in watch collecting that appeals to gun and knife collectors along with the watch collectors. That area is military watches.

Most of the important military watches can be traced to World War I or World War II. I prefer the unusual sterling watches of World War I. This war was an important step in the rise of the wristwatch.

Before the war, wristwatches were considered somewhat feminine. Pilots, gunners, and other soldiers learned how much more practical it was to have a wristwatch rather than a pocket watch. Time could be checked at the flick of their wrist rather than digging it out of their pocket every time they had to check for the time. After the war ended, these watches were associated with the rugged men who had used them dur-

Figure 1

Figure 2

Figure 3

Figure 4

Figure 5

Figure 6

ing the war. This created a much greater desire for wristwatches than had existed before this time.

During World War I, crystals were made of glass and were very susceptible to breakage. Designers of the watch cases at this time were very quick to compensate for this by installing metal grills. They were placed on the crystals so that you could still read the time, but wouldn't break the crystal if you bumped it hard. Many of these grills are removable. Many collectors refer to these as shrapnel covers. The removable covers are being reproduced, and even the old ones are not really valuable. The ones that are more valuable are the permanent-hinged covers and the permanent-pierced covers.

Figure 1 shows an 0 size sterling silver watch with an integrated pierced top. This top is not removable.

Figure 2 shows a half hunting case Rolex sterling silver wristwatch. Only the small section of the lid is cut out and has a small crystal in it. The exact time can be read by pressing the button down at the 6 o'clock position and the whole lid goes up. This watch has a hard glass enameled dial.

Another feature shared by both of these watches is the luminous dial. Be careful handling these old watches because the amount of radium used in this period is hazardous to your health if you bring it in contact with your body. Both of these style cases were eliminated before World War II came along. The main reason for this was the development of the unbreakable crystal or plastic crystals as we know them today. These later wristwatches could be made more water resistant with plastic crystals. Many of the early military watches were in silver cases. This was probably due to the large amounts of brass and nickel needed for the war effort.

Another early style of wristwatches used in World War I were the early chronographs. Some pilots used these watches. These are not very plentiful, and the better the maker the more valuable they become. Figure 3 shows a Ulysse Nardin single crown wrist chronograph, circa 1920. These hard glass enamel dials with fine black numbers painted on them are very striking. I especially like the ones where part of the numbers are in black and the others are red. While this was a complicated watch in its time, it doesn't compare to some of the unusual features of the World War II watches.

Perhaps the most noteworthy of the World War II era watches is the Longines Lindbergh hour angle wristwatches. Figure 4 is the large version of this watch. This particular watch is 47 mm in diameter. It was made in 18K yellow gold, sterling silver, and stainless steel. The smaller model is 30 mm in diameter. Be careful when buying the smaller size model, because it's the one that has been reproduced by Longines. There is an excellent history and instruction on how to use this watch on page 84 of the *Vintage America and European Wristwatch Price Guide,* Volume 1. Longines also made a Weems 47 mm diameter wristwatch which has the same center disc that can be rotated by the crown. The Weems watch is the forerunner of the Lindbergh watch. It was during his study of navigation under Commander Weems that Charles Lindbergh conceived the idea of adding the hour angle to the Weems watch.

Another style of military watch made during World War II was the divers watch with the extra large crown and a piece of chain to hold the crown cover from being lost. These watches were made by Elgin and Hamilton. They are marked "U.S. Navy Bureau of Ships" on the back (Figure 5).

Many watchmakers prize another product of World War II more highly than any of the other items. That is the boxed ship's chronometers made by Waltham, Elgin, and Hamilton. Many times I've gone into watch shops, and the master clock they used to check the running of their customers' watches was a model 22 Hamilton chronometer. Most watchmakers wouldn't sell their chronometers at any price. The most valuable American-made box chronometer is the larger model 21 by Hamilton. It's easy to tell apart from the more common models because it has a helical hairspring. There is nothing finer than one of these movements in a gimbaled mahogany box (Figure 6).

Just from the few basic military watches I have shown, you can build a very interesting collection in no time at all. Many of these pieces I have illustrated are valuable—especially the large Longines Lindbergh watch. Just trying to get one example of each type I have shown here could be quite a challenge. □

Timely Tips for Clockmakers

J.P. Kenyon, CMC

COUNTING GEAR TRAINS

In clockwork, a gear train is a series of wheels and pinions mounted on arbors that is used to transfer power from a mainspring, weight, or other source to a terminal point where a specific function is achieved. The end result can be the operation of an escapement, a strike hammer, an alarm, several chime hammers, or the turning of hands to indicate time. With the exception of the motion work, clock mechanism gear trains are designed for a step up in rotational speed. In other words, the wheels are the drivers and the pinions are driven. To function properly, the gears and pinions must be made from proper materials with a smooth finish and attached to arbors uprighted at the proper depthing between plates to insure accurate meshing so that uniform power can be transferred. If the train does not operate with complete smoothness and minimum friction, some of the steady flow of power required to accomplish the function of the train will be wasted in the transmission.

As a clockmaker examines each train to become familiar with the gear and pinion location and the flow of power through the train, he/she can collect data that can be used to determine beats per hour, correct pendulum length, mainspring length, time between windings, teeth on a missing wheel, leaves on a missing pinion, and other information. Since these are some of the tidbits to be considered in future issues, this writing will be devoted to the familiarization of gear trains and to wheel tooth and pinion leaf counts as required to complete the calculations. It should be mentioned that clockmakers who use electronic clock timing devices need to be familiar with train counts in order to obtain correct results from the equipment.

A good way to begin this study is to become familiar with the relative location of and power flow through wheels and pinions in the trains of some of the more common types of movements that cross the bench.

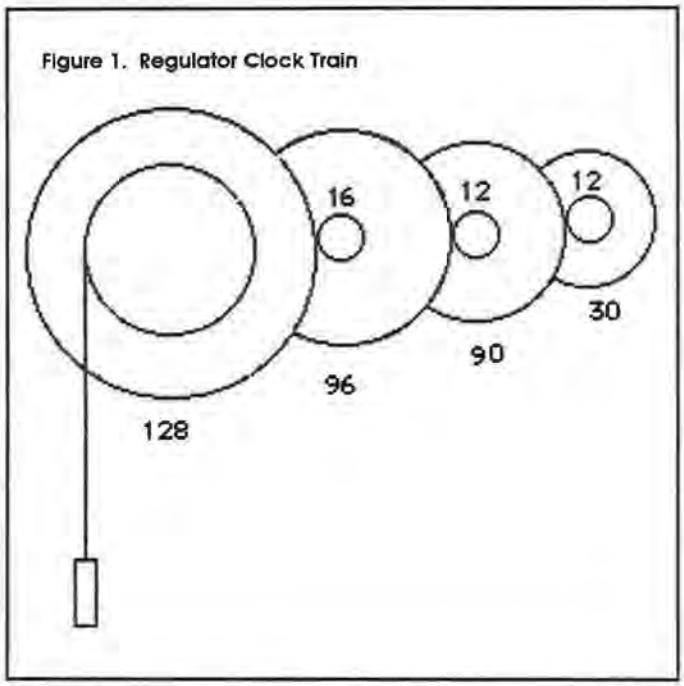
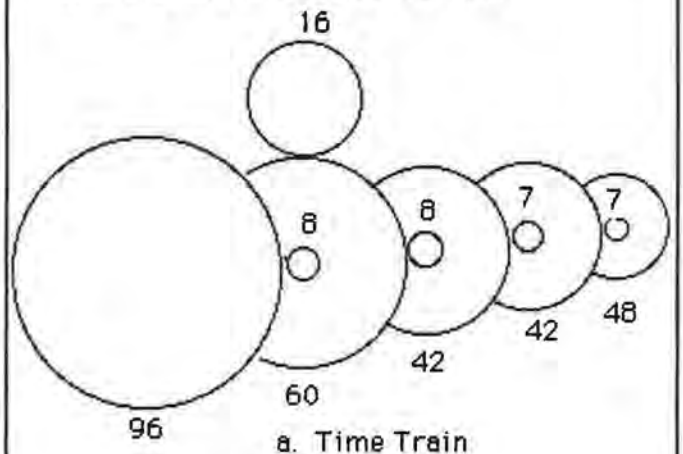


Figure 1. Regulator Clock Train

REGULATOR CLOCK

A standard regulator movement (Figure 1) contains only four wheels, not including the dial train. It is usually fitted with a seconds pendulum which beats at a rate of 60 vibrations a minute and an escape wheel that contains 30 teeth. The first wheel, driven by a weight on the winding arbor, drives the center pinion and center wheel at the rate of one revolution per hour. Hence, the center shaft (arbor) has the minute hand affixed. The center wheel turns the third pinion and third wheel on the third arbor, which is meshed with the escape pinion and escape wheel on the escape arbor. The first arbor has no pinion, thus the first pinion is, in reality, attached to the second arbor. For convenience sake, this pinion is called the second pinion; the second pinion, at-

