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Editorial

Whenever a foreign manufacturer competes with a United States manufacturer and ships a competing product to the U.S., the federal government levies a tax on the foreign product or foreign-made parts for the product. We (our government) protect ourselves and our own by providing this economic edge.

Originally, this tax was levied on watch materials entering this country in order to protect Hamilton, Elgin, and Waltham. Now the domestic companies are gone, but the taxes linger. Initial inquiries indicate that these taxes amount to from 18% to 33% , depending on the price of the material being imported. One material supplier gave 27¼% as an average; another 28½%. If the duty were removed, U.S. watchmakers would reap some substantial benefits. Most material suppliers agree that prices could at least be stabilized; some think that prices could be reduced slightly, while others think prices could be reduced by nearly the percentage represented by the amount of tax!

In the near future, your help will be needed to strike this duty from the books.

On the Front

Tulip *noun* [from the Turkish *tulbend* turban]: any of a genus *(Tulipa)* of Eurasian bulbous herbs of the lily family . . . widely grown for their showy flowers.

Tulips at their showiest brighten our March cover. For more about Turkish influence—this time on watches—see page 30.

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Time To Reassess

In 1971, when the solid state revolution was first making an impact on our industry, we sent William O. Smith Jr. on a fact-finding trip from one coast to the other; a year later, we sent Hal Herman on a similar tour. The information gathered by these two and their assessments of future trends in the industry have proved to be amazingly accurate. Most of AWI's policies and directions have been based on the information gained from these reports.

Now that a decade has passed and we have experienced the many changes these early reports predicted, I believe it is time to once again assess the position of the industry in order to determine "where we are going."

I am recommending that AWI take the lead in sponsoring a symposium to determine the direction in which the industry is headed. If handled wisely, this could be just as effective as sending a representative around the country. My thoughts on the symposium are as follows:

Joe Crooks

1. The symposium should be held in the vicinity of metropolitan New York City—perhaps in Westchester County. This location would allow us to draw from the many industry leaders in this area.
2. We should invite speakers to present brief comments on their position from:
   a. Name brand watch companies (domestic)
   b. Foreign manufacturers
   c. Private and lesser-known brand companies, i.e., Microsonic, Ronda, etc.
   d. The American Watch Association
   e. A material and supply distributor representative
3. A panel can question the presenters from industry and formulate a concensus of opinions based on the information presented.

I am appointing a committee to work on such a symposium to be held this summer, preferably after the RJA Show which is an annual event in New York City. I would welcome suggestions or questions from you about ideas you may have concerning the future of the industry and any questions you feel should be directed to the panel. Please send these directly to AWI Central.

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AWI News / Milton C. Stevens

A New "Master Plan For Action"

In January, 1975, I discussed with the Executive Committee of AWI the need to take steps to insure AWI's continuing ability to provide watchmakers with the kind of services, training, and information needed to cope with the changes which were occurring in timekeeping technology. As a result of the discussions held at that committee meeting, I formulated a "Master Plan For Action" which was presented at the annual Board of Directors meeting held in June, 1975. The Board gave its approval, and we set about implementing this plan. There were four main areas of concern, which were:

1. The need for an expanded publication and the hiring of an editor. Expenses for both could be offset by paid advertisements.

   A committee was appointed by Marvin E. Whitney, AWI President at that time, to formulate a plan to implement this project. As everyone knows, the *Horological Times* resulted from this action.
2. The need to consolidate and then expand the scope of our technical information service. This required the cataloging of all of our present technical information, the establishment of a file for technical questions which are repeated over and over again, and making this information readily available to AWI members.

   With the Board's approval, funds were made available for the purchase of a large 3-M photocopier and the hiring of additional part-time help to properly catalog our existing information. The Board also approved a monthly expenditure to establish and operate the special phone line and recorder which we now call the Technical Hotline. The technical bulletin file was greatly expanded as a result of our contacting foreign and domestic watch companies for technical information. A complete listing of all technical bulletins available from AWI has been provided to each member along with an established procedure for obtaining this information.
3. The need was acknowledged for bringing new technology to those watchmakers who were mechanically oriented and suddenly in need of electronic skills. The Board approved the hiring of a professional curriculum writer to prepare a course in microelectronics which could be handled through correspondence.

   Mr. Ed Rice, an electronics instructor and curriculum specialist at the Milwaukee Area Technical College, was hired to prepare this course; he received assistance from Jerry Jaeger. The result has been our highly successful Micro-Electronics for Horologists course.
4. The need to have someone at AWI assigned the responsibility of keeping watchmakers "caught-up" on the new technology was admitted, resulting in the recommendation that AWI consider hiring an Education Director.

   While we have gone in a slightly different direction (we did not hire an Education Director), we did hire a full-time administrator. As a result, your Executive Secretary has been able to devote many hours to the establishment of a wide variety of bench courses designed to fill these needs.

Milton C. Stevens

As your Executive Secretary, I believe it is now time to examine AWI's direction again and to establish goals which will meet the future needs of the Institute and its members.

I will be discussing some definite ideas which I have with the AWI Executive Committee when it meets for the midyear meeting. I will share these ideas with you in a future column. At this time, I would welcome input from any interested AWI member and will give serious consideration to any ideas advanced in writing to me at AWI Central, before a formal proposal is prepared for the entire Board of Directors which meets in June of this year.

Bench Tips / Joe Crooks

A DIFFERENT PERSPECTIVE

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

Recently, in your column [December, 1980], there was a hint about using a leather punch to make new inserts for hammers. I would like to add that one can place a piece of thin cardboard or plastic under the leather for a clean cut. The reason for this is that the punch anvil becomes deformed by repeated use and leaves ragged edges on the cut pieces. It is also recommended that the anvil be filed smooth before using. Also, sand the tips of the cutters to get a fine cut. File down the end of the hammer so as to use a shorter piece of leather and remove the crimped end of the hole. Also, put one drop of glue in the hole to hold the leather. A glue that I have found to be good for this purpose is called "Weldbond" by Frank T. Ross & Sons, Inc., of Evanston, Illinois. It is fast-acting and recommended for all sorts of materials. For myself, I made a punch and tube to hammer the leather into the hole in case of a mismatch in sizes.

In the January, 1981 issue, there appeared an idea for tool organizing. My organizer is a cigar box with a piece of quarter-inch mesh screen over it and a piece in the bottom to keep the tools from sliding sideways. It has quite a large capacity.

Along the same lines, I use a cigar box with a piece of half-inch square mesh screen over it to hold clock wheels when I disassemble a clock. The wheels can be placed in the same position that they were in the plates. It makes it easy to find the right wheel when rebushing holes. Also, it will position the pinion up or down as it was in the plates.

Now I have a question for somebody. Is there a good tool for removing and reinstalling those pesky snap washers? My tool is an old screwdriver with a slot and undercut on the underside. It works O.K. on some jobs, but there are many sizes of those darn things.

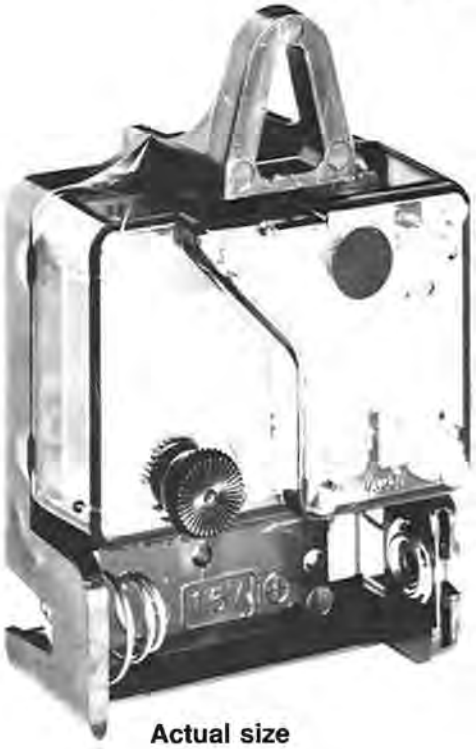
I share the philosophy that a person is only as good as the knowledge he's willing to share. AWI personnel have certainly shared an enormous amount. Thanks.

Thank you, Vic, for your alternate methods related to some past tips that have been published. As we have stated before, what saves time for one craftsman may be a handicap to another–but as we are all creatures of habit, most of us continue to repair watches and clocks the same way our instructors taught us, not knowing there may be an easier or faster way.

As for your question about a snap washer tool, automotive supply houses sell a small pair of pliers made to do this job. You may need to dress down the points a little to service all sizes with which we come in contact.

