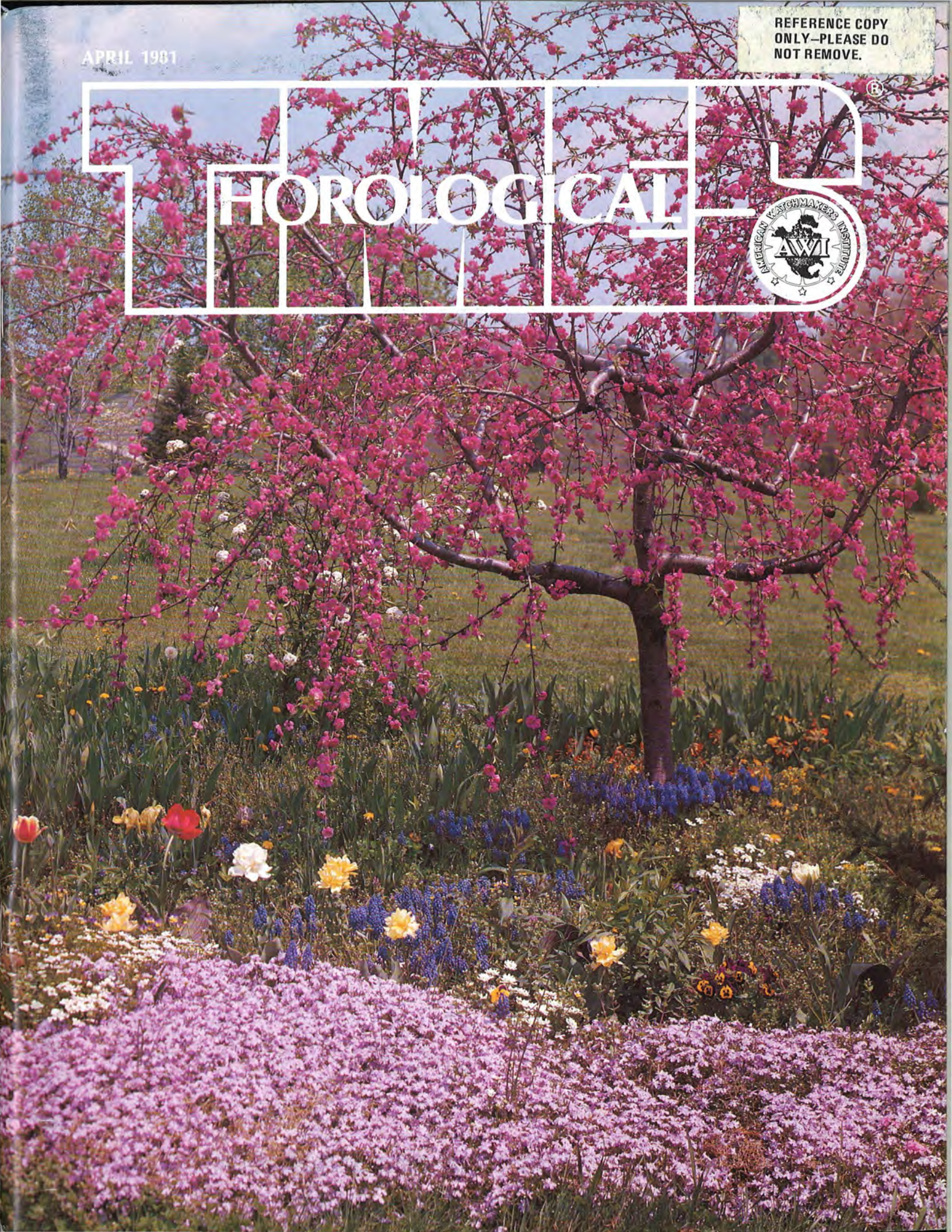
APRIL 1981

HOROLOGICAL



VOLUME 5, NUMBER 4 APRIL 1981

HOROLOGICAL TIMES

Official Publication of the American Watchmakers Institute

HOROLOGICAL TIMES (ISSN0145-9546) is published monthly and copyrighted by the American Watchmakers Institute, 3700 Harrison Avenue, Cincinnati, Ohio 45211. Subscription, $30.00 per year, $4.00 per copy in the United States and $36.00 per year, $5.00 per copy outside the United States. Second class postage paid at Cincinnati, Ohio. POSTMASTER: Send address changes to HOROLOGICAL TIMES, P.O. Box 11011, Cincinnati, OH 45211.

Candidates for AWI Directors 28

Focus on Theory: THE BIMETALLIC BALANCE 36

Understand The Co-Insurance Clause 57

BILL KILB: WMJDA Man of the Year 62

Concord Delirium MARINER 64

DEPARTMENTS

HOROLOGICAL TIMES

Executive and Editorial Offices

AWI Central
P.O. Box 11011
3700 Harrison Avenue
Cincinnati, Ohio 45211
Telephone: (513) 661-3838

Harold J. Herman: *Editor*
Maury Norrell: *Managing Editor*
Virginia C. Montgomery: *Associate Editor*

LuAnn Martin: *Art Director*
Sue Scott: *Business Manager*

Mildred Howard: *Circulation Manager*
Lee Rothan: *Circulation*
Margie M. Brater: *Circulation*

Technical Editors:

Otto Benesh
James H. Broughton
Fred S. Burckhardt
Steven G. Conover
Joe Crooks
Paul Fisk
Henry B. Fried
Orville R. Hagans
Ewell D. Hartman
Gerald G. Jaeger
Sean C. Monk
Robert A. Nelson
Archie B. Perkins
Marshall F. Richmond
Joseph Rugole
Leslie L. Smith
William O. Smith, Jr.
James L. Tigner
Marvin E. Whitney

AWI Officers:

Joe Crooks: *President*
Dorothy M. Aderman: *1st Vice President*
Joseph G. Baier, PhD: *2nd Vice President*
James H. Broughton, CEWS: *Secretary*
Marvin E. Whitney, CMW, CMC: *Treasurer*

AWI Directors:

Otto Benesh, CMC
Jay Foreman
Henry Fried, FAWI, CMW, CMC
Orville R. Hagans, FAWI, CMW, CMC
Ewell Hartman, CMW
Gerald G. Jaeger, CMW, CEWS
Donald W. Leverenz, CMW
Sean C. Monk, CMW
Robert A. Nelson, CMW, CEWS

Robert F. Bishop: *Affiliate Chapter Director*
George Schlehr, CMW: *Research and Education Council Chairman*

Milton C. Stevens: *Executive Secretary*
Michael P. Danner: *Administrative Director*

Editorial

Although skill at the bench is the first priority for financial success as a journeyman, skill alone will do little to improve your financial situation. It is not even how you schedule your repair prices that is most important, but rather just what you do mechanically that will satisfy your customer for the estimated stipend.

For example, suppose a customer with a Gruen calibre 290 OM enters your establishment. The movement is in a 14K gold case with a 14K gold bracelet. Examination shows the movement to be in good condition. The primary problem is that the stem pulls out due to a worn barrel bridge. Should the repair entail that the bridge be bushed and a 290 New Model stem and winding pinion be installed? Or should an oversize stem be fitted? Or should the mainplate and detent be altered to prevent the malfunction? For this job, the bushing, new model pinion, and stem should be fitted. The charges made should be commensurate.

For an equivalent repair on the same model of watch in an inexpensive case with a movement in fair to poor condition, selling the complete job may not be warranted. Certainly, doing the purist's job for a lesser charge would be incorrect.

In all fairness to your customer and to yourself, measure the reliability of the entire finished repair and compare it with the extent of individual component repairs. You will be fairly compensated and your customer will have been fairly treated.

On the Front

Childhood is the bough, where slumbered
Birds and blossoms many-numbered;—
Age, that bough with snows encumbered.

Gather, then, each flower that grows,
When the young heart overflows.

Henry Wadsworth Longfellow

For Profitable Repair Departments

The KAGAN RING SIZER

YOUR INVENTORY STRETCHER—WILL ENLARGE & REDUCE WEDDING BANDS QUICKLY, EASILY, ACCURATELY. SINCE 1947 KAGEN SIZERS HAVE BEEN SAVING TIME AND MAKING MONEY FOR THOUSANDS OF RETAIL JEWELERS, WHOLESALERS AND MANUFACTURERS.

This Machine will Pay for Itself Many Times Over—The very Modest Cost can be Amortized over 5 years—Although a Number of the Very First Machines are Still in Productive Use. Easily Operated by any Clerk by Following the Clear and Simple Instructions Provided with Each Machine.

Need high temperatures in tiny places?

The amazing Little torchis so tiny it can throw a flame of 6300°F. through the eye of a needle. It solders, brazes, welds and heats with exacting precision in the smallest places; uses oxygen and acetylene, hydrogen, propane, natural gas or Mapp. It's available with five tips ranging in size from one large enough to weld 16 ga. steel to one small enough to weld. .002" copper wire. Write for free brochures.

FOREDOM THE JEWELER'S WORKSHOP

Foredom Specially Priced Complete Kit No. 2272

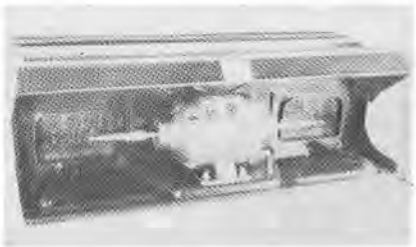
Foredom's most popular and versatile machine and accessories. Miniature Power Tool, rugged 3 ft. flexible shaft, precision hand piece, foot-controlled rheostat...plus a bonus selection of the most popular accessories. It's a complete power tool and accessory kit.

LOOK WHAT YOU GET...

- CC Series Machine with powerful 1/10 HP motor and foot control.
- No. 30 Handpiece with key-type chuck.
- Accessory Kit No. 20 with 35 assorted accessories including cutters, burs, mounted points, abrasive wheels, and more.

POLISHER/DUST COLLECTOR

The First Major Improvement in Dust Collectors in 40 Years



EFFICIENT—Powerful suction draws dust into filter from either side. Easily replaceable filter slips into slot atop unit. Unitized body construction also seals in dust. 24" fluorescent light provides better illumination of work, longer life than incandescent lights found in most polishers. Space under hood sufficient for buffs up to 8" diameter.

QUIET—½hp. 115V AC, 60 Hz 3450 RPM motor provides quiet operation. Vibration free housing eliminates squeaks and rattles.
RUGGED—Made of ABS Thermo Plastic—The same material used in telephones and football helmets. Shipping weight 45 lbs.—can be shipped UPS.

INTRODUCING THE MOST ADVANCED STEAM CLEANER FOR THE MODERN JEWELER

The Unique New
STEAMASTER Model HPJ-2S
Our new deluxe model Steamaster HPJ-25 surpasses in features, in quality, and value, any steam cleaner available on the market today. Designed especially for the retail jeweler, and smaller jewelry repair shop.
Among the outstanding features of the HPJ-2S are: an electric actuated foot control switch; an automatic steam release valve; and a positive acting manual reset, low water cut-off safety control. Compact in size, cabinet measures only 6⅜" wide x 16¾" long x 17" high. No installation required. Plug into any 110 or 220 volt outlet.

THE L&R · PC3

This brand new transistorized ultrasonic cleaning machine gives you more than enough room for many cleaning applications. What's more, its low initial price and minimum operating costs reduce cleaning expenses to a fraction of a cent per operation. Just pour in the cleaning chemical and switch the PC3 on — Cleans completely, efficiently and easily.

- Comes Complete with Cover
- Generous Size Tank-4¾x3½x2½
- Free Sample Cleaning Chemical
- Unconditionally Guaranteed For One Year

Shipped Promptly From Stock — Terms Available — Use Coupon Below

☐ Please Send Prices and Information ☐ Please Phone Me with More Information

Check For Free Catalogs ☐ Tool Catalog ☐ Findings Catalog ☐ Stone Catalog

NAME _____

ADDRESS _____

CITY _____ STATE _____ ZIP _____

Esslinger & Co.

P.O. BOX 43561 ST. PAUL, MN 55164
TOLL FREE 800-328-0205
MINNESOTA 800-392-0334

President's Message / Joe Crooks

GAINFUL ASSOCIATION

While at work, I was interrupted by a phone call from a watchmaker with whom I had become acquainted a few months before when he had called to inquire about a license application. He had been unaware of the demise of our state license law.

With this second call, he was swallowing his pride and asking for help in diagnosing a watch repair problem. It so happened that I had to dig the answer to this problem out of an AWI technical bulletin—and did I let him know where the answer came from!

This watchmaker had never joined a guild or association—never attended a seminar or bench course or a watchmakers' convention—but one day he will do all of these. He is probably unaware that he is already *associating*, i.e., coming out of his shell, so to speak.

Now it's up to me to follow through. He and I have become an *association*. The time is right to invite him to a guild meeting to associate with other watchmakers. He is eager to accept, and all that is needed is an invitation.

Joe Crooks

Here's the first pitfall. Stuffiness and protocol can discourage many promising members. What's the answer? What is the glue that cements successful clubs, guilds, associations, etc.? Brotherhood? Friendship?

Unlike many civic groups, clubs, etc., when watchmakers meet, we don't sell or buy products from each other or gain financially from making profitable contacts. The common denominator, however, is still the same—gain!

How do we gain? What do we gain? Perhaps it's best summed up by a standard phrase found in many constitution and by-law preambles: "To enlarge our store of knowledge."

We do, you know. It's absolutely impossible to keep from learning something from conversing and *associating* with others engaged in the same profession when we share the same day-to-day frustrations and successes.

Once a prospect for membership understands this, he will soon recognize that simple "put and take" is all that is required to be a member of a successful association.

I again ask each of you to make a pledge to invite a watchmaker to join your *association*—the AWI. That person will truly *gain* in knowledge, as will all who associate with him.

Maxell batteries.

Tools of the trade.

You know the quality of your tools. That's why you depend on them. Think of Maxell watch batteries with the same complete trust.

Inside each Maxell battery is a uniquely effective seal that protects your customers' watches. And your reputation. There's even more protection for you. We sell watch batteries only to the watch trade. They're labeled and packaged exclusively as watch batteries. So only you, the watch specialist, can offer our quality products to the battery replacement customer.

Count on Maxell batteries being easily available from your local watch material distributors. After all, what good is a tool if you can't put your hands on it. Rely on Maxell for quality. Many of the world's leading quality watch manufacturers include Maxell batteries as original equipment. And they recommend us as replacements. Our batteries work for them. They can be your tools as well. Contact Maxell for the details.

maxell
BATTERY PRODUCTS DIVISION

Maxell Corporation of America, Battery Products Division, 60 Oxford Drive, Moonachie, N.J. 07074 Tel: (201) 440-8020

Book Review/Henry B. Fried

Electrical Clocks & British Clocks

ELECTRIC CLOCKS AND CHIMES. 7¼ in. x 5¼ in., 159 pages, soft cover. 152 illustrations and photographs. Edited by Percival Marshall and published 1976 by Argus Books, Ltd., distributed in U.S.A. by Transatlantic Arts, Inc., Central Islip, NY at $9.75.

This is a compilation of articles that appeared from time to time in the *Model Engineer* in the early 1920's and has been reprinted because of great interest on the part of collectors and repairers of older electrical clocks. This book, therefore, has instructions and photographs of these older clocks and also includes good line drawings. The instructions cover clocks made up to the end of the first decade of this century and run by energy cells. Included are instructions and descriptions concerning a self-contained electric clock, how to make a seconds pendulum clock, and how to make a three-quarter second electric clock from inexpensive materials.

One chapter describes how to convert a "grandfather clock" to one with an impulse drive. Twenty pages are devoted to discussion and illustration of the well-known "Synchronome" system of Hope-Jones. Impulse devices and master clocks are also shown and described in good detail.

For the growing number of collectors interested in the earlier electrically driven clocks, this book should be a good reference.

HOW TO MAKE AN ELECTRIC CLOCK by R. Barnard Way. 7¼ in. x 5¼ in., 53 pages, 21 illustrations, soft covers. Published 197? by Argus Books, Ltd., distributed by Transatlantic Arts, Inc., Central Islip, NY. Price: $5.95.

In this era of timepieces containing no moving parts, we are made to believe that time is the function of billions of electrons with negative or positive inclinations, each racing along inside a solid mass--hard, impervious, and itself composed of its own universe of atoms. We are to be forgiven if at times we lapse into the luxury of horological nostalgia. We fondly remember the soulful ticking of the clock--despite its wayward deflections from astronomical accuracy, now too under scientific question.

It was nice to see those wheels, the gently swinging pendulum, and hear even the not-too-precisely tuned bells or chimes announce their versions of the new hour. Therefore, to read this book, a reprint of the original of almost seventy years ago describing how to make a pendulum clock with wheels but with electrical impulses to keep the pendulum swinging, is to go back again to that era. A train of wheels sans escapement but with an indexing "counting" wheel is included in these instructions on how to make this clock.

The mechanical train and plates show the cheap type of Connecticut shelf clock movement with the escapement removed. The hollow lead bob is electro-magnetically impulsed by the addition of the electromagnet attached to its bottom. The design is ungainly, but the mechanism and electrical instructions are detailed and basic for those who would like to construct one from some old movement waiting for a new, transplanted life.

COMPLETE BRITISH CLOCKS by Brian Loomes. 256 pages, 93 plates, 20 figures. 8 in. x 10 in., hard covers, colored dust jacket. Published 1978 in U.S.A. by David and Chas., Inc., North Pomfret, VT. Price: $24.00.

Brian Loomes is an experienced researcher, clock restorer, merchant, and author. His previous books include *Westmoreland Clocks and Clockmakers*, *Country Clocks and their London Origins*, *The White Dial Clock* and *Lancashire Clocks and Clockmakers*. He is also the editor-contributor to the new edition of *Baille's Watchmakers and Clockmakers of the World*.

(Continued on page 14)

The Complete Watchmaker's Work Center From L&R.

The Advantage Of Time.

These separate, time-saving components, when combined, make up the ultimate horological workshop. Start with the L&R Tempo-400 and automatically clean, rinse, dry and lubricate up to 16 watch movements intact, without time-consuming disassembly. Then add L&R's Leak Controller. An innovative system that provides accurate waterproof testing for all mechanical, electric and quartz controlled watches... with the simplicity of pushbutton ease. Complete your workshop with the L&R Quartz Tickoprint, capable of testing electric, mechanical, quartz and tuning-fork time-pieces within 1/100 of a second per day. A highly legible print-out tape affords you a permanent record of the analysis.

Combine the products and technology of L&R...our commitment to quality gives you the advantage of time.

For additional information, write or call: L&R Manufacturing Company, 577 Elm Street, Kearny, New Jersey 07032
Phone: (201) 991-5330
Telex: 642078 Ellanar Krny

L&R

The world's leading manufacturer of ultrasonic cleaning systems and chemicals.

LONDON ANAHEIM DES PLAINES KEARNY

Technically WATCHES

By Archie B. Perkins, CMW, FNAWCC

THE DETACHED LEVER ESCAPEMENT ©1981

Part VI

Another style of detached lever escapement is the pin lever or pin pallet escapement. This escapement was invented by L. Perron of Besancon, France about 1798, and was used by George Frederick Roskopf in 1867 in his famous low-priced Roskopf watch. About 1860, Roskopf conceived the idea of making an inexpensive watch that could be sold to the common working person for a very low price. He was successful in producing his watch between 1865 and 1867. The Roskopf watch sold for 20 francs. This type of watch is now commonly called the pin lever watch. It gets its name from the fact that the escape wheel teeth act on vertical steel pins rather than on pallet stones as in the higher grade watches. Since Roskopf used this escapement in his watch, billions and billions of these escapements have been made and used in pocket watches, wrist watches, alarm clocks, and other types of clocks.

It would appear that the pin lever escapement is very successful, although it is not the most desirable design. One undesirable feature is that after the escapement has operated for a while, there is a tendency for a groove to be cut on the teeth where the teeth hit the pallet pins at drop lock. Another undesirable feature is that the pallet pins are usually very thin which makes them easily bent, loosened, or broken. In spite of these undesirable features, if this escapement is well designed and well built, it will function very satisfactorily as evidenced by its success over the years.

Figure 1 shows a pin lever escapement of a common form. A is the balance wheel, B is the balance staff, C is the impulse pin, D is the pallet fork, E is the fork slot, F is the guard pin, G is the safety roller, H is the pallet, I is the pallet arbor, J is the receiving pallet pin, K is the discharge pallet pin, L is the escape wheel, M is an escape wheel tooth, N shows the draw on a tooth, O shows the impulse face on an escape wheel tooth, and P is the locking face of the tooth.

There are mainly two styles of forks. These are shown in Figure 2.

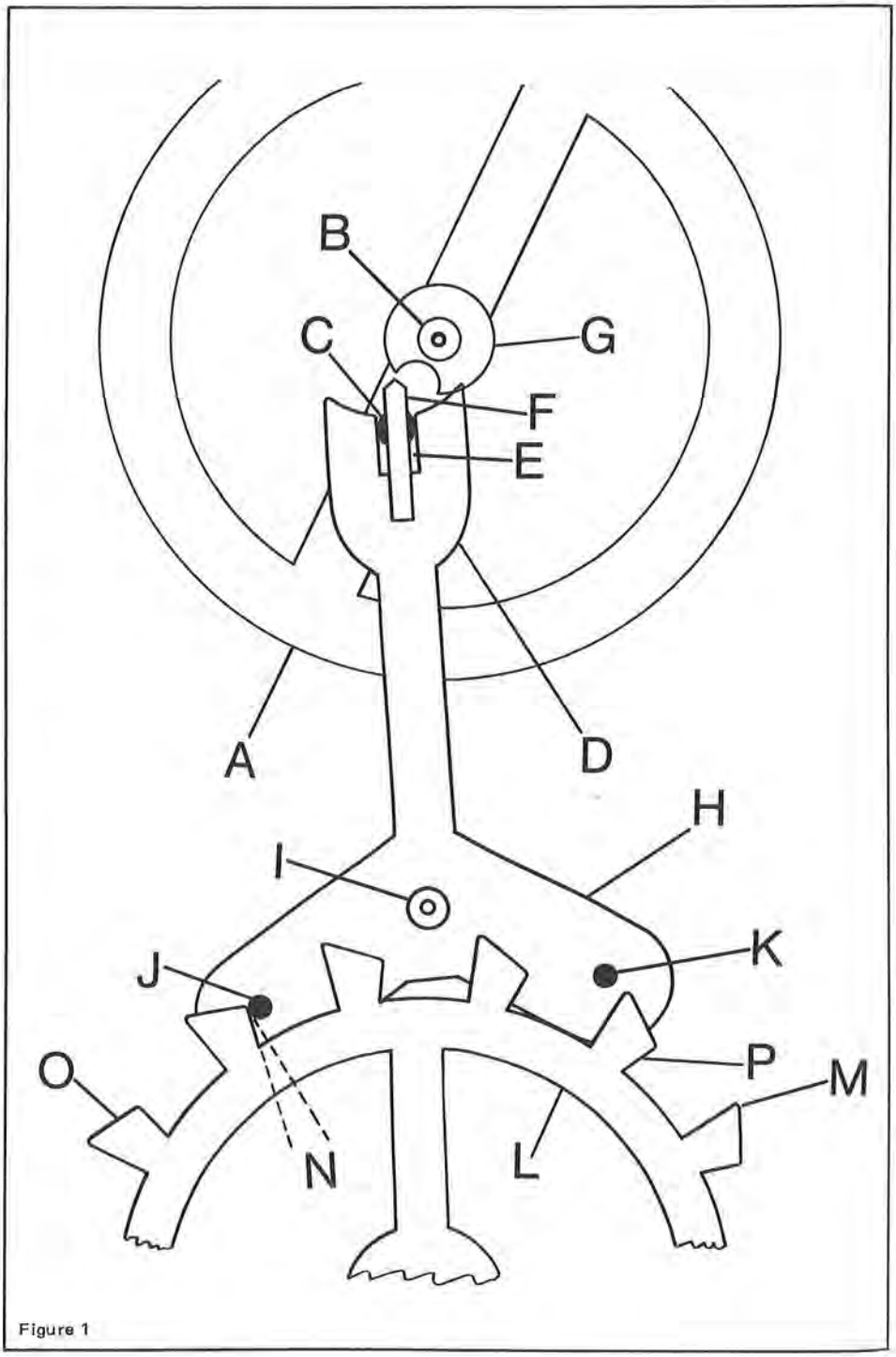


Figure 1

View A shows a fork which does not have a guard pin, but the points "a" at the outside end of the fork slot serve as the guard pin. These points act on the outside surface of the balance staff to prevent the accidental unlocking of the pallet pins onto the impulse faces of the escape wheel teeth, should the escapement receive a jar when the impulse pin is outside the fork slot. There is no safety roller; the balance staff acts as the safety roller. A notch in the balance staff lets the fork pass from one side of the line of centers to the other side. The other style of fork is shown at B, Figure 2. This style has a guard pin and is similar to the fork used in a jewel lever watch.

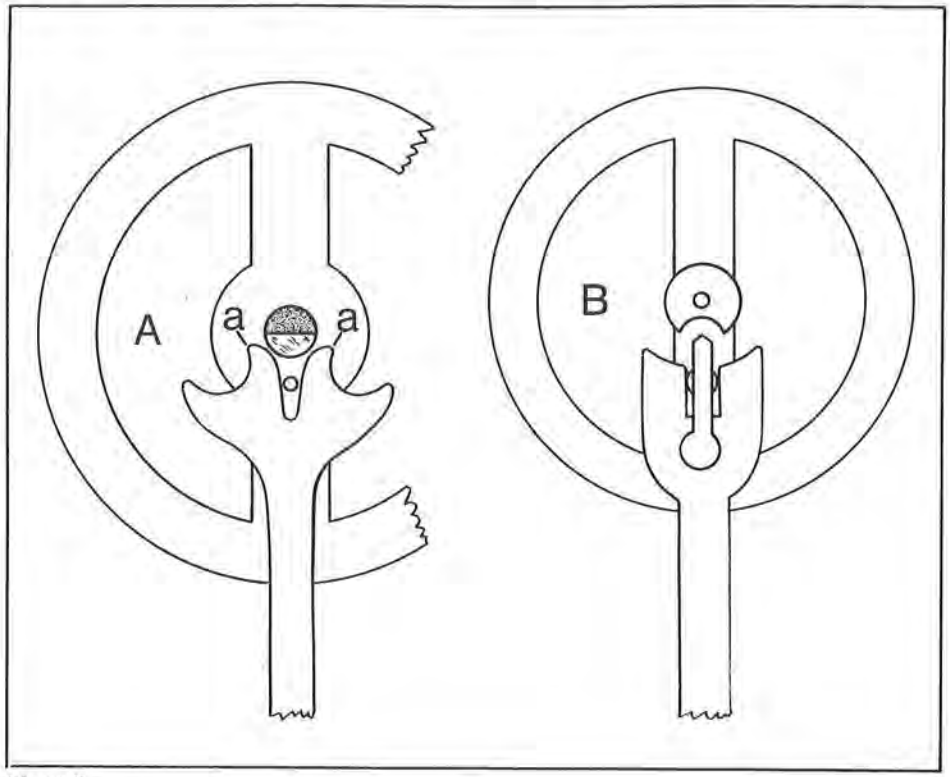


Figure 2

Figure 3

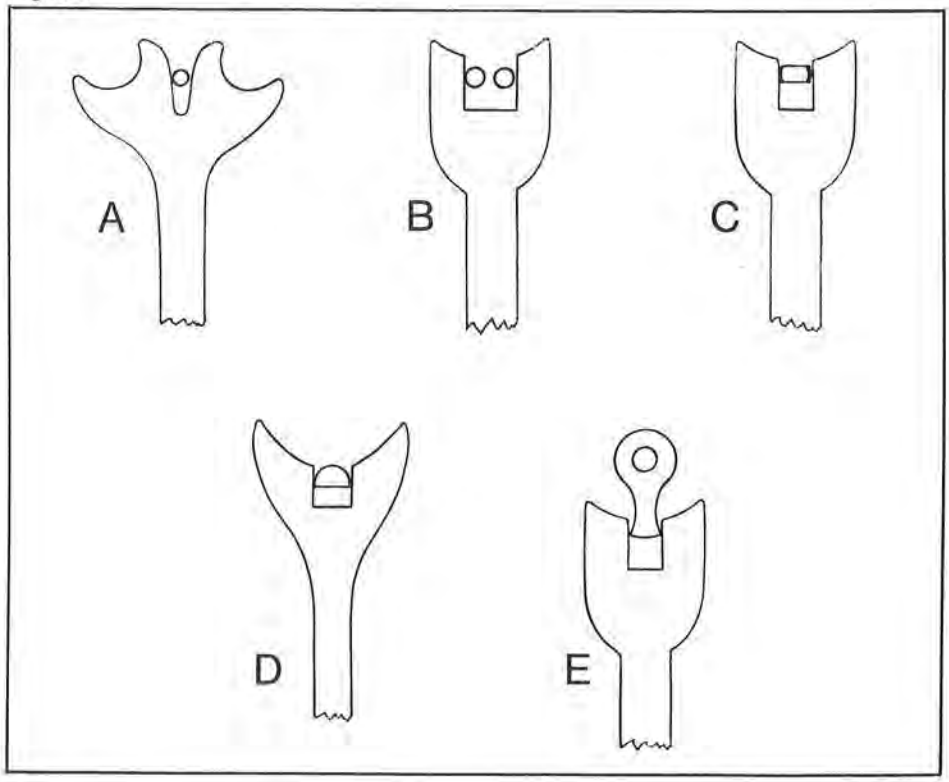


Figure 3 shows the different styles of impulse pins. View A shows a fork which uses a single, round impulse pin. View B shows a fork that uses two impulse pins that are planted the correct distance apart to fit the fork slot with the correct amount of freedom. One good feature of this style of impulse pin is that they can be opened or closed slightly to adjust for proper freedom in the fork slot. View C shows the round pin that has been flattened on two sides, leaving two rounded polished edges for contacting the fork slot. View D shows the "D" shaped impulse pin which is shaped like the roller jewel used in the jeweled lever escapement, but it is made of hard steel. View E shows the impulse finger that is very common in pin lever watches.