Figure 2. 8-Day American Clock Gear Trains



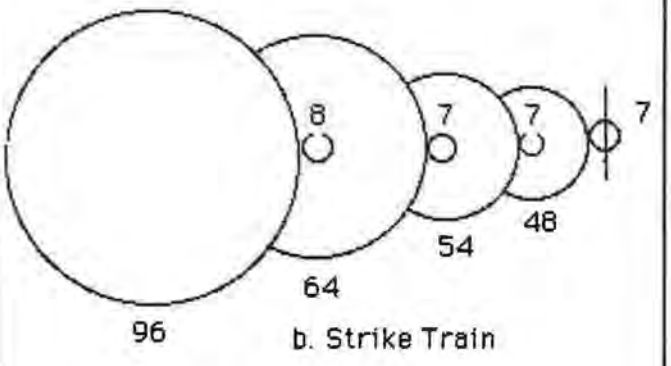
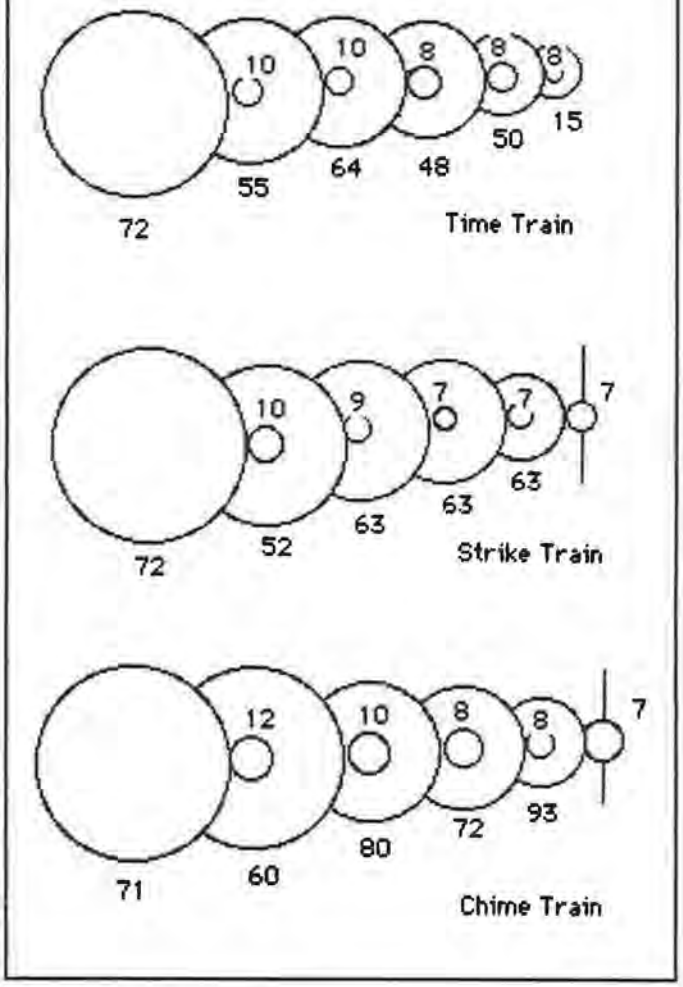


Figure 3. German Chime Clock Gear Trains.



tached to the third arbor, is called the third pinion; and so on. This way, the arbor, wheel, and pinion can be identified and referred to with little confusion. This procedure is standard to the industry.

8-DAY AMERICAN STRIKING CLOCK

The 8-day American striking clock has two major gear trains, not to mention the dial train; one for timekeeping, the other for operating the strike mechanism. In the time train (Figure 2a), the great wheel, or first wheel, is mounted on the winding arbor and is geared into the second pinion which, in this case, is not on the center arbor. The second wheel is geared into the center (drive) pinion on the center or minute arbor and to the third pinon on the third arbor. The third wheel drives the fourth pinion on the fourth arbor, and the fourth wheel drives the pinion on the escape wheel arbor. This arrangement requires special attention when counting and calculating the gear train.

The strike train (Figure 2b) is made up of five arbors. The first or main wheel, attached to the winding arbor, drives the second pinion on the second arbor; the second wheel drives the third pinion on the third arbor, which is the same arbor to which the strike locking cam and strike hammer lift pins are attached, along with the third wheel. The third wheel is geared to the fourth pinion on the fourth or warning wheel arbor, and the fourth wheel drives the pinion on the fan or fly governor arbor. The count wheel (not shown) is fitted on the winding arbor, and is rotated independently by a solid pinion on the second arbor.

GERMAN CHIME CLOCK

The German chime clock contains three gear trains in addition to the motion work. The time train is in the center, and facing the front of the clock; the strike train is on the left and the chime train on the right side. The time train actuates the chime train every 15 minutes which in turn acutates the strike train at the top of each hour. These trains are illustrated in Figure 3.

COUNTING A TRAIN

The logical time to count a train is when the movement is disassembled. Each train should be sorted and all gears, pinions, and their arbors cleaned by an approved method. With each train separated, the gears and pinions should be inspected and lined up on the bench top in the same order that they would be assembled in, between the plates. This is a good

time to upright each individual train between the plates to check for pivot hole problems or smoothness of operation if repairs have already been made.

Once you ascertain that the train is complete and correctly aligned, make a sketch to use as a worksheet. It's a good idea to keep a file of the sketches for future reference. You'll be surprised at how often the same movements turn up.

Mark a tooth of a gear with a pencil (do not punch or scratch), then count all of the teeth and make note of the number and location on your sketch. Next, using this same procedure, count the leaves on the pinions and record on your sketch. Depending on what kind of information you intend to determine from the calculation, you may not need to count all of the gears and pinions. This will be discussed in future installments.

The train count can also be accomplished with the movement assembled, but not without some degree of difficulty, in comparison. If there is no choice, be sure that the power is off and remove the verge in the case of the time train and proceed as described above. In respect to the strike and chime trains, be sure power is down and remove or position stop levers so that the train turns freely and proceed to count.

In order to obtain information required to arrive at correct final results, the count must be accurate. In the case of an assembled movement, we cannot depend on touch and feel when counting teeth and leaves. A low power loupe or binocular in good light is necessary, but it should be kept in mind that counting the train of an assembled movement is somewhat difficult and much more uncertain than counting one from a movement that has been taken to pieces.

Next time we will apply this information in the calculation of the beat (vibrations) of a pendulum. In the interim, practice counting some trains and making sketches to develop a file. ❑

CORRECTION

Please make note of the following correction which pertains to the article "Calculation Principles" in the March '91 issue, page 45. Problem # 6 should read:

Solve for C: A + B – C = –D

TIMELOCKS

(Continued from page 39)

Reserve Power

To put reserve power on this movement, hold back the main train of wheels at the escape wheel, wind the movement fully, and then with a let-down key on the winding arbor, slowly run down the train one-fourth turn of the winding arbor, controlling the speed by braking against the escape wheel with your finger.

Figure 16. After reserve power has been applied, let down the train ¼ turn and then reposition the dial to indicate the maximum hours of running time (i.e. 72 hours).

Figure 17

To Remove an Overwind

1. Remove the dial, pointer, and winding pinion. Do not remove the power wheel cam.
2. Remove the balance wheel and bridge.
3. Hold back the main train of wheels at the escape wheel.
4. Remove the upper pallet fork hole jewel and then lift up and remove the pallet fork from the movement (Figure 13).
5. Let the movement run down slowly with a let-down key, controlling the speed by braking against the escape wheel until the power cam stops against the oval tooth of the power wheel.
6. Replace the pallet fork and hole jewel and the balance wheel and bridge.
7. Replace the winding pinion.
8. Replace the dial so that it indicates zero running time as indicated by the dial pointer.
9. Replace the dial pointer.

Next time we'll take a look at the newest of Sargent & Greenleaf's timelock movements–the S & G new model small type movements. ❑

Association News

ARIZONA
The Arizona Clockmakers and Watchmakers Guild held a meeting on March 19, 1991. Guests present at the meeting were Bob and Wanda Bishop of Glenshaw, PA. (Mr. Bishop is an AWI instructor and past president of AWI.)

The following officers were nominated for the 1991-1992 year: Tom White, president; Jim Phillips, vice president; Sal DiStefano, secretary; Bernard Guhin, treasurer; and Tom Baggett, Jim Pickard, and Bob Richard, directors.

The program for the evening was an AWI video by George Daniels titled "The Making of a Tourbillon Watch."

NEW YORK
The Horological Society of New York, Inc. held their general membership meeting on February 4, 1991.

Harold Perlman, of the nominating committee, inducted the new officers for 1991. They are: Howard Fass, president; Ted Fishkow, vice president and treasurer; Ben Matz, recording secretary; Dan Richter, sgt.-at-arms; and Howard Levy, trustee. The executive committee members are Alvin Rudnick, Henry Loeser, Frank Loynaz, Jack Schecter, Frank Carpathia, and Walter Pangretich.

Ben Matz introduced Joe Cerullo who presented his video "Hairspring Manipulating and Vibrating." The program was a joint effort of Joe Cerullo, Zantech (camera work), Henry Loeser (video equipment from Cartier), and the American Watchmakers Institute (producer/sponsor). A question and answer period followed and the members received a packet of hairspring literature.

TEXAS
A two-day AWI bench course, "Cuckoo Clock Repair," was held in Austin, TX on February 16 and 17, 1991. James Williams was the AWI instructor for the course.

Participants of the Cuckoo Clock Repair Bench Course were (left to right): Purdis Medlin, Robert Fesler, Jack Chipman, John Plume, James Williams (instructor), Wynn Taube, Dean Duncan, Nino Gonzales, Gene Kramer, and Jim Sheffield.

UPCOMING CONVENTIONS

Texas Watchmakers Association
Annual Convention
May 17-19, 1991
Ramada Inn -- Dallas, TX
Downtown Dallas Convention Center

Arizona Clockmakers & Watchmakers Guild
Annual Convention
May 18-19, 1991
Plaza Hotel -- Tucson, AZ

North Carolina Watchmakers Association
Annual Convention
May 31 - June 2, 1991
Holiday Inn North -- Charlotte, NC

New York State Watchmakers
Annual Convention
October 4-6, 1991
Waterloo, NY

Participants were provided with the opportunity to actively disassemble, inspect, and reassemble cuckoo clock movements. Also provided were instructions on repairs and adjustments to related components associated with these animated timepieces.

CANADA
Services were held April 5, 1991 for Robert S. Phillip, Cookstown, Ontario, Canada. He died April 2, 1991 after a protracted illness. Mr. Phillip was in his 75th year.

Robert Phillip was the Executive Secretary of the Ontario Watchmakers Association. He was active in the affairs of the Horological Institute of America and the United Horological Association of America, and played a key role in the merger of the two groups when they became the American Watchmakers Institute. Mr. Phillip was one of the early directors of AWI; his perceptive mind and sound advice influenced the early decisions which charted the course for the success of AWI today.

Always dedicated to the welfare of others, and especially those involved in horology, Robert Phillip has left his mark on the many lives he touched through the years. His influence will linger long after many of those he toiled for are gone.

We express our sympathy to his widow, Alice; son, Robert John; and daughter, Joan. Robert S. Phillip was a gentle friend who will be missed by all who knew him. ❑

SELF-WINDING WATCHES

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

DATRON:

Movado's Self-Winding, 36,000 VPH Chronograph-Calendar

PART 3

Although each watchmaker may want to decide for himself the extent to which he should dismantle a watch movement, the following is the factory-recommended sequence for dismantling the Datron.