Another tip from Vic will appear in next month's column. In the meantime, **send your tips to Jingle Joe, 265 N. Main Street, Mooresville, North Carolina 28115.**

QUARTZ MOVEMENTS



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HOROLOGICAL SHOP TOOLS 1700-1900

By Theodore R. Crom, ME, FNAWCC, FBHI

12 x 9 inches, 678 pages, hard cover, 1,302 figures, one color plate with numerous other related, decorative end plates and figures. Published 1980 by the author, Rt. 2, Box 212, Hawthorne, Florida 32640, U.S.A. at $95.00 plus $3.00 postage and handling.

This is a book of major importance and one of the most comprehensively prepared books to appear in recent years. The wide field it covers and the depth of its information alone speak well for the years and the intensity of research that must have gone into its production. Theodore R. Crom is a professional engineer who has made the collecting of old watch and clockmakers' tools a dedicated activity throughout his many years of horological association. He also has traveled throughout the horological world in his searches for these devices and related information.

As a result, Mr. Crom has become possibly the world's leading authority on this subject. His own collection of antique and not-so-antique horological tools is a veritable visual encyclopedia of these devices.

As this book is divided into 103 sections, space prohibits listing all but a small sampling of the topics covered. There are "chapters" devoted to such subjects as: Dating Horological Tools; The Work Shops and Trade Cards of the Eighteenth and Nineteeth Centuries; Old Books and Catalogues; Case Working Tools; Chain Making Tools; Balance Tools; Benches, Drawbenches, Drawplates, and Drawtongs; Calipers, Compasses, and Dividers; Depthing Tools; Escapement Tools; Fusee Engines; Dial Tools; Lathes; The Evolution of the Watchmaker's Turn or Lathe; English Lathes; Swiss Lathes; The American Watchmaker's Lathe; The Universal Mandrel; Pinion Cutter; Pliers; Pivot Polishing Tools; *Machine-a-Raboter les Dentures;* The Rounding-Up Tool; Staking Tools; Threading; The Vice; Uprighting and Planting Tool; Wheel Cutting; The Dividing Plates; The Engine.

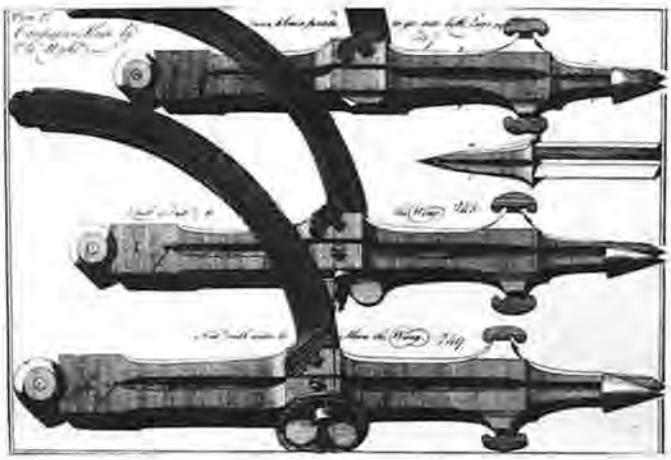
The numerous other divisions list the pertinent and sometimes complete sections of old horological catalogs or encyclopedias. Among these catalogs and encyclopedias are those of Joseph Moxon (1678) and Nicolas Bion (1709). In the latter, the first wheel-cutting engine is pictured and described. Also included is Antoine Thiout's landmark *Traite de L'Horlogeries et Mechanique et Pratique* of 1741. Thiout was one of the finest clockmakers of his time, and his book, aside from being a treatise on clocks and watches, was the first text to deal extensively with the tools used for such work. Like most book illustrations of that time, those in this book were printed from copper plate engravings, depicting the objects with sharp, true images.

Other encyclopedias which are represented in this book are the *Diderot et d'Alembert* of 1768, *Hulot* of 1775, *Peters Stubs* of 1801, and others, continuing into our own century.

As Mr. Crom points out, some of the older tools were made by the watch and clockmakers themselves; craftsmen lavished great care upon these tools, often decorating them with engravings and ornamentation, and placing their names and dates upon them. Thus, chronological placement of these tools in the historical calendar is made easier.

Most tools, however, were produced by professional tool makers who published catalogs elaborately illustrated with engravings. In this book, five of the more important and rare catalogs are reproduced in their entirety. The three earliest are: *Wyke and Green* circa 1758-1770; *Ford, Whitmore and Brunton* (1775-1785); and *Peter Stubs* (1800-1801). In the latter, the illustrations are almost unchanged from those appearing in earlier, eighteenth-century horological tool catalogs. Later Stubs catalogs of 1851 and 1890 illustrate technical advancements in design and manufacture, as well as some designs which did not change and have not changed even in modern times. Plates from many other catalogs and older books have been beautifully reproduced in this book.

The author points out that, while it is possible to date a watch or clock by its evolutionary position



John Wyke, 1765

Polishing Tool

on the technological ladder, this is not always true with horological tools because some tools have not changed much in the two hundred years covered by this book. Mr. Crom points out that the Lepine-type bridge movement caused the introduction of the mandrel faceplate, " . . . where before there was little need for such a tool." However, while the introduction of the mandrel faceplate might have been coincident with the advent of the Lepine calibre, the mandrel faceplate was a convenient device for use with all types of watches.

The *machine-a-raboter* was the forerunner of the rounding-up tool which was, in turn, the sire of the gear hobber. All three instruments are treated in respectful depth, together with their methods of operation.

Mr. Crom defines the mid-eighteenth century as the real start of the making of horological tools as a distinct industry. The exceptions, however, were wheel cutting engines. Among the first in England to start such a business was John Wyke. His catalog is also reproduced in this volume.

Included is a section devoted to trade cards of the eighteenth and nineteenth centuries with their baroque and rococo ornamentation and horologically fanciful designs. In this section, too, are reproductions of paintings and engravings of the workshops of famous clock and watchmakers of the eighteenth, nineteenth and early twentieth centuries. These provide insights into the tools, equipment, products, and even the work benches and clothes used by the masters, their apprentices, and customers. There are also photographs of early twentieth-century English and American watch and clockmaking shops, some of which belonged to notable craftsmen of the times.

Reproductions of the catalog pages illustrating older tools are of such clarity and size that one could easily be examining the original copies.

Ferdinand Berthoud, one of the most versatile and prolific horological geniuses of all times, an inventor, and a foremost chronometrist, was also a prolific writer. His two books, *Essai sur L'Horlogerie* of 1763 and *Traite des Horloges Marines* of 1773 also contain excellent engravings of the tools he used, many of which he originated or altered to suit his own needs. These illustrations were the basis for contemporary tool catalog illustrations; they appeared in Diderot's encyclopedia, and are repeated here as well. These include detailed views of wheel cutting engines, depthing tools, movement holders, pinion cutting machines, small lathes, universal faceplates, ball and socket bench vises, pivot polishers, fusee cutting engines, uprighting tools, calipers, scribers, dividers, cannon pinion crimpers, balance poising tools, fusee (equalizing) adjusting rods, pivot micrimeters, small file-making devices, swing tools for escape teeth, and hairspring and strength gauges, among others.

Often the tools shown in their original illustrations, have each of their parts fully taken apart for better understanding of their operating principles. Such attention to details has assisted museum curators in restoration of such antique devices as well as enabling modern instrument makers to reconstruct such reproductions from scratch, sometimes in order to restore an old, rare, watch or clock.

There is hardly a tool one can recall which is not represented in this volume, and often, Mr. Crom has provided his own descriptions of uses and operation, based upon using the tools in his vast collection.

For the clockmaker, there are elaborate drum-weight grooving lathes; there are draw plates for wire, pinions, fusee chain wire, links, and hooks. Screwplates, tongs, pliers of every description, files and file-making machines, case tools, dies and scales are shown. Even included are watch and clockmakers' benches which incorporate such an array of innovative ideas that the cliche, "nothing new under the sun" could easily be invoked. Some jewelers' tools also are pictured and documented in this volume. Included are the original prices, as shown in reproductions of the original catalog pages.

The coverage of American enterprise in watch tools and the numerous American inventions of the last half of the nineteenth century (Mosely, Webster-Whitcomb, Rivett, Hardinge, Stark, and others) indicate that American participation has not been neglected. "Damaskeeing" lathes, screwhead lapping devices, staking sets, English balance dynanometers, jeweling lathes, filing fixtures, crystal-cutting and grinding tools are all covered, as well as the earliest demagnetisers, heralding this mixed blessing to the watchmaker. Yes, even those useful wheel stretchers, used so often years ago by this reviewer, are included. *(Continued on page 16)*

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HOW TO SHOP FOR MONEY

By Joseph Arkin, CPA, MBA

Every few weeks we see changes in the prime interest rate and the Federal Reserve Bank's rediscount rate. The fluctuations can be likened to a yo-yo, but in reality, it is an attempt to control the available money supply in heading off the tight money debacle of 1966.