There are mainly four basic designs in the pin lever escapement. One of these designs is very much like the jeweled lever escapement. This design has a combination roller table, a "D" shaped steel impulse pin, and a guard pin that works in connection with a safety roller. This escapement also has banking pins that are frictioned into the watch plate.

Another design employs a finger that is frictioned onto the balance staff which serves as an impulse pin. This finger is specially shaped so there is a minimum amount of surface contact with the fork slot. The safety roller is the hub on the balance staff. A crescent has been milled in the hub of the staff to allow the guard pin to pass from one side of the line of centers to the other side. The guard pin is somewhat like the ones used in jewel lever watches. This design has banking pins that are frictioned into the watch plate.

In the next design, the impulse pin is frictioned into the balance wheel arm and the safety roller is frictioned onto the balance staff. The guard pin is of the conventional style. This design does not have regular banking pins. The banking is accomplished by the pallet pins going against the rim of the escape wheel. After an escape wheel tooth locks on a pallet pin, slide occurs; then the pin goes against the rim of the escape wheel to limit the angular motion of the pallet fork.

In the fourth design, the impulse pin is frictioned into the balance wheel arm, and the balance staff acts as the safety roller. One half of the balance staff is cut away to form a slot for the pallet fork to pass from one side of the line of centers to the other side. There is no conventional guard pin or banking pins. The points at the end of the fork slot serve as the guard pin. The banking is accomplished by having the pallet pins go against the rim of the escape wheel. Two circular grooves are formed, one on each side of the fork slot to clear the balance staff when the fork is in a banked position. A variation of this style escapement is where the pallet pins are diamond-shaped instead of being round, and the banking is accomplished by the tail of the pallet fork going against the escape wheel pinion instead of the pallet pins going against the rim of the escape wheel.

There are times when the depthing between the pallet pins and the escape wheel needs to be changed to correct the drop lock and drop. Some pin lever watches and clocks have been designed to be adjusted. Figure 4 shows some examples of how different pin lever escapements have been designed to allow for adjustment. View A, Figure 4 shows a pin lever pallet fork that has been designed so it can be adjusted to correct the drop lock and drop. By bending the arms holding the pallet pins toward the escape wheel, the drop lock can be increased, and by bending the arms away from the escape wheel, the drop lock can be decreased. If the arms are bent so the pallet pins come closer together, the inside drop is decreased and the outside drop is increased. If the arms are bent so the pallet pins are spread apart more, then the inside drop will be increased and the outside drop decreased.

View B, Figure 4 shows an example of how the plate is stamped out so the pallet arbor is pivoted in an adjustable segment of the plate. This segment can be bent in order to shift the pallet closer or farther away from the escape wheel to adjust the drops. In some of the early pin lever escapements, the segment that the pallet arbor was pivoted into was adjusted by the use of a screw. See View C, Figure 4.

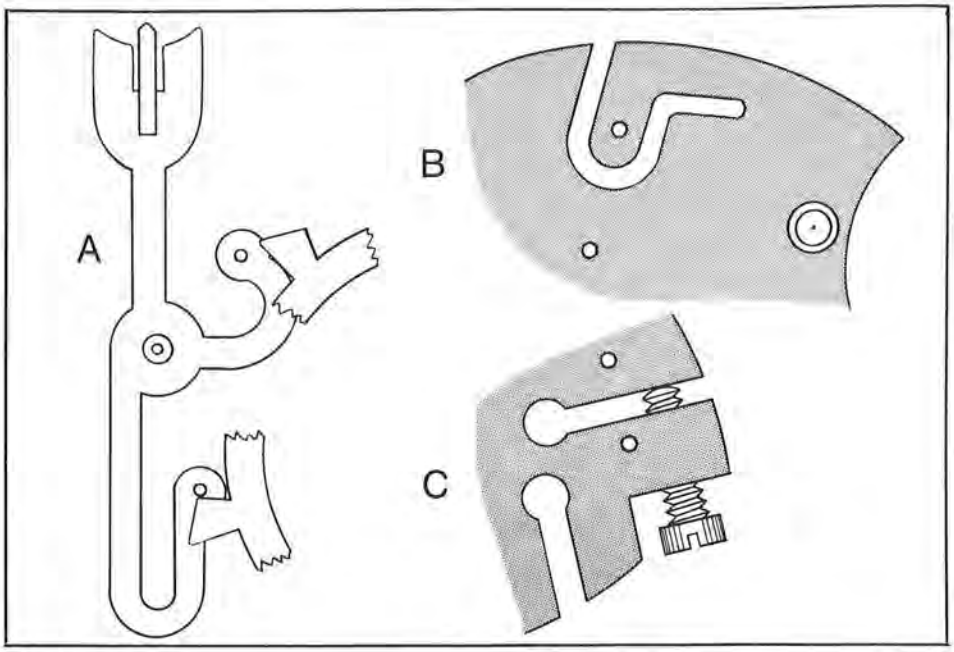


Figure 4

A common form of pivot used on the balance staff of the pin lever escapement is the pointed conical form. These pivots run in "V" shaped bearings which are frictioned or screwed into the watch or clock plate. This combination pivot and bearing is shown in Figure 5, View A. In order for the pin lever escapement to function correctly and for the balance wheel to take the proper amount of motion, it is essential for the balance staff pivots to be pointed, smooth, and highly polished. The shape of the pivot is also important. This type of pivot is usually sharpened at a 60° angle. The shape and condition of the bearings that these pivots run in is also important. The angle of the cup in the bearing must have more angle than the pivot in order for only the end of the pivot to touch the bottom of the cup. The cup must be smooth and polished. View B, Figure 5 shows a correctly shaped pivot. Views C, D, E, and F show incorrectly shaped pivots. View C shows a bullet-shaped pivot. The staff should be chucked up true in the lathe and the pivot reground to remove the bullet shape. Then the pivot should be polished. Grinding can be done with an India stone slip or an Arkansas stone slip. The polishing is done with a boxwood slip and Linde A or diamantine. View D, Figure 5 shows a worn pivot. This pivot needs to be

(Continued on page 60)

QUARTZ MOVEMENTS

Actual size

Features:
— Compact - only 2¼ w × 2¾ h × 1⅛ d
— 4.194304 MHZ Quartz
— Accurate to + − 1 minute per year
— State of the Art design
— Standard "I" Hand Shaft
— Battery life of over 1 year
— Three hand shaft lengths available
— Operates on standard "C" Battery
— All shaft lengths set second hand
— Integral case hanger

For Dials Up To:	Stock No.
1/4"	020-40-763
3/8"	020-40-764
1/2"	020-40-765

Mix and Match Shaft Lengths for Quantities!

Qty.	Movement	Hands	Total	Sec.
1-9	7.20	.75	7.95	.75
10-24	5.40	.55	5.95	.55
25-99	4.95	.30	5.25	.30
100	4.60	.30	4.90	.25
200	4.40	.20	4.60	.25

Second hands are available at additional costs above.

MINI-QUARTZ MOVEMENT

Actual size

Features:
2¼" w × 2¼" h × 9/16" d
Center shaft mount
For dials up to 5/16" thick
Standard "I" shaft hands
Up to 5" dials
Provision for second hand
Operates on Standard "AA" Battery
Back set or Hand set

Stock No. 020-27-308

Empire Clock, Inc.

1295 Rice St., St. Paul, Minnesota 55117

FOR ORDERS CALL US AT: 1-800-328-9620

Inquiries & Information: (612) 487-2885 (Minnesota Customers — call collect).

THE PICKLE BARREL

By Marshall F. Richmond, CMW

THE "JUNK JEWELER"

In a manufacturing jewelry shop specializing in jewelry repair for the trade, the most necessary and valuable workman in the organization is the "Junk Jeweler." Often he is not the finest "Finish Craftsman" in the shop, but he may be by far the finest and most versatile mechanic. "Junk Jeweler" is a title attached to this craftsman because he will make a satisfactory, durable repair on articles of jewelry that most jewelers would refuse to service. Many of these shops take pride in repairing any article that comes in for repair, which brings in a good quantity of work on fine jewelry. This superior craftsman can be what he is because of his extra mechanical ability, mental attitude, gift of common sense, and vast experience gained by never turning down the opportunity to learn. As undignified as the name might seem to most people, I would be proud to be called "Junk Jeweler."

Jewelry schools teach the basics of jewelry repair, the use of heat in soldering, how to size rings, repair settings, set stones, repair or replace stone settings and catches, etc. Usually plating, hand engraving, and casting are separate courses. Any person with average mechanical ability and a desire to become a jeweler can derive enough from schooling to make most repairs, but to be really successful, a jewelry repairman must be a student of the trade for as long as he works at it. A person, after completing schooling, must continually experiment, do research, and practice to expand his ability and become really proficient. Schools are limited in the practice pieces that are available to work on, as well as in the time for which they have the student. They do a commendable job of turning out capable workmen, but we are daily confronted with jobs that are not covered by textbooks or by what we learned in school.

Many years ago, "Carmen" bracelets were quite popular. Some were expensive, but none were too durable. They were usually made with a heart-shaped top and were probably the forerunners of the first expansion watch bands. These bands were made with small metal bars, having three holes and a hollow rivet in the center with a coil spring through the hole in the rivet. The ends were riveted together with the next pair and so on, until a band of the proper length was formed with a series of pairs, each making an X. Caps were fitted to the top and bottom to cover and hold the spring ends which kept them compressed. When the ends were pulled, this band would stretch out to about twice its length. Many of the top caps were karat gold, gold filled on sterling silver, or gold plated base metal. The bottom caps were made of like metals in the earlier bands, but later almost all bottom caps were stainless steel. The rivets would often wear the ends off or the rivet holes would be enlarged from wear and would become un-riveted. To repair these would require removing one bottom and one top cap, then re-riveting or replacing the rivet with a larger one to fit the worn hole, and finally replacing the caps which took considerable doing as the spring ends had to be pulled in with the edge of the cap to produce the tension necessary to keep the links closed. At that time, very few jewelers could repair these; however, later on, the base links were made with hooks so the springs could be hooked before replacing the caps, making repair much simpler. This is one of the jobs performed routinely by the "Junk Jeweler."

Watch bands come in so many types and styles that there would be no way to mention all of them or all methods of repair in a school. Even years of experience on the job cannot expose one to all watch bands. The expansion watch band is now probably the most popular, and there are only a few different types of this band. The "Embraceable" or claw-type band on ladies' watches was popular a few years ago, and the springs in these frequently break. The ones manufactured by the major watch companies have spring bars forming the hinge for the claw with a coil spring in the hinge. These springs frequently break and the spring bars wear, requiring replacement. Materials for these can be purchased from your material distributor. There are many on the market that have wire rivets to form the hinge and many of these have reverse coil springs that are not so easy to obtain. Therefore, a coil spring must be made after removing both the end of the rivet and the rivet itself. After the spring is made and fit, a new rivet is made from brass, nickel silver, or gold wire and re-riveted. This repair can usually be made by the "Junk Jeweler" in ten or fifteen minutes and a price charged to suitably compensate him for time and material.

There are many other types of watch bands that need to be repaired when broken. One type that seldom requires repair but can be problematical when it does, is the diamond band found on some ladies' watches. Usually these are white gold or platinum and are handcrafted by using square diamond settings with each setting hinged on each end with gold or platinum wire. Sometimes these wire hinges break from stress, or just break loose in the hard solder joint. As every break is different, there is no standard method for repairing them; a repair must be improvised using the basics in shaping and hard soldering. Being handcrafted, the catches are also individually made, so no standard replacement is available. These also must be repaired or, if too badly damaged or worn, a duplicate must be handmade to replace it. The only simple repair on these bands is replacing the safety chain. There are many more types of watch bands that are encountered for repair, but rarely does one cross the bench of the "Junk Jeweler" that he cannot easily handle.

Catches for bracelets, necklaces, or other pieces of jewelry are also encountered in many types.

Assortments of tongues, fishhooks, foldover catches, and many other types of catches for bracelets are available from the material jobber; however, even though these are all in the findings inventory, most will not fit with a simple interchange but have to be altered to make a proper repair. Most of the fine jewelry being handcrafted (like the diamond watch bands) must be repaired by the craftsman as replacement parts are not available. Sometimes catches are so badly worn or mangled that repair is not practical, and a duplicate must be handmade from the same material as the old one. This often requires rolling a piece of metal to proper thickness, cutting out the pieces, soldering them together, and then finishing and installing it. It should look and function like the one that was replaced. This is another job that is handled routinely by the "Junk Jeweler."

Hand engravers today produce only a small percentage of the engraving that is done on jewelry or trophies because engraving machines are available that will machine engrave almost any piece imaginable. Occasionally, however, a large or odd-shaped piece will be presented for engraving that cannot be chucked in the machine with available attachments. This leaves a choice of having it hand-engraved or improvising a method of holding it in the machine to engrave it. Usually the "Junk Jeweler" with his unusual ability can devise some method, even it it requires making a special jig just for this job.

Today, parts are no longer available for many antique watches. Many of these have winding and setting springs other than wire. When these replacements are not avialable, a watchmaker usually has to return this watch to the customer unrepaired even though many of these springs can be repaired by inlaying a small piece of steel across the break and silver soldering. True, this will remove the temper from the steel, but by the time it is hammered out and shaped, it will have hardened enough to function as a spring. There are many other functions requiring heats and fluxes in repairing antique watches that are beyond the skill of the watchmaker, but if he has access to the skills of the "Junk Jeweler," often many repairs can be completed that otherwise could not.

Although there are a few companies today specializing in watch case repair, the "Junk Jeweler" can almost always make any case repairs normally encountered. He can repair hinges, catches, lid and back catches or opening springs, lugs, and loops.

Stone settings can usually be replaced and the stones reset for much less than one would charge for rebuilding the old ones, but occasionally an article shows up that would be impossible to repair by replacing a setting or settings. Using gold, silver, platinum, or whatever metal is involved, with plate wire, tubing, and solder to match, most of these settings can be rebuilt to look almost the same as when new and perhaps be even stronger and more durable. Plate stock can be reduced in thickness with the rolling mill, and wire sizes can be reduced by use of the drawplate. Small plates can be hard soldered over the worn places, and prongs and beads can be replaced with gold wire. Bezels can be replaced by using bezel findings to fit the stone or stones or can easily be formed from thin pieces of metal. The demand for rebuilding old jewelry is getting greater, and with the skill of the "Junk Jeweler" these demands can be met.

Costume jewelry has been in existance for many years, and is made of less expensive material than quality jewelry. Most jewelers hate to see it come in for repair. Some refuse repairs on it, but if durable repairs can be made, charges can be made to make it profitable. Costume jewelry is made from various base metals—some die struck, some cast and then plated—or from metals that can be polished and lacquered. To make costume jewelry more ornate, inexpensive artificial stones or enameling is added. There are many qualities of costume jewelry. In the least expensive items, you will fine glue used to set the stones and paint-type enamels. In better-quality costume jewelry, you will find die struck settings for the stones so they can be prong set, and base metal with gold plating, silver plating, rhodium, or nickel plating. Many of these better-quality pieces are imitations of fine jewelry pieces. Usually the stones found in costume jewelry are foil-backed glass stones commonly called rhinestones. The better-quality rhinestone jewelry is made with die struck settings with four prongs and of very thin metal so these prongs can be bent over the edge of the stone with little pressure. Two sides of these settings have rectangular holes so a small metal bar can be inserted to connect two settings together. The ends are riveted (spread), forming a hinge as well as a connector. These are put together until they are a series of settings long enough to make a necklace, bracelet, or whatever piece of jewelry desired. A die struck foldover catch is soldered to the ends with soft solder. This is then plated and the stones set. To create floral or other designs, several settings—even different sizes and shapes (round, rectangular, marquise, pear, etc.)—are soft soldered to make the pattern. These can be used as earrings, pins, or soldered into the necklaces or bracelets, then plated and the stones set. This type of rhinestone jewelry can be profitably repaired by using the basic jewelry know-how and a lot of ingenuity. Die cast costume jewelry can be repaired if it is cast from any metal we can flux and solder; aluminum alloy castings are usually considered not repairable, for I have never heard of a way to weld or solder aluminum in pieces as small as jewelry. There are methods of welding aluminum used in the manufacture and repair of larger items, but even though it could be adapted to weld articles as small as jewelry, it would hardly prove practical for repairing. In some cases, these breaks can be drilled, pinned, and cemented with Aaron Alpha cement, but even with pinning, it is doubtful that a strong, permanent repair can be made.

In watchmaking today, a small battery-operated soldering iron is used to solder the micro-electrical connections of the circuits in electric watches. This tool, of course, applies soft solder but is also ideal for making solder repairs in small articles of jewelry. Any watchmaker that has spent the time necessary to learn to solder these micro-connections in circuits should have little trouble using the same tool to solder jewelry. An experienced jeweler with his knowledge and experience with all types of solders and heats should be able to make use of this small soldering iron to great advantage.

There seems to be no sensible reason why some people want some

articles repaired and will pay charges that in many cases are much greater than the original cost or replacement value. Some say it's for sentimental reasons, and others say that they just like the piece so well that it must be repaired at any cost. For whatever reason, if we make an honest quality repair and charge a fair price for time and material, we are doing a necessary service for our customer.

Although the "Junk Jeweler" derives this name from the fact that he is capable and willing to make repairs on jewelry that most jewelers consider junk in addition to repairing all the fine jewelry that comes across his bench, he is in reality the "Master Jeweler."

The next article will deal with miscellaneous repairs that find their way to the jeweler's bench. TLB

BOOK REVIEW

(Continued from page 6)

This new book is a worthy addition to the collectors' shelves. The title here suggests a most ambitious, comprehensive treatise, something hardly to be covered in these 256 pages. What Mr. Loomes has done, though, is a basic study of most of the main categories of clocks made in the British Isles. Of the twelve chapters, the title headings of seven reveal much about the book's composition: Lantern Clocks, The London Longcase, Provincial Eight-Day Longcase Clocks, Clocks with Painted Dials, Clocks for the Wall, and Table Clocks. Other chapters deal with the Cream of Crafts, Casework, Collecting and Investing, and Outstanding Makers and Outstanding Work. A glossary is included, along with a list of books for recommended reading and an index.

The author manages to cover most British clocks made before 1870, discussing the training and background of the makers as well as the influences upon them.

A "clocksmith" (a term he differentiates from a "clockmaker" who has had a formal [London] apprenticeship) is described as the mechanically oriented maker of provincial clocks who transferred his skills from some manually allied or not-so-allied trade. The work of the "clocksmith" is characterized by innovations, but lacking traditional urban practices. For the most part, Loomes relates that these clocks have a rustic charm as these " . . . smiths made almost all of the clock, unlike the London makers who employed the services of dial makers, engravers, cabinet makers, and purchased castings, plates, and hands." Thus, the London makers produced a finished product which reflected the sophistication and skills of the specialists combined in one timepiece. The "smiths" described by Loomes thus have a provincial charm despite some crudity.

His chapter on the pendulum sheds light on the Huygens, Coster-Fromanteel story, although a broader account of the Fromanteel connection was published by him in a recent clock publication, possibly for later inclusion in a complete book on this maker.

The chapter on the painted dial clocks is an interesting and valuable inclusion, probably condensed from one of his best earlier books, *The White Dial Clock*.

As a former geneologist, this researcher's ability has resulted in new historical disclosures revealed in this new book. In the chapter on wall clocks, the "Act of Parliament" clock question may be considered as finally put to bed with what Mr. Loomes states is definitive proof of the clock's origin, history, myths, facts and fiction. He also comments on the scarcity of these desirable tavern clocks.

For both the neophyte collector and the more sophisticated collector of clocks, there are valuable chapters on Collecting and Investing. These reveal what an experienced, authoratative collector looks for when sighting a potential purchase.

The chapter on casework is also a short course in design, inspection, sophistication of cabinetwork, examination and appreciation, as well as detailed, illustrated nomenclature. The photographic plates are good. Loomes avoids the too-often pictured clocks seen in every new book. He has discriminately picked ninety-three plates best suited to illustrate the theme of his text. The drawings are quality illustrations of bolt and shutter work, case features and details. Other plates show how to tell the age of clock movements by the shape of the pinion's wheel collets and arbors. A chart of clock hands and styles is not as comprehensive as the full group shown in *Clocks* of July, 1980, in which about forty different hands and identifications are shown as compared to the fourteen illustrated here, although these are a welcome inclusion in this book.

For the collector who would know more about his own British clock or would like to prepare himself for the purchase or acqusition of a British-made clock, this book should be a worthwhile guide and reference. TLB

75 BATTERIES *PLUS* SELLING CABINET ONLY $79.95

Get organized...Make more money with the BATT-TRONIC Battery Selling Cabinet AND MAXELL batteries

The BATT-TRONIC Watch & Calculator Battery Selling Cabinet

Here's How It Works:

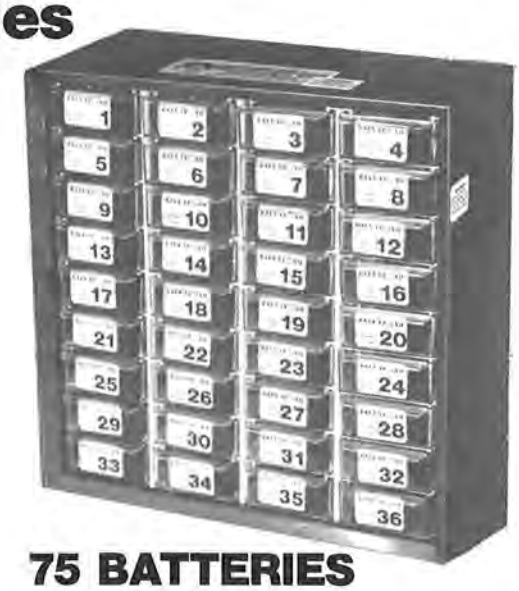
First, determine the manufacturer's name and number from the battery you are replacing. Then, using the *Battery Interchangeability Guide* provided: (A) locate the battery number and (B) determine the BATT-TRONIC Drawer Number. In that drawer you will find the same brand battery you just removed as well as the batteries that are guaranteed interchangeable. All drawers are sized to accommodate all popular batteries:

MAXELL • EVEREADY • RAY-O-VAC • TIMEX • SANYO • BULOVA-ACCUTRON • SEIKO • PANASONIC • Private Label Brands

MAXELL Batteries ...The Jeweler's Best Buy!

We have chosen the 9 popular sizes (75 batteries) representing 90% of all your battery needs.

BATT-TRONIC DRAWER NO.	MAXELL MFG. NO.	Interchange Eveready Mfg. No.	QUANTITY YOU RECEIVE
1	SR44 SW	303	10
8	SR44 W	357	10
9	SR43 SW	301	10
16	SR1130 W	389	10
19	SR41 SW	384	5
20	SR43 W	386	10
21	SR41 W	392	10
24	SR926 SW	395	5
26	SR620 SW	364	5
		TOTAL:	75 Batteries



75 BATTERIES *PLUS* SELLING CABINET

COMPARABLE VALUE $111.20

ONLY **$79.95**

Offer good through May 15, 1981.
Limit 1 deal per location.

ABOUT YOUR CREDIT: Your credit is good if you are rated by Jewelers Board of Trade, Credit Standing is 1st or 2nd. If not, payment must accompany order, but we will establish future credit if you furnish the name, address and phone number of your bank and the officer to contact. Thank you.

Call toll free!

NATIONWIDE: 1-800-431-2828
NEW YORK STATE: 1-800-942-1944

Or Write! BATT-TRONIC CORP., P.O. BOX 10, Orangeburg, N.Y. 10962

Questions and Answers / Henry B. Fried

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

ATTENTION

In the January, 1981 issue of *Horological Times* on pages 34 and 56, there appeared information concerning various chemicals used in watchmaking. Important corrections to this information are in order. These corrections were first brought to my attention by Mr. Stephen A. Sheldahl of Littleton, Colorado and Mr. Arthur C. Pabst of Bradenton, Florida. Many thanks to you two gentlemen.

MAC (Maximum Allowable Concentration) is no longer used. TLV-(Threshold Limit Value) TWA (Time Weighted Average) is now used and means the maximum allowed average concentration for a worker under constant 8-hour-day, 40-hour-week exposure. TLV-STEL is the maximum concentration for widely spaced 15 minute exposures. CCFP (Closed Cup Flash Point) is an indication of the relative degree of flammability.

Now the latest available data:

BENZENE

TLV-TWA	10 p.p.m.
TLV-STEL	25 p.p.m.
CCFP	12° F.

CARBON TETRACHLORIDE

TLV-TWA	10 p.p.m.
TLV-STEL	20 p.p.m.

Non-flammable

CHLOROFORM

TLV-TWA	10 p.p.m.
TLV-STEL	50 p.p.m.

Non-flammable

METHYL ISOBUTYL KETONE

TLV-TWA	100 p.p.m.
TLV-STEL	125 p.p.m.
CCFP	73° F.

A good rule to always follow if you are using chemicals and are in doubt concerning their dangers is to contact the manufacturer. The information you need will be provided.

Next month, look for a complete run-down on many of the chemicals used in the industry.

Time Zone

Q I am enclosing pictures of an old watch which I have had for several years. I took it to Mr. Cal Creasy, an AWI member, to see if he could tell me anything about it. He suggested that I take pictures of the front and back and send them to you with the additional information that it is a 19 ligne Swiss movement with a case number 26805.

I would appreciate any information that might be available regarding manufacturer, age, etc.

Claude D. Harding
Copperas Cove, Texas

A *I have examined the photos of your watch and I am quite familiar with these. This is Swiss, of the 1880 period, and of modest, medium quality. The movement is obviously fifteen jewels with uncut, bimetallic balance (to compensate for temperature changes). The watch is stem wound, but pin set by thumbnail into the pinpiece at the dial, 1 o'clock position. The six-time dial was a feature manufactured separately and made available to anyone making watches, wanting to add this feature onto any existing watch. These cases were for the most part of gunmetal, soft steel colored.*

Despite their modest quality, some collectors desire these. As for value . . . I occasionally donate my services free with a donation to the AWI ELM Trust Fund.

Q In the December issue of the *Horological Times*, I noticed your answer to an inquiry by R. Craig Rowland of Hopewell, Virginia, regarding a Trainmen's Special 23 jewel watch in an Alaska Silver case.

When I first started collecting watches years ago, I found much valuable information in old catalogs. Sears' catalog of the 1905-10 era shows this watch. The Alaska silver case was also shown in the 1902 and 1908 catalogs with a 7-jewel Trenton movement. I also remember a catalog in which Sears stated that these watches could be sold by traveling men for $20-$25. Sort of a traveling drummer set up!

Thanks so much for your help in the past . . . to all of us.

T. William Schroeder
Chicago, Illinois

A *I also have these catalogs in my library and I do remember that Sears used the Trainmen labels as well as the Plymouth and Century labels and Edgemere. I really like the*

(Continued on page 18)

Borel GROUP

TIMEPOWER quartz watch timer

- **Universal**
  Fully automatic. Times all quartz watches: Analog, LCD and Led.
- **Simple**
  Set watch on sensor. Measures accuracy within one second per month.
- **Sensitive**
  Gives readout on cased watches. Automatic identification on 32.768 Khz or 786.432 Khz.
- **Reliable**
  Solid state circuitry. 18 month warranty.
- **Compact**
  Size: 9 3/4" x 2 3/4" x 5 11/16"

SPECIAL OFFER—ORDER TODAY
Get set of Regulating Tools, worth $14.95, Free of charge.