Figure 27: 1. Unscrew the three-rotor screw (51143) and remove the oscillating weight (1143). 2. Loosen the reduction gear bolt screw (51525). Push the bolt (1525) towards the inside of the movement and remove the reduction gear (1481). Now secure the reduction gear bolt screw (51525). 3. Press the detent axle (502) and take out the winding stem and crown (401). 4. Remove the casing clamps (166). 5. For three-piece cases, remove the bezel. 6. Extract the movement from the case.

Figure 28: 7. Replace the winding stem (401) in the movement. 8. Remove the dial and hands. 9. Remove

Figure 27

Figure 29

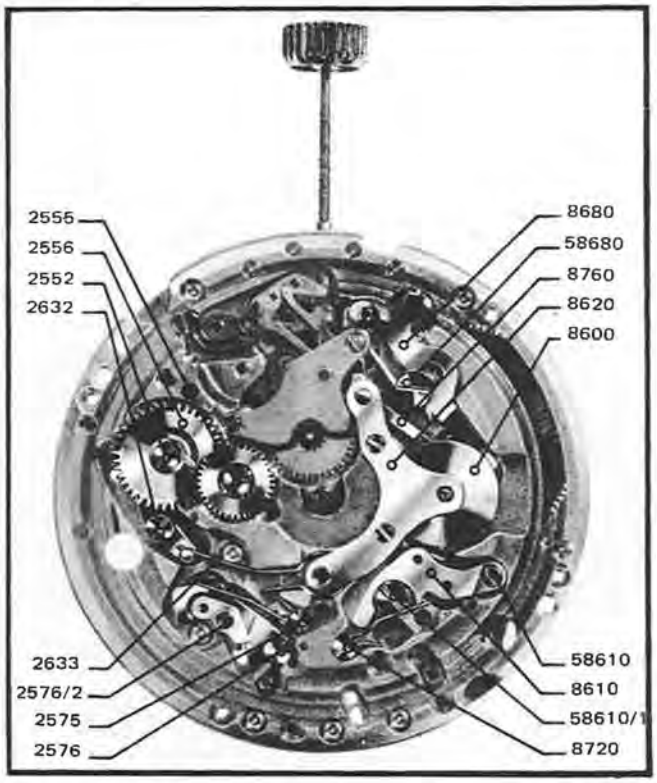
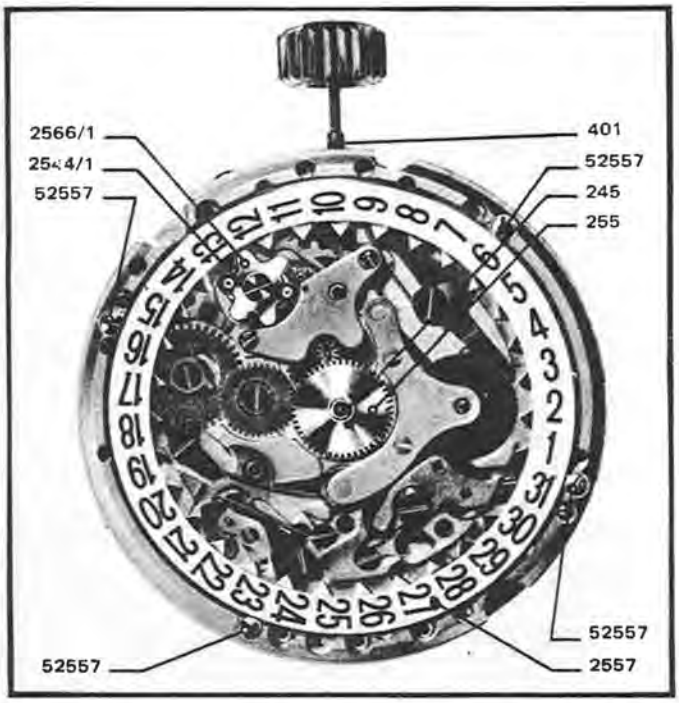


Figure 28



the balance and bridge. 10. Remove the hour wheel (255). 11. Unscrew the four date indicator screws (52557) and remove the date indicator (2557). 12. Remove the cannon pinion (245). 13. Take off the date corrector (2566/1) and its pinion (2544/1).

Figure 29: 14. Remove the hour recorder bridge (8620), the hour-recording runner (8600), and its friction spring (8760). 15. Remove the endshake hour hammer screw (58680) and dislodge the hour hammer (8680). 16. Remove screws (58610 and 58610/1) and remove the conveyor (8610). 17. Remove the conveyor spring (8720). 18. Remove the calendar driving wheel (2555), the date finger (2552), and the date indicator driving wheel (2556).

19. Extract the release lever spring of the date indicator (2633), the release lever of the date indicator (2632), the date jumper spring (2575), the date jumper bolt (2576/2), and the date jumper (2576). Turn the movement over.

Figure 30: 20. Remove the hammer spring (8350). 21. Remove the three screws (58500) and take out the chronograph bridge (8500).

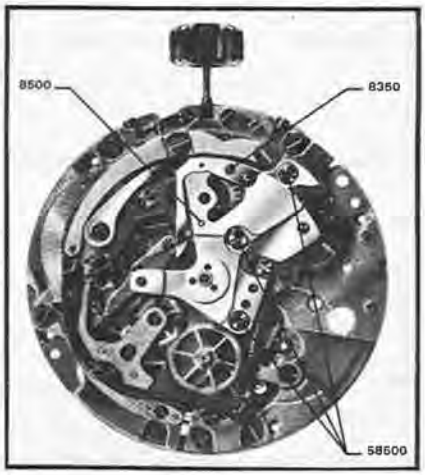


Figure 30

Figure 31

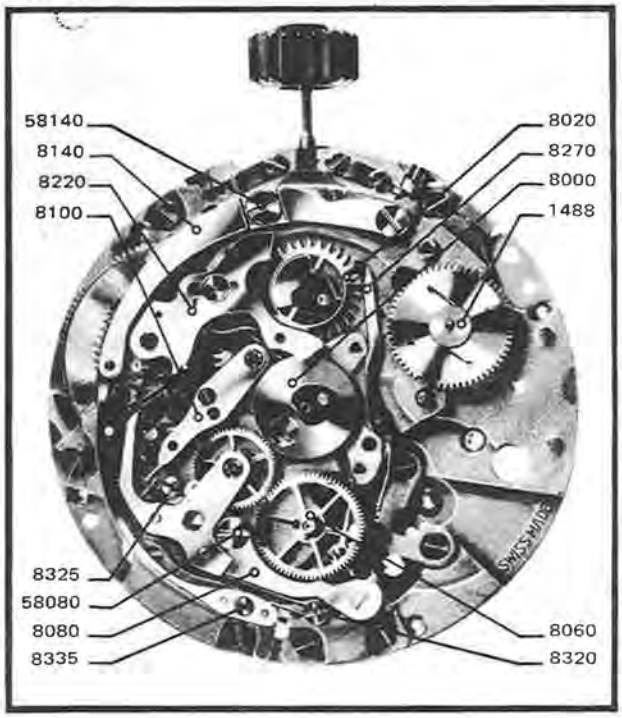


Figure 31: 22. Remove the hammer (8220), the chronograph runner (8000), the minute-recording jumper (8270), the minute-recording runner (8020), the pawl wheel (1488), and the sliding gear (8100). 23. Remove the screw (58080) and the coupling clutch (8080). 24. Take out the coupling clutch spring (8320). 25. Lift the driving wheel (8060). *Take care not to bend the fourth wheel pivot.*

26. Take out the sliding gear spring (8325). 27. Remove the operating lever spring (8335). 28. Remove the screw (58140) and the operating lever (8140).

Figure 32: 29. Remove the maintain pin for the

Figure 32

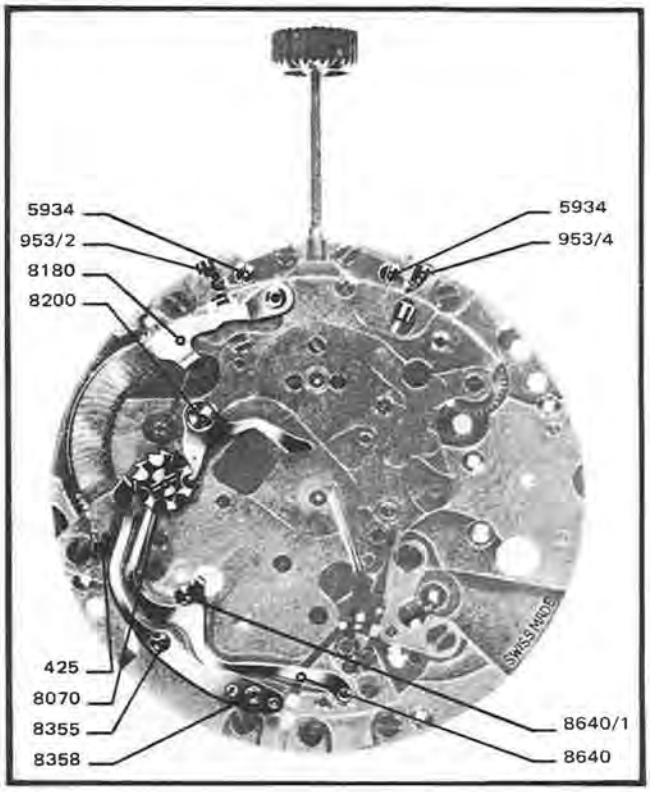
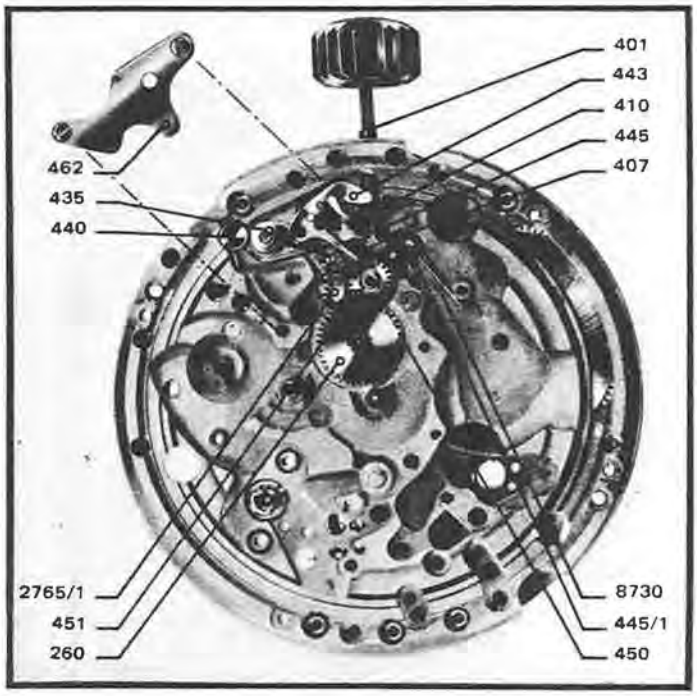


Figure 33



switch (8640/1) and the switch (8640). 30. Remove the pillar wheel jumper (8355) and the sole (8358) which is placed under the pillar wheel jumper. 31. Remove the blocking lever (8200). The blocking lever spring (8345) remains in place.