No matter what money does cost, you need credit (the ability to use someone elses' money) in the everyday operation of your business—perhaps to carry accounts receivable, to carry peak-load inventory, to modernize your facilities, for the purchase of new equipment, for expansion, or simply for everyday business needs.

Money is a commodity and you "buy" it like everything else. How much you pay is dependent upon how good a shopper you are. Price tags for money are not uniform and you can borrow at a cheaper rate by knowing where to borrow and by understanding the true interest rate being charged.

Most states have usury laws of varying rates, and wherever rates are quoted in the following examples, they are not necessarily reflective of actual rates; they are for illustrative purposes.

Here are some suggested places to obtain loans and pointers on how to reduce interest costs:

Bank Loans: A business firm can obtain a bank loan on the basis of its financial statement. Despite all the furor over the lack of money, banks are still making loans. But what does it cost?

Banks will lend money in a variety of ways. The most popular method from the bank's viewpoint is the discount loan. For instance: If you borrow $1,000 at 6% for 1 year, the bank will deduct $60 and credit your account with $940. (Money cannot be borrowed from banks at 6% per annum. This figure is used only for purposes of illustration.) Each month you have to repay $83.33, and because you never really had the use of $1,000 for a full one-year period, you are paying an effective rate of approximately 12% per year. In addition, you may have to pay extra for life insurance, filing fees, etc.

Another method is the "add-on" wherein you repay the money borrowed plus agreed-upon interest, over an extended period of time. Thus, $1,000 borrowed at 6% for one year is repaid at the rate of $88.33 per month.

The cheapest form of bank loan is the straight business loan where you borrow a sum of money to be repaid with interest at the end of the term. A $1,000 loan for one year at 6% interest is repaid in full, $1,060, at the end of the 12-month period.

There is a variation to this type of loan in which the bank deducts the interest in advance, or renews the loan quarterly. Both of these methods represent a slight increase in the straight "true interest" rate.

You can also borrow on your personally owned or business owned vehicles. Usually you'll get a lower rate on auto or truck loans, but because they are installment loans and must be repaid monthly, the true interest rate is almost double the discount rate quoted.

Or, you can hypothecate securities owned individually or in your firm's name. Most banks will lend up to 70% of the market value of listed securities, some over-the-counter stocks, and most mutual fund shares. In most states, there are usury laws setting forth maximum rates that can be charged on loans, but some states allow higher rates than the usual maximum in the situation where loans are secured by the pledge of securities.

Factoring: The pledging of a firm's accounts receivable is a relatively simple way to get liquidity, but the method is costly and only those firms with a high gross profit margin can ever consider factoring of accounts receivable.

Most factoring is done on the basis of assigning sales invoices to the factor in exchange for an advance against future payments. Let's say your agreed-upon rate is 1½%; then on $1,000 of bills assigned, the factor will advance $788. ($1,000 less $200 reserve = $800 x 1½%.) The 1½% charge is good for 30 to 45 days after which the uncollected account is charged back against the reserve account, or there is an additional charge levied of 1½%. On any unpaid balances, there is a charge of one-quarter to one-half of one percent per month.

Factoring can be obtained on notification basis, i.e., customers pay directly to the factor, or on non-notification basis, i.e., where customers remit to you and you in turn give the checks over to the factor who endorses them in code (with proper arrangement with the bank) and deposits to his account.

Insurance Loans: Low-cost loans can be obtained by borrowing the cash values in your insurance policies. Borrowing this way is easy for there are no credit investigations, no financial statements to prepare, and little paper work. Also, you can practically write the terms of repayment. Rates vary, but usually you can borrow at 5% or 6% true interest rate. Veteran Administration policy loan rates are usually cheaper than rates of private insurance companies.

If you want to make periodic repayments, the loan will be reduced and the interest charge lowered accordingly. Of course, the proceeds upon death are reduced by the amount of the loan then outstanding, but many companies will allow you to purchase term insurance on the amount of the loan.

Passbook Loans: Some people cannot understand why a person would borrow his own money from a saving bank and pay for the privilege. People do this for the same reason they open a non-interest-bearing Christmas Club account . . . they want a form of compulsion to repay themselves!

It is relatively simple to borrow on the saving passbook, leaving it in the custody of the bank during the term of the loan. Deposits can

be made, even withdrawals, as long as the balance remaining is in excess of the loan balance. You pay a higher interest rate than the amount received as interest from the bank, but the cost is cut because of the tax advantage. Suppose your savings account is earning 5¼% (taxable to you) and you borrow at 6¼% (tax-deductible to you). Your entire cost is only 1%, less whatever you save on federal, state, and local income taxes. Also, you don't break the continuity of your earning interest if your need for money comes in the middle of an interest period.

This type of loan is repayable periodically, or in a lump sum, at your option.

Home Mortgage Refinancing: Homes purchased years ago have a considerable amount of equity due to mortgage payments having been made and to the inflationary trend that has boosted land and building values during the past three decades.

Mortgage money is tightening up—but if you shop around and ask savings banks, state and federal savings and loan associations, commercial banks, insurance companies, etc., you'll perhaps find one with available funds and anxious to refinance your existing first mortgage.

This method of obtaining cash for your business is costly. The new mortgage will be at the present interest rates (probably much higher than your original rate) and you'll be paying that rate on the balance owed on the original first mortgage.

Also, you'll find that you'll have to pay legal fees to the lender, to your own lawyer, and make payments for title policy, title closing, and mortgage filing fees. This could cost as much as $1,000 plus the increased rate of interest—but you are spreading the additional cost factors over a long, long period of time.

Finance Companies: If you can't borrow from your bank or other source, you can seek financial assistance from finance companies or commercial factors. They will lend you money on the equity represented by your fixtures and equipment. Loans from these sources are extremely costly and should only be considered as a last resort.

Credit Unions: You must be a member to borrow, but it is easy to acquire membership by buying a $10 or $20 certificate of membership. Usually you'll pay 12% or more per year as the interest rate. Credit unions will ask for co-signers and have strict rules as to the maximum amount that can be loaned to any one borrower.

Small Business Administration: There are three types of loans available from the SBA. The first of these is the direct loan covering the situation where the applicant must have tried, without success, to obtain financing from banks or lending institutions at reasonable rates. Direct loans are made by the SBA up to a ceiling of $100,000. A second type of loan is the guaranty loan, one wherein the SBA will guarantee up to 90% of the loan, with a ceiling of $350,000. The third type of SBA loan is the participation loan in which the lending institution furnishes 25% or more of the loan amount, with the SBA furnishing the balance.

There is quite a considerable amount of red tape involved in the procurement of loans through the SBA. For one thing, there is a detailed questionnaire requiring the furnishing of profit and loss figures, balance sheets, and retained earnings, for a five-year period.

"Cash is the necessary fuel for the successful operation of your business. Sit down with your accountant and review your current situation."

In addition, the principals must submit personal statements of their assets and liabilities, with the requirement that they (and their wives) personally guarantee the loan and its repayment.

Despite the tightening money market, the SBA has helped many small businesses to obtain needed capital. "We can now accommodate many small businessmen," says an SBA spokesman, "specifically those who have been pinched for funds during this period of unprecedented business activity, coupled with extremely tight credit. This easing of loan restrictions is in line with SBA's objective of providing every possible assistance to small business."

Miscellaneous Sources: There are disaster loans made to businessmen whose establishments have been damaged or destroyed by floods, etc. The loans made in this category carry very attractive interest rates.

There are also rural development loans to foster employment or to reduce unemployment. These loans are made by the Area Development Administration to foster business expansion in rural areas, specifically those areas where the rate of unemployment is above normal.

State and Municipal Loans: Many states have agencies existing for the sole purpose of making loans to business firms desiring to enlarge their facilities so as to provide employment and payrolls in a given area. Cities, too, have gotten into the act, and you can get the powers at City Hall to finance part of your operations on a long-term loan basis to increase industry in their area. Contact your state Department of Commerce and local authorities for additional specific information.

The federal government has a program for those persons with money problems where it is thought that the money problem is caused by poor management. There is a Service Corps of Retired Executives (SCORE) with more than 2,000 talented, trained, retirees available to help small businessmen with the problems of running a business—merchandising, pricing, advertising, purchasing, etc. There is no charge for the first 90 days of SCORE counseling.

The SBA has an office of Procurement and Technical Assistance whose function it is to help the small businessman get a share of government contracts or subcontract work for larger firms.