Both only

$859

TIMEPOWER
BATTERY PRICES
ON REQUEST

Time payment or lease/purchase plans to suit your need. To order today — call our Toll-Free Order Service 1-800-821-5686, in Missouri 1-800-892-5818.

SEIKO®

SPRING

ASSORTMENT

Zx3-SB 96-2

Complete assortment. Contains 22 each of 48 numbers. Comes in 48 bottle cabinet.

$34.50

Zx3 - SB 96/1

For those who already have the STC asst. Allows you to incorporate into a complete assortment. Includes 2 each of only the 26 new numbers. Comes in 48 bottle cabinet.

$21.50

Stock #	Length	Diam.	Shape
1	3.20MM	1.20MM	
6	4.08MM	1.30MM	
2	4.10MM	1.30MM	
3	4.13MM	1.30MM	
4	4.60MM	1.30MM	
5	4.80MM	1.20MM	
23	5.70MM	1.50MM	
24	6.30MM	1.50MM	
12	6.73MM	1.20MM	
7	6.80MM	1.30MM	
8	6.99MM	1.30MM	
9	7.45MM	1.30MM	
10	8.00MM	1.30MM	
27	8.00MM	1.70MM	
11	8.03MM	1.20MM	
13	8.50MM	1.30MM	
30	8.65MM	2.00MM	
28	8.65MM	1.20MM	
25	8.70MM	1.50MM	
14	9.00MM	1.20MM	
26	9.00MM	1.70MM	
15	9.56MM	1.30MM	
29	9.62MM	1.50MM	
31	9.65MM	1.50MM	

Stock #	Length	Diam.	Shape
32	9.75MM	1.50MM	
16	9.80MM	1.50MM	
17	9.85MM	1.20MM	
33	9.92MM	1.70MM	
34	10.75MM	1.50MM	
18	10.80MM	1.30MM	
35	10.96MM	1.70MM	
40	11.00MM	1.80MM	
36	11.75MM	1.50MM	
37	12.00MM	1.70MM	
38	12.75MM	1.50MM	
39	13.00MM	1.70MM	
41	13.05MM	1.80MM	
19	13.45MM	1.60MM	
42	14.10MM	1.85MM	
20	14.40MM	1.30MM	
21	14.70MM	1.30MM	
43	15.00MM	1.85MM	
22	15.90MM	1.30MM	
45	15.97MM	1.85MM	
46	16.85MM	1.80MM	
44	17.60MM	2.50MM	
47	17.70MM	1.80MM	
48	19.67MM	1.80MM	

Toll-Free Phone Order Service

1-800-821-5686

In Missouri 1-800-892-5818

Borel GROUP

BOREL GROUP 1110 Grand, Kansas City, MO 64106

Distribution Centers in:

NEW YORK • CLEVELAND • OAKLAND

MIAMI • KANSAS CITY • LOS ANGELES

QUESTIONS AND ANSWERS

(Continued from page 16)

fine print honesty in the catalog, i.e., "The composition of this watch is of the best grade of Alaska silver composition metal, in every way excepting in intrinsic value the equal of coin silver" *(emphasis mine).*

Although the watch is stamped 23 jewels, I have seen these with celluloid "jewels" pasted over the bearing holes. In my younger days as a watchmaker and trade watchmaker, we wouldn't repair these as the charges would have been greater than the retail cost of the watch . . . and they were tougher to repair.

Q I have in for repair the watch described below. I cannot find any information on it, such as where it was made, where to get parts, etc. I would appreciate any information you can furnish me.

It is a 16-size with "The Alexander Co." on the dial. On the movement appears: No. 7517, Paillards Patent Non Magnetic Balance & Spring.

Thank you.

Paul M. Wilson
Fort Myers, Florida

A *The Alexander Company was a mail order company that marketed watches, among them the products of the Paillards Non Magnetic Watch Company (of America). This was in the latter part of the nineteenth century. Parts are no longer available. The Paillard people used different model movements, some Swiss and some made in America. These were all well-made movements. A photo of the movement or a very good sketch would reveal to me who really made your movement.*

Q Please take a moment of your time to answer this question. A customer requested information of me regarding a watch made by Cornavin Watch Co. It is 6 jewels, Swiss-made, very ornate, and 14K gold filled. The matching bracelet is stamped "Sturdymaid" and shows: "Pat. 3. 11. 13." Is it conceivable that the watch was manufactured in 1913? If not, when did this company stop making watches?

Thanks for your help.

David H. Simon
San Antonio, Texas

A *The six-jewel Cornavin dates from just before the 1930 period when seven-jewel markings came into being. The Cornavin Company was last listed in 1954 at 116 Nassau Street, New York City. The Sturdymaid bracelet was marketed by J. F. Sturdy & Sons of Providence. They too are no longer listed in any directory. The dates on the bracelet only refer to the patent dates—not the production date. The Cornavin was a Swiss-made product. A photo of the movement would help me identify the factory in Switzerland from which it came.*

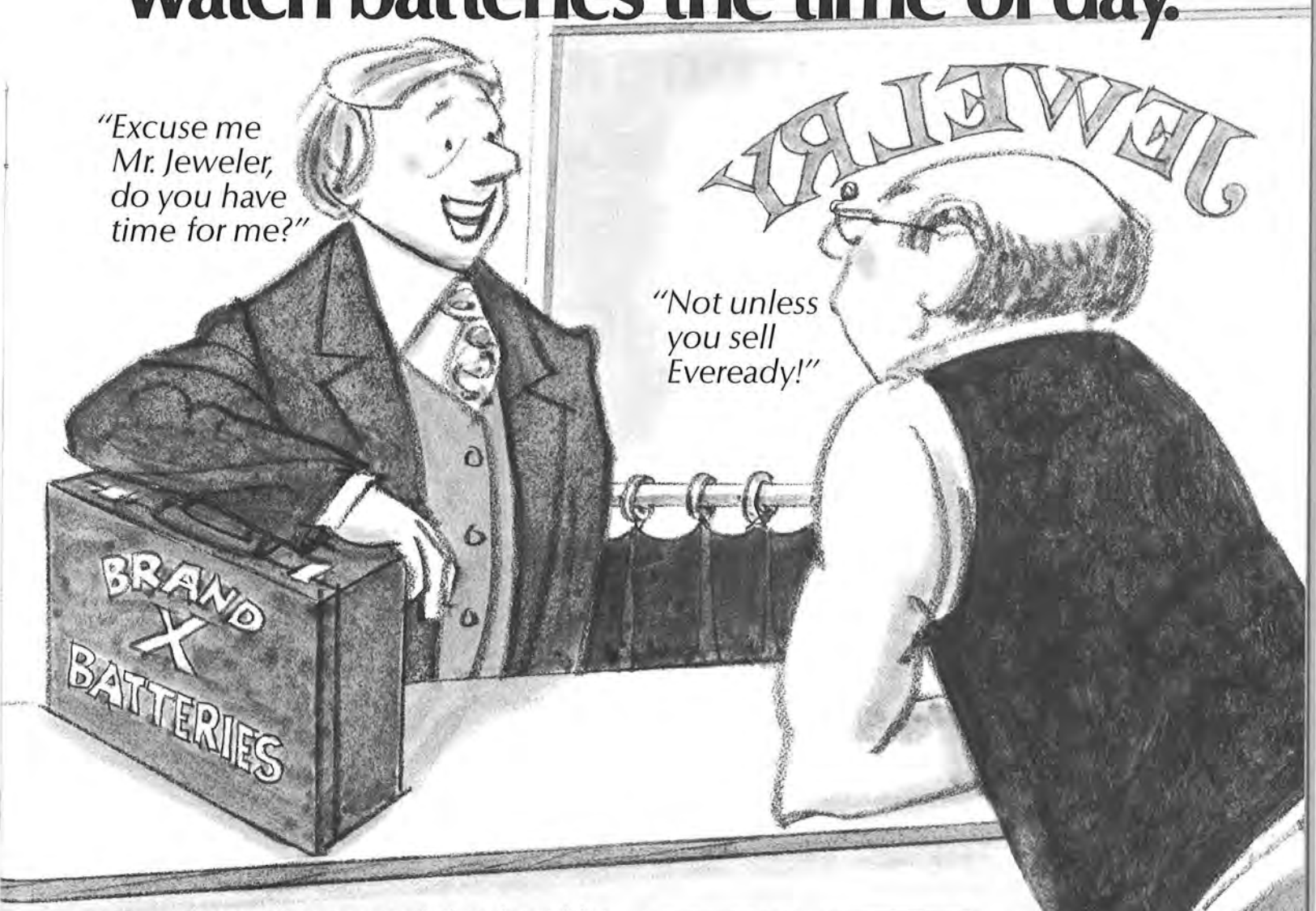
Q Once again I'm seeking your expert advice. I have a 16s watch marked "Abbott Watch Co." Of course, I cannot find them listed in any of my reference books on American watches. It has a broken staff and balance jewel. Can you tell me where I can get a replacement?

G. F. Carlson
Pinellas Park, Florida

A *The Abbott Watch Co. used E. Howard models 3 and 9 movements to incorporate the Abbott stem winding attachments which Mr. Abbott patented. Your sketch of the winding reveals that patent which could be attached to the keywinder of that time. Staffs for that model are unavailable and would have to be made by a specialist or pivoted on the broken end by a skilled watchmaker.* HT

"Eveready" Miniature Battery Report.

You don't have to give other watch batteries the time of day.



"Eveready" Watch Batteries are really the only watch batteries you'll ever need. After all, "Eveready" was the first to manufacture watch batteries. And today, "Eveready" is the leading worldwide supplier of batteries to watch manufacturers and the jewelry industry.

"Eveready" makes an extensive line of watch batteries, including Silver, 1.5 volt Lithium and Mercury types. And even though we make hundreds of thousands every day, no battery leaves our factory before it's aged, voltage tested and visually inspected.

And "Eveready" continues to be a pioneer in watch battery development: new super-thin batteries for fashionable thin line watches...Lithium Batteries that keep the cost down and the quality up. And you can be sure more and more new ideas will be coming soon.

So, you see, "Eveready" Watch Batteries are the only watch batteries you'll ever need. Therefore, next time somebody tries to sell you anything but our watch batteries...tell him, in a nice way, that you've only got time for "Eveready."

Follow the leader... "Eveready."

UNION CARBIDE

"Eveready" is a registered trade mark of Union Carbide Corp.

THE SHIP'S CHRONOMETER © 1981

By Marvin E. Whitney, CMC, CMW

American Chronometer Makers

Part VI

As mentioned earlier in our series on American chronometer makers, there is little known about the lives of most of these important individuals. There is also little information regarding their production records which is, indeed, unfortunate. Each maker (and this was also very true of English and Continental makers) had his own numbering system—seemingly using whatever method happened to strike his fancy.

Many of the makers, particularly the foreign ones, not only made chronometers, but also other types of timepieces. Some had a different numbering system for each type, while others continued in the same sequence without a break. Still others continued with the same series of numbers, but when they began producing another type of timepiece, they placed an additional number in front of the series number. For instance, if they were numbering their chronometers 1001, 1002, etc., upon switching to pocket chronometers, they would add a numeral, such as a four, and the number would read 41003. Several instruments would carry the prefix four, and when the maker returned to chronometers, he would just drop the four and continue on with the series.

Other makers started out a series for a particular type of instrument, and when their fancy dictated trying something else, they would place a letter or numeral as a numerator to the series number, i.e., 21/1111. Then, when they switched back, they would just drop the numerator and continue on with the series.

Some may well wonder why instruments cannot simply be dated by their trial dates. True, this may put you "in the ball park," but it is not a conclusive indication. Records at the Observatory show that a number of years, sometimes eight or ten, would elapse between the time an instrument was made and the date it passed trial. This was the result of the fact that almost all new chronometers, when first assembled, tended to accelerate. Thus, they were set aside and permitted to run a year or two to settle down. Even the best would accelerate from three to six seconds per day over this period of time, so each instrument was allowed to settle down before any serious adjustments were made. If an instrument showed great acceleration or became very erratic, it would be disassembled and gone over. This going-over process was sometimes repeated two or three times before the problem was eliminated.

Many different theories have been advanced as to why this acceleration occurred, but the majority of the makers at the time attributed it to the hairspring. Old movements that were re-sprung or overhauled sometimes accelerated, particularly when the hairspring had to be manipulated too much during truing and/or fitting. During my years at the Observatory, it was nothing to see eight or more chronometers sitting on one's bench, settling down after an overhaul. In most instances, several days were sufficient, but some took a month or two. Yet nothing was actually done to the hairspring other than removing it from the staff so the balance pivots could be polished.

Thus, it can be seen that it is very difficult to pinpoint the year a chronometer was made, either from its serial number or its trial date.

There can be no doubt that many of the chronometer makers and/or nautical chandlers had great ability but were just not as well known nor as commanding of the headlines as were Bond, Bliss, and Negus. However, each in his own way made a significant contribution to the development of the chronometer in America—an instrument that played a critical part in America's domination of the seas and her many victories in some of the greatest naval battles ever fought.

We shall touch on such facts as this writer has been able to unearth concerning the lives of those American chronometer makers not previously discussed in this series. In some instances, no more than a name, address, or date is available. It is hoped that others may be able to come forth with additional names and/or information.

ADAMSON, GEORGE H., Time Laboratory, Tecunseh, Michigan. Mr. Adamson made non-magnetic shields for chronometers during the early 1940's. The shields sold for $35.00 each. The Adamson shield consisted of a two-part, non-magnetic, moistureproof cannister type carrying case that measured 6 in. x 8 in. The screw cover was fitted with a glass protected by a recessed metal lid which was attached to a small chain. This was held in place by two knurled-headed screws which could be loosened and removed, so the instrument could be read.

The chronometer bowl was fitted into a non-gimbaled, tub-shaped neopreme shockproof mount. The bowl was made stable by a neoprene mounting ring which was attached to the cover but permitted easy reading of the instrument when the lid was removed. The movement was wound by removing a knurled screw plug in the bottom of the case through which the key was inserted.

The gray lacquered, finished case was fitted with a leather strap to which was attached a snap leather pouch for the key. Those cases made for the U.S. Army were finished in olive drab. Some carrying cases were fitted with binding posts so a break-circuit chronometer could be installed.

ADAMSON, THOMAS, of New York City. Adamson is said to have had a shop near T. S. & J. D. Negus when they were located at 140 Water Street, in the 1850's. His dials were

signed, "Thomas Adamson, Sag Harbor, Long Island." I do not recall having ever seen one of his instruments, nor do any of his instruments appear in the listing of over 5,000 Naval Observatory instruments that I have compiled through the years.

BALLOU (?), GEORGE H. In the early 1940's, he was listed at several different addresses–37 South Street, 40 Water Street, and 90 West Street–all in New York City. His name also appears with the New York firm of Ship Shore Condenser Service during this same period of time. During the early part of World War II, when the Navy and the Maritime Commission were experiencing a critical shortage of chronometers, Mr. Ballou was given a letter by the Navy, identifying him as buyer of instruments for the Government. The instruments, which he purchased throughout the country and, in turn, delivered to the Observatory, were purchased by the Maritime Commission.

BARRDET, C.S., 236 Broadway, New York City. His name appears under the heading of Chronometer Maker in the early 1850's New York Business Directory. However, his name does not appear in any of the Naval Observatory's records.

BLUNT, E. & G. W., 179 Water Street, New York City, 1833-1866. The Blunts first started out publishing coastal charts, tide tables, and other nautical software in the early 1830's. As their business increased, they expanded their operation to include the sale and repair of chronometers and other nautical instruments. In 1838, they became the agent for Arnold and Dent, which had its beginnings in 1830. After John R. Arnold and Dent dissolved their partnership in 1840–over what historians say was a trivial squabble–Blunt, in 1842, became the agent for E. J. Dent. Dent and the Blunts became very good friends. Even the Superintendent of the Observatory at that time commented in some of his correspondence that, "Blunt and Dent evidently carried on a great deal of correspondence." Therefore, one can readily understand why Blunt became the agent for Dent when the Arnold-Dent partnership was dissolved.

John Glover, a very excellent craftsman who had worked for Dent in England, came to New York and began working for the Blunts, making chronometers. Before Glover returned to England in 1848, he had produced nearly forty chronometers for the Blunts. They were signed "E. & G. W. Blunt, made by John Glover." After Glover returned to England, the firm no longer produced any chronometers.

In the early 1840's, the Depot of Charts and Instruments requested the Blunts to participate in the chronometric determination of longitude between Liverpool and New York City. As you recall, William Bond and Son was involved in a number of similar expeditions, but between Liverpool and Boston in the mid-1800's. On June 24, 1841, the Blunts received six chronometers from Charles Frodsham, consigned to the Depot and shipped aboard the *Prince Albert* for longitudinal comparison. The comparison was made at 2 o'clock and determined to be:

Charles Frodsham	No. 1412	$4^h\ 55^m\ 10.0^s$
"	No. 1949	$4^h\ 55^m\ 34.0^s$
Arnold	No. 1436	$4^h\ 57^m\ 14.5^s$
"	No. 1438	$4^h\ 56^m\ 29.0^s$
"	No. 1446	$4^h\ 56^m\ 33.5^s$
"	No. 1513	$4^h\ 54^m\ 59.0^s$

On November 9, 1843, the Depot again notified the Blunts that they were to receive a shipment of chronometers from Parkinson and Frodsham, which had been shipped aboard the packetship *Westminster* and consigned to them for the comparison of longitude. The Blunts were informed that the errors of these chronometers (all Parkinson and Frodshams), as of October 15, 1843 when they left Liverpool, were:

No. 2433	$2^m\ 26.5^s$
No. 2434	$2^m\ 12.5^s$
No. 2578	$0^m\ 22.6^s$
No. 2590	$2^m\ 17.5^s$
No. 2603	$2^m\ 13.6^s$
No. 2605	$0^m\ 27.6^s$
No. 2607	$0^m\ 39.0^s$
No. 2610	$0^m\ 59.5^s$

The firm of E. & G. W. Blunt remained as such, and at the same 179 Water Street address, until early 1866 when a change in the ownership took place. In May and June of 1866, several pieces of Naval correspondence were addressed to Messrs. Blunt and Nichols. Evidently, the new firm did not remain in business long after those dates, since there is no further mention of either name in Observatory correcpondence after the June date.

GEORGE E. BUTLER COMPANY, 356 California Street, San Francisco, California. The Butler Company was given a contract, June 2, 1937 to repair and rate chronometers for the Mare Island Navy Yard. During the early 1940's, they were also the repository for Maritime Commission chronometers which were to be placed aboard new vessels being constructed on the West Coast.

DAVENPORT, WILLIAM, chronometer maker, New York City, 1810-20. There is no mention of his name in Naval Observatory records.

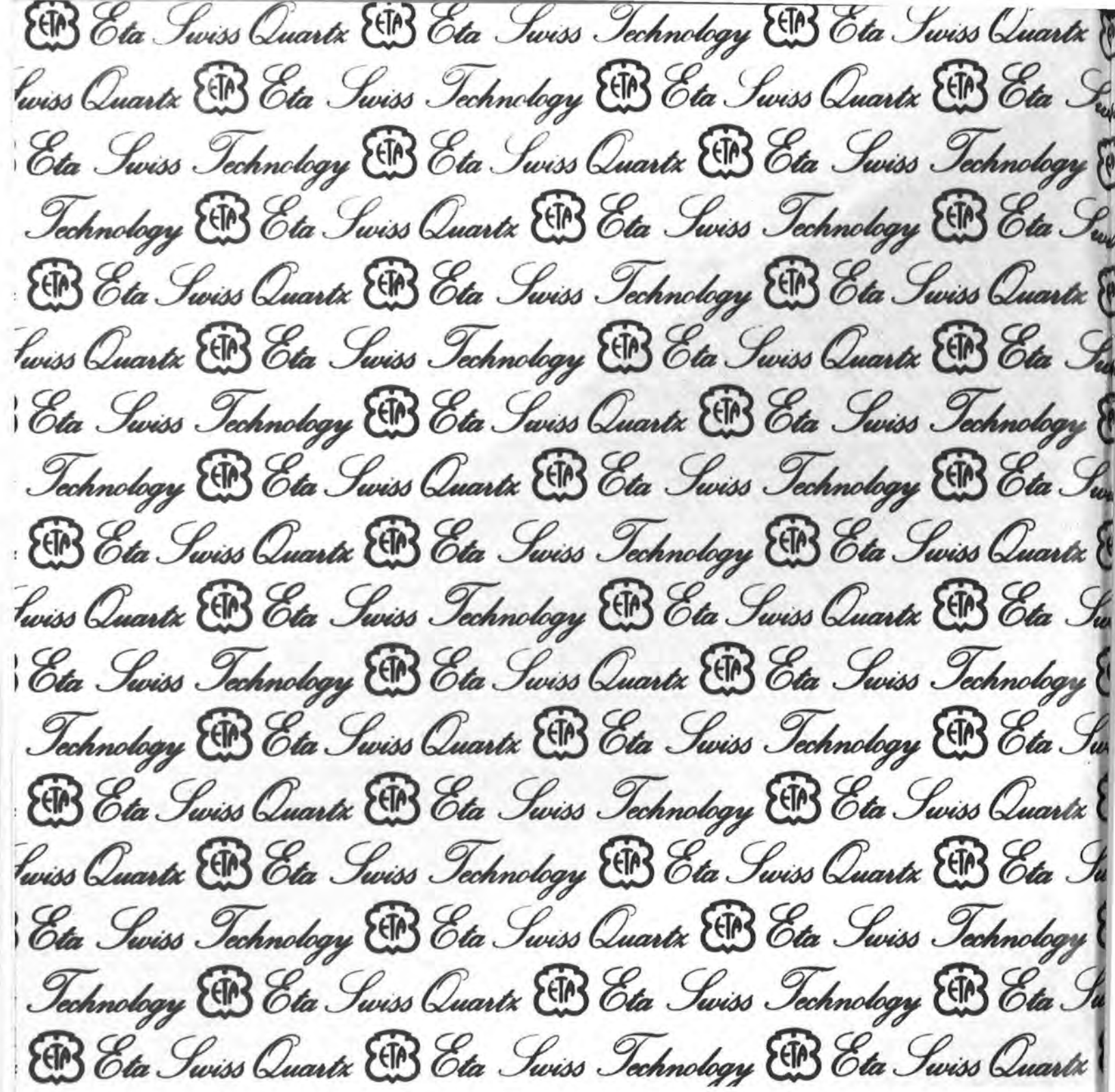
DEMILT, B. & S., New York City. The Demilt brothers, Benjamin, the elder, and Samuel, were not chronometer manufacturers but were the first and foremost nautical chandlers in New York City during the latter part of the 18th century. They began providing nautical instruments and services to those mariners who were making New York their home port or port of call around 1795. At that time, they were located at 233 Pearl Street, which was also their residence. As there was no facility in the New York area to provide a means of accurately checking and rating chronometers, the Demilts erected their own observatory.

The Demilt firm handled several different English makers' instruments. Naval Observatory records show that the Demilts submitted several chronometers made by Charles Frodsham shortly before Samuel's retirement. Of the five Frodsham chronometers submitted, numbers 1447, 1495, 1496, 1510, and 1863, only number 1495 passed with a high enough trial number and the Depot offered them $345.00 for it. Another record shows that on May 23, 1844, trial papers for Parkinson and Frodsham numbers 2473, 2477, and 2511 were forwarded to the Demilts by the Naval Observatory time section.

In their early years the Demilt brothers encountered a myriad of business adversities, but being astute businessmen, they were able to overcome them and prosper, thus amassing a large fortune before Benjamin's death in 1835 and Samuel's retirement in 1839. Upon Samuel's retirement, the business was taken over by Dominic Eggert, who had been an employee of the Demilts for many years. Samuel passed away in 1845, but before his death, he built a free dispensary, located on 2nd Avenue, not far from their business.

DILLON, EDWARD–DILLON and TUTTLE–DILLON & COMPANY, New York City and San Francisco. Edward Dillon learned his trade under the tutelage of J. G. Foster of New York City. Upon the completion of his apprenticeship, he worked for several firms in the New York area. During this time, he came to the attention of Bliss and Creighton. Dillon, being a very superb craftsman, was hired by Bliss

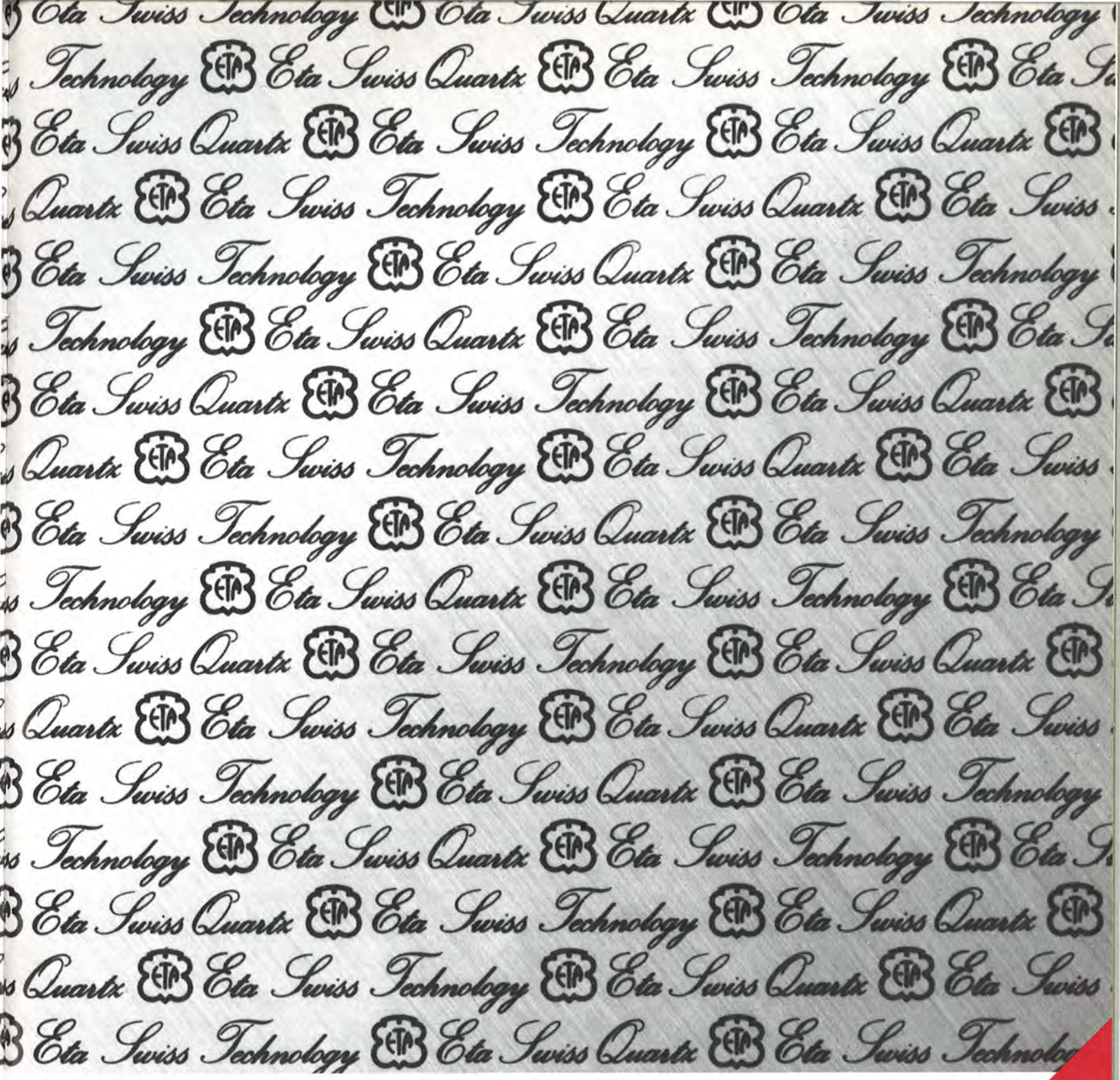
(Continued on page 55)



The label of a leading

For millions of people around the world, these symbols guarantee quality, precision and reliability.

You've seen these trademarks in the past, you will see them in the future — associated with some of the best watch brands. They are your assurance that these watches are equipped with genuine ETA calibres.



technician in timekeeping

ETA SA Fabriques d'Ebauches
CH-2540 Grenchen/Switzerland
Schild-Rust-Strasse 17
Tel. (065) 51 21 11
Telex CH-ETA 349 371

EBAUCHES SA
An affiliate of the
Swiss **ASUAG** group

MANAGING THE CLOCK REPAIR SHOP *

By Steven G. Conover

Managing the flow of repair work through a very small shop is usually not difficult. The repairer works on the clock he thinks he has had the longest, or the clock whose owner is impatient, or the clock he just wants to work on next. This informal approach works well enough until the shop is filled with clocks. Then it becomes necessary to be more systematic, to assign priorities. Unless the repairer organizes the shop, it takes longer and longer to get things done. People have to wait too long, and there are complaints. Estimates lag behind, and parts are not ordered promptly. Sooner or later everything grinds to a halt.