32. Take out the pillar wheel (8070). 33. Remove the fly-back lever (8180). 34. Loosen slightly the bolt screws (5934) and extract the pusher extensions (953/2-953/4). Tighten the bolt screws (5934). 35. Let down the mainspring carefully; grasp the crown lightly while the click (425) is disengaged so that this spring unwinds slowly.

Figure 33: 36. Remove the minute wheel bridge (462). 37. Take off the minute wheel (260), the setting wheel for the minute wheel (451), the date corrector lever (2765/1), the detent spring ring (445/1) with the hour hammer spring (8730), the detent (443), and the clutch lever spring (440). 38. Dislodge the winding stem (401), the winding pinion (410), and the clutch pinion (407).

Figure 34

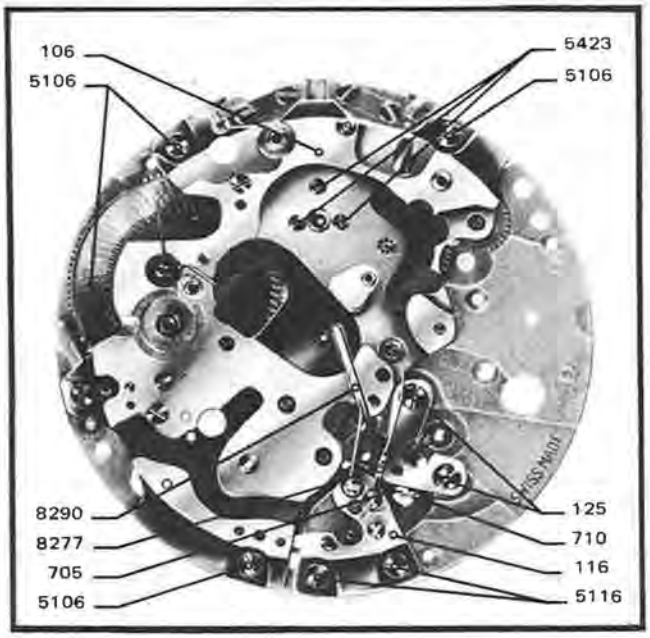


Figure 35

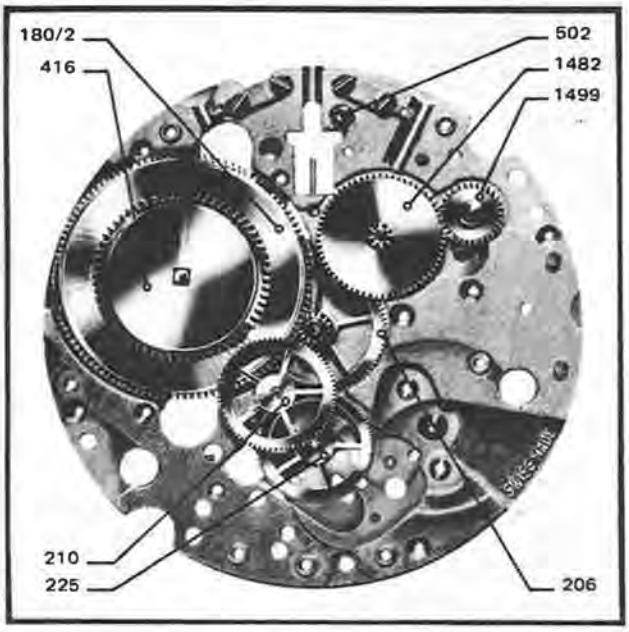


Figure 34: 39. Remove the pallet bridge (125) and the pallet fork (710). 40. Remove the escape wheel bridge (116), screw (5116), and the escape wheel (705). *While doing this, be careful not to twist the friction spring for the chronograph runner (8290) and the spring for the minute-recording jumper (8277).*

41. Take out the four screws (5106) and remove the barrel and train wheel bridge (106). 42. Barrel bridge upper side: support this bridge at the crown wheel so as not to bend the bridge. Then remove the three crown wheel screws (5423). Take off the crown wheel core (423) and the crown wheel (421). Barrel bridge lower side: remove the click (425) and its spring (430); (421, 423, and 425 are not shown in this figure).

Figure 35: 43. Remove the third wheel (210), the fourth wheel (225), the barrel (180/2) with the ratchet (416), the reverser connecting wheel (1499), the driving wheel for the crown wheel (1482), the center wheel (206), and the detent axle (502).

LUBRICATION

The symbols shown in Figure 36 represent the types of lubrication and directional points recommended by Movado.

Figure 36

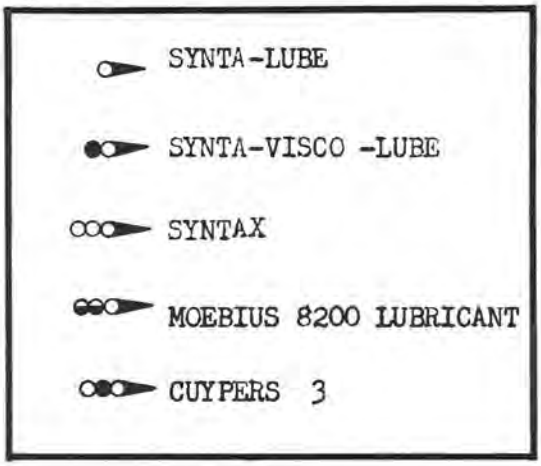
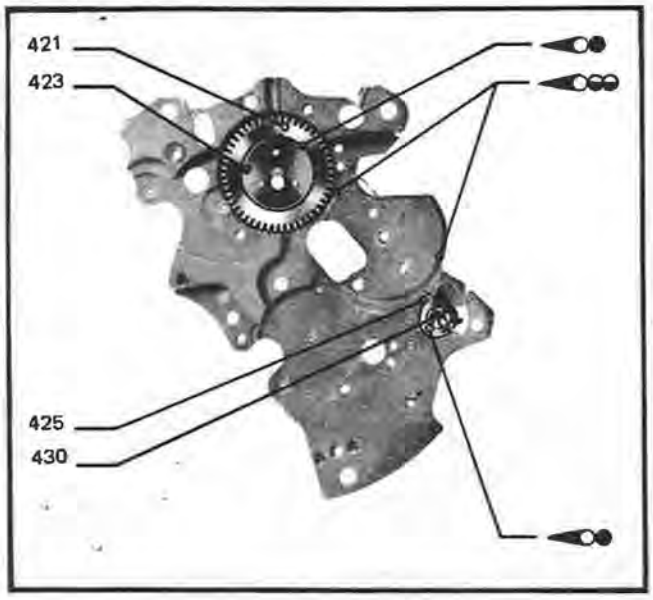


Figure 37



REASSEMBLING THE MOVEMENT

Figure 37: 1. Before assembling, grease the pivots of the crown wheel (421), the crown wheel core (423), the click-spring (430), and the click (425) at the points indicated by the symbols with the lubricant types shown in Figure 36.

These parts assemble on the bottom of the barrel bridge. Also oil the bead which limits the endshake of the ratchet wheel. Support the crown wheel core (423) when it is being secured to prevent warping the bridge.

Figure 38: 2. Fit the detent axle (502), center wheel (206), and the complete barrel, taking care to oil their pivots. Fit the ratchet wheel (416), the fourth wheel (225), the third wheel (210), the reverser connecting wheel (1499), and the driving gear (1482).

Figure 38

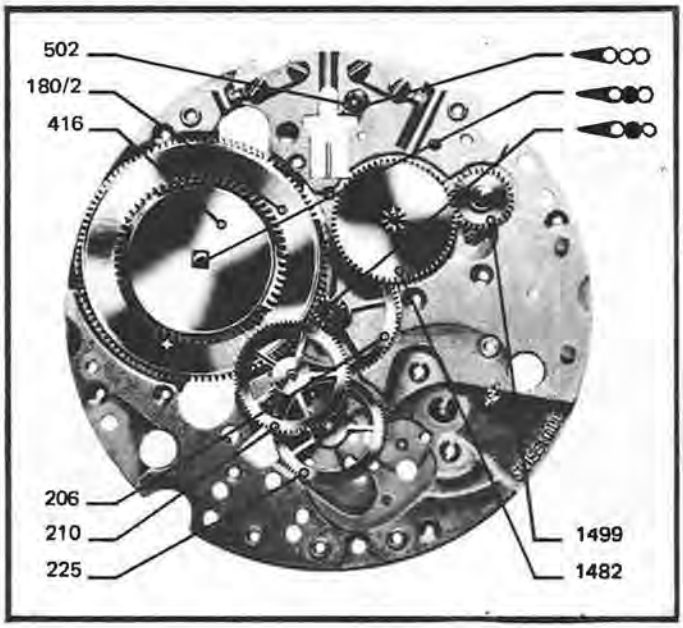


Figure 39: 3. Set the train wheel bridge (106) into place and fasten its screws. 4. Set the escape wheel (705) and the escape wheel bridge (116) into place and secure the screws. 5. Oil the upper pivot bearings of the third wheel (210), the fourth wheel (225), escape wheel pivots only (705)–*not the teeth.* Oil the driving gear for the crown wheel (1482) and the reverser connecting wheel (1499).

6. Oil the lower pivots of the third wheel (210), fourth wheel (225), escape wheel (705), driving gear for the crown wheel (1482), and the reverser connecting wheel (1499), shown in Figure 38.

Figure 40: 7. Grease the pivot of the winding stem fixed in the plate, the pivoting point of the detent (443), and the lower setting wheel (450).

8. Replace the clutch wheel (407), the winding pinion (410), and the winding stem (401), having taken care to grease the breguet (clutch) toothing as well as the stem square. Set the detent (443) in place and the clutch lever (435), the setting wheel (450), and the clutch lever spring (440), and then fasten the screws. Grease the functioning points of the detent and the support of the clutch lever spring.