Also, to help with your money problems, the SBA has a load of booklets on various phases of operating businesses—with case histories, advice on all phases of day-to-day operations. They vary from free to three or four dollars per book.

This article hasn't covered the complete sources of obtaining money for the conduct of your business—but an attempt has been made to highlight the most popular sources and show the relative costs.

Cash is the necessary fuel for the successful operation of your business. Sit down with your accountant and review your current situation. Map a plan, watch your cash flow, anticipate your cash needs throughout the months ahead. Keep in mind, though, that all of the cash need not be obtained from one source. You can combine one, two, or even three of the ideas outlined, just as long as you explore the feasibility and the obligations undertaken for repayment.

BOOK REVIEW

(Continued from page 11)

Nineteenth-century tools and devices for making and finishing cylinder escape wheels are here reproduced in comprehensive detail. The Boley products of 1865, with photographic reproductions from this earliest Boley catalog, reveal some evolutionary improvements and include the rounding-up tool, eclipsing the "raboter" mentioned earlier. Also in this large section, we find the Swiss hand and gear-driven, but hand-powered, mandrel with all its attachments.

Although lathes and their attachments are covered in other parts of this encyclopedic thesis, the thirty pages on lathes represent both a textual and illustrated account of the lathe's evolution in horology from its inception to modern times.

Swing tools, spotting and snailing, "a puddin," goniostats, planting tool, Beck iron, bow mills, breastplate, card plyers, chops, clock throws, corn tongs . . . What are they? These are real devices, once commonly used in everyday horological life, and now pictured and described in Mr. Crom's in-depth book.

The author has traveled extensively throughout the horological world, collecting antique and interesting horological tools and devices. He has interviewed hundreds of older masters (some of whom are pictured at their benches in this book), collected books, catalogs, and memorabilia.

The author has an easy style, with sly bits of humor sparsely sprinkled in the descriptive text. Mr. Crom uses the English terminology and spelling where most appropriate. He has done his homework quite thoroughly, and it would be presumptuous or petty to inject minute criticisms.

Although many professional watch and clockmakers feel we are entering the twilight of pure mechanical horology, there are many fine professional and equally fine amateur horologists who are dedicated to keeping fine, older timepieces in their original conditions. To these and to all collectors, this book **must** be at hand. Not only is it a most revealing visual and textual encyclopedia of horological tools, equipment, and sundry related devices, its explanations of how these work should provide authentic methods of performing otherwise elusive operations.

The book itself is of the highest quality. The paper is archivalquality documentary paper, manufactured especially for long life. The binding is especially strong, necessary to support the book's eight-pound weight. This formidable volume's price of ninety-five dollars may seem high, but its contents–unapproached, in comparison, by any previous effort– make it a necessity for anyone who seriously undertakes clock or watch restoration or studies horological history from any national point of interest. This book, in my opinion, ranks very high among the major horological reference sources. HTIMES

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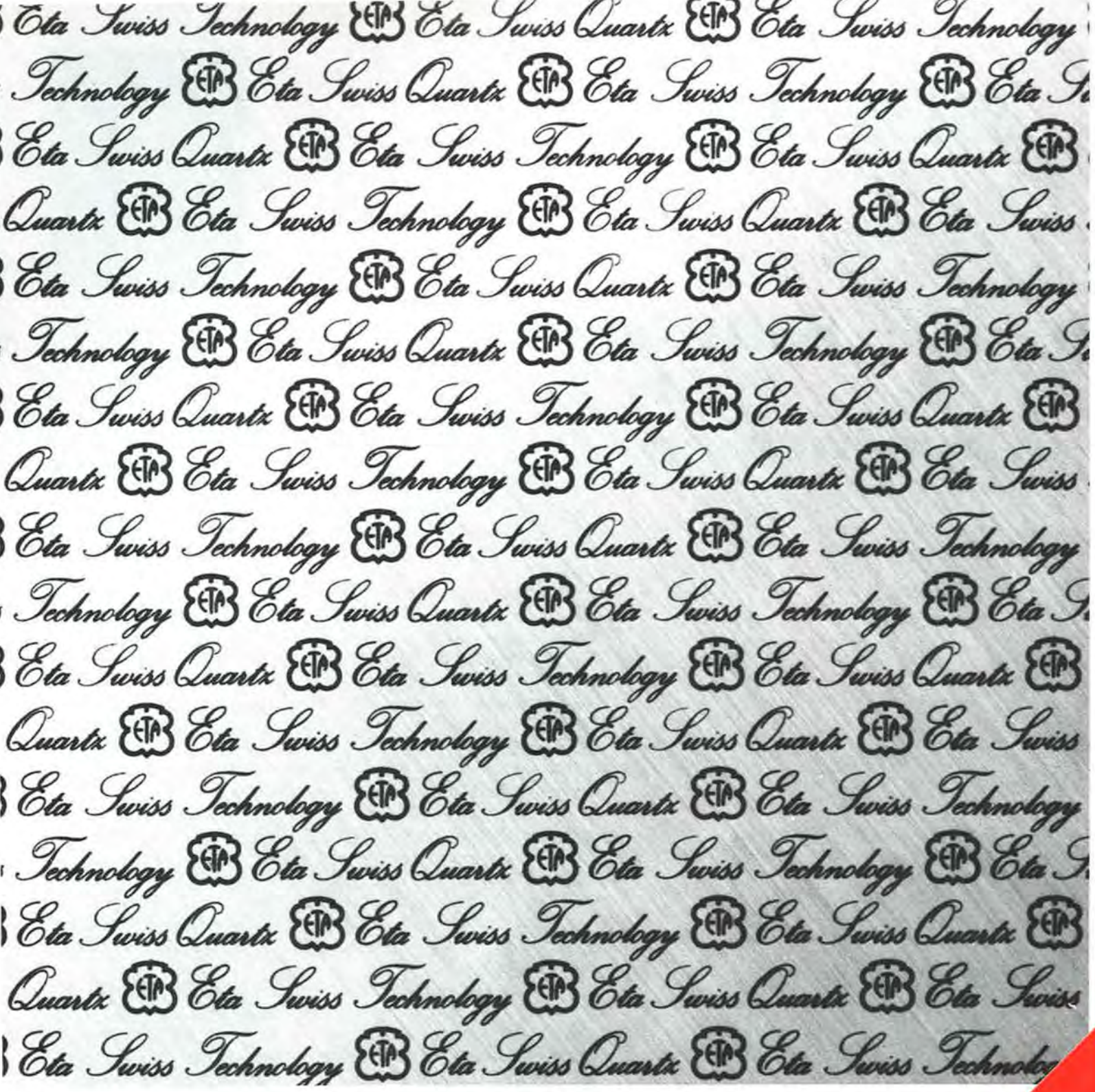

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SALES TALK

By Wes Door, CMW

Selling By Appointment

A few days ago, I was seated in my dentist's waiting room. I was there because I had an appointment. It all started, not because of a toothache, but because the dentist's records showed that it was time for a check-up, and they called me to make an appointment.

For the dentist, the appointment is the principal means of encouraging repeat customers. Waiting for toothache customers to walk in would make for a very small business. Even though we in the jewelry business depend mostly on "walk in" customers and very little upon appointments, the small amount of business we do conduct this way can be very important.

Most appointments start with a phone call. Customers call us for several reasons: they want to talk to the manager or a certain employee, or they just want information about jewelry. Perhaps if their watch has stopped, they feel the need to explain the problem on the phone, and we are tempted to tell them that we cannot repair their watch over the phone. (Naturally, being refined craftsmen, we have more reserve than to actually say that, don't we?) We must be polite and courteous and listen sympathetically. Then, of course, we ask them to bring the watch in to be examined.

A phone call is a method by which a customer or potential customer can talk to us without pressure. They can ask us if we repair their brand of watch, or if we buy gold, sell diamonds, or know the value of grandma's ruby ring. They might ask if we have one of those "pins" to hold their watch onto their watchband. Although it is impossible to replace a spring bar over the phone, sometimes we can sell merchandise over the phone.

For example, suppose Mrs. Jones phones long distance from her new home two hundred miles away, wanting us to make a pendant to match the ring we made for her last year. Since we happen to have a good record of this ring, we could fill her request and mail it to her, or we could make an appointment with her.

Suppose Mrs. Smith phones and makes an appointment for 3 p.m. to discuss remounting her diamonds from an old engagement ring (one of her previous marriages) into a dinner ring with the addition of a couple of rubies. First we usher her into our "gem room" where we have our "sit down" showcase with appropriate chairs to match. We can easily reach for our ring sizers and other gauges and tools since we have previously made certain that these are convenient. Our certificates on the wall add to that professional touch which is so important. As we swivel our chair, we can reach into our "gem room" safe to secure the proper rubies.