By scheduling your work efficiently, you can keep work moving. There is a lot more involved than just doing the "oldest" job next. You need to work out estimates, get approvals, and order parts. All of this may consume weeks before you can actually repair a clock. When testing time is added on, the total time required may be considerable.

The system which is best for you will depend heavily on what kind of business you have. If you run a clock shop or jewelry store and take in your work over the counter, you deal with each individual customer. Some are willing to wait months for their clocks, but others are not. Many people want an exact price before they allow the work to proceed; others are satisfied with a range. You must reach an agreement with each new customer.

On the other hand, if you do trade work, you rarely meet the clock owner. Instead, each jeweler or clock shop account is a customer to be satisfied. Each will make a different agreement with you. Some may require detailed estimates on every job for customer approval. Others will allow you to proceed based on a price list, expecting you to call any unusual added cost to their attention before going ahead. Although you are usually spared any customer complaints that a particular job is taking too long, you must still satisfy your account in general. You are naturally oriented toward your several trade accounts instead of dozens of individual customers.

When I worked in a clock shop, I found that keeping

EASTERN CLOCK REPAIR
TEST STATUS

CUSTOMER NAME _____

AGENT _____ AGENT NO. _____

MAKE OF CLOCK _____ TYPE _____

ASSIGNED TO _____

	TEST NUMBER			
WOUND	1st	2nd	3rd	4th
DATE				
DAY				
TIME				
TIMING STATUS				
STRIKE STATUS				
CHIME STATUS				
RAN FOR (NO. OF DAYS)				
STOPPAGE				
TIME				
STRIKE				
CHIME				
READY FOR SHIPPING (DATE)				

Figure 3

Figure 1. (All figures are intended for readers' use. Unauthorized commercial reproduction is prohibited.)

EASTERN CLOCK REPAIR

Clock	Cust. ID	IN	EST.	Go Ahead	Repairer	Parts ord/rec.	On Test
French movement	Smith	12/1	12/5	12/12	SGC	12/15	1/18
Crystal Reg.	J 14827	12/3	N/R	12/3	SGC		1/9
S.T. No. 124	J 16891	"	N/R	"	AL	12/10	1/13
Ansonia Iron	J 16899	"	N/R	"	SGC		12/20
S. T. Woodbury	J 16951	12/3	N/R	12/3	AL	12/10	1/10
Colonial 3400 20	GC 210	12/8	12/12				1/20
Miller Ship's	GC 211	"	"				1/22

EASTERN CLOCK REPAIR

REPAIR ESTIMATE

CUSTOMER NAME _____ DATE _____

AGENT _____ AGENT NO. _____

MAKE OF CLOCK _____ TYPE _____

1. CASE				
A. GENERAL CONDITION	GOOD	AVERAGE	BAD	
B. GLASS	GOOD	CRACKED	MISSING	
C. REMARKS _____				
2. MOVEMENT				
A. SPRINGS				
STRIKE	GOOD	WEAK	BROKEN	$XXX
TIME	GOOD	WEAK	BROKEN	
CHIME	GOOD	WEAK	BROKEN	
B. CLICKS				
STRIKE	GOOD	REPAIR	REPLACE	
TIME	GOOD	REPAIR	REPLACE	
CHIME	GOOD	REPAIR	REPLACE	
C. RIVETS				
STRIKE	GOOD	REPAIR	REPLACE	
TIME	GOOD	REPAIR	REPLACE	
CHIME	GOOD	REPAIR	REPLACE	
D. BARRELS/MAIN GEARS				
STRIKE	GOOD	REPAIR	REPLACE	$XXX
TIME	GOOD	REPAIR	REPLACE	
CHIME	GOOD	REPAIR	REPLACE	
E. BUSHINGS			HOW MANY _____	$XXX
F. HAMMER PADS	GOOD	BAD	HOW MANY _____	$XXX
G. PENDULUM	INCLUDED	MISSING	REPLACE? _____	
H. PENDULUM ROD	GOOD	BROKEN		
			SUB TOTAL	$XXX
3. MISC.				
A. OVERHAUL & CLEANING _____				$XXX
B. SHIPPING _____				
C. KEY _____				
D. OTHER _____				
			SUB TOTAL	$XXX

ESTIMATED BY _____

APPROVAL RECEIVED _____

ASSIGNED TO _____ $ _____ GRAND TOTAL $XXX

Figure 2

track of the individual customers was relatively simple. We gave each owner a receipt for his clock on a form that would eventually be the invoice. The clock itself was given an identification tag. The invoice was then placed on a wall-mounted file rack with slots in it. If a detailed estimate was requested by the customer, the invoice went into the top slot, marked "estimates." When we received the go-ahead for the work, we made note of the date and placed the invoice in the next file down, labeled "to be done." If parts were needed, the invoice ended up in the "parts on order" slot. After the work was done, the ticket was placed in the "testing" slot. Dates were always noted, so that we could answer customers without delay when they asked about the status of the job. This was, in fact, half the reason for the file rack—direct exposure to customers. The other main purpose of the file rack was to help in the scheduling of the work, so that no clocks would be forgotten. There was a slot for "to be called," because it often took several tries to get a customer on the phone to give an estimate or to notify them that the job was done. The last slot was marked "complete." We looked through this one every week to see if anyone had apparently forgotten to come in for the repaired clock.

Most of my repair work now comes from trade sources. I keep a separate folder for each account, with a record of our agreement. I keep copies of written estimates and any other correspondence. There is no need for the file rack because I do not have separate invoices for each clock. Recently, I added several new accounts and found myself stuck behind a growing backlog. I began spending precious time trying to determine which clocks were most critical. When clocks were completed and testing, I found it hard to remember when to wind them, and I often forgot to check for proper regulation. Worse, I found that as I got busier, I sometimes neglected to charge for new parts I had installed.

Finally I decided to draw up a master schedule, as shown in Figure 1. I am the last person to look for more paperwork to do, but after a few weeks, I found things easier to manage. My friend Al Diamond, who works with me, designed the Repair Estimate in Figure 2 and the Test Status, Figure 3. We are in the process of revising these forms to suit our needs even better.

The master schedule in Figure 1 keeps me up-to-date on several important categories of information. It tells me when the work comes in, whether I have done an estimate, and when approval is received. It tells me whether I am repairing the clock myself, or have assigned it to one of my associates. The overall purpose of the form is to identify which clock I should work on next. Another benefit is that if someone asks, I can give the status of a job. When the completed clock is put on a test run, I fill in the date.

The Repair Estimate, Figure 2, is filled out when I do the estimate, or when I start the job if no approval is needed. Four weeks or so later, when I write up the invoice for the work, I will refer to the form so that I include everything. Eight months later, should a customer question arise, I can look up the form and be certain of what was included in the job.

Figure 3, Test Status, will show when a clock is complete and ready to return to the owner. It does this by means of the written record of when the clock was wound, and whether it chimed and struck throughout the test period. The form highlights any timing problems to be resolved. I staple this form over the Repair Estimate, and place it next to the clock on the test shelf. Having the forms there somehow makes it easier for me to remember to wind and regulate the clock. On the day I pack the clock for the customer or trade account, I file the two forms away. Then I have a complete record of the job in case I need to refer to it later.

I am convinced that the three forms illustrated here can make a shop more efficient when there is a volume of work to be handled. It takes time to fill them out, but it is well worth the effort.

SELL IT!

Basically, you have two types of customers:

1. The repeat customer who relies on your judgment because of favorable past experience.
2. The first-time customer who may ask for a specific watch. Of course, you hope you have what he wants. If not, you have the KNOWLEDGE of your stock and hopefully the confidence in what you *do* sell to prove yourself a true salesperson.

A TRUE SALESPERSON SELLS AN ITEM AND DOES NOT WAIT FOR IT TO BE BOUGHT.

Do not put down one brand of watch in order to sell another.

KNOWING WHAT YOU ARE SELLING COULD VERY WELL MAKE YOU THE VERY BEST WATCH SALESPERSON.

SERVICE IT!

What will happen after you big sales seasons? What about those watches that don't work after removed from their gift-wrapped boxes?

When a customer comes in after the sale, claiming the new watch doesn't work, this is where KNOWLEDGE on your part can save the day as well as the reputation of your store. Often the customer is merely not operating the watch properly.

When possible, RENDER AFTER SALES SERVICE ON THE PREMISES.

If required service is too extensive, however, return the watch to the appropriate SERVICE CENTER. . . and by all means, MAKE A FRIEND AT THE VARIOUS SERVICE CENTERS. This will go a long way when you are really in a jam. YOU CATCH MORE FLIES WITH HONEY THAN WITH VINEGAR.

Taken from a speech delivered by Jay M. Foreman, Jr., at the 24 Karat Club of Southern California 1980 Sales Seminar.

ZANTECH

for all your
DIGITAL WATCH
service needs

2nd Edition
$19.95

Model Q32 - $45

Model 930 - $65

Model 810 - $65

- TRAINING
- EQUIPMENT
- PARTS

STEREO MISCROSCOPE
10X & 30X magnification.
Large working distance,
built in light.
Model M85 - $379

Model 840

MODULE TESTER
Measures current, voltage switch functions and quartz crystals on the module. Analyze the problem in minutes.
Model 800 - $850 includes analog.
Universal Module Fixture
Model 840 - $195

QUARTZ TIMER
The fastest and most sensitive, one reading per second, no contact necessary. Times all digital and analog watches in or out of case. 32768Hz or 786432Hz. Model 1000 - $995. Includes analog sensor. (Remote sensor avail.)

EQUIP A COMPLETE QUARTZ WATCH SERVICE CENTER FOR LESS THAN $2,700.

For further information regarding Digital Watch Services, equipment, parts, training course, or placing order, write or call ZANTECH, INC.

Thank You, Louis A. Zanoni. President

ZANTECH INC. • 77 SHADY LANE • TRENTON, NEW JERSEY 08618 • 609 586-5088

ELECTION TIME AGAIN !

This month's news concerns the upcoming election of AWI Directors. Of the eleven nominees pictured here, you, the AWI membership, will elect five individuals to serve a three-year term of office. They will join the other Board members during the annual Board of Directors meeting (June 27-28 of this year). At the Affiliate Chapter meeting, the Affiliate Chapters will select a sixteenth Director to serve a one-year term on the AWI Board.

During April, ballots, information about the candidates, and voting instructions will be received by each active member who is eligible to vote. This material will come by first class mail. Ballots are to be marked and sent in the official ballot return envelope to the certified public accountant who is charged with the responsibility of counting the ballots. All ballots must be postmarked on or before the deadline date mentioned in the voting instructions.

Members will note that each ballot return envelope is numbered. This will insure that no bogus ballots will be counted. The certified public accountant will separate each ballot from its return envelope, thus voter anonymity is assured.

Only ballots should be sent to the certified public accountant. *Do not include any notes or requests* as these would not be received by AWI personnel until sometime after July 1. The CPA keeps all materials received during the election in his custody until that time.

During the annual Board of Directors meeting this June, the sixteen AWI Directors will meet to select from among themselves the Executive Board for 1981-1982. The Officers selected will be President, First Vice-President, Second Vice-President, Secretary, and Treasurer. Therefore, when you vote for the Board of Directors, you are also indirectly electing AWI Officers. Everyone should study the qualifications of each candidate carefully when the election material is received. We hope each member will take the time to vote during this year's election.

CANDIDATES FOR AWI BOARD OF DIRECTORS

(Listed alphabetically)

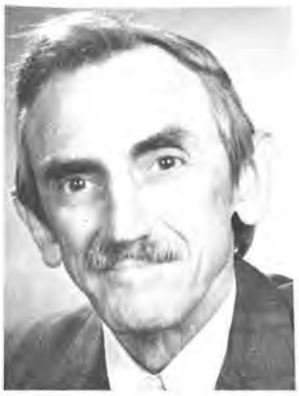
Robert Bishop
Pittsburgh, Pennsylvania

Willard Blakley
Moscow, Ohio

Karl Buttner
Albuquerque, New Mexico

Buddy Carpenter
Tarboro, North Carolina

Jerry Jaeger
Sheboygan, Wisconsin



Robert Leach
Urbana, Illinois

Charlie Mann
Tacoma, Washington

Sean C. Monk
Bloomfield Hills, Michigan

Howard Opp
Chillicothe, Ohio

Jack Tillman
Philadelphia, Pennsylvania

Marvin Whitney
Alexandria, Virginia

Your Vote COUNTS!

In the Spotlight© 1981
by Orville R. Hagans

Orville R. Hagans, CMC, CMW, FAWI, FBHI

Krazy Clocks:

This month's article marks the end of our journey into the world of "Krazy Clocks." We hope that you've enjoyed being introduced to these clocks which represent both work and play, and that perhaps you've been inspired to try something a little Krazy of your own!

Kinetic Sculpture

Not Crazy, But Ingenious

This unusual timepiece was created by Lawrence Hunter of San Diego, California. He is on the art department faculty at San Diego State University and teaches furniture design.

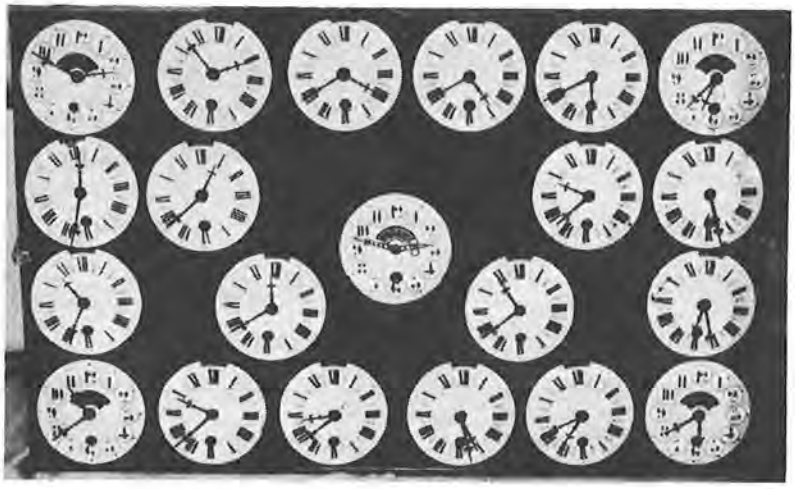
This author was contacted by a watchmaker in Australia who had seen an article in the spring, 1978 issue of *Time Woodworking*. We finally located Mr. Hunter and he supplied the following information with photo.

The clock is 7 feet, 6 inches high, 36 inches wide, 19 inches deep and is made of walnut with 1/8 inch birch dowels. The photo gives you an idea of its height, as Mr. Hunter is slightly over 6 feet tall.

The clock's great wheel has 160 pin-type teeth; the escape wheel has 72 teeth. The lantern pinion has 8 leaves. The pendulum beats once every 1¼ seconds, and the single hand turns once an hour.

This is the fourth clock which he has designed, and he considers them to be kinetic sculptures which also keep quite accurate time. He plans a series of six such clocks. Three have already been purchased, and he has clients for the others when completed. The current price is $4,000.

He has completed two other very interesting clocks, and a third—a wall clock—is almost complete.

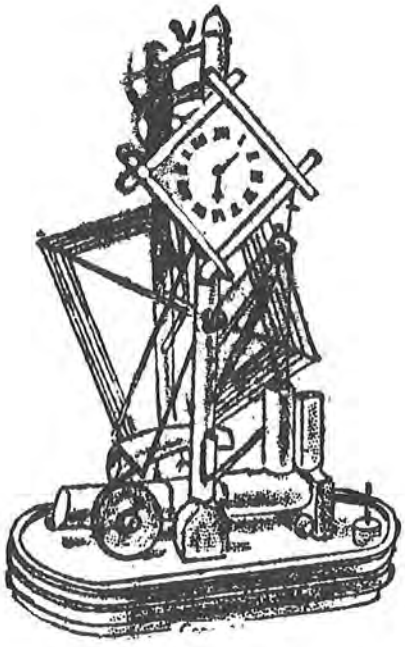


COFFEE TABLE CLOCK

Who is crazier than clock nuts? Some 30 years ago, one decided to reduce his porcelain clock dial inventory, so he made a coffee table with 21 dials. The center dial is a clock with a battery movement. The top of the table is covered with plate glass. Crazy, but fun.

TREE BRANCH CLOCK

This clock was made entirely of tree branches without a single metal part. It was constructed in Paris by Irene Kraus.



"CLOCK CHATTER" © 1981

By Otto Benesh, CMC

Replacing A Dead Beat Pallet

A Quick and Easy Method

Recently, a friend of mine called, wanting me to take a look at a "French clock" of his that would not run. I said, "Sure! Bring it to the shop and we'll see what's wrong with it."

The clock turned out to be an Austrian Regulator–but he was correct about one thing: the clock would not run.

The clock that this acquaintance of mine brought to the shop is shown in Figure 1. It can be seen that it is a quality item; however, like so many clocks, it had been subjected to mistreatment over a period of time. The worst of this was apparent in the pallets, as shown in Figure 2.

The pallets evidently had been ground down to remove grooves on the faces, thereby creating excessive drop. As if this were not enough, the impulse faces had been ground back so that there was no impulse at all. The escape wheel tooth fell on the locking face and then abruptly dropped off the pallet. Figure 3 shows the pallets removed from the arbor. The entry pallet is at the left of the picture. Incidentally, the pallets had not been reversed on the arbor. Close examination of the pallet and the collet showed no evidence of any work having been done.

Now, how was I to go about correcting this situation in the clock that this person (who I really didn't know very well) had literally forced on me for repair?

A rough drawing was made as shown in Figure 4. The distance between the escape pivot hole and the pallet pivot hole was measured with a pair of dividers and marked on a center line drawn on a piece of paper. The escape wheel diameter was measured and its circumference drawn with a compass. Counting the old pallet's span on the escape wheel, it was found that the escapement had been designed for 11½ teeth.

At this time, it should be stated that this exercise is not intended to lay out the new pallets by precise angular measurements, but rather to present a quick method which presupposes your knowledge of the angles for drop, lock, and impulse as you finish and fit the escapement.

Figure 1

Figure 2

Figure 3

The escape wheel is placed in its hole on the drawing and arcs are drawn. These arcs are equidistant from the pallet center on both sides of the escape wheel. They are also drawn slightly over-size and brought to the correct fit while finishing.

Figure 5 shows the drawing, the old pallets, and the roughed-out new one.

A piece of steel, capable of being hardened, is selected for the new pallets. Steel known as flat ground stock is excellent for this purpose. It comes with both water and oil hardening capabilities. The water hardening is preferred. This steel is available from any machine tool supply house and comes in a wide variety of widths and thicknesses.

The steel comes in gray, and in order to provide good visibility, it is desirable to coat the steel with one of the layout dyes that are available. Figure 6 shows the dye being applied. The dye is available from machine tool suppliers, is quick drying, and comes in several colors, blue or black being preferred.

As this is a quick, practical method, the old pallets are used as a guide for the arms and top. They are placed on the flat steel, leaving room for the new faces as shown in Figure 7.

After clamping the old pallets on the steel with a small machinist's clamp, the outline is drawn using a scriber as shown in Figure 8. With a center punch, a mark is made which corresponds to the center of the old arbor hole. Using dividers set to the arc on the drawing, these arcs are transferred to the new piece. The impulse faces are likewise transferred by use of dividers. The outline for the new pallets is shown in Figure 9.

Those of you who have attended the clock restoration course know

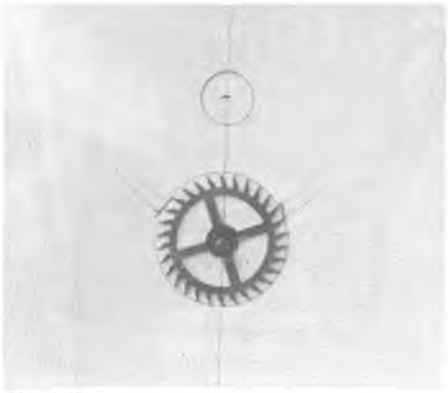


Figure 4

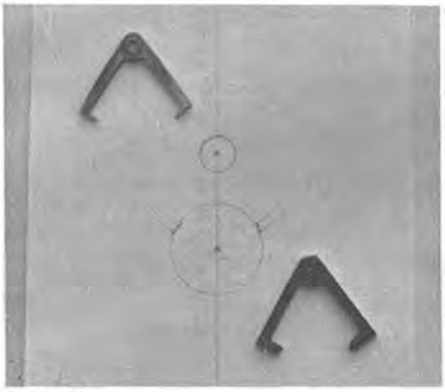


Figure 5

Figure 6

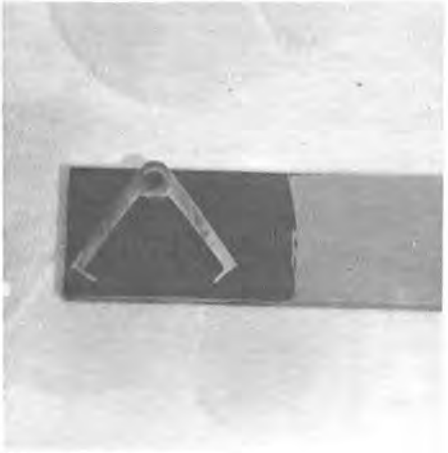


Figure 7

that I am partial to a piece of wood with a "V" notch for sawing. The operation of cutting the pallets using the fingers to hold the work is shown in Figure 10. This pair of pallets took 20 minutes to cut.

The pallets are now filed smooth, i.e., the arms, top, and faces are left rough. Figure 11 shows this operation. The right hand guiding the file has been omitted for photographic clarity. When all the saw marks have been filed out and the arms and top have been brought down to the scribed lines, a semi-finish is given to these parts by draw filing. This is done by placing the file at a right angle to the work and pulling the file toward you. Figure 12 shows this operation which puts a smooth finish on the work. A fine-cut file should be used.

It should be mentioned that finishing and polishing consists of using materials and methods (files, charged papers, powders, and other materials), each one being for the purpose of removing the marks left by the previous method or material. When you arrive at the point where there are no more marks to be removed, you are finished.

The pallet arbor hole is now drilled and the pallets temporarily fixed on the arbor. Then the faces are filed to proper size. The usual specifications of 1° for lock and 2° for impulse are used. These can be judged by eye and checked by placing the pallets in the movement. If there is trouble in judging these angles, they may be drawn on paper.

When the pallets have been fitted and all is working correctly, it is time to harden them. This is done by holding them in a pair of pliers with only the faces showing. Heat is applied until a red is obtained—the cherry red so often

(Continued on page 47)

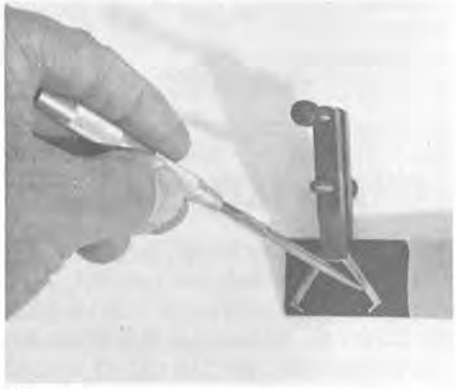


Figure 8

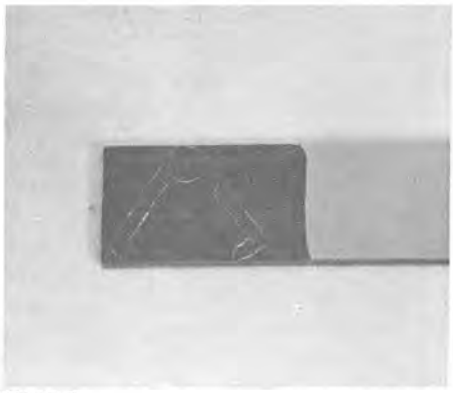


Figure 9

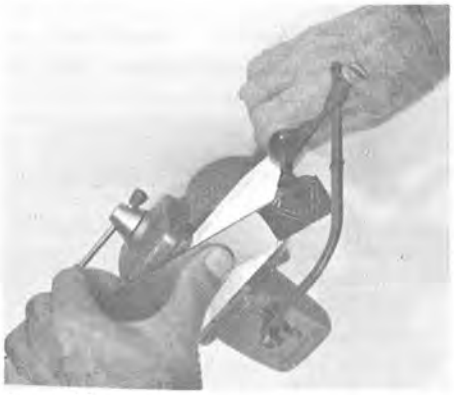


Figure 10

Figure 11

Figure 12

VIGOR® TECHNICIAN'S TOOL KIT TK-105

A general selection of all-purpose tools invaluable for precision or miniature work projects. Kit contains 4½ in. chain nose, flat nose, and side cutter pliers – 4½ in. needle files – flat, triangular, round – 4 in. metal fine wire trimming scissor – metal point oil applicator with cover – cutting broach – fine dusting brush – fine point tweezer – carbide marking scriber – 6 in. steel rule – fine point all-metal screwdriver – brass head mallet with metal handle – double end pin vise, adjustable – tube of Aron Alpha "45 second cement" – applicator with micro lubricant grease – pegwood probing sticks – spare part tubes approx. 6 in. long (4 pieces) – complete in leather zipper case.

$79.95

VIGOR® PRECISION TOOL KIT TK-110

This kit provides a small selection of specially-chosen hand tools in a "vest pocket" roll-out case. Very handy to have around! Kit contains cutting broach – smoothing broach – fine hair brush – fine knife with blade – carbide scriber – 4½ in. flat needle file with handle – 4½ in. triangle needle file with handle – pegwood probing sticks – double end pin vise – metal screwdriver, fine blade – fine point probing tweezer – fine point probing tweezer, self-locking – sharpening stone – complete in plastic "roll up" case.

$27.00

MATT-GUN NEW TECHNIQUE FOR WAX MODELING

CA-955 **$64.25**

The MATT-GUN provides a new technique for modeling jewelry and mini-sculpture with the extrusion of hard wax. Excellent for the model-maker, sculptor, hobbyist. MATT-GUN is actually a miniature wax extruder which transforms hard wax pellets into "wire" of different shapes and thicknesses. A self-contained kit supplies the gun. With it are all the accessories necessary for the gun and for original designs and model-making.

As important as the gun is the generously-illustrated 106-page hard-cover book, WAX MODELING FOR JEWELRY AND SCULPTURE, by Adolfo Mattiello. It provides full instruction on the extruding technique, and tells how to get the most out of the MATT-GUN. It takes the reader through actual modeling projects, shows examples of famous designer's creations, and provides invaluable compilation of sources of supplies, information and education.

STANDARD KIT for Jewelers and Hobbyists contains **MATT-GUN** with 2 brass tips, 3 styles of wax "to get started," supply box, and complete 106-page book.

Quick credit to accounts well-rated by Dun & Bradstreet or Jewelers Board of Trade

Name _____

Firm _____

Address _____

City/State/Zip _____

MARSHALL-SWARTCHILD

2040 Milwaukee Ave., Chicago, IL 60647 — 312/278-2300
109 North Akard St., Dallas, TX 75201 – 214/741-1454
1212 Main St., Houston, TX 77001 – 713/759-9009
657 Mission St., San Francisco, CA 94105 — 415/421-2153
1425 Fourth Ave., Seattle, WA 98101 — 206/682-6158

TOLL-FREE PHONE ORDERS (except—sorry!—Alaska and Hawaii)—9-4 C.D.T. WEEKDAYS. ILLINOIS.—800/972-3776. OTHER STATES. 800/621-4767 OR MAIL ORDER TO P.O. BOX 726, CHICAGO, IL 60690

WATCH ADJUSTMENTS

By Joseph Rugole, CMW

THE BIMETALLIC BALANCE

The bimetallic watch balance is one of the finer inventions of horological science. It represents a combination of scientific research, metallurgical know-how, and watchmaking precision. It has been mentioned before that compensation must be automatic. The best way to do this is to use the same phenomenon which causes the loss of elasticity to trigger an automatic reaction to compensate for it. If it could be arranged that the change in the radius of gyration were proportional to the loss of elasticity, one could expect perfect compensation. Unfortunately, this is not quite possible, and the problem becomes more complex because of it.

The creation of the bimetallic balance was possible because of the scientific knowledge about thermal expansion of metals. When two metals with different coefficients of expansion are fused together, their respective elongations correspond to their coefficients of expansion. To achieve different elongations, they cannot remain straight, but must bend so that the metal with larger coefficient takes longer radius and vice versa. This was the basis for the creation of the brass and steel bimetallic balance. The basic thought behind it was this: if the hairspring loses some of its elasticity when the temperature is increased, the time of one vibration could remain constant if the radius of gyration of the balance wheel would become smaller for an appropriate amount. If the balance wheel is made in such a way that the brass strip is placed on the outside and the steel on the inside of the balance rim, and the rim is cut to allow for expansion, then the ends of the rim will curve inward in higher temperatures and outward in lower.