9. Set the calendar corrector lever (2765/1), but first grease its pivots as well as the fittings of the two pinions. *Be certain that the finger of the calendar corrector lever (2765/1) leans against the extension of the detent* (see Figure 5, *Horological Times*, March 1991).

Instructions for assembling the Datron will continue next month. ❑

Figure 39

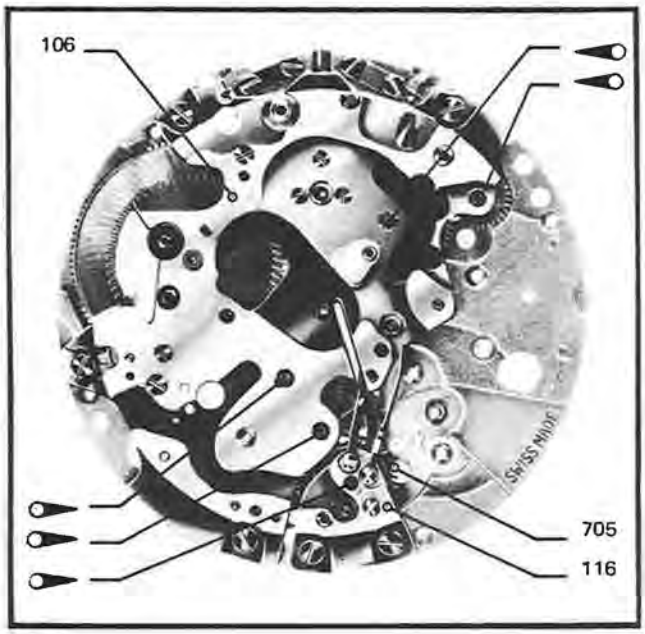
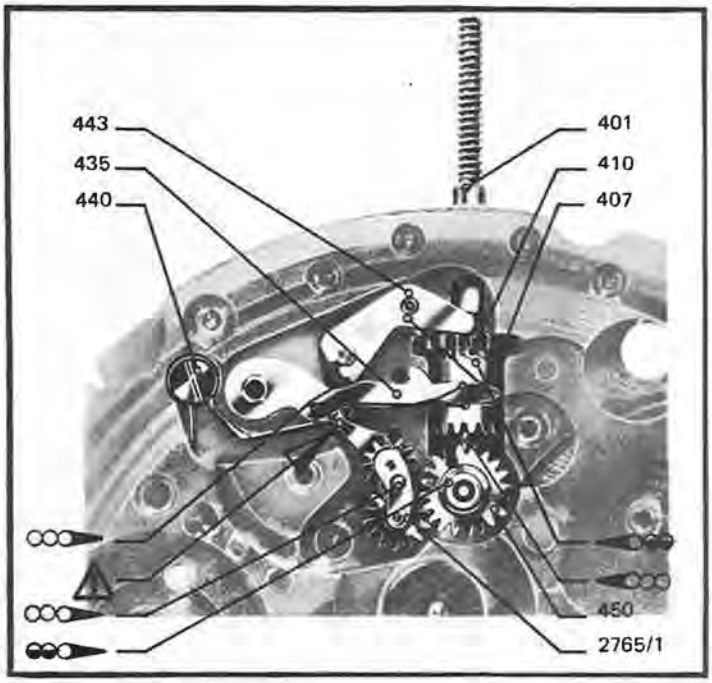


Figure 40



JIDA's 1991 Convention
Recap

The Jewelry Industry Distributors Association (JIDA) held their Convention and Merchandise Day March 6-10, 1991 at the Marriott at Sawgrass, Ponte Vedra Beach, FL. Several well-received business seminars were given and conferences were held during the course of the convention, along with the ever-popular Merchandise Setup Day.

Mr. Charles Berris of M. Beresh, Inc. was elected President of JIDA, succeeding Roger Borel (Jules Borel & Co.), who served a two-year term.

James N. Leighton, Vice President of OEM Marketing, Lubricating Specialties Co., gave a presentation entitled "Innovative Marketing & Sales Strategies" in which he offered effective ideas to raise profit margins, new approaches to marketing, rules for brainstorming, and how to motivate the buyer.

Nathaniel C. Earle, President of the Jewelers Board of Trade, presented "The Role of the Trade Banker," focusing on credit applications, credit reports, detecting scams, and collection tips. Important rules and regulations governing the packaging and shipping of hazardous materials were presented by Jennifer Graves, a representative of Chem-Tel, Inc., Temple Terrace, FL.

JIDA's prestigious "Man of the Year" award went to Mr. Robert Mahar of Mahar & Engstrom Co. for outstanding service to the jewelry and watchmaking industries, which he has served in many capacities on both the local and national level. He is a member of the Boston Jewelers Club and the Diamond Peacock Club, which he served as President in 1984. A member of JIDA since 1977 (formerly the Watch Material and Jewelry Distributors Assn.), Bob Mahar has served through the chairs to the Presidency in 1987-89. He has been with the Mahar & Engstrom Company since 1963.

MAN OF THE YEAR
Robert E. Mahar, center, JIDA's 1991 "Man of the Year", shown here with wife Barbara and their family Debbie and Robbie.

Next year's JIDA Convention:
April 8-13, 1992
Tuscon, Arizona

JIDA Officers: Douglas R. Page, Treasurer; Gerald Wilson, First Vice President; Charles Berris, President; Roger P. Borel, Past President; Henry A. Livesay, Second Vice President.

JIDA Directors and Officers: Christopher Gaber (Ray Gaber Co.), Douglas R. Page (Page & Wilson, Ltd.), Patrick J. Cassedy (Cas-Ker Co.), Gerald Wilson (Wm. S. McCaw Co.), Charles Berris (M. Beresh, Inc.), Alan Berman (Vigor Co.), Roger P. Borel (Jules Borel & Co.), Robert Lazarus (L&R Manufacturing Co.), Henry A. Livesay (Livesay's, Inc.), Robert Kilb (Kilb & Co.), Ed Dickinson (REDCO Supply Co.). Not shown: Vincent Innocenti, Sr. (Berco Co.) and Thomas Payne TMP Co.).

Anita B. Lee of Neycraft (Yucaipa, CA).

Paul C. Finne, Finn Time Products, Inc. (Lake Worth, FL) demonstrates his new QTM-901 test meter.

Robert J. Lazarus, L&R Manufacturing Co. (Kearny, NJ) explains the features of his company's ultrasonic cleaning machines.

Above: Ian D. Irving and Sean P. Collins of the Maxell Corp. of America, Battery Division (Fair Lawn, NJ).

Right: Eleanor and Henry Livesay stop by to take a look at Lou Zanoni's new products (Zantech, Inc., Trenton, NJ).

Ray Heifetz (Twin City Supply, Minneapolis, MN) visits with James Kemnitz and Barclay Smith of the Eveready Battery Co., Inc. (St. Louis, MO).

Left: Leonard P. Belmonte of EZV, Inc. (Hillside, IL) was featuring his new EZV watch hand trimmer.

Right: Clinton Nelson of the C.D. Nelson Manufacturing Co. (Lake Bluff, IL) was busy demonstrating how his new Steamshine steam-cleans jewelry and watches to a brand-new brilliance.

Herman G. Kirkpatrick of Albert Froidevaux & Sons, USA (Lenexa, KS) displayed Euro-Tool® hand tools and state-of-the-art precision jewelers' instruments.

Nicholas Krohn and Patrick Elliott of Krohn Industries (Carlstadt, NJ).

John Piccinich and Jonathan Frankfort of COSERV (Mahwah, NJ).

F. Paul Mooney, Jr. of George H. Fuller & Sons (Pawtucket, RI) showing findings to Denis Gaber (Ray Gaber Co., Pittsburgh, PA).

John A. Wieber (Rayovac Corp., Madison, WI) and Keith Sessler (Star Struck, Bethel, CT).

Herb Rosenfeld of AP Creations (New York, NY).

James Wright and Thomas McRoy of the Newall Mfg. Co. (Chicago, IL) give a copy of their new Watch Material Catalog to Denis Bullard (Southern Watch & Clock Supply, Kent, England).

Left: Stu and Margaret Lindsay of Timex Corp. (Waterbury, CT).

Right: Claude Metzger of Pibor (Switzerland) talks with Guenther Baerje of Guenther & Sons (Los Angeles, CA).

Bill Batarla of United Precious Metal Refining, Inc. (Alden, NY).

Thomas J. Corbett and Thomas Muglia of AWB-Skyline Industries, Inc. (New York, NY).

Rei Hayashi and John Whitehead of the Citizen Watch Co. of America (Los Angeles, CA) and Roger Borel (Jules Borel & Co.).

Leonard Simon of the Germanow-Simon Corp. (Rochester, NY) and Thomas Payne (TMP Co.).

James G. Conlan of the WW Impex Co. USA, Inc. (Dallas, TX).

Louis and Mary Zanoni of Zantech, Inc. (Trenton, NJ).

Alan Berman of the Vigor Company (Austell, GA) shows the company's wide range of tools and machinery to Saul Cobrin (Reliable Watch Materials, Montreal, Canada).

Peter J. Carlin of the Mormac-Kestenmade Co. (New York, NY) with a display of fine watch bands.

Jay Patel (PK Mfg. Co., El Monte, CA) and Robert Frei (O. Frei & J. Borel Co., Oakland, CA).

Thomas Shaner, CAE, JIDA's Executive Director (Baltimore, MD).

David Pfingst (right) of Pfingst & Co., Inc. (So. Plainfield, NJ).

Wallace Bryan, John Canzoneri, and Lola Rizzuto of Grobet USA-Hammel-Dixon (Carlstadt, NJ).

Ask Huck

CLOCKMAKING BITS About...

By J.M. Huckabee
CMC, FBHI

WHEELS OUT OF ROUND and SAWING

Q. What is the process to correct a clock train wheel that is untrue in round? Does this require a new wheel? How do you treat this problem?

A. Almost all wheels have a detectable amount of run-out in round. This may be of little consequence; however, any obvious run-out will affect the gearing and should be corrected.

The first step is to determine the cause. Is the arbor bent, wheel rim stretched and deformed from overstress when mounted, bore off center, etc.?