Many appointments start with a phone call from a

potential customer who says they are simply comparing prices, that they have already been looking around and perhaps even have a price quoted from a competitive store. They just called to verify their "good deal" and maybe to challenge us to make a better offer.

I had a personal experience like this just before Christmas. A lady telephoned me, and our conversation went something like this:

"Do you have a good price on one-carat diamond rings?"

"Yes," I answered. "Naturally we think our prices are good. Would you like to come in and let us show you what we have?"

"I don't know. I found a very good deal somewhere else. They have an $8,000 diamond on a half-price sale, so it would only cost me $4,000."

"Do you live very far away? The reason I ask is because I need a few minutes to double all of my diamond prices so I can also offer you a half-price deal on our diamonds. It would be a shame for you to purchase from that other store and then later come into our store and find out our prices are actually better. Now, we will be open until 5 p.m. today and all day tomorrow. Which is best for you?"

"Well, I don't know. Maybe I will come in today just to look."

The above words are not the exact ones used; however, we did make a $5,400 sale to this lady, thanks to her phone call and the resultant appointment. Most of our sales are small; only a few are large ones like this. However, they are all important, and when the phone rings, we have no idea what will result.

If you do make an appointment, you must write it down or use an appointment book. Better yet, set your alarm watch to about 20 minutes before the appointment. Then, if you are with another customer and your alarm goes off, you can explain that you have an appointment, but you do want to finish up with them first.

A pleasant telephone personailty is necessary to give a good initial impression. This includes being enthusiastic and speaking with a friendly voice. They say even our smiles go through the telephone wires.

Remember that customers are used to making and keeping appointments with all types of people—dentists, doctors, barbers, bankers, even their friendly loan company. They know what an appointment means, and they are used to parting with some amount of money at the end of each appointment.

As stated before, I really believe in the use of a "gem room" or "diamond room"—whatever you want to call it. This gives that needed privacy to the most important person we know—our customer!

Try treating your customers as well as the dentist treats his. Who knows? They may enjoy sitting in your chair better. And when customers are seated, they generally BUY NOW.

Buy Now,
Wes

Charlie Smith, Noted Horologist, Passes Away

CHARLIE G. SMITH, for many years a horologist of great influence in the Washington D.C. area, died January 19, 1981, at the age of 85.

Charlie Smith was born in 1895 in Madison, North Carolina. At age 12, he went to work for a jeweler as a watchmaking apprentice and immediately showed a real aptitude for the work. Eventually he found his way to Washington and to the Naval Observatory. Just before the U.S. entry into World War II, he was assigned by the Observatory to do classified horology in Pearl Harbor. He was recalled home just before the Pearl Harbor disaster and continued working in the Navy chronometer shop. This work involved monitoring Hamilton Watch Company's development of their marine chronometer in Lancaster, Pennsylvania. When the Navy's chronometer shop was moved to Norfolk, Virginia, Mr. Smith chose to stay in Washington and became involved in a school to teach veterans watch and clock making. He joined the Smithsonian Institution and remained there until he retired.

Throughout his career, Mr. Smith was counted among the most esteemed chronometer, watch and clock repairmen of the area. He was called upon to perform work for the Washington museums, universities, and celebrities. He repaired a watch for Thomas Alva Edison, clocks for Joseph Alsop, and was personally entrusted by President Franklin D. Roosevelt with the delivery of a clock to Queen Wilhelmina of the Netherlands, then resident in Washington.

Mr. Smith was very active in the Horological Institute of America, the ancestral organization of AWI. In this photo of him at work, the sign in front of him reads, "Horological Institute of America. Marine Chronometer & Time Service Display. Are You a Member? Join Now."

Charlie Smith is survived by his wife, Neville P. Smith, a son and a daughter, seven grandchildren and three great-grandchildren.

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In the Spotlight © 1981
by Orville R. Hagans

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

Krazy Clocks:

The Clock of Texas

The Clock of Texas was constructed as a civic and educational attraction, and as a focal point and timepiece for Sharpstown Center, a shopping mall in Houston, Texas. Located in the center of the all-weather mall, the Clock of Texas was designed and built by Dale Clark, a craftsman and sculptor from Santa Barbara, California. Frank E. Tritico, teacher of Texas history for the Houston Independent School District, was historical consultant.

The clock is approximately 18 feet high and 12 feet in diameter. It is constructed around a central vertical stem which rises from the center of a round base. The main body of the clock, containing six three-dimensional historical scenes covered by sliding doors, is similar in shape to a merry-go-round with closed sides turning on a vertical shaft. The actual timepiece is on top of the center stem. The six flags of Texas hang from metal poles angled above the main body of the clock with each flag over its particular scene. The total clock weighs two and one-half tons.

Each of the six stages houses a separate animated scene representing a moment in Texas history under each of the six flags of Texas.

On the hour, from 10:00 a.m. through 9:00 p.m., seven days a week, the main body of the clock containing the scenes starts to turn at the rate of one revolution every four minutes. The doors of the six scenes slowly open and one stage is animated, accompanied by appropriate music, lights, and wind effects. Animation for this stage is in full swing for four minutes, and then the doors close. Rotation ceases, and the clock is silent for 56 minutes. Then the sequence is repeated for the next scene.

Three times each day, at 12 noon, 4:00 p.m., and 8:00 p.m., full animation is scheduled and all six scenes come to life at once.

The miniature figures are made of paper mache. They act out scenes representing historical moments under each of the following flags: the flag of Spain (1519-1821); the flag of France (1685-1689); the flag of Mexico (1821-1836); the flag of the Republic of Texas (1836-1845); the flag of the Confederate States of America (1861-1865); and the flag of the United States (1846-1861 and 1865-present).

Scene 1: SPAIN (1519-1821)
"The Spanish Colonization of Texas reached its zenith with the Mission Era. These centers of Spanish culture formed a chain across the Texas map, and many of them remain today."

The scene shows an old mission in the background and four Spanish soldiers carrying halbards with a cloth canopy stretched overhead. A Fransciscan Friar in a brown robe walks beneath the canopy. A woman grinds corn by hand in the foreground.

Scene 2: FRANCE (1685-1689)
"France's claim to Texas sprang from La Salle's mistaken landing near Matagorta. The short-lived settlement of Fort St. Louis was wiped out by disease and hostile Indians."

This scene shows La Salle's flagship in the background. La Salle and three of his men view the new land. A priest gives thanks for a safe landing.

Scene 3: MEXICO (1821-1836)
"Mexico invited Americans to colonize Texas under the famous Stephen F. Austin, called the 'Father of Texas.' "

This scene, with a log home in the background, shows Stephen F. Austin standing at a table handing out land grants to the settlers assembled around him. Baron DeBastrop sits at the table. A child dances happily in the foreground.

Shoppers await the moment of animation as the hour strikes and one section of the Clock of Texas comes to life.

Scene 4: REPUBLIC OF TEXAS (1836-1845)

"General Sam Houston's victory at San Jacinto over General Santa Anna, April 21, 1836, assured the independence of Texas, and for ten years it was a sovereign nation."

This scene depicts the surrender of General Santa Anna to General Sam Houston at San Jacinto. General Houston's wounded ankle is being bound by an attending physician. "Deaf" Smith sits on a stump in the foreground. Santa Anna, in the garb of a private, is flanked by two of his captors. A Mexican officer in red jacket and epaulets stands near General Santa Anna. General Thomas Jefferson Rusk, Secretary of War, is standing behind General Houston.

Scene 5: UNITED STATES (1846-1861 and 1865-present)

"On February 19. 1846, the "Lone Star" flag was lowered to rise again as the twenty-eighth star in the United States flag, with J. Pinckney Henderson as Governor."

This scene shows a long log building in the background with a large veranda extending across its entire front. President Anson Jones stands at the center of the rostrum. The Lone Star flag has been lowered, and the U.S. flag has just been raised. The scene also shows two moving soldiers and assembled spectators.

Scene 6: CONFEDERATE STATES OF AMERICA (1861-1865)

"The victory at Sabine Pass by Lt. Dick Dowling and forty-six Confederates over a federal invasion force of five gunboats, twenty-one troop transports, and six thousand Union soldiers, was without parallel in history."

This scene depicts the invasion fleet in the background with Lt. Richard W. Dowling and some of his men behind a log and mud fort with cannon. TIMES

Not By Horology Alone

Part II

Some time back, we extolled the virtues of an important support course in the horology program curriculum—Applied Composition and Speech, i.e., Communication. We noted the obvious reasons why people in general, and horologists in particular, fare better with their fellow men in business and customer relationships when they are able to get their message across clearly, intelligently, and with a minimum of confusion.