Initial experiments indicated that the rim did not always curve for the same amount for the same temperature variation in different balances. Some balances were more sensitive and some less so. The problem was finally solved by Yvon Villarceau who did very extensive research and experimentation on the subject. He found that to make the most sensitive bimetallic balance, strict attention had to be paid to the proportions of brass and steel. They must be such that the bending moments of the two metals are exactly

Figure 1

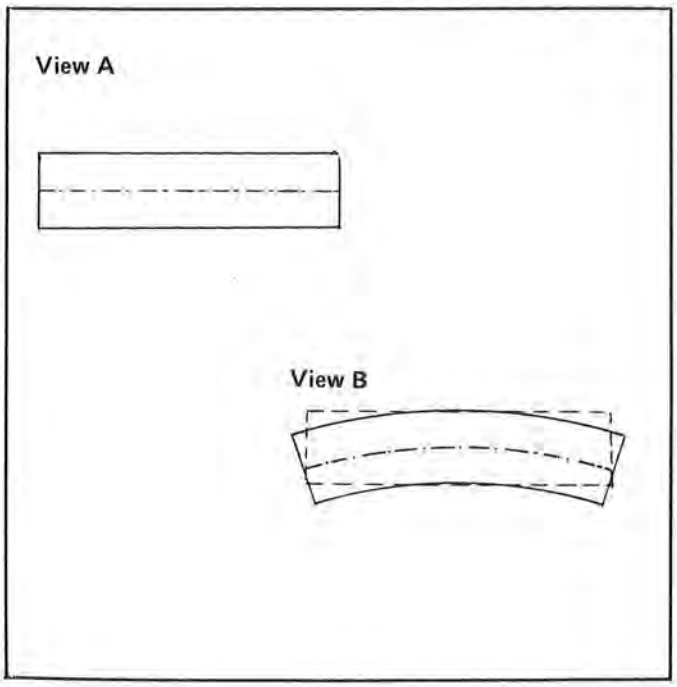
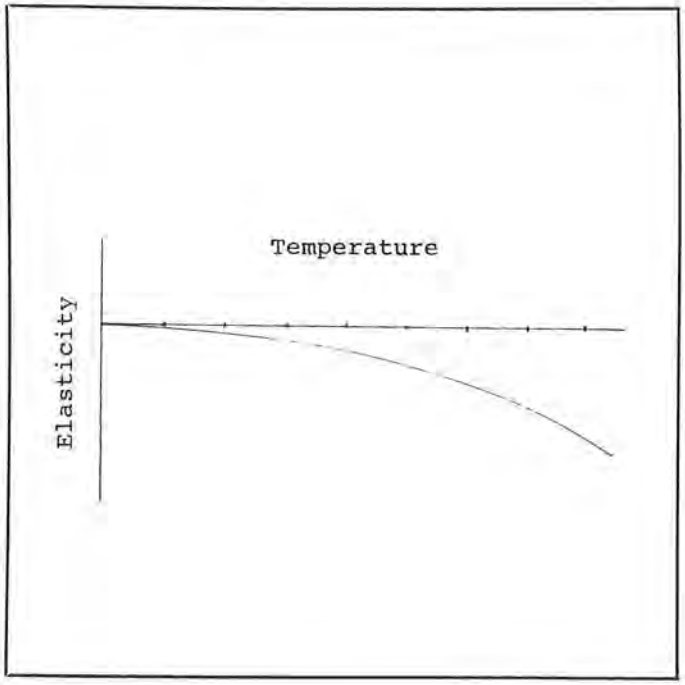


Figure 2. Loss of elasticity of a steel spring due to increase in temperature.



equal. When this is achieved, the relative position of the neutral axis of the rim will be where the two metals are joined. Furthermore, the neutral axis changes its length in varying temperatures proportionally to both metals.

The term "neutral axis" needs some explanation. Figure 1, View A shows a rectangular piece of metal of uniform dimensions. The "neutral axis" is indicated with a broken line through the center. If this metal were bent as in Figure 1, View B, the molecules on the top side would be forced to stretch and those on the bottom to compress. The molecules along the broken line would remain equally spaced as before bending. That is why the plane along which the molecules are stressed the least is called the "neutral axis."

The balance wheel is made of two metals which have different resistance to bending. Under load, brass will reach the point of strain (where it will change its shape permanently) with less pressure than steel of the same dimensions. To equalize the resistance to bending, the less resistant metal must be made thicker. Villarceau found a mathematical solution for finding the proper proportions between brass and steel. His formula states that the ratio between thicknesses of two metals must be inversely proportional to the square root of their respective elasticities. This is expressed in the equation:

$$\frac{\text{Thickness of brass}}{\text{Thickness of steel}} = \frac{\sqrt{\text{Elasticity of steel}}}{\sqrt{\text{Elasticity of brass}}}$$

When proper values for elasticity are applied to this formula, the ratio between brass and steel should be $\frac{17}{12}$, i.e., 17 parts of brass to 12 parts of steel. Since $\frac{18}{12}$ ratio is easily reduced to $\frac{3}{2}$, the practical application of this ratio has been universally adopted.

There is yet another problem with compensation for temperature variations. Although the balance wheel when constructed by the above rules is very sensitive to temperature variations, the compensation it provides is not perfect. The problem lies in the inherent characteristics of the steel hairspring. Its modulus of elasticity does not change proportionally with the change in temperature. At higher temperatures, the loss of elasticity per degree centigrade is much greater than at lower temperatures. This can be illustrated by plotting elasticity against temperatures as determined by experiments. The resultant is a parabola as shown in Figure 2, i.e., a curve the equation of which is a quadratic expression. Unfortunately, the compensation provided by the balance is perfectly uniform. For every degree of change in temperature, the radius of gyration changes for exactly the same amount. When the change in the radius is plotted on the graph against temperature, the resultant is a straight line as shown in Figure 3. By combining the two effects—namely the loss of elasticity of the hairspring and the change in the radius of gyration—we obtain partial compensation for the system. Figure 4 shows graphically the result of such compensation. There are only two temperatures at which the compensation is perfect. Between those two points, the watch will show a gain, and beyond them, there will be a loss of time. This error in compensation is called "The Middle Temperature Error." When the two temperatures are selected at which the compensation is perfect, the mid-point between these two temperatures will show the greatest error. In North America, it became customary to adjust watches at 45° and 90°F so that the fastest rate occurred at approximately 67°F. At this point, the Middle Temperature Error was about +2 to +2½ seconds per day.

Figure 3. Expansion of brass and steel

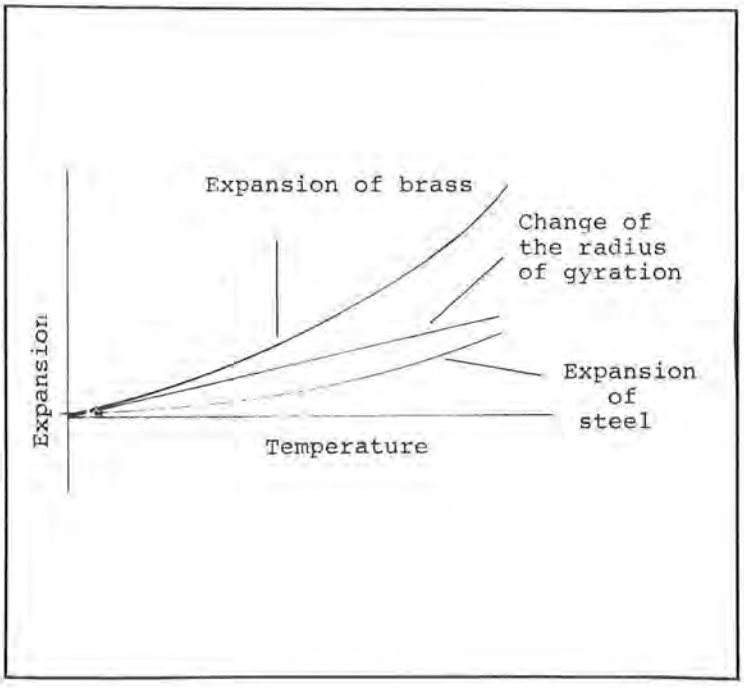
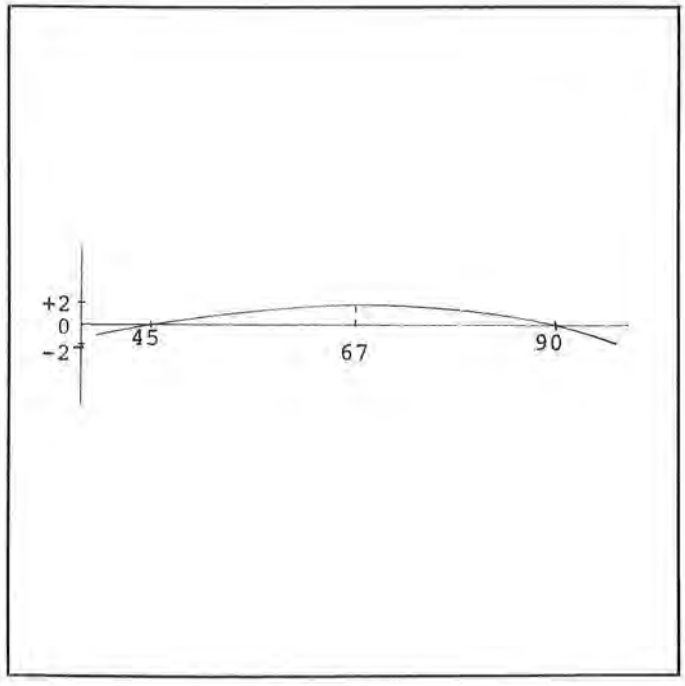


Figure 4. Middle Temperature Error



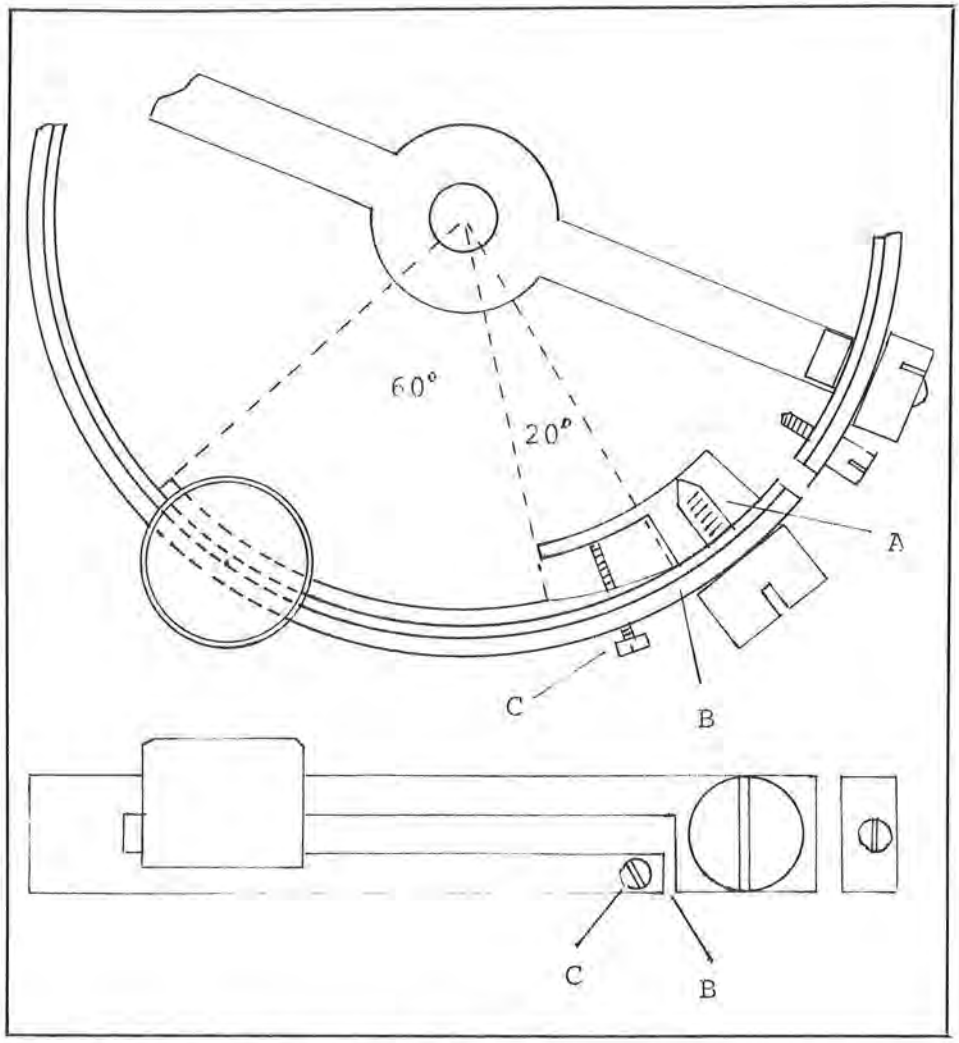


Figure 5. Kulberg's Auxiliary Balance Wheel for Marine Chronometers. (Plan & Side View)

Such a small variation was quite acceptable for even the better pocket watches, but it was still much too large for marine chronometers. Many renown chronometer makers attempted to reduce the error with a variety of devices and alterations of the balance wheel. These devices were usually applied or affixed to the balance wheel and became known as affixes or auxiliaries. Their only purpose was to alter the rate of change of the radius of gyration so that it became more equal and opposite to the rate of change of the elasticity of the hairspring for which they had to compensate.

One of the best affixes to the balance was made by Kulberg. It is generally known as "Kulberg Auxiliary" as shown in Figure 5. The balance has the usual bimetallic rim, but one-third of the width of the steel of the rim has been reinforced over an arc of 80° on opposite sides and toward the cut. The middle third of the width of the rim has been cut away, and a block (A) has been screwed to the end of the rim. The auxiliary rim is cut through at B and prevented from moving inward by a screw (C) which can be adjusted to bank against the block (A). The adjustment for the middle temperature error is achieved by slightly manipulating the screw (C) under specific temperature conditions. With this auxiliary arrangement, it is possible to adjust chronometers for middle temperature error from 0 to +.2 sec/24 hours. HTJES

AWI Bench Courses / 1981

	Programs	Instructors
A	Basic Electricity & Use of Meters	Jeager
B	Citizen LCD Alarm	Carpenter
C (a)	Citizen LCD Multi-Alarm	Broughton
C (b)	ESA/ETA Quartz Analog	Broughton
D (a)	Seiko 4300 Ladies' Quartz Analog	Smith
D (b)	Seiko LCD Chronograph/Alarm	Smith
D (c)	Seiko 0903A Men's Quartz Analog	Smith
E	Intro. to Solid State Watch Repair	Nelson
F (a)	Bulova Quartz Analog (SMQ)	Opp
F (b)	ESA LCD Chronograph	Opp
G	ESA Digital/Analog	Biederman
H	Clock Restoration	Benesh

APRIL, 1981

5	G	Greenville, SC	Biederman
12	A	Philadelphia, PA	Jaeger
25,26	H	Dallas, TX	Benesh

MAY, 1981

3	E	Seattle, WA	Nelson
17	D (b)	Zanesville, OH	Smith
17	E	Kansas City, MO	Nelson
23,24	H	Los Angeles, CA	Benesh

JUNE, 1981

7	E	Rochester, NY	Nelson
14	D	South Bend, IN	Smith
14	A	New Jersey	Jaeger

I AM INTERESTED IN YOUR BENCH COURSE TO BE PRESENTED ON _____ AT _____ .PLEASE SEND ME MORE INFORMATION.

NAME: _____

ADDRESS: _____

CITY, STATE, ZIP: _____

SALES TALK

By Wes Door, CMW

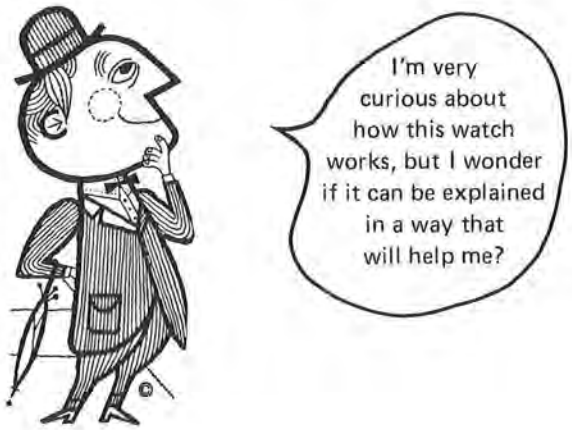
Words That Help

Isn't it amazing that all of the words we use are made up from only 26 letters? From these letters, in order to sell our products and our services, we must formulate the proper words to use. We should use words that help, not hurt, when we speak to our customers. We should not say, "It's no use explaining this to you, since a watch is very complicated and I'm sure you would not understand."

Even when we are speaking to our own trade, it is important to know how to impart different levels of technical knowledge. I remember Bob Nelson saying that while he was conducting his solid state seminars for AWI, he found it necessary to explain the difference between LCD and LED, as some watchmakers were not familiar with these terms in the earlier days of solid state timepieces. We should not feel embarrassed to ask questions and we should also be able to explain things to our customers without using words that "hurt."

It is seldom necessary to go into complete details when explaining a repair job or the functions of a watch, but sometimes a customer is really interested and wants to listen to an explanation. When this is the case, we should take the time necessary, but should employ a formula with which I'm sure you are familiar called the KISS formula. This really means, "Keep It Simple, Stupid," but we will drop the word "stupid" as hardly flattering to anyone, including ourselves. Normally, we would not go into details and use terms like bimetallic compensating balance, unless a customer really wanted a technical explanation; even then, the KIS formula should be kept in mind.

Perhaps a rough, free-hand sketch is warranted to accompany our explanation. Do not get out protractor, compass, or even a ruler as we are not trying to win a prize or compete with AWI drawings. We can draw on anything, but preferably on something displaying our name, such as a scratch pad or the back of our calling card.



Let's say we are explaining the regulation method used on our customer's old pocket watch to adjust for heat changes. In the process of the explanation, we may be able to groom our customer for a future new watch purchase. As we sketch a balance wheel and hairspring, our conversation might go something like this:

"Your watch has a bimetallic compensating balance wheel, which means the balance is made of two metals. You see, as your watch gets hot, the steel hairspring will lengthen and cause the watch to slow down. At the same time, the balance 'arms' will pull in toward the center and cause the watch to run fast enough to compensate for the longer hairspring."

"Of course, regulation of your watch can never be as close as in our new quartz watches. We can adjust them to about one minute per year."

Although we may seldom use the sketch method with customers, there is one way in which all repairs should be illustrated. Whenever we replace parts, we should return the old broken parts to the customer. I like to tape the old parts to the outside of the job envelope. When we deliver the watch to our customer, we simply point out the old part. This takes up very little space on the envelope and is very impressive to the customer. Just as when the television repairman leaves the old tubes, etc., our customer has proof that these parts were really replaced.

Although in selling we must be careful what words we use, we can still tell stories or even jokes if they are clean, in good taste, and appropriate. However, if we are laughing at a joke at the moment someone enters our store, they will assume that we are laughing at them.

In conclusion, we should use only the best and most flattering humor and the simplest technical language when choosing the right words to use with our customers.

Buy now,
Wes

A.W.I. is Horologists, Helping Horologists

The officers, directors, and technical staff of the AMERICAN WATCHMAKERS INSTITUTE are practical watchmakers and clockmakers—they not only know the theory, but the practical side as well—they've either done it or are doing it now!

The basic purpose of the AMERICAN WATCHMAKERS INSTITUTE is to encourage and assist horologists to improve their technical skills, knowledge, and income. It is AWI's aim to bring the horologist the most up-to-date information available on developments in all facets of the industry.

How can we do this?

Stimulating, how-to articles appear each month in HOROLOGICAL TIMES.

The technical information stored in the files and library at AWI Central can be yours upon request. This includes more than 4,000 individual TECHNICAL BULLETINS.

A 24-hour HOT LINE brings members quick response to pressing technical requests.

Personal counseling by America's leading horologists who take time from their work at the "bench" to help fellow craftsmen. Their response might not always be written in the most scholarly style, and might occasionally misuse the "Queen's English," but they usually get the point across.

Practical "bench" experience is provided during AWI's numerous BENCH COURSES held in all sections of the country. School instructors attend AWI in-service training each year. Solid state residence courses for the repair of solid state watches are scheduled periodically during the year.

AWI invites everyone interested in horology to join with us in advancing the art and science of HOROLOGY.

THE WATCH AND CLOCKMAKERS' BUYER'S GUIDE

A "MUST" FOR EVERY HOROLOGIST!

Only $7.95 or FREE

With membership in the American Watchmakers Institute

The ever-popular *Clockmakers' Buying Guide* by Charles Terwilliger has been combined with the American Watchmakers Institute's *Sources*, resulting in this impressive, new horological handbook, *Watch and Clockmakers' Buyer's Guide*.

This combination—watch supply data thoroughly researched by AWI and the expert material from the *Clockmakers' Buying Guide*—produces an invaluable publication. The *Watch and Clockmakers' Buyer's Guide* is a must for anyone connected with the field of horology.

Send a check or money order in the amount of $7.95 for the GUIDE only, or a request for membership along with $30.00 and receive the GUIDE FREE, to:

AMERICAN WATCHMAKERS INSTITUTE
3700 Harrison Avenue
Cincinnati, Ohio 45211

What a Splendid Idea!

application for membership

American Watchmakers Institute

3700 Harrison Avenue Cincinnati, Ohio 45211

Enroll me immediately so that I can share in all the benefits of A.W.I. membership. Here is my $30.00 for annual dues.

Name (please print) _____

Address _____

City _____ State _____ Zip Code _____

Please check: Watchmaker ☐ Watchmaker-Jeweler ☐ Clockmaker ☐

Retail Jeweler ☐ Student ☐ Other _____

If you are a member of a guild or association or school, please indicate

Name of Organization or school _____

If you are certified, Indicate Type of Certificate _____ Number _____

REPAIRING THE DUPLEX ESCAPEMENT *

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

The very peculiar New England-Waterbury duplex escapement was, aside from the jeweled lever and pin lever watches, the only mass-produced escapement watch in the United States.

Most requests concerning this watch are for instructions on how to make the unusual balance staff and how to solve problems arising from inequalities of the peculiar star-shaped, sunburst-style escape wheel teeth. Little instruction on these matters has found its way into print.

What makes the duplex balance staff unusual is the thin, longitudinal slit in its impulse finger post which allows the escape wheel's long, locking teeth to pass. Figure 1 shows the Waterbury type of balance staff with the typical "passing slit." Because this longitudinal slit is not easily made, it is better to attempt to repivot the staff, should the pivot break, than to make a complete new one.

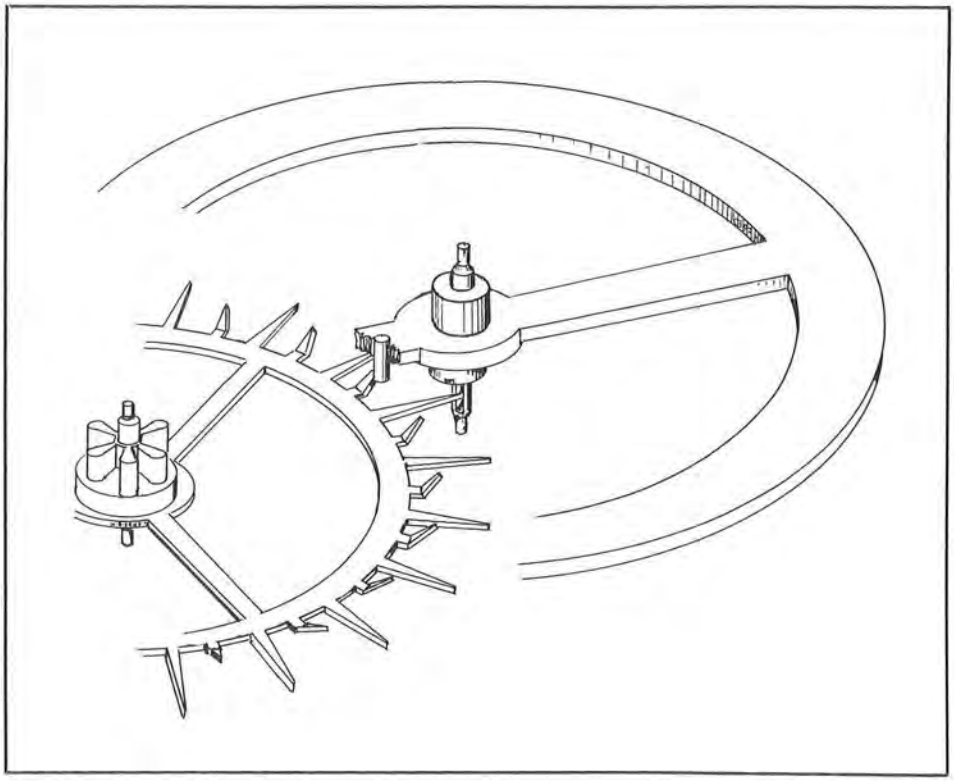


Figure 1

Making a balance staff

Instructions on repivoting have been covered and illustrated comprehensively in this writer's book, *Bench Practices for Watch and Clockmakers.* When repivoting is impossible due to severe breakage of the staff or loss, a complete new staff is required. In very high grade duplex watches, the staff is secured to the balance by riveting, much as modern staffs are today. Also, the safety roller with its passing slit is often removable much like the two-piece rollers in American railroad watches.

Thus in making a new staff for a watch, both the impulse finger and the safety roller of the old staff can be removed and fitted to the new one. For the high grade old English, Swiss, or French duplex watches, staff-making is much the same as for the riveting-secured balance staff, although some of these were secured to their balances by the simpler friction-fit method. However, just as often, the safety roller and its passing slit

Figure 2

* Reprinted with permission of "Jewelers' Circular Keystone," June, 1979

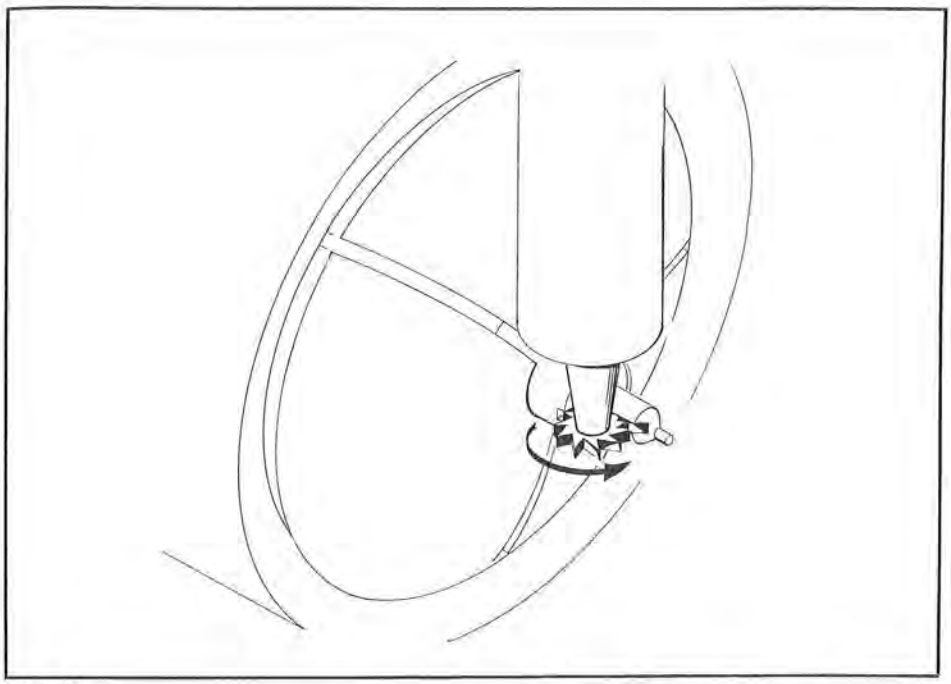


Figure 3

Figure 4

Figure 5

are part of the one-piece staff.

The best method of making the passing slit in the post is with a tiny miller held in the milling attachment to the lathe. Since most watchmakers do not possess this equipment, other simpler, though not as precise, methods will be covered here.

Making the slitting miller

For those who possess a milling attachment to the lathe, the first requisite is to make the tiny slitting miller or saw, since the diameter of the milling cutter is but the size of a small pinhead (about 1.70 mm). Making one is not as difficult as it sounds, as these are easily converted from dental drills. Figure 2 shows such a miller next to its twins before it was converted. The dental drill was first softened by heating it to a cherry-red and withdrawing it gradually from the flame, allowing it to cool slowly, thus becoming annealed.