A bent arbor is possibly the most common cause, with bent pivots a frequent cause. Correcting these two problems is the solution in most cases.

An escape wheel is less tolerant to run-out than train wheels, with the dead beat escapement the most demanding of a true wheel. Run-out is a problem in escape wheels as well as train wheels; correction is achieved by the same methods.

Let's discuss one of the more difficult cases. Assume a wheel has a true arbor, good pivots, and no obvious wheel damage. Let's say that the wheel bore appears to be off center. How did it get that way? One cause is an overzealous staking job when the wheel was mounted or at a subsequent repair. How do we get back on center?

Remove the wheel and mount the arbor between lathe centers. Take a trueing cut on the hub seat. We must cut a new wheel seat slightly larger than the original because we also will make a trueing cut in the wheel bore.

Affix a thin piece of wood to a lathe faceplate and turn a pocket that the wheel can just be pressed into with light finger pressure. Now open the wheel bore to a trial fit to our new hub seat. We have a true-bore wheel and a true hub. This means our wheel will run perfectly true. Stake lightly in four places and the job is finished.

Don't overstake the hub--only enough to keep the wheel in place and withstand the torque of that section of the gear train.

The wheel turning technique is called "turning in a box." This is a simple operation with an astounding degree of accuracy. The wood "box" can be a small piece of plywood about 1/8 inch thick, held in place with double-sided sticky tape. About the only negative aspect of this operation is the wood dust on the lathe.

Q. How do you make a piece that is sawn to shape? For instance, please describe how you would make a clock hand.

A. This is an exercise in use of our most simple tools: a saw, file, some abrasive paper, and a bit of blueing.

Look through a catalog for hand types to fix the desired shape in your mind. Now practice drawing this on paper until you are pleased with size and detail.

Coat the raw material with a lacquer pen so you can draw the image with a scriber. You will need a bench pin. I use a piece of wood about 3 x 8 inches and a 1/2 inch thick. Clamp this to the bench with about half-length overhang. The end needs a saw slot about an inch or so deep. Hold the raw material flat and saw in the slot, pulling straight downward. Cut out the piece with a minimum of oversize.

I use the shallowest possible saw frame. A frame deeper than necessary aggravates blade breakage. Lube the blade with beeswax, candle wax, or light oil; use long, steady strokes making the cut on the down stroke. Use a small blade, as it is easier to control. I order blades by the gross and ask for an assortment in mid-range sizes. Some blades cut better than others; some are easier to control. If you have serious problems, change the blade.

Finish the edges with a fine-cut needle file, and the surfaces with a buff stick. An abrasive paper around a paint paddle also works good.

Drill and file the hub to order. Polish the outside surface to a bright finish and avoid all possibility of oil or fingerprints on the bright surface.

Lay the hand, bright side up, on a piece of flat sheet metal and heat from the underside with a propane torch. The instant the hand turns blue, dump it from the sheet metal support. If the blue is unsuccessful, it will be necessary to repolish and start over. Practice on a small piece of raw material will help to perfect the technique.

Gun shops in central Texas have small containers of touch up blueing called Perma Blue. This is available in liquid and paste form. The paste is easier to use, works out much easier than the liquid, and is considerably easier than heat.

This exercise will demonstrate that a saw and file can produce most any type of clock part that can be drawn to size. The parts that can be reproduced are endless in number. ❑

If you have a subject that you would like J.M. Huckabee to address in a future article, send it to: "Ask Huck," c/o *Horological Times*, 3700 Harrison Avenue, Cincinnati, OH 45211.

SCHOLASTICALLY SPEAKING

Benjamin Matz

The Joseph Bulova School

Alive and Doing Well

The Joseph Bulova School, created in 1945, had as its prime purpose the training and rehabilitation of disabled veterans. Later, it included disabled civilians as well. Today, however, the handicapped constitute only a small portion of the student body. In a sense, therefore, it is a school with a different outlook and a different goal. This school is doing very well!

At a time when school closings are commonplace, the Joseph Bulova School is expanding. What accounts for this healthy condition?

An important factor is the training of its instructors. It is constantly being updated to keep abreast of the technological changes in the field. Instructors study techniques used in other schools. This includes going to schools abroad; they have a very close relationship with WOSTEP in Switzerland. The Research and Education Council (REC) of the American Watchmakers Institute is also an important aid in collecting information. All this amounts to a continuing process–a quest–to achieve the highest standards in training procedures.

Its extraordinary placement rate underscores the success of this program and adds to the reputation of the school: 95% of its graduates obtain jobs.

The school's growth pattern can also be explained by the activity of its Advisory Board. The Board consists of representatives from community groups, companies, and organizations.

The fields cover watches, jewelry, and electronic/computer/instrument. Amongst the community groups are Radio Station WWRL; the Queens Chamber of Commerce; and the Kiwanis Club. Some of the companies and organizations are the Watchmakers of Switzerland; Eta Industries; North American Watch Co.; Rolex; Cartier; DRS; the New York State Jewelers Association; IBM; and Xerox.

And there are many others.

Aside from the collective wisdom the Advisory Board provides, it also offers financial support. Some of the giants in the industry have volunteered to raise funds for the reconstruction and modernization of classrooms and for new equipment.

We now come to the very heart of the school–its curriculum–the criterion by which any school is judged.

All classes work on staking, balance wheel truing and poising, pivot polishing, hairspring manipulation (including colleting, vibrating, studding and centering), jeweling, escapement matching, and general repairs.

More extended courses include blueprint reading, shop arithmetic, lathe work, jewelry repair, electric theory, quartz watches, and the making of watch parts.

The length of the watch courses are 9 months for the Watch Technicians; 13 months for the Watch Repair; and 17 months for the Watchmaker.

Classes are small, and instruction is individualized and self-paced.

The physical needs of the live-in students are also taken into account. They are housed in comfortable quarters with each room containing a television set and a VCR. There is a gymnasium and a swimming pool. Only 20 minutes from midtown Manhattan, there is ample opportunity for outside diversion.

The fees are either for training alone or for training and housing. Scholarships are also available.

With an ambitious but practical eye to the future, the Joseph Bulova School looks forward to increasing growth.

□

New Products

CAS-KER INTRODUCES NEW DIAMOND SCALE

The Cas-Ker Company is now offering a diamond scale for the low price of only $249.00. The portable scale features advanced technology for accurate readings, one-touch zeroing, and automatic tare capacity. The scale measures 4-5/8 x 6-3/4 x 1-5/8, and has a 50 x .01 carat capacity and a 10 x .002 gram capacity. Specify model number 510.1555.

Contact: **Cas-Ker Co., 2121 Spring Grove Ave., Cincinnati, OH 45214; (513) 241-7073/ fax (513) 241-5848.**

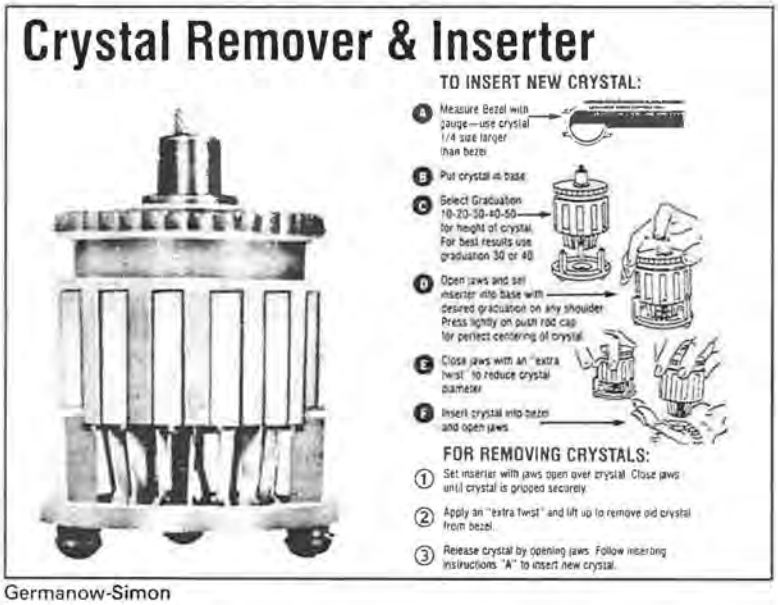
Cas-Ker

NEW GERMANOW-SIMON CRYSTAL INSERTER/ REMOVER TOOL

The Germanow-Simon Corp. has introduced its new G-S Model 2000 Crystal Inserter/Remover. This tool, formerly called the SUC crystal lift, has been completely re-engineered, using materials that will not wear out from frequent use, and therefore give a long and useful life.

The calibrated base of the G-S crystal inserter/remover makes grasping a new crystal simple and easy. It has a large grooved rotating section which enables the user to reduce the size of the crystal quickly and accurately for quick insertion or removal of the crystal. The introductory suggested retail price is $30.00, which will be held until September 1, 1991. After that date the price will be $40.00 retail.

Available through your material supplier, or contact: **Germanow-Simon Corp., P.O. Box 1091, Rochester, NY 14603; (716) 232-1440; fax (716) 232-3857.**



Germanow-Simon

DRS

HOLE PUNCHING PLIERS FROM DRS, INC.

DRS is introducing a new hole punching plier for watch repairmen and retail jewelers. This tool will enable you to sell more straps from stock by having the ability to shorten or lengthen leather straps. The introductory price is $12.95.

Contact: **DRS, Inc., 56 West 47th St., New York, NY 10036; (800) 223-8960; (212) 819-0470.**

DRS

CASE VISES FROM DRS

DRS is featuring two bench-style precision case vises. The double-sided accommodates both ladies' and men's watches, and is priced at $24.95; the single-sided is $19.95. These vises allow the jeweler to work with both hands.

For information on these tools and DRS' wide range of other jewelers' and watchmakers' tools, contact them at the address shown at left.

MECHANICAL WATCHES AT THE 1991 BASEL FAIR

Basel this year was an uninhibited celebration of the virtues of mechanical time technology. Never before has the European Watch, Clock and Jewelry Fair harboured so many striking new developments--not even during the golden years of mechanical time when it was still known as the Swiss Watch Fair. Many entries at Basel 91 were new items: a 'Grande Complication' style wristwatch; an 8-day tourbillon design; sectorial display of the time in combined analog-digital fashion; the world's slimmest perpetual calendar watch with moonphase indicator; novel, complex multifunction watch designs including a self-winding model showing the annual and daily cycles along with a perpetual calendar and a minute repeater; pocket watches with music box mechanisms; the mechanical diving watch with alarm device.