The overwhelming majority of horology school graduates quickly find themselves in the maelstrom of the business world as employees, employers, and entrepeneurs. We would be remiss were we not to prepare our students to take their places in the small business community.

At our community college, we require our horology students to complete yet another support course in the horology curriculum—Small Business Management. Business 153 examines the day to day operation of the small business. It includes an analysis of the application of the fundamental principles of business management. It explores ways of establishing a small business.

The course objectives, as stated in the syllabus, are:

1. To enable the student to recognize the contribution of small business to our economy.
2. To acquaint the student with the advantages, disadvantages, problems, and rewards of managing a small business.
3. To provide the student with the organizational tools needed to manage a small business.
4. To emphasize the need for self-discipline and objective self-evaluation in the management of a small business.

George Schlehr

5. To familiarize the student with the history of small business in this country and the role of legislation in its development.
6. To provide the student with information on the legal and tax aspects of small business management.
7. To provide the student with the knowledge of how the application of management principles differ in small business management as opposed to big business.

These objectives are then accomplished by discussions of such topics as:

Merits and demerits of self-employment
Prerequisites for success
Employment vs. ownership
Ratios determining trends
Ethics and morals in business
Symptoms of business failure
Strategic planning
Meaning of adequate capital
Steps in the planning process
Requirements of OSHA
Reasons for making a part
Sources of credit ratings
Data from the Census of Business
Working and fixed capital
Site factor requirements
Problems of store layout
Product advertising
Steps in marketing research
Availability of SBA loans
Nine kinds of budgets
Retail inventory control method
Taxes that must be paid
Pros and cons of trading stamps
Impact of automatic data processing
Employee relations in small firms
Procurement and inventory records
Reasons for buying a part
Costs of credit extension
Buying an existing business
Personal expenses in initial capital
Providing physical facilities
Problems of merchandise display
Institutional advertising
Sources of capital for expansion
Record keeping of finances
Insurable and uninsurable risks
Contracts and mortgages
Government assistance programs
Managing a service firm
The "personality" of a store

As you can see, the course covers about everything one would ever want to know about starting and succeeding in a small business. The instructor is a former member of the Small Business Administration and is unusually well qualified as a professional in this field. The text is, appropriately enough, *Small Business Management* by Broom and Longenecker and is available from Southwestern Publishing Company.

"We would be remiss were we not to prepare our students to take their places in the small business community."

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THE ROCK QUARRY

By Fred S. Burckhardt

WHAT's YOUR EXCUSE?

For many years, I've been keeping notes on the excuses used by watch and clock repairmen when a repair article isn't ready on time. I realize that some of you may find it hard to believe that there are those in our profession who would resort to such tactics; I know I was appalled to hear some of these excuses, as I've never had to use them myself. I always have a repair job ready on time. Often I've had to work late at night, on Sundays and holidays, in order to have a job ready, but I feel I owe it to the customer to do the best job I can, regardless of the personal sacrifices I've had to make through the years. This is why most of the customers call me "Mr. Nice Guy."

After analyzing these excuses, you will find that they can be used in a series which could put off a customer for up to a year and a half—or longer, if necessary. The main thing to remember is to keep a record of what you tell each customer.

To start with, when a customer comes in to pick up a job that you somehow forgot to finish on time, say, "I had to order a part. It should only be a few more days." This should always be followed with, "Of course there will be no additional charge because it was my fault for missing it when I gave you the estimate." This makes the customer feel that he/she is getting something for nothing, and softens the blow of having to wait.

When the customer returns in a few days, try this one: "The supply house didn't have the part in stock so they back-ordered it." Never say where it was back-ordered from as this should remain one of the mysteries of life. Here again, say something to soften the blow, like, "Gee, I'm sorry it's taking so long, but I know you don't want your watch (or clock) back unless it's in first-class shape."

At least six weeks should have passed by this time. Your customer may be getting a little perturbed, so it's best to offer some consolation. This can be done by first putting the blame on someone else. Try this one, as you'll find that it works wonders, but you'll have to act a bit irritated yourself to make it really effective. "Those darn people sent the wrong part. You try to give the customer good service and some idiot messes things up. I can't tell you how sorry I am about this. Please forgive me for being so irritated." The customer will be won over to your side because of sympathetic reaction. Remember, there is strength in unity, so make it sound like you are going to fight this thing together! You might even try humming a few bars of "You and Me Against the World." Moist eyes will add a little extra touch. If you've done things right, the customer should be thinking, "What a heck of a nice person to go to all this trouble for me."

A minimum of six months should have passed by now, so you'll have to come across with a real biggie. This time, you hit them with, "It had to be ordered from the manufacturer in Switzerland." As was mentioned before, good records are a must. You don't want to say Switzerland if the customer owns a Japanese watch! I remember one fellow who

almost got caught. Fortunately, he was a quick thinker. He told the customer that the part had to be ordered from Switzerland because they were the only ones who had the machinery to make that particular part, so they made it for the Japanese.

Once you are out of the country, a whole new set of excuses will open up for your use. Possibilities include:

"The mail is very slow."

"The Swiss watchmaker who makes this part has been sick with the Swiss flu."

"The movement is obsolete (which it probably will be by this time), so they have to set up special to make this part."

"They said it was shipped. I guess it got lost in the mail."

"Customs agents are holding the shipment."

"The company moved to the Himilayan Mountains to a place called Shangri-La. It's a very difficult journey, especially during the snow season which is eleven months out of the year."

"They had a fire in the Black Forest, causing them to fall behind in the production of spare parts."

By this time, at least four seasons should have passed. The customer may be getting a little suspicious, so it's time to renew their faith in you. This can be done by a statement such as, "I guess I'll have to make the part myself. Of course I'll have to put everything else aside and it will cost me a lot of time and expense, but I want to keep you as a satisfied customer." Not to worry, because they'll never agree to your making such a sacrifice.

By now, you should be ready to repair the watch or clock– if you can still find it. Even if it doesn't run right, the customer will be so happy to get it back, he/she won't dare complain. But if it should happen to be brought back, use one of the less time-consuming excuses, such as, "The system lug cam worked loose," or "I must have gotten a bad batch of cleaning solution," or one of the old stand-bys, "You must have gotten it magnetized." If your customer is a real wiseacre, you can teach him/her a lesson and start over at the beginning.

As I said before, you shouldn't use excuses like these with customers. Not only does it show you have no scruples, it also proves you have no couth. Never let it be said that you are a person without couthful scruples!

Have to go now. Here comes that fellow back with his Hamilton 500. Let's see . . . have I used the one about the battery needing time to burn-off? TLTES

". . . you shouldn't use excuses like these with customers. Not only does it show you have no scruples, it also proves you have no couth. Never let it be said that you are a person without couthful scruples!"

Questions and Answers / Henry B. Fried

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

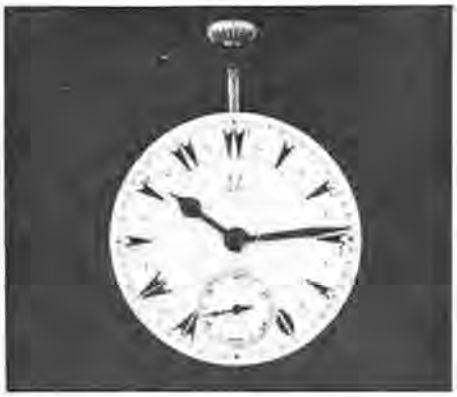
More Turkish Numerals

Q Enclosed please find a picture of an Omega watch which I recently repaired. The odd symbols on the dial attracted my attention.

For the number five, there is an oval-shaped symbol, and after some of the symbols, there are small "u" shapes.

Have you seen numerical symbols like these before?

Richard Foley
Morristown, New Jersey



A *To those who have dealt much with older watches and antique timepieces, these dials do not present anything unusual. The figures are Turkish, and such items as your watch were made for the Turkish market before 1925. In 1925, Ataturk had his country adopt the Western type of alphabet and numerals.*

Turkey was a very large consumer of Swiss watches at that time, and it was a simple matter for them to place such figures on the dial. This writer has seen such figures on many clocks and watches of English, French, and German origin, dating back to the seventeenth century. Your watch evidently is from the first decade of this century.

When you've seen many of these, it is rather simple to make out the numerical system, such as the one, two, and three, the ten with the single point and small zero, etc.

Q I recently received in my shop a French mantel clock for repair. It is a typical French clock, with the round movement and bell mounted by a bracket on the back plate.