After annealing the drill, the rear of the drill head is trimmed until the profile appears as in Figure 2. The drill, now miller-saw, is again heated to a dull red and quickly quenched to reharden it. Very small objects become cool between the flame and the quenching liquid. Therefore, first wrap such small objects with fine iron or brass binding wire, as if in a cocoon. This provides a larger mass of metal so that when heated, it retains the red-hot color until it is quenched. The brittleness may be tempered by heating the shank of the drill until the base taper approaching the saw-milling teeth turns straw color; then quench again to arrest the tempering process at that stage.

If the job is to be done in a milling attachment, the staff is locked in a well-fitting lathe chuck and the lathe head locked in position, rigidly secured. The milling head with the little mill is adjusted to the proper height so that it will approach exactly along a line horizontal with the center axis of the post to be milled and slit radially towards the center of this post. This insures that the tiny miller will cut radially on dead center into the staff's post.

The trick to assure a successful cut is rigidity of all parts. The staff in the lathe chuck, the lathe head securely locked to the lathe bed, the T-bolt securing the milling head to the slide rest, and the slide rest to the lathe bed and the lathe head—all should be fastened securely. All parts of the miller should be tightened so that there is no side or up and down movement during the actual cutting operation. That operation should take no longer than one or two seconds.

Right angle cut

When all these precautions have been met and rechecked, the post is dabbed with oil and the cutter advanced straight into the staff's post at right angles to the axis of the staff. The resultant cut can either be a circular trough or a long, axial slit as in Figure 8. Its depth should be about halfway through the post and not deeper.

Figure 9 shows a photo of the staff with the miller actually within the cut is has made. The mill's speed should be moderate as excessive speed causes chattering of the milling head, resulting in an unsatisfactory job. Figure 5 is a photograph of the finished staff. Notice the slit in the post.

(Continued on page 45)

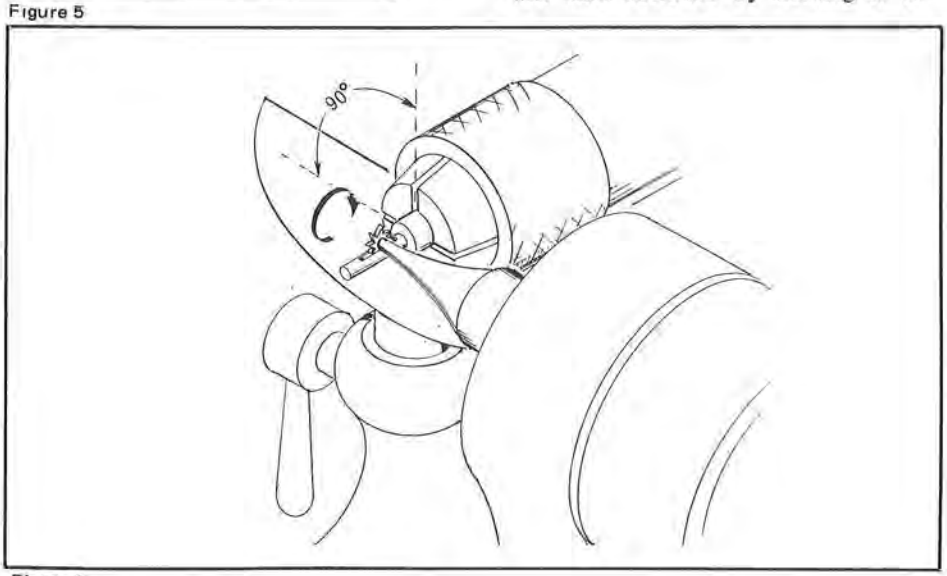


Figure 6

Bench Tips / Joe Crooks

BALANCING A CRUTCH

This month's tip, like last month's, comes to us from Mr. Victor C. Broski, 14639 E. Lanning Drive, Whittier, California 90604.

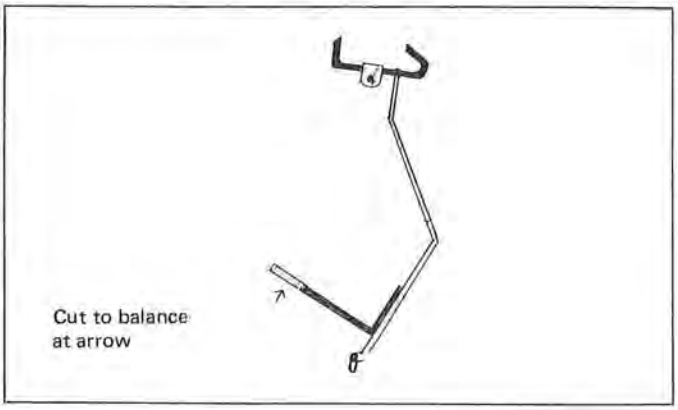
On ladder chain movements and 31-day clocks, the crutch has a weird dogleg bend (in order to clear the center wheel) that alters the center of gravity and prevents the verge from giving an impulse in both directions. To correct this, I have used a piece of brass that is soldered to the crutch in the opposite direction. The center of gravity can be adjusted by trimming the brass until the impulse is even in each direction.

This new tip to balance those crazy off-set verge crutches will surely be used by clockmakers who are perfectionists in setting up escapements in these clocks. It's similar to what the Swiss did to counter balance tuning fork watches.

We have been taught that the suspension spring should have no tension straight down (in the middle of the beat). The method I use may be a wrong way, but it works very well for me. With the pendulum off and no power on the escape wheel, simply bend the suspension spring, at the top where it is supported, to the right until the pendulum rod will hang straight down. Then wind up the movement, put on the pendulum, and set the beat. Remove the pendulum to readjust the suspension spring, if needed, until the inside and outside slide is the same on both sides of the verge before drop off.

In fact, all recoil verges are out of balance, and after setting the beat, they will perform better by adjusting the suspension spring in this manner. This is especially true of semi-recoil escapements where there is very little impulse on the verge and it will actually stop if not balanced with the suspension spring.

Send your tips to Jingle Joe, 265 N. Main Street, Mooresville, North Carolina 28115. THE



(Continued from page 43)

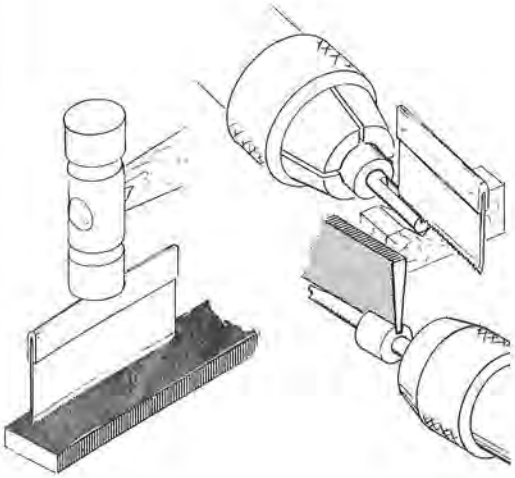


Figure 7

It is best to perform this operation before the pivots are turned, since if the first efforts are unacceptable, you have not wasted the pivoting operation.

Pinvise chuck

Those who have no milling attachment can, with a little practice, obtain a good, workable slit by holding the milling saw in the lathe and the unpivoted staff in a well-fitting pinvise or chuck holding pinvise held in the hand. The slit in the pinvise chuck serves as the center-guide as it is rested on the T-rest of the lathe.

With the lathe running at moderate speed and observing the action under magnification of a pivot loupe, slowly bring the staff's post up under the turning miller. Make certain that the cutter will cut radially into the post's axis and that this axis is absolutely parallel with the cutter blades. It is not necessary to move the staff forward.

The trough the cutter makes will be sufficient to supply enough latitude to meet the escape wheel's locking teeth. It is best, of course, to practice on a thin, softened needle or old balance staff to acquire the correct touch or "feel." The actual cutting operation takes but a second or two, as when the milling lathe attachment is used. Figure 6 illustrates the operation.

Making a good saw

Some antique watch restorers claim success with a watch screwhead slitting file manipulated axially along the staff's post. A good saw can be made from a single-edged razor available at art supply shops.

Place the sharp edge of the razor on a fine-cut file and tap it with a hammer as in Figure 7. The razor's edge will assume the cutting profile of the file and become a good slitting saw. Otherwise, a very sharp hand engraving tool can be made to grave this slit while the staff's post is rested on a boxwood block with the body of the staff held in the pinvise. When the slit appears satisfactory, the remainder of the staff may be completed.

In making a staff for the older, high grade duplex watches, the safety roller and impulse finger can be removed and fitted to the new staff. Again, it's best to repivot the damaged staff.

Our discussion of repairs to the duplex escapement will continue next month. TIMES

THE ROCK QUARRY

By Fred S. Burckhardt

It's a bird; It's a plane— No!

It's a Click Spring!

If all the man-hours expended looking for watch parts, stones, and findings were added together, they would probably equal or exceed those spent building the pyramids.

There are a few who really overdo their flipping. One watchmaker I know has spent so much time on all fours that he now walks around like an ape.

A shop where I once worked was so bad, with parts ricocheting off the walls and ceiling, that every day sounded like the gunfight at the O.K. Corral. We went on strike once for hazardous duty pay. This was after we found one fellow slumped over his bench. It seems the clockmaker sitting across from him was dismantling an eight-day strike movement. The mainspring slipped, throwing a train wheel like it was shot out of a 20mm cannon. It flew across and struck him in the chest just above the heart. It was a nice way for him to go because he loved the business. He didn't have any family nor did he leave any money. Rather than have him put in a pauper's grave, he was gold-plated and stood in a corner of the shop. I hear they decorate him for Christmas each year.

It's surprising how people react when they slip or flip. Some will let out with a long, low moan. Others will use a bit of risque language, interspersed with very stong adjectives. Years ago, when I was an errand boy, I had to run jobs down to an old German diamond setter. You could always tell when he slipped or dropped something. Even the deaf could tell, because the air would turn blue. It was quite an embarrassing experience because I was such a young, sweet, pure boy.

On the other hand, some never make a sound or say a word. One fellow I knew would just reach for a goose-neck lamp and start looking around. We called him "Statue of Liberty" because the light was always glowing.

Most people blame their tweezers when they flip. What I can't understand is why a company that puts out such an inferior product is able to stay in business after such a long time. I'm referring to the "Lousy Tweezer Co." They must do a big business because everybody I've known in this industry has owned at least one pair of their tweezers.

Some people are more adept than others. Let me tell you about "Speedy Duncan," a watchmaker friend of mine. Speedy and I worked together back when watchmakers used to disassemble watches before they were cleaned. We called him Speedy because he turned more screws in a day than most did in a week. This one day, Speedy was working on his seventy-fifth watch, and it wasn't even lunchtime yet. I sat watching him and marveling at what a fine craftsman he was. The unusual thing about Speedy was that he was ambidextrous. Not only that, he could work equally well with both hands. He always worked on two watches at the same time. Once, while assembling a watch with his left hand, he started to pick up a ratchet wheel screw with his right hand. The screw slipped out of his tweezers, and without looking up, he caught it in mid-air with the tweezers in his left hand, calmly put it in place, and screwed it down. The last I heard of Speedy, he was working as the assembly line in a watch factory! If they ever start a Hall of Fame for watchmakers, Speedy will surely get my vote.

It isn't always a catastrophe when something slips. Sometimes things turn out for the better. One time, while showing a beautiful Andalusite to a society woman, I felt it starting to slip. I made the mistake of squeezing the tweezers more. The stone popped out, bounced off the showcase, flew up, and embedded itself right in the center of her forehead. When she came out of the coma, she was a little upset at first, but I calmed her down when I told her how nice it looked and that she would be the envy of her bridge club. What really clinched the deal was when I told her there would be no charge for the setting—plus she saved the expense of a mounting. I even threw in a couple of aspirin tablets as she was complaining of a slight headache. It's always heart warming to see a happy, satisfied customer. The only thing that concerns me is how we're going to get her head into the ultrasonic tank or under the steam machine when she comes in to have the stone cleaned.

Sorry, but I have to close now. If I don't find that date jumper spring, a customer is going to be very unhappy. I sure don't want that, because he's about the size of a bull moose.

"Will someone please hand me that goose-neck lamp again?"

"The last I heard of Speedy, he was working as the assembly line in a watch factory! If they ever start a Hall of Fame for watchmakers, Speedy will surely get my vote."

(Continued from page 33)


Figure 13


Figure 14


Figure 15

described. It is not good practice to heat beyond this point, as you may be in danger of burning the steel. Quench by dipping the pallets straight down as quickly as possible; by doing so, warpage will be avoided. It is not necessary to anneal the work, as fully hardened pallets are a definite advantage. The pallets are now ready for final polishing.

Figure 13 shows the pallets being polished with 4/0 paper. After the 4/0 paper has been used, the piece is polished on a boxwood block with diamantine as shown in Figure 14. Final finish is provided by polishing with a steel burnisher which produces a mirror-like surface, the so-called "black polish" shown in Figure 15.

So ends the saga of the French clock that changed its allegiance to Austria—and the stranger who brought the piece to me.

A Gross-ary of Terms

Naive instructor that I am, I believe that students learn and retain both knowledge and habits by observing what I do and listening to what I say. I am particularly careful to use only the kind of language which I hope they will use when conversing with customers. Most students have not had the advantage of exposure to such ecclesiastically correct horological terms. Instead, they enter the program with only the layman's street jargon to express themselves. It is a continuous crusade to change their choice of careless slang to the lofty language of the horological craftsman. Here are a few of the more flagrant abuses which warrant revision:

"Tear it down"—usually refers to the demolition of a building or the ruin of someone's reputation. Occasionally replaced by "break it down," only somewhat less violent in meaning.

To me, "tear it down" and "tear it up" are synonomous, and most customers conjure up a vision of what might happen to their timepiece if left in the hands of a vandal. Automobile engines and old wallpaper are torn down, but watches and clocks are disassembled or at least taken apart. The idea is to convey to the owner that a careful dissection of his property will take place, not a riproaring, slam-bang, bull-in-a-china shop spree with crowbars and wedges. It is inevitable that the poor customer has a fleeting moment of consternation upon hearing this phrase.

"Works"—must not be confused with public utilities, e.g., gas works and water works.

Because the average person has little or no concept of what is inside of a timepiece, the word "works" invokes

George Schlehr

a vision of gears, pulleys, belts, and springs pulsing away in a miniature factory, cranking out the correct time. At the earliest opportunity, and without hurting his feelings, refer to the movement of his watch or clock.

"Face"—just because it has hands doesn't mean it has to have a face.

A face usually has eyes, a nose, a mouth, maybe even a beard and a mustache. People and animals have faces. Watches and clocks have dials.

"Tinker"—commonly used with mild blasphemy, as in "tinker's damn." Not used much in recent years to signify examination and techniques necessary for repair.

This term is idiomatic to customers and is used to describe experiences prior to bringing the work to you, as in "I've tinkered with it some," or the variant, "I've fooled with it some." Ignore such ignorance and make a mental note not to fall into this habit yourself.

"Big hand, little hand"—childish names for the hour and minute hands.

Rarely does one hear this expression anymore—no doubt due to the tremendous strides in education in our public schools.

"Deal"—not necessarily a financial arrangement in buying a car or the distribution of cards around the poker table. Universally used by non-technical people to describe anything for which the correct name is either unknown or too much trouble to recall.

Fortunately, this term is more succinct and less back-woodsey than thingamajig or doohickey. Shows better breeding.

"Bradded"—quite the same thing as riveted.

Whether two pieces of metal are bradded or riveted is a moot point.

"Yes, Mrs. Jones, we'll be glad to fix your watch. How much will it cost? That's hard to say until we tear it down and check the gears in the works. Maybe you'll want the face redone for a few extra bucks. And we'll throw in two new deals in the band. Whatever it takes, we'll fool with it until it's right."

Just when you think you're making progress, some student who has been reading DeCarle comes up and starts talking about flirts, eye-glasses, winding buttons, transmission wheels, pull-out pieces, castle wheels, check springs, winding shafts, bar screws, prising off the balance spring, oil pots, return bars, etc. It's hard to scold him, because he is indeed using the Queen's English.

"Automobile engines and old wallpaper are torn down, but watches and clocks are disassembled or at least taken apart."

Report from

THE AWI CLOCK RESTORATION COURSE, DENVER, COLORADO

Instructor Otto Benesh, CMC, AWI Director, held one of his most informative sessions in Denver, Colorado, February 21-22 with 16 enthusiastic and appreciative participants, all of whom look forward to the next course.

Highly rated by the participants was the "Code of Ethics for Restorers" distributed and discussed at the session. Many stated that this piece of information alone was worth the expense of the course and would be followed in their daily business routine.

Participants in the course are pictured below: (front row, L to R) Ray Rennemeyer, Littleton, CO; Joel L. Bouchard, Glenwood Springs, CO; Archie B. Perkins, Denver, CO; Orville R. Hagans, Denver, CO; Larry A. Kolby, Salt Lake City, UT; Sam Gereg, Aurora, CO (second row) Milton Lyon, Castle Rock, CO; Otto Benesh, Instructor, Cape Coral, FL; Brian Varner, Denver, CO; John Crouch, Denver, CO; Josephine Hagans, Denver CO (third row) Charlill Hansen, Littleton, CO; Lyle S. Evans, Golden, CO; Gary J. Hyland, Cedar City, UT; (fourth row) Harold Hansen, Littleton, CO; Lew Oswald, Broomfield, CO; Forest Crum, St. Francis, KS (back row) Carl Mattson, Colorado Springs, CO; Robert Moreland, Cheyenne, WY; Mark A. Arnold, Washington, IA; Steve Sheldahl, Littleton, CO.

Contributed by Orville R. Hagans; Photo by Archie B. Perkins

Profile:

The Ontario Watchmakers Association

Thirty-nine of our Affiliate Chapters are located within the continental United States, and the fortieth, the Ontario Watchmakers Association, is located in the province of Ontario, Canada. This chapter, one of our largest, has had a long and productive history. Many of their policies and achievements could well be emulated by the rest of us.

The Ontario Watchmakers Association began in 1937, through the efforts of William Jackson, Watch Repair Instructor at the Central Technical School in Toronto. Between 1900 and 1929, several attempts to organize watchmakers resulted in failure. Because of this, Mr. Jackson (who had taken an active part in the earlier attempts) invited only recent graduates from his school to the initial meetings. Frank Farewell, James Simone, Edgar Failes, Victor Failes, and Robert Phillip became the nucleus of this new organization. A series of meetings was held, and plans were developed to attract the young people of the watch repair trade to this fledgling organization.

By 1939, this group had grown to approximately 40 dedicated members. However, when Canada declared war in September, 1939, all of these young persons were involved in the war effort. It was 1945 before the association could be reactivated. This time, they felt that some form of licensing was needed. With the support and guidance of the United Horological Association of America, a series of meetings was held throughout Ontario and new guilds were formed. Soon there were over 200 members.

In order to gain official recognition and establish formal Aims and Objectives, the Ontario Watchmakers Association was incorporated in April, 1957. A membership drive increased membership to 600, and in 1960, an application to become a Designated Trade under the Apprenticeship and Tradesman Qualification Act was submitted. This proved to be a slow process

Robert F. Bishop

because of opposition from the Canadian Jewellers Association, and it was four years before the trade of watch repair became officially designated and certificates of qualification were issued. During the next two years, a loss of 100 members occurred, the reason being the attitude, "We don't need you anymore because we have our Certificates of Qualification." The membership is presently stable at 400 members.

OWA's strength is the dedicated core of supporters who realize that there is something worth fighting for, and when the need arises, join together in a solid front. As recently as two years ago, the government advised that the trade be decertified. OWA became politically active, and the members followed up with personal contacts and letters to their elected representatives. This activity was successful, and the final word from the government was that the trade was not to be decertified.

The OWA has an elected executive board of young people, and a Board of Directors consisting of five elected directors. All past presidents who wish to remain active also serve as directors. This gives a good balance between young ideas and the experience of the past presidents. The Association's officers are now second generation. The father of the immediate past president, David Barthau, was a long-time treasurer of OWA. The current President is Robert John Phillip. His father, Robert Phillip, was president in 1938. The "nuts and bolts" of OWA are capably handled by Robert Phillip, Executive Secretary for 43 years, with the assistance of his wife, Alice. They are always ready to give help and advice. Robert is a charter member of AWI, served as AWI Director for six years, and is a long-time committee chairman. Currently he is chairman of the Awards Committee.

Ontario has a Horological Department in the George Brown College of Applied Arts and Technology that is staffed by three OWA-AWI member instructors. Joseph Rugole, past president of OWA, and former Chairman of AWI's Research and Education Council, writes the series "Watch Adjustments" for *Horological Times*.

The Aims and Objectives of OWA are fully realized by the many and varied services provided to its members. Some of these include technical seminars from AWI and industry, technical bulletins from WOSTEP and other companies when available, an employment service, an information center, suggested price lists, wall certificates, door decals, disposal of tools and equipment for members and their widows, collection of used cells for AWI-ELM Trust, plus a newsletter that deserves special mention. It is published quarterly, is extremely well written, and its contents are of real value to the members.

OWA has four guilds and is operated by watchmakers for watchmakers. No one will be admitted to full membership who does not hold a current Certificate of Qualification.

As you can see, OWA is a strong, viable organization. Many of our chapters would do well to be inspired by their accomplishments and incorporate some of their policies.

A special thanks to Robert and Alice Phillip for the article upon which this column is based. Their labors are appreciated.

Jewelers and Horologists Hold Joint Meeting in California

CALIFORNIA

The California Jewelers Association and the Horological Association of California joined forces for a mini-convention at the new Marriott Hotel in Anaheim on Saturday and Sunday, March 28 and 29.

Roger Marks, president of the CJA, and Warren Rogers, HAC president, said the two organization combined their meetings because the topics discussed centered around matters of mutual interest to jewelers and watchmakers. The specific topic to be addressed was "Profitability in the Watch Department."

"The watch and jewelry operations within a store should be run with smooth teamwork," Marks and Rogers said. "Where customers buy jewelry is where they should have it serviced, and we hope that by bringing together jewelers and watchmakers, we'll be able to help get that message across."

The CJA recently concluded the first of a series of regional mini-conventions and was planning the second one in Orange County when it learned of plans for the HAC meeting. A quick discussion followed and agreement was quickly reached to join forces at the new Marriott Hotel near Disneyland.

The meeting opened on Saturday evening with a dinner dance, during which the HAC officers were formally installed by Marks. Then, on Sunday morning, jewelers were hosted at a continental breakfast by The Watchmakers of Switzerland. Following that, the president of WOSIC, Jean Pierre Savary, discussed the current status of the Swiss watch industry and its plans to regain the undisputed position of world leadership.

Arthur Gleim, a CJA board member and president-elect of the Jewelers of America, then spoke on the inter-relationship between watch repair and jewelry sales and discussed how the two can work together to help increase overall store sales.

Then the two groups split, with watchmakers leaving to attend technical workshops and the jewelers to hear Tom Dorman of Intergold and Gene Laroff of Diamond Promotion Service discuss how their respective organizations will be assisting jewelers in selling more merchandise.

Later, the two groups came together again for a series of round-table discussions, which have now become a tradition at CJA conventions. Marks said that these were even more interesting than before because there was a greater variety of discussion. Jewelers had a chance to hear watchmakers' problems and vice versa.

ARIZONA

The 1981 statewide watch and clockmakers annual convention will be held at Doubletree Inn, Tucson, Arizona, May 16 and 17, 1981. Some of the events planned are a golf tournament, sponsored cocktail party, and a dinner-dance. Sunday will begin with a sponsored breakfast, three seminars, a state association meeting, and awarding of door prizes.

OHIO

The January quarterly board meeting was well attended. Also well attended was the Saturday night hospitality gathering. All WAO members and their spouses are invited to attend these meetings, especially the Saturday night hospitality room. It is surprising how many interesting items are discussed at these informal gatherings. The next meeting will be Sunday, April 26, 1981 at the Marriott Inn, Columbus, Ohio.

During the business meeting, President Bob Allis appointed Howard Opp chairman of the Ways and Means Committee. This committee will recheck the annual budget. A report will be given at the April meeting.

Now is not too soon to start making plans for attending the WAO Annual Convention, July 24, 25, and 26, 1981 in Columbus. Plans are developing for a well-rounded educational weekend.

The OWA credit union is still functioning. Members are continuing to increase their savings. A folder is available from the OWA office, fully explaining the credit union's features.

INDIANA

The Indiana State Board of Examiners in watch repair along with the Watchmaker's Association of Indiana has formulated a training program in Electronic Watch Repair with Indiana University and Purdue University of Indianapolis. The result of this joint venture produced a pilot program in the theory and practice of repairing and knowing the quartz watch. The program lasted for three days, with eight hours a day spent in intensive training.

Professor George Wallace of the Purdue Electrical Engineering School is the instructor of the course and a very able teacher. The first session was conducted Sunday, January 25, 1981. This session dealt with an extensive examination of the principles of the watch cell and a general introduction to the realm of the cell. Theory and practical application of the crystal was then discussed, which was very interesting. Also examined were the principles of the LED and LCD methods of timekeeping, and meter reading.

Professor Wallace then passed around training movements—analog SMQ's donated to the university by the Bulova Watch Company. They have contributed fifty training movements to the program.

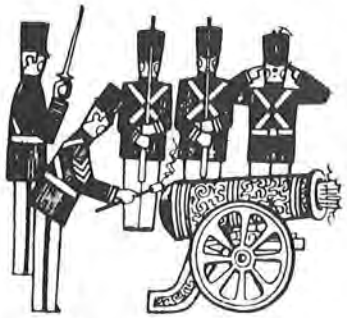
There were 21 watchmakers in attendance, along with Prof. Wallace. There was also a representative of the Bulova Watch Co. present, Mr. Calvin E. Sustachek, instructor of the Field Training Services.

ILLINOIS

"Questions and Problems" provided the program for the meeting of the Central Illinois Watchmakers Association on February 19, 1981. Jack Donovan was in charge of the program. It was an unusual and helpful evening.

The annual CIWA survey of watch and clock repair prices is being made. The survey items have been reviewed and revised by a committee headed by Bob Leach. Don Bilyeu is working on a revision of the jewelry repair survey questions.

(Continued on page 54)



We Salute These New Members!

ABBOTT, George W., Jr.—New York
AFTON, Scott—Colorado
ALBRECHT, William—New Jersey
BAKER, Mark A.—Ohio
BARTELT, Jeffrey D.—Wisconsin
BEASLEY, John—Alabama
BENNET, Mort—Illinois
BRADSHAW, Jack M.—California
BROOKS, Glenn W.—North Carolina
BROUSSEAU, Robert—Texas
CHING KOK GO—Ohio
CLARK, John W.—Illinois
CLARK, Laurence B.—Michigan
COHEN, Robert—Connecticut
COMFORT, M. Scott—Florida
COOKE, Charles G.—Virginia
COMPTON, Lem—Missouri
CORPENING, Bruce A.—North Carolina
DE LA PAZ, Marcelino P.—Ohio
DRAKE, J. N.—Kansas
FERGUSON, Robert G.—Florida
FIEDLER, Walter L.—Wisconsin
GASTON, Jeannene—Texas
GILBERT, Richard J.—Missouri
GRAU, Clarence P.—Wisconsin
GREENAN, James—Michigan
GRYGNY, Christopher D.—Wisconsin
INMAN, Charles W., M.D.—Florida
JAKOWCZUK, George D.—North Carolina
JENSEN, Garold K.—Wisconsin
JERRELS, Robert E.—Indiana
JONES, William—Illinois
KNITTLE, Gale L.—Illinois
KRAUSE, James—California
KRAUSS, Theodore—Ohio
LANGFORD, William D.—Iowa
LARSON, Dale M.—Wisconsin
LASSER, Howard—Virginia
LEVY, Warren M.—New York
LINDON, Henry—Louisiana
MAC ARTHUR, Robert G.—Wisconsin
MILLER, Stanley T.—Florida
MONTENEGRO, Domingo—Connecticut
MOSSBACHER, Rolf R.—Florida
NAPIENTEK, Frank N.—Wisconsin
NECHVATAL, Melvin M.—Wisconsin
NORWOOD, Renae L.—Washington
OHASHI, Michael—Washington
O'LEARY, Paul F.—Oregon
PEREZ, Rafael G.—Puerto Rico
PERRY, Alfred J.—Florida
PIERUCCI, P.—New York
PIPPIN, Jere M.—Michigan
REBHOLZ, Warren R.—Wisconsin
RICKEL, Roy—California
ROBELO, Jose A.—Florida
ROBERGE, Paul E.—B.C. Canada
RODRIGUEZ, Rodolfo A.—Texas
ROMANI, James J.—Pennsylvania
SARICH, Joel—Ohio
SCHROEDER, Robert M.—Wisconsin
SEDLAR, Gerald W.—Wisconsin
SHULTHEIS, Clarence D.—Ohio
SCHULTZ, Vyron—California
SLATON, Jonathan D.—Illinois
SNEED, Judy—Colorado
STEELE, David P.—Virginia
STRASSNER, David M.—New York
SUTTON, Richard—Missouri
THOMAS, Richard B.—Florida
THRALL, Eugene V.—California
TROWBRIDGE, Barbara S.—Pennsylvania
VAN WINKLE, Frank J.—Oregon
WALK, Donald F.—Ohio
WALKER, John W.—Ohio
WATSON, Cynthia L.—Texas
WOODHAM, J. Steve—Georgia
WRIGHT, Leo A.—Florida
WIEST, Irvin C.—Wisconsin
WIGHT, Glendon E.—Maine
ZANIEWSKI, Dion—Michigan

SCENES FROM AWI'S CLOCK RESTORATION COURSE, DENVER, COLORADO

Photos by Archie Perkins

Instructor Otto Benesh

The class at work

This popular new AWI Bench Course taught by Mr. Otto Benesh will be coming to Dallas, Texas on April 25 and 26, and to Los Angeles, California on May 23 and 24. Might *you* be interested?