Still other timepieces are neither totally original nor truly vintage but simply express the mood of the moment in mechanical time. They include minute repeater watches with perpetual calendar, wristwatch designs with 8-day movements, along with the star of this year's show: the chronograph.

Mechanical chronographs have really earned a special mention at the Basel Fair this year. Every version, every variant, every design, was on hand. Self-winding with perpetual calendar, or featuring a second time-zone (perhaps retractable), with high-frequency beat, with full diving equipment or even dressed to the nines in a gleaming platinum case. Chronographs are now enjoying unprecedented popularity.

Mechanical watches have been steadily losing ground in the Swiss watch industry's production statistics ever since the quartz watch era began; in 1987, however, the curve ticked up again. That hadn't had the least influence on the mean price of such watches which had continued to rise steadily. Although mechanical watches represented only 7% of total 1990 Swiss watch exports in units, they were worth 42% of the industry's total export sales. It is true, also, that many of the mechanical designs on display in Basel this year contained a movement designed over the last two decades or so, now back in production to cope with current heavy demand.

But a very significant development should also be noted. Essentially handcrafted, absolutely prestigious "complex" movements are now being joined by all-new self-winding and even hand-wound calibres. One such is a barrel-shaped design with a power reserve indicator. Which all goes to show that mechanical watchmaking in the grand tradition is not confined to history books and museums. It is alive and well and perfectly capable of changing with the times.

Following are some of the timepieces that were on hand at this year's Basel Fair.

Epos 8-Day Watch: *The "8-day watch" is back in style. This wristwatch boasts a full eight days of reserve power. Its dial opens to reveal the beat of its 15-ligne movement's balance wheel; 10-micron gold-plated case.* ***Epos, P.M. Hofer SA, case postale 883, Rue du Milieu 35, CH-2501, Bienne, Switzerland.***

Audemars Piguet "Star Wheel": *Technology occasionally has its poetic side at Audemars Piguet. Take the new "Star Wheel" design, featuring a novel, unexpected way of reading the time without watch hands. At the center of the watch rotate a wheel and three stars. The hour figure (inscribed on a sapphire disc) moves onto a "sectorial" type dial, graduated from 1 to 60, to indicate the minutes. Never before found on a wristwatch, this system was used once, on a pocket watch, in the latter years of the 18th century.* ***Audemars Piguet, 18 E. 48th St., New York, NY 10017; (212) 223-0099.***

International Watch Co: *Now for IWC's "Grande Complication" timepiece: Do you want the 659 parts or the 240 pages? The question is worth asking because this masterpiece of mechanical ingenuity requires no less than 659 components to perform its 12 functions, and it now comes with its own 240-page book relating and describing the technical exploits involved in its construction. It is the first time ever that the design of a watch has been accompanied by such complete documentation, which even a layman can understand. IWC has also produced a 20-minute video cassette featuring the "Grande Complication" on the wrist.* ***IWC, International Watch Co. AG, Baumgartenstrasse 15, CH-8201, Schauffhausen, Switzerland.***

Universal Geneve: *The diver's version of Universal Geneve's "Compax" is water resistant to 100 meters. Screwed-in case back, screw-lock crown, and rotating bezel. It has a self-winding Valjoux 7750 movement with three totalizers and date calendar at 3 o'clock.* ***Universal Geneve SA Montres, Route de Jussy 29, case postale 58, CH-1226 Thonex-Geneve, Switzerland.***

Zodiac "Gold Point": *A new self-winding chronograph with Valjoux 7750 movement now joins Zodiac's "Gold Point" collection. it features a steel case water resistant to 100 meters, fitted with a screwed-in back, screw-lock crown, and a one-way rotating bezel with tachymetric scale.* ***Zodiac SA, Montres, Grand-Rue 1A, CH-2000, Neuchatel, Switzerland.***

New Products

Patek Philippe: *This complex, multifunction "complications" design is fitted with a 27-jewel self-winding mechanical movement. Its perpetual calendar shows the day of the week, the date, the month, the phases of the moon, and even February 29th on leap years. Two subdials respectively display the leap-year cycle and the position of the current year; and the four parts of the day over a 24-hour time span: morning, afternoon, evening, and night. The minute repeater's two-gong chimes strike, on request, the hours, quarters, and minutes. The gold hour circle on a gold dial is covered in opaline silver and fitted with Dauphine style hands. The 18K gold case has four correctors for setting the perpetual calendar.* ***Patek Philippe SA, Rue du Rhone 41, CH-1211 Geneve 3, Switzerland.***

Vacheron Constantin: *This calendar watch possesses a double aperture for the month and day of the week, while the date, inscribed around the dial rim, is shown by a pointer. The phases of the moon appear in a small dial that also shows the seconds. The watch case is of 18K yellow gold.* ***Vacheron Constantin, 680 Fifth Ave., Ste. 1900, New York, NY 10019; (212) 713-0707.***

From ***Reuge Music,*** *a world first: a pocket watch with a music box mechanism that plays two Mozart tunes. Inside an 18K gold case, the watch movement is engraved entirely by hand. The music-making mechanism includes 35 blades activated by 218 studs. In classic 19th century tradition, studding and tuning operations are effected by hand. The dial is gold. Each model is individually numbered.* ***Reuge SA, Rue des Rasses 26, CH-1450 Sainte-Croix, Switzerland.***

Revue Thommen: *The famed "Cricket Nautical" diving watch is back: it is the only wristwatch with mechanical movement, alarm device, and internal rotating bezel actioned by a disconnectable crown that is water resistant to 200m. A safety lock prevents any involuntary stop or jam of the alarm, which itself sounds against a triple case back fitted with an acoustic membrane. It comes in an all-steel case or steel with 18K gold bezel; sharkskin strap or steel bracelet with safety clasp.* ***Revue Thommen SA, Rue de la Paix 135, CH-2300, La Chaux-de-Fonds, Switzerland.***

Jaeger-LeCoultre: *This Reverso model "with case sliding inside its brace and capable of being turned completely on its back" was born on March 4, 1931. To celebrate its 60th anniversary, Jaeger-LeCoultre has designed the "Soixantieme" model: the case's 37 components are carved from an ingot of pink gold, polished, decorated and assembled by hand. A clear sapphire case back reveals the glittering dance of the watch's all-new barrel-shaped mechanical movement, entirely decorated by hand. It features a power reserve indicator on the dial. Production is limited to 500 numbered exemplaries.* ***Jaeger-LeCoultre SA, Rue de la Golisse 8, CH-1347, Le Sentier, Switzerland.***

A new addition to ***Movado's*** *1881 Collection, "Calendomatic" features an 18K gold, three-piece round case with faceted horns. The back includes a watertightness seal and is held in place by four screws. The tiered bezel holds a mineral crystal while the crown is also equipped with a watertightness seal. It features a white dial with hour markers and applied Arabic numerals. There are dial apertures for the day and month, and the date is inscribed on the dial circumference and shown by a red-dot-tipped pointer; center seconds hand and date corrector.* ***Movado Watch Company SA, Bettlachstrasse 8, CH-2540 Grenchen, Switzerland.***

A ***Patek Philippe*** *design for women, featuring a round yellow gold case with rounded bezel and lugs. Its white dial features 12 black painted Roman numerals; quartz movement.* ***Patek Philippe SA, Rue du Rhone 41, CH-1211 Geneve 3, Switzerland.***

Witschi: *Over four decades of experience have been invested in this fast and efficient device for mechanical wristwatches. It displays a diagram of the beat, accompanied by an automatic readout of rate, beat error and amplitude, all computed and digitally displayed in figures. It automatically finds and selects vibration rates. It is fitted with a loudspeaker for listening to the rate directly and can be connected to a printer.* ***Witschi Electronics USA, Ltd., P.O. Box 2, Palmyra, NJ 08065-0002; (800) 882-7977.***

Raymond Well's *new "Parsifal" models with genuine blue, green, or black sharkskin strap. Their water-resistant cases are in steel and 18K gold or all steel, with sapphire crystal. A small gold or steel plate protects the setting crown, itself set with a blue cabochon-cut stone. Comes with quartz movements with calendar.* ***Raymond Well SA, Rue le Royer 13, CH-1211 Geneve 26, Switzerland.***

News in the Trade

LONGINES-WITTNAUER ANNOUNCES PROMOTION

The promotion of Steve Jager to Director of Merchandising has been announced by John L. Davis, President, Longines-Wittnauer Watch Co., New Rochelle, NY.

Mr. Davis stated, "Jager will head a newly created department with specific responsibility for product development, planning, and purchasing. with centralizing these key responsibilities, we have established a system which will expedite flow of product from inception to completion, to the mutual benefit of our customers and Longines-Wittnauer."

Jager, an 11-year veteran in the watch industry with an MBA in Marketing, resides in Livingston, NJ with his wife Susan and their two children.

Steve Jager

RICHARD SWITZER NEW EXECUTIVE DIRECTOR OF JOSEPH BULOVA SCHOOL

Richard M. Switzer was recently appointed by the Board of Trustees of the Joseph Bulova School as Executive Director.

He is the former Deputy commissioner of the New York State Education Department, prior to which he was superintendent and Vice President of the Human Resources School.

Mr. Switzer has had 35 years of experience in the area of Special Education and Vocational Rehabilitation. He is a graduate of Syracuse University, and resides in Glenmont, New York.

BULOVA SCHOOL ADVISORY BOARD'S FEB. 1991 MEETING

The Watch Repair Division of the Bulova School Advisory Board meeting on February 19, 1991 made fresh plans and appointed new committee chairmen. A summary of the proceedings is as follows:

1) On the renovation of the classroom: The report on this major reconstruction was submitted by Peter Laetsch, President, Watchmakers of Switzerland.

2) On the ongoing program to upgrade its curricula: Brian Murphy, Bulova Instructor, is taking the Repairers Training Course at Watchmakers of Switzerland's Training and Educational Program (WOSTEP) at Neuchatel, Switzerland. At the term end, he will submit his report to the Bulova School administration.

3) Recruitment, hiring, industry lay-offs: This provoked an intense group discussion.

4) Appointments of new Committeé Chairmen: Publicity, Ben Matz; Fund-raising, Herb Liebman; Watch Curricula, Joe Cerullo; Recruitment, Eli Rivera.