My problem concerns the bell. As the hammer strikes the bell, there is a dull thunk! before you hear the ring of the bell. The bell rings clearly as the hammer recoils from the bell, but I cannot stop the dull thunk! I have adjusted the position of the hammer many times, from too close (which at first I thought was the problem) to a distance at which it merely touched the bell, but still that thunk! was there. I checked the mounting for tightness and position, but to no avail. My customer is unhappy and says that the bell used to have a beautiful, clear ring. Needless to say, I am not happy about it either, but I don't know what else to do. I have even installed a new hammer.

Can you please offer any solution to this problem?

James Bartell
Hemet, California

A *Most often, thud-like bell ringing in clocks is due to one of two causes. Either the bell is cracked or mounted loosely, or the hammer arbor spring is not working and, as a result, the hammer falls with a thud instead of being assisted by the hammer (recoil) arbor spring.*

One other fault may be with the leather pad at the end of the hammer head. If it is loose, it should be shellacked into the hole at the head of the hammer.

Try the bell for cracks when the hammer is cocked at the silent, in-between hours position, using the tweezer back as your hammer. If the bell sound is pleasant and sharp, the bell is not cracked.

Try the hammer manually—that is, by lifting it off with your fingers and allowing it to drop onto the bell. If the thin, tapered spring does not cause the hammer to bounce sharply back as it strikes the bell, adjust this spring.

I am enclosing two photocopy sheets of an extensive article on the repair of these French clocks which I wrote for Jewelers' Circular Keystone *in 1977. Study these closely. Your bell problem should be easy to solve. If you have more difficulty, let me know.*

Q Recently, I acquired an old screw polishing machine (or tool). The iron and bell metal laps are scored, which will make it necessary to face them off smoothly before use. After they are faced off, what should be done to prepare them for use? I assume that the iron lap is to be used with oilstone powder, the bell metal with diamontine, and the wooden one (which is in good condition) as a final polisher.

I also have a Levin utility tool which has two gravers, two wheels, two saws, a saw table and chuck holder. Is there any chance that I could get a copy of the folder that Levin provided with the tool? I imagine it has more ideas for use than I can think of.

In your *Bench Practices for Watchmakers*, you illustrate a three-legged screw polisher which uses conventional lathe chucks. Is this available or are there any detailed instructions available for making one?

T. William Schroeder
Chicago, Illinois

A *To finish off the laps, use a straight-grained fine to medium-fine emery paper, rubbing the laps across the paper so that all marks are in one direction. Then clean the laps' surfaces with Rodico®, dabbing it so that no errant emery grains remain on or in the surface of the laps. You are correct as to the abrasives and polishing compounds used with each type of lap. Diamantine works very well, but fine jewelers' rouge that is pure and free of fine grains will work well, too. Sometimes green rouge is also good.*

Levin & Son is still in business and you may write to them for the printed material you wish. Their address is: Louis Levin & Son Inc., 3573 Hayden Avenue, Culver City, CA 90220.

My three-legged chuck holder is no longer available. It consists of a tube with guide pin which allows a chuck holding tube to slide inside (vertically). The screwhead is held in the chuck in the tube which is pressed downward by the finger, applying slight pressure on the lap (frosted glass). The three legs, after much use, will need replacement. It can be made, but requires dedicated application to get all level and precise. A knurled nut atop the chuck tightens it in the cylindrical chuck holder, again, which itself telescopes into the tool table's tubular holder with slot-guide.

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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	
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Part II

THE DIGITAL WATCH TROUBLESHOOTING GUIDE ©1981

By Louis A. Zanoni

This is the completion of the "Digital Watch Troubleshooting Guide," the first installment having appeared in the February, 1981 *Horological Times*. Again, refer to the LCD Digital Watch Component Flow Chart (Figure 1) when using this step-by-step guide.

For details on correcting the faults of the module, consult *The Digital Watch Repair Manual* by this author.

Step 7:00 Remove the batteries from the module. Place all disassembled parts from each individual watch in a separate parts tray, including the old battery.

7:10 Test the battery under load.

7:11 Examine the battery for signs of leakage.

7:12 Good or bad—place the battery in the parts tray for future reference.

Step 8:00 Microscopically (10x or 30x) examine the battery cavities and the surrounding area. Examine for: corrosion, contamination, physical damage, loose contacts, and short circuits.

Step 9:00 Apply power to the module with a current reading power supply, such as the Zantech Module Tester, Model 800. Be sure to duplicate the battery contacts to the module, i.e., negative to negative, positive to positive, case contact to switch, series, parallel, etc. However the batteries are connected to the module, the current monitoring power supply should be connected. Zantech equipment owners should connect module to the Battery Substitute Fixture or cable mini hooks, according to the instructions. **When the power is applied, the following questions must be answered:**

9:10 Is current flowing in the module? If yes, proceed. If no, find out why.

9:11 **No current**—No current indicates poor or no connection to the module and IC. If the battery cavity is clean (no interference with battery contacts), examine for broken substrate, poor battery clip contact to the substrate, or broken wires to the IC. Always be certain the module is properly connected. If in doubt, verify the connections by testing a similar module which you know is good with the same set-up. **Note**: Some modules have a "shut down" mode. They will not draw any current until the set or command switch is activated.

Step 10:00 Is the current low, high, or normal? 1 to 5 ua can be considered normal; occasionally 10 ua is normal. See battery life expectancy charts in the *Digital Watch Repair Manual* in order to determine acceptable current levels.

Louis A. Zanoni's "The Digital Watch Troubleshooting Guide" has been made available to Horological Times *by the author. This guide—which presents a clear and unique approach to troubleshooting the LCD watch—will be included with all new orders of Mr. Zanoni's* Digital Watch Repair Manual *at no extra charge.*

10:10 **Low current**–Some modules operate properly on very low current. An important indicator of adequate current flow is the oscillator. If the oscillator is running, it can be assumed the current flow is normal. Some causes of inadequate current flow are:

a. Improper connection to module tester
b. Poor battery contact
c. Faulty up converter. (No display drive voltage)
d. Broken substrate
e. Poor contact to display
f. Faulty IC

10:20 **High current**–High current can be the result of a large variety of problems:

a. Faulty IC
b. Dead oscillator circuit
c. Contamination on substrate (most common)
d. Tweezer or screwdriver marks on substrate
e. Shorted LCD display
f. Shorted zebra
g. Short between segments of an LCD display
h. Shorted IC wires
i. Case filings on substrate
j. Quartz crystal can shorted to substrate or wires
k. Alarm disc shorted to caseback
l. Solder end seal of display shorted to metal frame
m. Shorted switch contacts

High current is the most difficult symptom to analyze. Most of the time, it can be related to the IC. Impurities within the IC contaminate it and cause current leakage without affecting the operation of the module. However, before blaming the IC for high current, check all other potential causes.

Proceed as follows:

Visually examine the module. Disassemble it whenever necessary. Inspect with a high-power microscope (10x and 30x) for contamination on circuit board. Screwdriver marks on a ceramic circuit board can cause partial and permanent short circuits. Battery leakage, as well as moisture on the substrate, can cause high current. Examine for shorted wires on the IC; examine for flux residue. Some modules contain solder flux residue on the circuit board. When moisture combines with the flux, high currents result. To remove the flux and any remaining residue of water damage, soak the substrate only in an electronic grade flux remover. When contamination or flux accumulates under a chip cap, resistor, or trimmer, the component must be removed from the board, cleaned, and replaced. Dry the substrate thoroughly using a hot air dryer. Be sure to evaporate

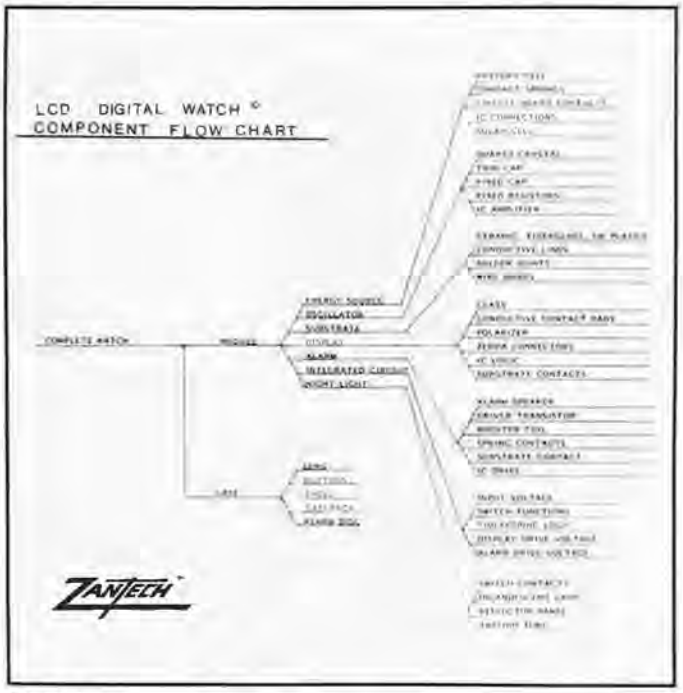

Figure 1

all solvents. **Note**: One of the most effective methods of removing screwdriver and tweezer marks from a ceramic substrate is by rubbing it with an abrasive ink eraser. Use a small part of the eraser and a tweezer to clean delicate, inaccessible areas. Be sure to remove all eraser debris from the circuit board by gentle air pressure or Rodico®.