ASSOCIATION NEWS

(Continued from page 51)

IDAHO

The new year has gotten fully underway. Presently, the guild is working with Francois Giradet, of Watchmakers of Switzerland, on his visit planned for March 8, 1981. The guild is also negotiating with Seiko and Citizen Watch Companies to have a similar seminar on their products.

Many members have requested a course entitled "Escapements." This course will explain moving the pallet stones, adjusting the horns and tails, as well as lowering and raising the pallet on the staff. Another course that has been requested is "Fine Timing," which entails balancing or poising the balance wheel, staffing, adjusting the roller table, fitting roller jewels, pivot straightening, and hairspring adjustment.

Another subject that has been requested is a course on Basic Electricity and the Use of Meters which would be a four-hour course. The exact dates on these courses will be made definite as early summer grows closer.

FLORIDA

Mr. William Felty, current president of the Southwest Florida Guild of Watchmakers and member of the Board of Directors of the Florida Association of Watchmaker Guilds, was a recent guest speaker at the Kiwanis Club of LaBelle, Florida.

Various subjects were covered, such as the atomic clock or hydrogen maser timepiece and watches powered by body heat.

Pictured below is Mr. Huong Hoang, a new member which the Florida State Watchmakers Association is proud to have.

Mr. Hoang came to the United States from South Veitnam where he was born and raised. He comes from a family of watchmakers, and was taught watchmaking skills at a very young age by his father. Huong served in the South Veitnamese Army for some time until he was captured by the Communists and put in a concentration camp after their take-over of the country. After several years in the camp and two attempts to escape, Huong managed to be picked up as one of the refugee "boat people" and ended up in a Singapore Camp and soon bound for the United States.

A church group in Gainesville, Florida sponsored several Veitnamese refugees of which Huong was one. His qualifications became known and was soon employed by Mr. Jim Lentz, owner of "House of Time" in Gainesville. We extend to Huong Hoang our wishes for a happy and successful life in his new home.

CALIFORNIA

There was a meeting of the Central California Watchmakers Guild on March 3, 1981 in Fresno, California. A slide program of great interest to the Watchmakers was presented by Keith Dickey.

Congratulations go to the new Directors, Keith Dickey and Harold Phillips, and to the new Vice-President, Norman Enns.

(Continued from page 21)

and Creighton and placed in their chronometer-making training program where he was trained to be a finisher.

When the partnership of Bliss and Creighton was dissolved, Dillon became a finisher for T. S. & J. D. Negus. After working for Negus for several years, Dillon decided to enter into a partnership with a former co-worker, a Mr. Tuttle, and the firm became known as Dillon and Tuttle, Chronometer Makers. In March of 1862, Superintendent Gilliss of the Naval Observatory wrote Messrs. Dillon and Tuttle, saying ". . . In order that you may have every opportunity to introduce your instruments, a second trial will be given them through four months, commencing April 1st. The Potomac is entirely unobstructed by the rebels and shipment may be made with absolute safety."

However, there is no evidence that Dillon and Tuttle ever submitted any instruments to the Naval Observatory for trial. The Naval Observatory records do show that a Dillon and Tuttle chronometer number 648 was owned during the 1940's by the McCoy Brothers, designers, builders, and operators of power and sailing vessels.

At the conclusion of the War between the States, the partnership was dissolved and Dillon traveled West, settling in San Francisco. There h. opened a chronometer repairing business under the name of Dillon and Company.

DILLON, THOMAS E., New York City. Thomas was a brass turner who made chronometer boxes for Bliss and Creighton during the late 1840's. In 1853, Mr. Dillon became one of the partners in the firm of Kline, Sammos and Company, chronometer makers. The partnership was short-lived as Mr. Sammos felt that he was not receiving a sufficient return from his investment. After the partnership was dissolved, Mr. Dillon and Mr. Kline became partners again and their company was listed as Kline and Dillon. This partnership was also short-lived, for Mr. Dillon died suddenly while working at his bench.

There is nothing that seems to indicate whether or not Edward and Thomas were brothers, but since they were in the same type of business and lived about the same time, there is a strong possibility that they were.

FELLOWS, WADSWORTH and COMPANY, New York City. The only information available on this company is that in the 1840's they were listed as agents for Litherland, Davies and Company, London, Chronometers.

FORESTER, JOHN, New York City, Chronometer Box Maker. Although John Forester was not a chronometer maker, it is only appropriate that his name be mentioned during this era for his contribution was just as noteworthy as those of the makers. He furnished

nearly all of the three-part boxes used by American chronometer makers. The makers not only took pride in the instruments they produced, but in the manner in which they were mounted. John Forester was one of those artisans who took just as much pride in his product as the makers did in theirs. Consequently, a highly profitable and desirable business relationship was established which proved most beneficial to all concerned.

John Forester, a very fine and meticulous cabinetmaker, began manufacturing chronometer boxes in 1846 at the corner of Fulton and Pearl Streets, New York City. Later, due to the increased demand for his boxes, he was forced to move to larger quarters at 164 Maiden Lane.

His boxes were very beautifully crafted with a hand-rubbed finish and solid brass and ivory or pearl trimming inlaid by hand. Even the handles were handcrafted. Although some of his boxes were solid mahogany, the majority were rosewood veneer on mahogany. He selected only well-seasoned, fine-grained wood, paying very close attention to the grain chararcteristics. This uncompromising craftsman sold these beautifully crafted boxes for $10.00.

FOX, ARTHUR C., New York City. Mr. Fox for many years was one of Bliss's finest chronometer makers. Other than that, there is little known about this craftsman. He did own a very fine and rare collection of auxiliary chronometer balance compensating devices.

GEISSLER, C.A., 102 Fulton Street, 26 South Street, New York City. In the early months of 1896, Mr. Geissler, a chronometer maker who had worked for H. H. Heinrich, took over control of the Heinrich firm. During that same year, he moved the firm to 102 Fulton Street where he remained until 1900 when he moved to 26 South Street. Mr. Heinrich remained with the firm until year's end, as he was completing adjustments on eleven chronometers for the January 1, 1900 trial.

During August 1899, the Observatory notified Mr. Geissler that the bid for twelve chronometers to be purchased upon the successful completion of the next competitive trial was being revised. Later the Observatory furnished Mr. Geissler a chronometer repair price list upon which the Navy and the various makers had previously agreed.

Those Heinrich chronometers which failed the January 1900 trial were returned to Mr. Geissler for readjustment since Mr. Heinrich had retired. For the December 1900 competitive trial, Mr. Geissler submitted six chronometers; four were Heinrich's and two, numbers 1059 and 1061, were signed C. A. Geissler. Geissler number 1061 passed trial and was purchased June 29, 1901 for $300.00. Mr. Geissler continued making and submitting chronometers to the Observatory for trial. For the trial ending June 30, 1902, two of three chronometers submitted by Mr. Geissler passed and were purchased for $300.00 each.

GLOVER, HENRY, New York City. Henry Glover was apprenticed to the famous firm of Parkinson and Frodsham, London. He must have been a very fine craftsman and highly respected for his technical skill for at one time he was a foreman at Poskell and Sons, London, and later worked for Arnold and Dent in a similar capacity. He evidently came to New York in the early 1840's, since the 1842-43 New York Directory shows him at 33 John Street. During a span of 29 years, Henry moved his business thirteen different times and he appears under the title of Chronometer Maker, H. C. Nautical Instruments and H. O. Optician. The last listing (1870-71) shows him at 222 Water Street, as a chronometer maker.

Undoubtedly, with his training and experience at three of England's most celebrated chronometer making firms, he had the capabilities of making a chronometer. However, there is no record of him ever submitting any instrument to the Observatory for trial.

GLOVER, JOHN, New York City. John Glover was the son of William Glover of Prescott, in Lancashire, once the center of the English horological industry. He entered into an apprenticeship in 1786 to John Arnold Sr., the inventor of the helical hairspring and a chronometer escapement. Arnold had several other apprentices at that time, one being his own son, John Roger Arnold, who began serving his apprenticeship to his illustrious dad three years prior to Glover. An apprenticeship in those days was for seven years.

The two Johns (Glover and the younger Arnold) became very close friends–a friendship that continued until Arnold's death.

John R. Arnold followed up the successes of his father, and when he began his business in Chigwell, about 1820, he hired Glover. When John R. Arnold and Dent formed the partnership of Arnold and Dent in 1830, Glover stayed with them. In the later 1830's, Arnold and Dent had a petty argument which lead to the dissolution of the partnership in 1840. Just before the partnership was terminated, Dent gave Glover a chronometer to spring. Glover, in turn, gave it to someone else to do, much to Dent's displeasure. John Glover quit and traveled to New York City, where he found employemnt with E. & G. W. Blunt. Glover made about forty chronometers for the Blunts before returning to England in 1840.

Naval records reveal that a John Glover chronometer, number 306, was one of several instruments taken from the rebel steamer *Florida* when it was captured by Federal forces during the Civil War.

When John R. Arnold wrote his last will, he remembered his long-time friend by stating " . . . and to Mr. John Glover, my fellow-apprentice, one hundred pounds."

Here again, as in the case of the Dillons, we have two makers by the same name (Glover). However, there is little to indicate that Henry and John Glover were related.

GRAY, PETER L. DeMORY, New York City. Gray's name appears in the 1853-54 New York City Directory under Chronometer Makers, and his address is listed as 222 Water Street. After that, however, there is very little known about him, other than what is found in a letter from the Naval Observatory's Superintendent J. M. Gilliss, dated October 23, 1863, to Rear Admiral Davis, Chief, Bureau of Navigation. In this letter, Gillis informs Davis that he visited Gray, " . . . one of the firms engaged in the manufacturing of chronometers in New York." Naval records show that in May 1895, a Gray chronometer, number 534, was listed as a "hack."

Chronometers which, because of age, wear, etc., were judged to require costly repairs in order to be put in such condition as to pass a competitive trial, were just cleaned, brought to time, and then designated as "hacks." When they were available, hacks were issued to each ship in addition to her assigned complement of chronometers. Thus, the hack assumed the role of an auxiliary instrument, most often being used as a portable timepiece.

JOHN E. HANDS & SONS, 208 Chestnut Street, Philadelphia, Pennsylvania, 1910-1932. The John E. Hands & Sons firm was not involved in making chronometers, but they offered all of those services which were normally rendered to mariners by nautical chandlers. They not only sold and serviced chronometers, but also other nautical instruments and supplies. In fact, the Hands' firm was probably best known among mariners for their exceptionally detailed charts. All of the instruments that I examined which were signed by John E. Hands & Sons, Philadelphia, were made by either Johannsen or Mercer.

The Hands' firm also maintained a satellite shop in Norfolk, Virginia. Naval records disclose that the Norfolk shop repaired several chronometers for the Norfolk Navy Yard.

The firm was sold in 1932 to Baker Lyman Limited, 308 Magazine Street, New Orleans, Louisiana. There were many amusing stories told about Baker Lyman and the way he could "wheel and deal." One of the best was that if Noah and his Ark had called at New Orleans, Baker would have sold him a chronometer and compass.

(Continued next month)

WATCH OUT FOR THE CO-INSURANCE CLAUSE!

By Joseph Arkin, CPA, MBA

"You mean I'm only going to collect a little over $12,500? Wasn't my fire loss more than twice that amount?" fumed Richard Jenkins, looking at the gutted remains of his jewelry store.

Jenkins was referring to the offer by his insurance carrier to pay for the damages to the equipment and fixtures destroyed in the fire. He raged and ranted at his insurance broker and accused insurance companies of only wanting to collect premiums and not wanting to pay for losses.

Actually, the fire insurance policy that he had bought was one similar to that issued by almost every fire underwriter in his state. It contained a rate-reduction paragraph in exchange for his getting a lower rate and carrying insurance for only a specified portion of the current value of the fixtures and equipment.

Of course Jenkins got a bargain rate when he accepted this clause, but he became a co-insurer.

Here is a specific example to illustrate the point: Suppose you equip your establishment (exclusive of inventory) for $20,000. That would be its present reasonable valuation. If you insure for $16,000 and pay premiums on only that amount, you save the premiums on $4,000 and pay less on the $16,000, too.

But you won't be able to collect $20,000 in the event that your premises and its contents are totally destroyed by fire. You have a guarantee though, that the insurance company will pay in full for any losses up to $16,000.

Basically, you have agreed by acceptance of the co-insurance clause that you will stand some of the risk of loss and you have let the company reduce its liability for loss to the proportion of the loss that the amount of insurance bears to the sound value of the property at the date of loss.

However, the greatest danger for those accepting policies containing co-insurance clauses is the fact that inflation has greatly increased the replacement value of tangible property. Yet most businessmen ignore this factor and continue to insure their property at renewal time for the amount of coverage as shown in the previous policy.

Getting back to Jenkins and the trap he made for himself. At the time of setting up his establishment, he paid $15,000 for fixtures and equipment. He took out a policy for $14,000 which was more than 80% of the cost. So far, so good. Thereafter, he made periodic additional purchases of equipment which cost $10,000 without increasing the coverage under the policy, on the theory that the original equipment was older and that it had depreciated in value.

What he overlooked was the great bogey of inflation caused by two wars, an assortment of crises, the high cost of Viet Nam, and an endless cycle of wage and price increases. The present purchasing power of the dollar has been radically

reduced with respect to that of the 1939-40 dollar.

At the time of the fire, it was determined that the current value of the fixtures and equipment was $35,000. This is how the company computed the loss payable under the terms of the policy.

$$\frac{\text{Amount of insurance carried}}{\text{Amount required to be carried}} \times \text{Loss} = \text{Amount of insurance recovery limited to amount of insurance carried.}$$

-or-

$$\frac{\$14,000}{\$28,000^*} \times \$25,000 = \$12,500$$

*80% of $35,000

Unfortunately, this wasn't the full extent of the loss suffered by Jenkins. He had a similar clause in the coverage for merchandise.

This situation happens often despite the fact that many banks and insurance companies take advertisements in nationwide publications and send periodic notices in their mailings, warning the business community to re-examine present coverage in view of the greatly accelerated values of past purchases.

Many times, individuals will suspect that their brokers are trying to *oversell* when they suggest that present coverage be increased so as to conform to the 80% co-insurance clause. In the illustration, the figure of 80% was used, but as a matter of fact, the percentages may vary from state to state or from one insurance carrier to another.

You may consider co-insurance a bargain—and it really is—but you must be sure that you are insured for at least 80% of your *current valuation* of fixtures, equipment, and inventory.

Now is the time to review your coverage with your broker and accountant to ascertain if you are adequately insured.

(Continued from page 10)

reground and polished. View E shows a burred pivot. This is usually caused by someone over-tightening the bearing on the pivots. In this case, the burr would need to be ground off and the pivot repolished. View F shows a broken pivot. This can be caused by tightening the bearing screw too tightly, or this can happen if the clock or watch is dropped. This pivot can be reground to bring it to a new point if the bearing screw can be tightened up enough to take up the end shake in the balance staff so it will have the correct amount. If the bearings are badly worn or pitted, they should be replaced with new ones. These bearings are very difficult to refinish because of the sharp center needed for the pivot to run in. Steel bearings are left dead hard after they are formed. It is sometimes possible to use a sharp polished center punch that has the proper angle to repunch the center in the bearings in order to renew their shape. The center can sometimes be recut by chucking the bearing true in the lathe and re-cutting the center with a sharp polished carbide graver. In most cases, it is better to replace the bearings. An assortment of these bearings can be obtained from your local watch and clock material dealer. Note: Some of the higher grade pin lever escapements have jeweled inserts in the bearing screws. These last for many years without wear.

The balance staff pivots used in the most modern pin lever watches are of the conical shoulder form. These pivots usually run in holes drilled in the plate and balance cock. A steel plate or cap jewel is used for the ends of the pivot to rest on. Some of the newer, higher-grade pin lever watches have shock resistant jewel assemblies to support the balance staff pivots. One of the very latest innovations in shock resistant bearings for the balance staff of pin lever watches is the ANTICHOC A2000

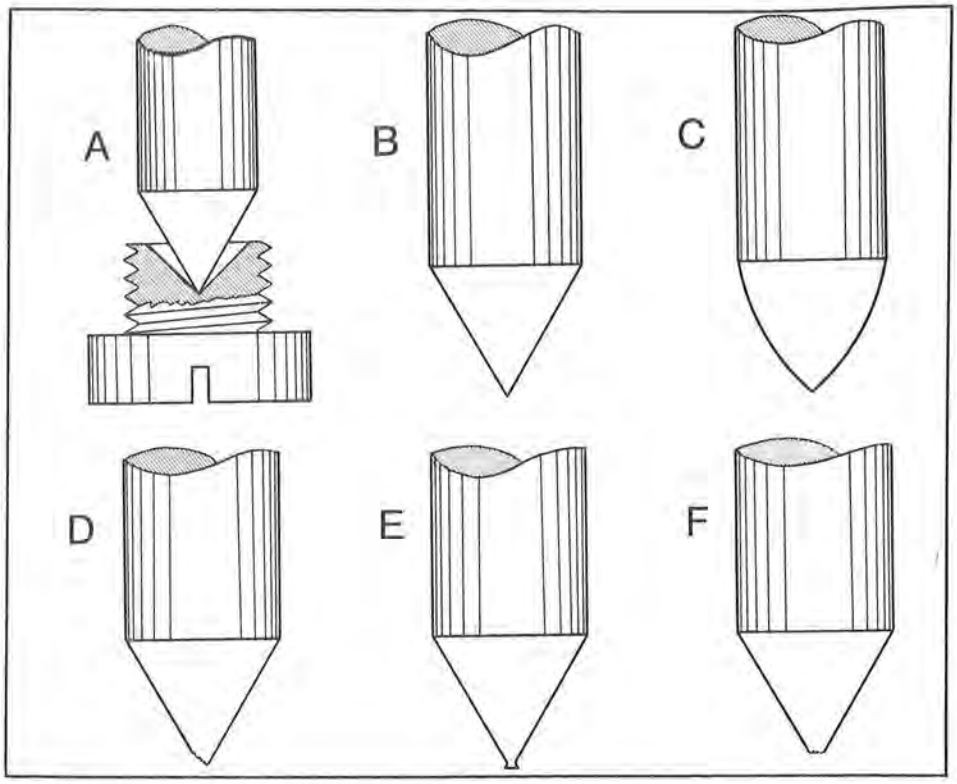


Figure 5

self-lubricating membrane bearing manufactured by Portescap. Some time ago, some samples of this bearing, together with information about them, were received from Mr. Gerard Progin of Portescap U.S. This bearing is shown in Figure 6. Mr. Progin informs us that, so far, 20 million pin lever watches have been equipped with this bearing. This bearing is formed of two elements which cannot be disassembled, is self-lubricating, and must not be oiled.

For best performance, the pin lever escapement must be checked and adjusted like the jeweled lever escapement. The corner freedom and guard pin freedom must be sufficient and even on both sides of the line of centers. The drop lock, slide and drop must be sufficient and equal. When the pin lever escapement takes poor motion, check to see if the escape wheel teeth are locking up deeply enough on the pallet pins. If the teeth lock up on their impulse faces, a short arc of motion will result and this must be corrected. Check for bent pallet pins, a bent pallet arbor, or bent pivots on the pallet arbor which would cause the pallet to be too far from the escape wheel, resulting in insufficient drop lock. If the pallet arbor and its pivots are straight, then check to see if the plate is cut out so the pallet can be shifted toward the escape wheel. Another condition that can cause the drop lock to be too light is loose fitting pallet arbor and escape wheel pivots.

Another problem which is often encountered is a groove appearing on the locking face of the escape wheel teeth where the tooth strikes the pallet pins at drop lock. This groove interferes with

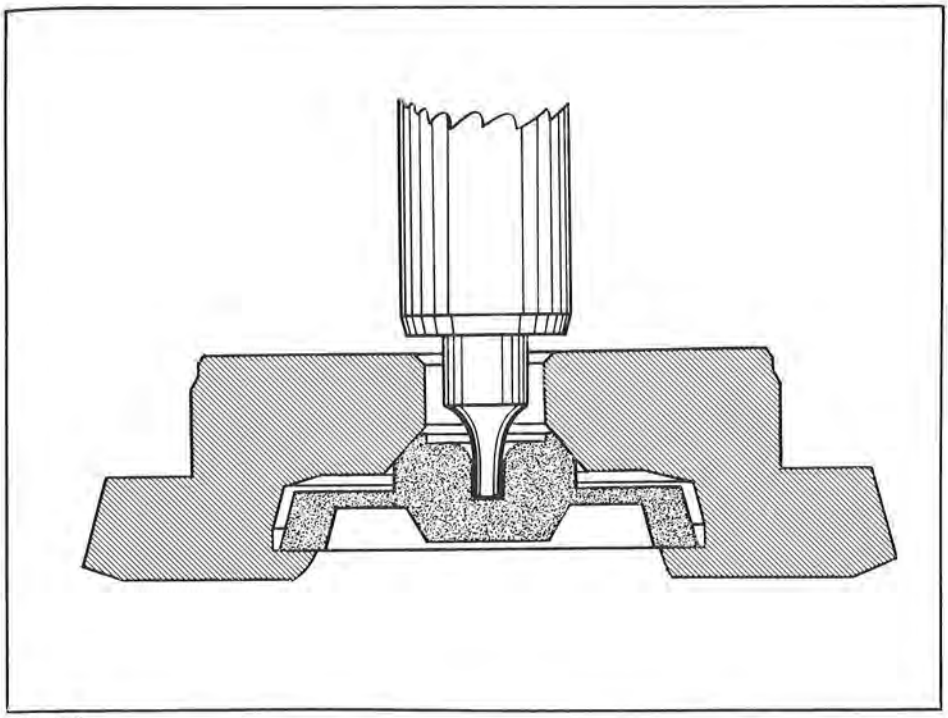


Figure 6

the pallet pins sliding down the teeth as they should. This condition allows the guard pin to rub the safety roller which causes poor motion. Sometimes this condition can be corrected by using a fine escapement file on the locking faces of the teeth to remove the grooves and then polishing these surfaces. If this doesn't cure the trouble, then the escape wheel should be replaced. Poor motion can also be caused by the pallet fork rubbing on the safety roller or the impulse pin hitting the guard pin.

If the pallet fork is bent to one side, it could rub the balance staff or its guard pin could rub the safety roller table and cause poor motion. The pivots on the balance must be sharp, polished, and lubricated in order to have good motion of the balance wheel.

Sometimes a groove becomes worn in the fork slot and causes poor motion. The fork slot can usually be burnished out to correct the condition.

Unequal drops can be caused by bent pallet pins or the pallet could be too close or too far from the escape wheel. If the pallet pins are bent so they are too close together, the inside drop will be insufficient and the outside drop will be excessive. Pallet pins that are bent so they are too far apart will cause excessive inside drop and insufficient outside drop. Pallet pins can be straightened by the use of a staking tool punch with a hole that fits the pins closely. If the pallet is too close to the escape wheel, the outside drop will be insufficient and the inside drop will be excessive. If the pallet is too far from the escape wheel, the outside drop will be excessive and the inside drop insufficient. Note: When the pallet is moved toward the escape wheel, the drop lock will be increased, and when the pallet is moved away from the escape wheel, the drop lock will be decreased.

Next month, the cylinder escapement will be discussed.

AWI AWARD GOES TO BULOVA

The American Watchmakers Institute has given Bulova special recognition for 20 years of field training services to the watchmaker by presenting the Company with a commemorative plaque.

Henry B. Fried, a Director and Fellow of the Institute, made the presentation in behalf of the officers of AWI. He is a former president of the organization and one of America's best-known horologists. Herbert Novick, Director of Bulova's Technical Sales and Service division, and Leo Helmprecht, manager of Field Training Services, accepted the plaque at Bulova Park.

Bulova introduced field training for its Accutron watch in 1960 and has trained some 10,000 watchmakers on its various calibers since then. At present, two full-time instructors are scheduled to give seminars in 45 cities during the first half of 1981.

The plaque is inscribed with the following text: "Presented to Bulova Watch Co., Inc. in recognition of 20 years of outstanding service to the watchmaking profession through the work of their field training services division 1960-1980: With greetings and good wishes from the officers and members of the American Watchmakers Institute."

Henry B. Fried (center) presenting A.W.I. award to Bulova's Herb Novick (left) and Leo Helmprecht.

Left to right: A. Simonin, director of the WOSTEP, Guillermo Ortiz, Eric Ammann, Elaine Rolf, Micheal Vallone, and Paul Tricarico.

NEWEST WOSTEP GRADUATES

Following a twenty-week stay in Neuchatel, Switzerland, these five watchmakers are returning home to Brooklyn, Denver, and Seattle, filled with memories of skiing, continental cuisine, and French speaking experiences. However, most important of all, they have a WOSTEP Diploma in their pockets.

This diploma is recognized throughout the horological world as proof of their ability to supply excellent after-sales service for watches. For 20 weeks, working eight hours a day, they studied mechanical watches as well as the latest electronic timepieces; they visited factories and attended lectures given by specialists.

For the past 15 years, the Watchmakers of Switzerland Training and Educational Programme (WOSTEP) has offered watchmakers from all over the world the opportunity to increase and complete their knowledge in watch repairing. The latest group of selected American watchmakers left the U.S. on January 5, 1981 to attend the WOSTEP Spring Course. The number of applicants for the Summer Course is already exceeding the available quota. "We like to think," says Jean P. Savary, President of the Watchmakers of Switzerland Information Center, "that we are doing our utmost to sustain the excellence of their [watchmakers'] training."

For further information, please contact the Watchmakers of Switzerland Information Center Inc., 608 Fifth Avenue, New York, NY 10020. Telephone (212) 757-7030.

L & R PRESIDENT PLANS USO 40th ANNIVERSARY

James J. Lazarus, President of L & R Manufacturing Company, Kearny, New Jersey, one of the world's leading manufacturers of ultrasonic cleaning systems and chemicals, is in the process of planning a year-long celebration for the world-renown United Service Organization's 40th Anniversary. A mixture of TV, special media events, proclamations, conferences, salutes, and a gala dinner in Washington are planned to bring public awareness to the USO.

Mr. Lazarus is chairman of the year-long celebration, as well as an international Vice President of the USO. Pictured with Lazarus is Pearl Bailey of international fame, and Susan Powell, Miss America 1981. This photo was taken just prior to their leaving for the Liberty Bowl football game in Memphis,

WILLIAM KILB RECEIVED WMJDA MAN OF THE YEAR AWARD

William J. Kilb, of Kilb and Co., Milwaukee, Wisconsin, has been selected as the Watch Material & Jewelry Distributors Association's Man of the Year. As one of the organizers and the first president of the Association, Kilb has given 35 years of attention and devotion to the needs and concerns of the distributor industry.

Kilb's history with WMJDA is long and distinguished. His strong influence as a leader has shown throughout the years of activities, programs, and projects of this organization, and he has been a mainstay for the Board of Directors from the charter year. His company and family have always been strong supporters of WMJDA at Annual Meetings, and his son, Robert, has also served as president of the Association.

In addition to WMJDA, other industry affiliations include leadership positions with the Jewelers Mutual Insurance Company, the Milwaukee Wholesale Jewelers Association, the National Association of Watch & Clock Collectors, and the Licensed Watchmakers Association. He collects commemorative glass and ceramics as well as U.S. coins, other Americana, and antique clocks.

His remarks at the Man-of-the-Year Award Luncheon, on March 26 during the WMJDA Annual Meeting at La Costa, Carlsbad, California, reflected his experience and overview of the industry and included, in his words, "bits and pieces that are not recorded anywhere else."