Classified Ads

REGULATIONS AND RATES

Ads are payable in advance $.60 per word, $.70 per word in **bold type.** Classified display ads are $25.00 per column inch, 2-1/4" wide. Ads are not commissionable or discountable. The publisher reserves the right to edit all copy. Price lists of services will not be accepted. Confidential ads are $4.00 additional for postage and handling. The first of the month is issue date. Copy must be received 30 days in advance (e.g. June issue closes for copy on May 1st).

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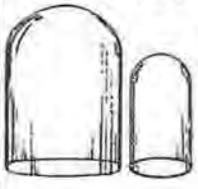

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This illustration points out the important, coded information on the right side of your membership card. Always use your AWI membership number when corresponding or ordering from AWI.

Dates to Remember

MAY 1991

3-5--Introduction to Clock Repair Bench Course (AWI); James Lubic, instructor; Denver, CO.*

4-5--Cuckoo Clock Repair Bench Course (AWI); James Williams, instructor; Rochester, NY.*

4-5--400-Day Clock Repair Bench Course (AWI); John A. Nagle, instructor; Cincinnati, OH.*

5--Introduction to Quartz Watch Repair Bench Course (AWI); Buddy Carpenter, instructor; Detroit, MI.*

5--ETA Quartz Chronograph Bench Course (AWI); James Broughton, instructor; Greensboro, NC.*

17--Useful Techniques: Mechanical Watch Repair Bench Course (AWI); James Adams, instructor; Dallas, TX.*

17-19--Texas Watchmakers Association Annual Convention, Ramada Inn, Downtown Dallas Convention Center, Dallas TX. For more information, contact Texas Watchmakers Association, c/o Regent Jewelry, 1405 E. Beltline Road, Carrollton, TX 75006.

18-19--Arizona Clockmakers & Watchmakers Guild Annual Convention; Plaza Hotel; Tucson, AZ.

31-June 2--North Carolina Watchmakers Association Annual Convention; Holiday Inn North; Charlotte, NC. For more information, contact the North Carolina Watchmakers Association, P.O. Box 147, Tarboro, NC 27886.

JUNE 1991

2--Useful Techniques: Mechanical Watch Repair Bench Course (AWI); James Adams, instructor; Quad Cities.*

7-9--Advanced Clock Repair Bench Course (AWI); Roland Iverson, instructor; Jacksonville, FL.*

8-9--Repair of the Atmos Clock Bench Course (AWI); Gerald Jaeger, instructor; Buffalo, NY.*

8-9--Cuckoo Clock Repair Bench Course (AWI); James Williams, instructor; Denver, CO.*

8-9--400-Day Clock Repair Bench Course (AWI); John A. Nagle, instructor; Chicago, IL.*

9--Introduction to Quartz Watch Repair Bench Course (AWI); Buddy Carpenter, instructor; Philadelphia, PA.*

9--ETA Quartz Chronograph Bench Course (AWI); James Broughton, instructor; Baltimore, MD.*

25-27--Research & Education Council Annual Meeting; Radisson Inn, Greater Cincinnati Airport. Contact AWI Central for more information.

28--AWI Affiliate Chapter Meeting; Radisson Inn, Greater Cincinnati Airport. Contact AWI Central for more information.

29-30--AWI Board of Directors Meeting; Radisson Inn, Greater Cincinnati Airport. Contact AWI Central for more information.

JULY 1991

7--Retrofitting, Casing and Coil Repair Bench Course (AWI); James Broughton, instructor; Orlando, FL.*

SEPTEMBER 1991

27-Oct. 6--United Jewelry Show; Providence, RI.

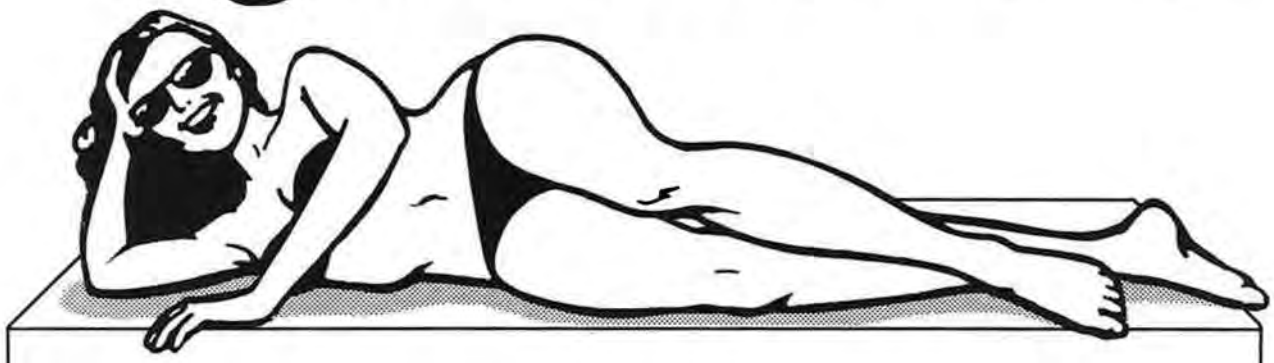
OCTOBER 1991

4-6--New York State Watchmakers Annual Convention; Waterloo, NY.

*** For more information on AWI Bench Courses and Regional Seminars, contact AWI Central, P.O. Box 11011, 3700 Harrison Avenue, Cincinnati, OH 45211; phone (513) 661-3838, fax (513) 661-3131.**

Ad Index

Figures don't lie.



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AWI BENCH COURSES

AND REGIONAL SEMINARS

To register for these courses, please send along with your request a registration fee of $25 per instruction day (for AWI members) to:
AWI Central, P.O. Box 11011, Cincinnati, OH 45211.
PLEASE NOTE: Registrations are limited, and will be selected by the earliest postmarks. You may register by Fax if you wish; if so, please include your Visa or MasterCard number, card expiration date, and signature.
Fax: (513) 661-3131; Information: (513) 661-3838

MAY 1991

3-5--Introduction to Clock Repair--Denver, CO
4-5--Cuckoo Clock Repair--Rochester, NY
4-5--400-Day Clock Repair--Cincinnati, OH
5--Introduction to Quartz Watch Repair--Detroit, MI
5--ETA Quartz Chronograph--Greensboro, NC
17--Useful Techniques: Mechanical Watch Repair--Dallas, TX

JUNE 1991

2--Useful Techniques: Mechanical Watch Repair--Quad Cities
7-9--Advanced Clock Repair--Jacksonville, FL
8-9--Repair of the Atmos Clock--Buffalo, NY
8-9--400-Day Clock Repair--Chicago, IL
8-9--Cuckoo Clock Repair--Denver, CO
9--Introduction to Quartz Watch Repair--Philadelphia, PA
9--ETA Quartz Chronograph--Baltimore, MD

JULY 1991

7--Retrofitting, Casing, and Coil Repair--Orlando, FL

Introduction to Quartz Watch Repair
Instructor: Buddy Carpenter, CMC, CMEW
Advanced Quartz Watch Repair
Instructor: Robert Bishop, CMEW
Retrofitting, Casing & Coil Repair
Instructor: James Broughton, CMEW
Introduction to Clock Repair
Instructor: James Lubic
Advanced Clock Repair
Instructor: Roland Iverson, CMC
Repair of the Atmos Clock
Instructor: Gerald Jaeger, CMW, CMEW, FAWI
Useful Techniques: Mechanical Watch Repair
Instructor: James Adams, CMW, FBHI
Introduction to the Watchmaker's Lathe
Instructor: James Lubic
Cuckoo Clock Repair
Instructor: James Williams
400-Day Clock Repair
Instructor: John A. Nagle
ETA Quartz Chronograph
Instructor: James Broughton, CMEW

PROJECT EXTEND

PROJECT EXTEND PROVIDES SELF-HELP EDUCATIONAL OPPORTUNITIES FOR: 1) The newly trained individual seeking to gain speed and profitability. 2) The marginal or self-trained individual seeking to fill gaps in their training. 3) The experienced craftsman seeking to extend skills in certain specialties.

In order to provide access to a maximum number of AWI members, there will be no tuition for the programs offered at the AWI Extension Development Center. Attendees will be responsible for their transportation and room and board. Motel rooms are available for approximately $50 per day; most courses last five days. A limited number of grants will be available for those who need help with room and board.

PROJECT EXTEND'S TENTATIVE SCHEDULE

The course schedule presented here is **TENTATIVE.** However, those interested in specific programs are encouraged to register now. Class sizes are limited and registrations will be accepted by earliest postmark or fax date. Each class requires a registration fee of $50 which will be refunded when you attend the class. For specific course and registration details, please contact: **AWI CENTRAL, 3700 HARRISON AVE., CINCINNATI, OH 45211; (513) 661-3838; fax (513) 661-3131.**

I--QUARTZ WATCHES

May 13-17	Quartz I--Gerald Jaeger (beginners)
May 20-24	Quartz II--Robert Bishop (advanced)
June 3-7	Quartz III--Alice Carpenter (preparation and completion of CMEW exam)

All classes will be held at the AWI Development Lab, Oak Crest Plaza, 5981 Harrison Ave., Cincinnati, OH 45248.

II--CLOCKS

Sept. 23-27	Clock Repair III-(restoration)
Aug. 26-30	Clock Repair IV--Marvin E. Whitney (practical repair techniques)
July 15-19	Clock Repair V--James Lubic (preparation and completion of CMC exam)

III--LATHES

Aug. 5-9	Lathe I--James Lubic
Aug. 12-16	Lathe II--Archie Perkins

IV--MECHANICAL WATCHES

June 10-14	Watch Repair III--James Lubic (complicated watches, i.e. automatics, calendars, stopwatches)
Sept. 9-13	Watch Repair V--Archie Perkins (restoration)
May 6-10	Watch Repair VI--Harold J. Herman (modern methods and production repair)
July 8-12	Watch Repair VII--James Lubic (preparation and completion of CMW exam)

V--CASES

Apr. 29-May 3	Watch Case Repair--Marshall Richmond
Aug. 19-23	Clock Case Repair--James Williams

VI--ADJUNCT TRAINING

July 29-Aug. 2	Support Services--Ewell Hartman (cases, crystals, bands, sales, and take-in)
Sept. 16-20	Management for Watch- and Clockmakers--Fred S. Burckhardt