Left to Right: Jim Lazarus, Pearl Bailey, and Susan Powell

Tennessee. In December, USO kicked off its year-long celebration by producing the half-time festivities at the Liberty Bowl. The show was nationally televised by ABC, and featured Pearl Bailey, Miss America (Susan Powell), and Margarite Piazza, along with three exciting bands, a colorful variety of floats, a spectacular fireworks display, and countless servicemen and women.

INITIAL RESPONSES TO A POLL OF BASLE FAIR EXHIBITORS

The 9th European Watch, Clock, and Jewellery Fair will be held in Basle from April 25 to May 4 of this year. As in recent years, the Swiss Exhibitors Committee polled its members for information on the new items scheduled for introduction at the Fair.

While technical developments are undoubtedly an essential aspect of the Basle Fair, another is obviously just as important: fashion. Sneak previews confirm the fashion directions observed last autumn (at "Montres et Bijoux de Geneve"): softer styling with curves prevailing over straight lines though never without a certain spirit of firmness. Dials can be expected to be broad, bezels slim, and decoration quite restrained. Some trends introduced last year seem to have held their ground: screwed-in bezels, for instance, along with identical pairs of "His and Hers" designs and two-tone models.

A few of the new developments scheduled for Basle in 1981 are:

-The first production models of a new, solid-state combined (analog-digital) model with liquid crystal hands, 6 digits, 4 symbols and a wide variety of functions.
- The first quartz watch indicating the phases of the moon.
- A strong showing for prestige table and bracket clocks with period-style or modern case designs (including one quartz design fitted in a block of rock crystal).
- A variety of new, officially certified "Quartz Chronometers" including a compact model for feminine wrists.
- Sports stopwatches with a memory, a large, legible LC display, and a watertight synthetic case.

For servicing operations, there is a new gluing kit scheduled to be introduced which can be used to replace worn watch gaskets or repair metal watchbands with defective lugs or pins, and, in the jewelry area, operations whereby gemstones can be prepositioned before setting.

These are but the first news briefs of Basle's forthcoming European Watch, Clock and Jewellry Fair—April 25 to May 4, 1981.

Stylish sportiness for the modern woman will be featured at the Basle Fair. This all-steel watch is enhanced by a yellow goldplate bezel featuring stainless steel screws. The same screws, goldplated, are found on the bracelet. "Slimline" quartz movement has center seconds, calendar, a water-resistant case and is available in a choice of two sizes. ("Paquebot" model from ARDATH et PAUL ARDENT, Geneva)

WORLD'S THINNEST WATER-RESISTANT WATCH

Swiss technology continues to demonstrate its leadership with the introduction of the Concord Delirium Mariner, the world's thinnest water-resistant watch. At 2.58 mm (about 1/10 inch), it is thinner than a silver dollar.

"We live in a technological age where companies and nations are measured by their technological achievements–and when it comes to watch technology, nobody quite measures up to the Swiss," noted Gedalio Grinberg, president of North American Watch Corporation, distributor of Concord watches.

"Technology's greatest accomplishment is when it serves the aesthetic and material needs of people," he said. "That is what the Swiss do consistently in watch design and production," he added.

The 18K gold Concord Delirium Mariner is water-resistant down to two atmospheres (66 feet). Battery life has been doubled to over two years from earlier Delirium models. Interchangeable silver oxide batteries are available from several manufacturers. Specially welded water-resistant lizard straps are provided with the Delirium Mariner.

Suggested retail price for the Concord Delirium Mariner is $4,900.

Grinberg said, "Over 5,000 standard Deliriums have been sold in the past two years and sales are continuing strong. I firmly believe that the Delirium Mariner will also capture the imagination of the American consumer and further expand the market for high quality watches." he added.

Concord Delirium Mariner was designed by Ebauches SA of Switzerland and is being produced by its ETA subsidiary. North American Watch Corporation is importing and distributing the watch in the U.S.

JACOBY-BENDER MONEY CLIP/KEYHOLDER GIFT SETS

Jacoby-Bender, Inc., one of the world's leading manufacturers of men's and women's watch bracelets and jewelry, has created a unique series of men's matching money clip and keyholder gift sets.

Modestly priced for any gift-giving occasion, the sets retail for $16.95 to $42.95. "Match-Mates" are available in yellow-gold electroplate and rhodium-plated finishes. Other styles in the series include colorful oval engraveable designs and a classic tortoise shell pair with smooth center panel for personalization. At the top of the line are prestigious satin-finished styles in rhodium plate with 22K gold hand-engraved border designs for that dramatic "two-tone" look. Luxuriously packaged in a velvet-covered presentation box, "Match-Mates" are a most personal and practical gift.

Concord Delirium Mariner

For further information and a copy of our new Retailer Catalog and Price List, contact Jacoby-Bender, Inc., 62-10 Northern Boulevard, Woodside, NY 11377.

HIS AND HERS STYLE FROM CITIZEN WATCH

For newlyweds and anniversary couples, suggest a distinctive set of watches–to remind them of the good times shared and those to come. His and hers quartz watches from Citizen Watch feature sophisticated, ultra-thin analog styling with something different–subtle stripings at each side. The face of the watches is cobalt blue, and they come with leather straps. Retail price for both men's and women's models is $195. For more information, contact Citizen Watch Company of America, Inc., 1099 Wall Street, Lyndhurst, NJ 07071.

NEW RM SERIES FROM FOREDOM

The Foredom Electric Company has introduced its newest flexible shaft miniature power tool–the Seires RM. This unit features a unique electronic feedback control which provides full torque over the entire speed range. Precise dial speed control and on-off indicator light are built into the base of this compact yet powerful unit.

Foredom flexible shaft ma-

chines are made to industrial standards and are widely used in industrial and many craft applications for sanding, grinding, deburring, polishing, buffing, and carving of small parts or in hard-to-reach internal finishing operations.

A selection of thirteen interchangeable handpieces and hundreds of miniature accessories, including cutters, burs, buffs, brushes, and sanding discs, make Foredom versatile tools for any toolroom or workshop.

For complete information on the new Series RM Machine and other Foredom flexible shaft machines and accessories, write to the Foredom Electric Company, Route 6, Bethel, CT 06801.

PRECIOUS METAL TESTING SET

This precious metal testing set, featuring a new, seven-pointed test plate and boxed in a 4" x 3 3/4" x 2 5/8" polished wood case, is now available from jewelers' supply houses carrying GFC products. Included in the testing set are acid bottles featuring glass stopper/applicators, test stone, metal test plate with surfaces for identifying gold and silver, and salts for making Schwerter's testing fluid. Acids for use with the set must be purchased locally.

The unusual test plate has surfaces for identifying 8, 10, 12, 14, 18, and 22K gold and fine silver. It is an effective and economical alternative to expensive gold testing needles.

Price of the compact metal testing set, No. 45-212, is $44.95, about half the cost of comparable sets equipped with gold testing needles. Further information can be obtained from the Casthigh Corp., 750 Washington Ave., Carlstadt, New Jersey 07072.

L & R AQUA TORCH

The L & R Aqua Torch is a self-contained, gas generator and torch combination that provides a variable temperature reducing flame for welding, soldering, brazing, flame polishing for plastics, thermo plastic and most metal material fabrication. It consists of a generator assembly, a gas atomizer, and a hand torch with assorted quick change tip sizes that are equivalent from 18 gauge to 26 gauge hypodermic needles. The gas used is not stored but generated at the time of use, producing a pressure of approximately 3/4 of a lb. per sq. inch. There is no need for regulators or high pressure cylinders. Basis for this operation is to develop a hydrogen and oxygen gas from distilled water. The gas is then forced out of the operating cell at a pressure of 3/4 P.S.I. It subsequently passes through an atomizer which contains a flammable liquid such as: acetone, methol ethyl ketone or alcohol, which results in a flame which has greater BTU content. During the actual burning operation, some of the oxygen is used to help support the combustion of the solvent. When this occurs, the flame becomes (what is known as) a reducing flame, i.e., a flame that is looking for oxygen to absorb. Therefore, any oxides that are on the workpiece are immediately absorbed by the small amount of hydrogen that is not burned at the torch tip.

Other features of the Aqua Torch are: the flame size can be reduced without changing the flame temperature, and it is possible to go from the extreme of an 18 gauge all the way down to a 26 gauge, in only five seconds. The heat can also be directed exactly where the technician needs it; for example, in soldering, the soft solder is drawn right into the cavity because the flame is so direct. This eliminates excess solder and reduces cleanup time considerably. In one actual case, it has reduced cleanup time to 1/6 of the time period usually taken. It also reduces the solder waste.

More information can be obtained from L & R Manufacturing Co., 577 Elm Street, Kearney, NJ 07032.

PLITRON™ PRESS KIT AVAILABLE

Now it is possible to hold delicate items of any shape in the special Plithene Jaw Panels of the Plitron Press Kit. You can remove and replace tight press or screw backs on all watches quickly without damage. Adapters allow crystal removal and replacement. Even gold chain, delicate stones, ceramic

circuit discs, carving wax, etc. can be held in this press. Both hands being free for precise control allows new techniques and new dimensions in workmanship. The Plitron Press Kit (with adapters) is distributed by the Electronic Time Corporation, 470 S. Colorado Blvd., No. 209, Denver, Colorado 80222.

MORE MINERAL GLASS TEMPERED CRYSTALS FROM AMERICAN PERFIT

The American Perfit Crystal Corp., BB Crystal Co. division, announces the immediate availability of a complete range of sizes of its TB round mineral glass tempered watch crystals, sizes 15.0--30.3 mm. There are 154 sizes in all, 1.0--1.1 mm thick.

With quartz analog watches taking a greater share of the market every passing day and most of these watches having mineral glass crystals, these TB crystals are the most important replacement crystals on the market today.

Mineral means glass which is scratch-resistant by definition. Tempering makes these glasses more resistant to breakage. Resistance to scratching means these crystals will not dull with use, in many cases rubbing of a sleeve will improve their luster.

These crystals are available from all watch material dealers in one-each assortments as well. BB Crystal Co. 653 Eleventh Ave., New York, NY 10036.

Classified Ads

Regulations and Rates

Ads are payable in advance $.35 per word, $.45 per word in bold type. 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.

Horological Times, P.O. Box 11011, Cincinnati, OH 45211. (513) 661-3838

Tradesman

Superior Tweezer Resharpening. $2.50 each, including return first class postage. Minimum of three tweezers. Advance payment required. Harvey C. Watkins, CMW, P.O. Box 1738, 1204 West Cason Street, Plant City, FL 33566.

Pearl and Bead Restringing. All types. Fast service. Jean A. Gruenig, P.O. Box 12007, 1279 Inglis Ave., Columbus, Ohio 43212.

Clock repair material and tools. Manufacture of clock springs, dials, escape wheels, verge kits, weights, all types of brass and steel stock and custom made parts. Catalog postpaid $2.00; Tani Engineering, Box 338, Atwater, Ohio 44201. (216) 947-2268.

'A' QUALITY SWISS SPRING BARS. WRITE FOR FREE SAMPLES. P.O. Box 774, GREENVILLE, MS 38701.

PULSAR WATCH REPAIRS. Complete repairs on all L.E.D. PULSARS except calculators. Prompt service. Leo G. Kozlowski, 55 E. Washington Street, Chicago, IL 60602. 312-236-8052.

DIAL REFINISHING, CRYSTAL FITTING & WATCH REPAIR. 48-hour services on Dial Refinishing & Crystal Fitting. Finest quality. Quantity works welcome. Send your works to: Kirk Dial & Crystal Co., 625-4th & Pike Bldg., Seattle, WA 98101.

WATCH REPAIR FOR THE TRADE: QUARTZ (LCD, STEP MOTOR), ACCUTRON, AND MECHANICAL. Careful work & thoroughgoing repairs plus ultrasonic cleaning and electronic diagnosis. The Watch-Repair Shop, C. K. Goshman, 1219 Mound St., Madison, WI 53715. 1-608-255-3247.

DIGITAL WATCH REPAIR SPECIALIST, LED and LCD. Tuxedo Electric, Tuxedo Square, Tuxedo NY 10987. Phone: (914) 351-5678.

CLOCK WHEEL AND PINION CUTTING, repivoting, retoothing, escapement work. J. C. Van Dyke, CMW, CMC, CMBHI, 1039 Rt. 163, Oakdale, CT 06370.

HERSCHEDE FACTORY REPAIR SERVICE Call or write for details. Earl E. Furnas, Service Director, P.O. Box 825, Starkville, MS 39759. Toll free 1-800-647-1835. Visa and MasterCard accepted.

WATCH REPIVOTING, WHEEL and **PINION CUTTING** expertly done by **EUROPEAN WATCHMAKER** with diploma from **GLASHUTTE** $15.00 and up. Specializing in **REPEATERS, CHRONOMETERS, TURBILLONS, KARRUSELS,** watches with **PERPETUAL CALENDAR, UNUSUAL ESCAPEMENTS,** etc. I can make any part for any watch; it is just a matter of economics. Send **SASE** for **FREE** price list. **FREE** estimate given on your watch. **PHILIP PONIZ (NAWCC, AWI, MBHI),** 1207 Scrub Oak Circle, Boulder CO 80303. 303-494-9666.

We repair early WATCHMAKERS ULTRASONIC cleaners (WT), and related equipment. Send to: Bruce, S Electronic Shop, 983 South Quince Road, Walnutport, PA 18088. (215) 767-1413.

Digital Watch Repair. We repair LED & LCD watches, including Bulova. One week service. Geroge's Digital Repair, 311 Louise Ave., High Point, NC 27262. Tel: (919) 882-0468. Elmer C. George.

Watchmaker–Fast and excellent work. Certified Accutron Technician. Prompt service. Send for price list: Richard Mazza, 29 N. Main, Niles, Ohio 44446.

WHEELS, Pinions, barrels or whatever, repaired or made new. Repivot arbors. Parts made to order. Send sample for free estimate. No watch parts. Ken Leeseberg, Ken-Way Inc., 19 W 672 Army Trail, P.O. Box 219, Addison, Illinois 60101.

Help Wanted

SALESPERSON: A fine well-established jewelry and watchmaterials wholesaler is looking for good salesmen to cover the States of North Carolina, South Carolina, Georgia, Alabama, Florida, Mississippi, Tennessee, Arkansas, Iowa, Missouri, Wisconsin, Nebraska, Kansas, Oklahoma, and Texas. We offer an excellent compensation program, benefits, and an opportunity to succeed. Would prefer watchmaterial experience, but not necessary. Aggressive and knowledgeable man or woman. We are building for the future. Please reply to: *Horological Times*, Dept. HW301, P.O. Box 11011, Cincinnati, OH 45211.

Wanted To Buy

IMMEDIATE CASH PAID!! Old Mine and Old European cut diamonds. Especially needed: Stones over 1 carat. Ship with phone number for highest offer, or call Mr. Neff, (404) 938-0744. W. F. N. Enterprises, Inc., HT, 2300 Henderson Mill Rd., NE, Suite 318, Atlanta, GA 30345.

STERLING FLATWARE STOCKS–new or used needed. Call us before you sell for scrap. Also wanted: silver, diamonds, gold scrap, coins and coin collections. Call or write: Mr. Neff, HT, WFN Enterprises, 2300 Henderson Mill Rd., N.E. Suite 318, Atlanta, Georgia 30345. Phone 404/938-0744.

IMMEDIATE CASH PAID for Gold, Silver, Platinum, any form! Jewelry scrap, filings, gold filled, sterling! Immediate top dollar cash offer return mail! Satisfaction guaranteed. Ship insured/registered mail to: American Metals Co., St. Andrews Branch, P.O. Box 30009H, Charleston, SC 29407.

GOLD FILLED and ROLLED GOLD PLATE RGP $3.50/t.o.; 1/10 10k $16/t.o.; 12k G. F. $8.75/t.o.; 14K G. F. $14.75/t.o.; 25 year watch case $17/t.o. Prices based on $600 gold. Send for schedule. CASH or CHECK. Ship to AVON METAL SERVICE, LTD. P.O. Box 17484, Milwaukee, WI 53217. (414) 351-0933.

Wanted: Unclaimed & trade-ins, surplus jeweled pocket watches. RUNNING or NOT; Details, write first. Doty Coy, 811 E. Irvine St., Richmond, Kentucky 40475.

Wanted: Older type watchmakers bench within 100 mile radius of Dubuque, Iowa. Phone weekdays 9 to 5; ask for Jim. (319) 583-9015.

$100.00/Day: Buying scrap gold. Write: Harland, 1312-Z H-st, Eureka, California 95501.

For Sale

ESEMBL-O-GRAF LIBRARY in 28 volumes, Pittsburgh, 1955. Chronograph repairing is made easy by step-by-step procedure. Each small step of removing and replacing each part and making adjustments is clearly illustrated. No concentrated study is necessary. $200.00. Write EOG, P.O. Box 11011, Cincinnati, OH 45211.

U.S. HEADQUARTERS FOR ALL SCHATZ PARTS. PARTS FOR THE NEW 400-DAY ELECTRONICS. ALSO FOR KUNDO ELECTRONIC. GREENHILL CLOCK SERVICE, 4895 COCONINO WAY, SAN DIEGO, CA 92117.

For Sale–Timing Machines, Watchmaster Timers, Vibrograf Timers. Factory rebuilt. All machines guaranteed. Terms available. Also available Ultrasonic Watch Cleaning Machines. Write Vibrograf sales representative Robert Swensgard, 2630-A Jett Hill Road, New Richmond Ohio 45157. Or phone (513) 553-2113. Territory: Southern Indiana, Kentucky, Michigan, Ohio, Tennessee, and West Virginia.

TICKOPRINT TIMER. Standard 2 in excellent condition with supplies. 350.00. Stockton Time Repair, Francisco Alcalde. 5646 Pershing Ave., Stockton, CA 95207. 1-209-952-4127.

For Sale: Digital watch repair equipment, quartz timer, module tester, micro-tip soldering iron and many additional tools for repairs on LED and LCD watches. All tools from Zantech, Inc. Write for complete list and prices: The Digital Watch Clinic, 3192 Lassiter Rd., Marietta, GA 30062.

American Pocket watches, movements, cases, material and tools for sale. Write for list. Want to buy watchmakers tools, American pocket watches, related items. Dashto Horological Services, 5349 Basilica Circles, Virginia Beach, VA 23464. Phone: (804) 420-2631.

QUARTZ BATTERY CLOCK MOVEMENTS: Regular or Mini; $7.95 each, 3 for $22.65, 6 for $42.90.. Hands included. $2.00 handling. CALDAK TIME, Box 3181, Camarillo, CA 93010.

Metal Cutting Lathes, Bench Mills, Drillpresses, Unimats (accessories also), Maximats, Sherline, Machinex, the new Maximat Super Eleven. Lathe Catalog, $1.00. Precision tools, inch or metric, aluminum, brass, steel, all shapes, miniature screws, taps, drills, saws, collets. Tool Catalog, $1.00. Campbell Tools, 2100 Selma Road, Springfield, Ohio 45505. Phone (513) 322-8562.

Jewelry store or fixtures for sale. Excellent repair shop. Tel: (313) 278-2720.

Miscellaneous

Digital Watch Service Training. Zantech, Inc. offers training and instruments for servicing all types of digital watches. Course includes diagnosis of watch malfunctions and repair methods, including techniques in wire bond repairs using silver epoxy. Louis A. Zanoni, Zantech, Inc., 77 Shady Lane, Trenton, NJ 08619. (609) 586-5088.

Someone You Know Is Missing Out

NEW MEMBER:

Name _____

Street _____

City/State _____

Zip _____

School (if student) _____

SUBMITTED BY:

Name _____

AWI No. _____

Payment enclosed for: 1 yr. regular membership $30.00
1 yr. student membership $10.00

Horological Times included in membership.
Mail to: American Watchmakers Institute, 3700 Harrison Ave., Cincinnati, OH 45211.

The Book You've Been Waiting For

THE BEST OF

J.E. COLEMAN: CLOCKMAKER

For more than 28 years, Jess Coleman helped working horologists solve their day by day technical problems in clock repairing by answering and analyzing their questions in his column "Clockwise & Otherwise." This feature appeared monthly in the pages of *American Horologist & Jeweler* magazine.

Since the death of Coleman, many clockmakers have felt the void created by the lack of personal attention which Coleman always gave to their specific, professional problems. Now, the present generations of horological craftsmen can enjoy all the benefits of Coleman's more than 28 years of experience. His columns have been skillfully compiled into a single reference volume.

The book is designed to aid those who are interested in solving the everyday problems confronted in practical clock repairing. This attractive, hard-bound, 544-page encyclopedia of horological information is published by the American Watchmakers Institute Press. The price is just $30.00, postpaid.

The unique, 9-page index and cross-reference information, prepared by Coleman's contemporary, Orville R. Hagans, is a valuable, extra feature which allows today's working horologist to consult the store of knowledge which Jess Coleman spent a life time creating and recording.

Send $30.00 payable to AWI Press, addressed to The Best Of Coleman, 3700 Harrison Ave., Cincinnati, Ohio 45211

USE THIS HANDY ORDER FORM

Name _____

Address _____

City _____

State _____

Zip _____

Dates to Remember

APRIL

3-5—Montana-Wyoming Retail Jewelers and Watchmakers Association Annual Convention; Northern Hotel, Billings, MT

4-7—Las Vegas Gift Show; Aladdin Hotel, Las Vegas, NV

4—MJ&SA Western Gala/Dinner Dance; Los Angeles, CA

5—Iowa Jewelers & Watchmakers Association Spring Technical Seminar; Best Western Airport Inn, Des Moines, IA

5-7—MJ&SA's Expo/West; Los Angeles Bonaventure, Los Angeles, CA

5-7—Louisiana Retail Jewelers Association; Holiday Inn North, Lafayette, LA

8-9—United Lapidary Wholesale Show; Dallas, TX

11-13—Alabama Jewelers Convention; Ramada Inn, Birmingham, AL

12-13—United Lapidary Wholesale Show; Houston, TX

13-16—Tel Aviv Jewellery Fair; Hilton Hotel, Tel Aviv, Israel

24-28—American Gem Society Conclave; Marriott Hotel, Chicago, IL

25-May 4—European Watch, Clock & Jewellery Fair; Basel, Switzerland

26—Ontario Watchmakers Association Meeting; Marvin E. Whitney technical speaker on chronometers

MAY

1-3—South Carolina Retail Jewelers Association Convention '81; St. John's Inn, Myrtle Beach, SC

16-19—Canadian Jewelers Association Convention and Conference; Empress Hotel, Victoria, BC

24-29—American Jewelry Distributors Association Annual Convention; The Homestead, Hot Springs, VA

28—American Watch Association Meeting; Edgewood Country Club, River Vale, NJ

JUNE

4-6—National Conference of the Society of N. American Goldsmiths; University of Kansas, Lawrence, KS

6-7—Sean C. (Pat) Monk speaker at the Watchmakers Association of Pennsylvania Convention; Hershey, PA

7-10—International Investment Gemstone Conference; Century Plaza Hotel, Los Angeles, CA

20-22—World Jewelry Trade Show; Las Vegas Convention Center, Las Vegas, NV

22-25—AWI Research and Education Council (REC) Instructors Meeting; Americana Hotel, Cincinnati, OH

26—AWI Affiliate Chapters Meeting; Americana Hotel, Cincinnati, OH

27-28—AWI Annual Meetings and Board of Directors Meeting; Americana Hotel, Cincinnati, OH

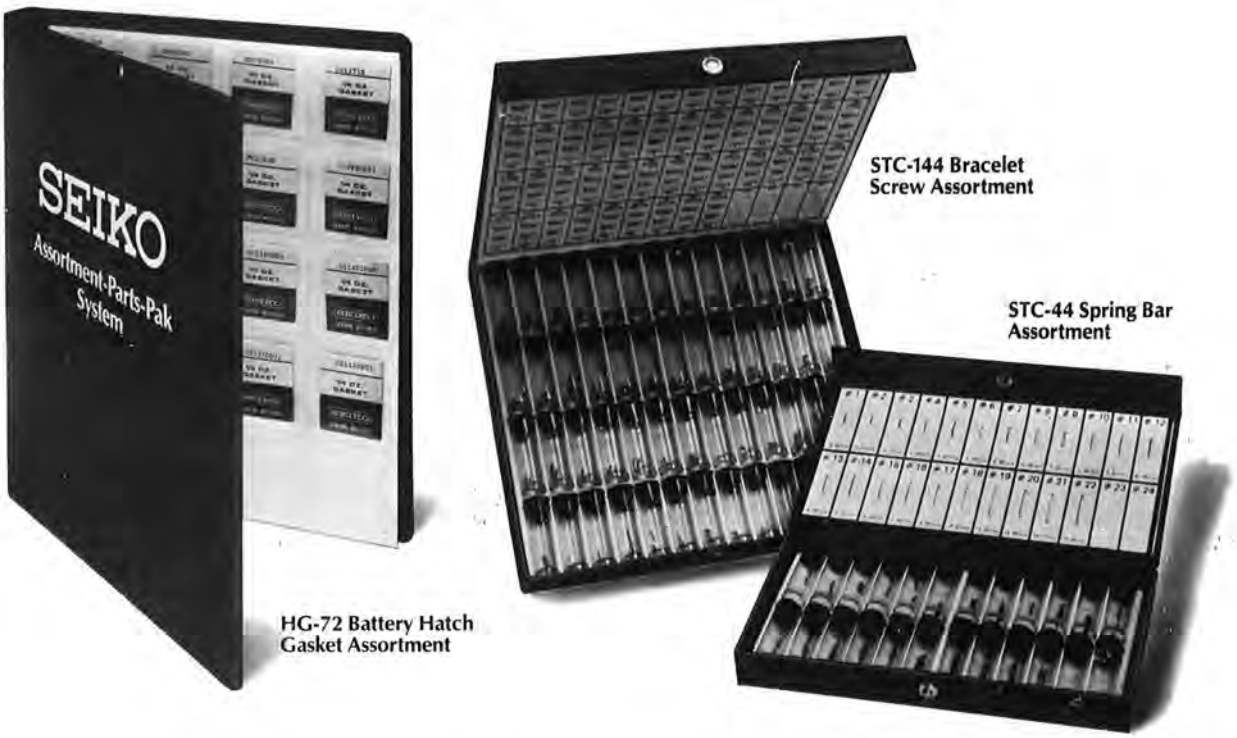
JULY

19-22—SJTA Atlanta Show; Hyatt Regency Hotel, Atlanta, GA

25-29—JA Fall International Jewelry Trade Show & Convention; Sheraton Centre & New York Hilton Hotels, New York, NY

Advertisers' Index

Simple repairs are simpler with genuine Seiko replacement parts.



Now you can keep all the parts you need on hand to perform simple bracelet repairs and battery hatch gasket replacements. Right where you work. It's an efficient way to save time, effort and money, and keep customers happy.

Seiko Bracelet Replacement Screw Assortment STC-144.

48 of the most popular screws, three of each kind, for most bracelets, clasps, and safety chains in the Seiko line. Complete with an illustrated case numbering chart to make selecting the appropriate part easy and convenient. Price: $26.75.

Seiko Stainless Steel Bracelet Spring Bar Assortment STC-44.

22 durable, dependable stainless steel spring bars, two of each kind. Arranged in graduated sizes by millimeters. With illustrated chart showing various sizes. Numbered unbreakable clear bottles add extra convenience. Price: $16.50.

Seiko Battery Hatch Gasket Assortment HG-72

16 different size gaskets. 72 total fitting over 175 case numbers. Specifically designed parts pack arranges gaskets for fast, efficient use. With alphanumeric case number guide. Price: $37.50.

These lightweight, compact kits are professionally designed to offer the utmost in convenience. So you can perform professional, convenient and profitable service for your customers. All kits available only through Authorized Seiko Material Distributors.

SEIKO

Someday all watches will be made this way.

Seiko Time Corporation—Material Sales Department
555 West 57th St., New York, N.Y. 10019

Citizen unwraps a quartz timer that does it all for under $1200.*

You could spend around $3000 for a digital display multi-function rate measuring instrument.

But it isn't necessary.

The Citizen CQT-101 can measure not only quartz watches (analog and digital) but also tuning fork and balance wheel watches with all the accuracy you need.

Its measuring range is from 0.01 second a day to ±399 seconds per day.

To monitor various types of watches and clocks, you simply change the microphone.

The CQT-101 is the only quartz timing instrument you'll ever need.

And even when it's not helping you build your service business, its attractive, professional look makes it in an effective in-store promotional display.

Pay $2000 or $3000 for a timer? Ridiculous. Now that Citizen's CQT-101 is here.

Place your order with your material house or directly to Citizen Watch Company. For more information, write: Citizen Watch Co. of America, Inc., Service Headquarters, 12140 W. Olympic Blvd., Los Angeles, CA 90064. Tel.: (213) 826-6541.

CITIZEN

We sell **with** you, not through you.

*Suggested retail. Price does not include shipping and microphone for mechanical watches. Sales tax additional in California.