Clues to the location of a short or high current cause can be obtained by the process of elimination. Ask yourself the following questions:

10:21 Are all of the switches working properly?

10:22 Does the alarm work? A shorted alarm disc will not sound.

10:23 Is the short related to the case? Remove the module from the case and test it separately.

10:24 Are the battery contacts shorting to each other? Examine them under a microscope.

10:25 Is the oscillator running? A short in the oscillator circuit will kill the oscillator.

10:26 Is the liquid crystal display shorted? Separate the display from the circuit board and measure the current.

10:27 Is the reflector panel or zebra strips contributing to high current? Separate them from the circuit board and find out.

Note: Display related high currents are usually indicated by a weak or dead display. Remember, no two segments of the display, zebra, or circuit board must ever touch each other. The

(Continued on page 61)

Be wise!

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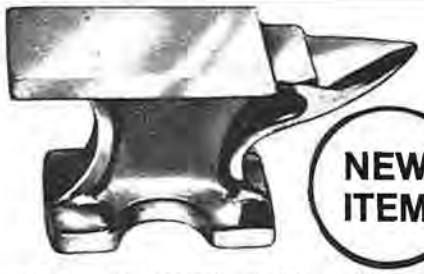

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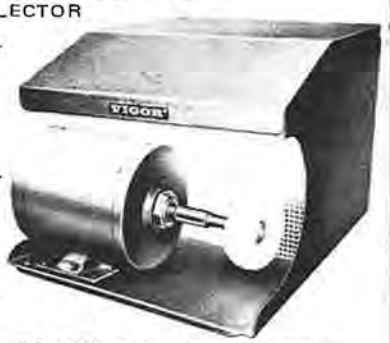

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THE DETACHED LEVER ESCAPEMENT ©1981

Part V

The BANK-TO-DROP method is another method that can be used for checking and setting up the detached lever escapement. When this method is used to set up the escapement, the adjustments are started from the stone end of the pallet fork rather than from the fork end as in the ELGIN METHOD that was previously described ("Technically Watches," February, 1981). The BANK-TO-DROP method gets its name because the banking screws are set so that the escape wheel teeth will just escape from a pallet stone and drop onto the other stone without any slide. This is done on both stones. Banking the escapement to the drop is necessary so that the different functions of the escapement can be checked for correctness and safety.

To bank an escapement to the drop, begin by closing the banking screws until the escape wheel teeth cannot escape from the impulse faces of the pallet stones. Then open the banking screws one at a time until the escape wheel teeth can just escape from the stones. This must be done very slowly and carefully to avoid opening them more than is necessary to just let the teeth escape. When an escapement is correctly banked to the drop, there is no slide present; therefore, if the banking screws are opened more than just enough to let the escape wheel teeth drop onto the locking faces of the pallet stones, the escapement is not correctly banked to the drop. Note: Any time a pallet stone is moved in adjusting the escapement, the escapement must be re-banked to the drop. In fact, the escapement may need to be re-banked to the drop several times during the process of setting it up. Banking the escapement to the drop should only be done when the watch has adjustable banking screws. If the watch has banking pins that are frictioned into the watch plate or solid-type banking, bank to drop should not be attempted as it is not advisable to alter solid bankings for this purpose. Instead, when the escapement is checked, the balance wheel is turned very slowly with the finger until a tooth of the escape wheel leaves

Figure 1

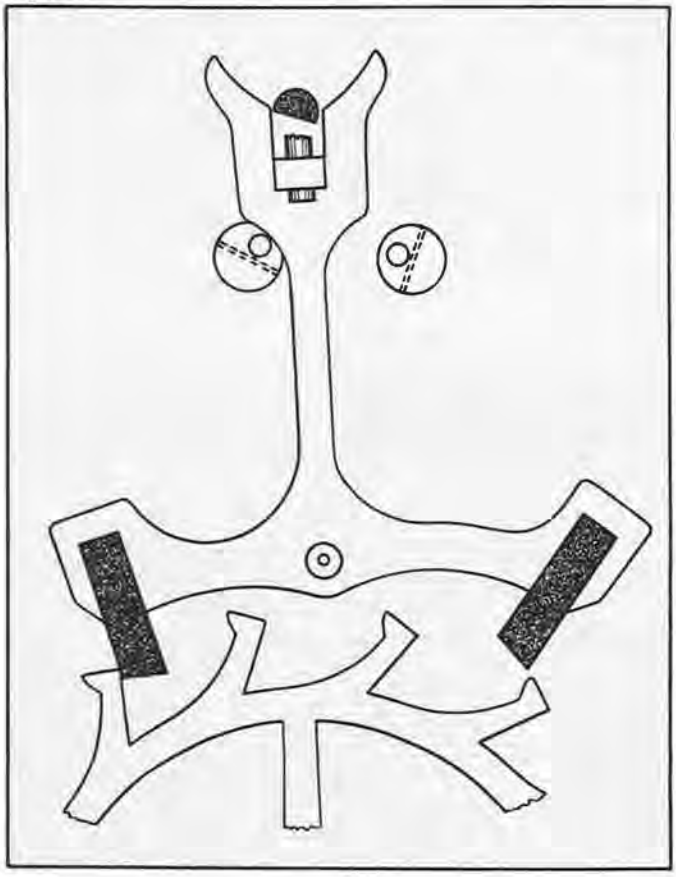
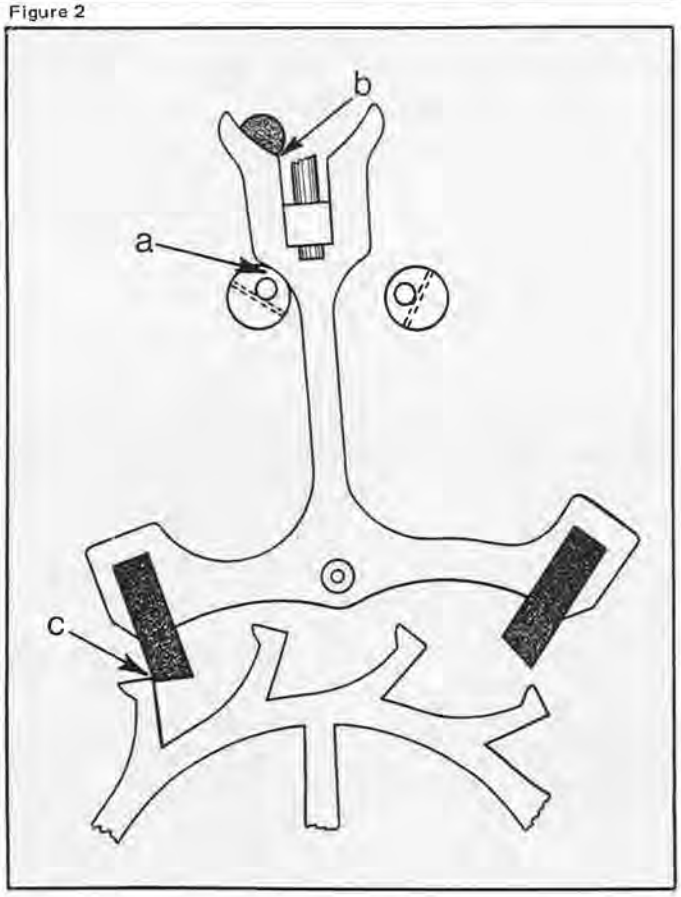


Figure 2



one pallet stone and another tooth contacts the locking face of the other stone. Then the escapement is checked at this instant. This procedure is repeated on the other pallet stone. Figure 1 shows the pallet fork and roller jewel in a bank-to-drop position.

When learning the bank-to-drop method, it would be best for the beginner to select a high-grade pocket watch with moveable banking screws. It would also be desirable to have the hairspring removed from the balance wheel while the escapement is being set up. To use the bank-to-drop method in setting up the escapement, first make sure the pivots on the balance wheel, pallet fork, and escape wheel are straight, smooth, and highly polished. Then check these units to make sure the end and side shakes are correct. The roller jewel must be tight in the roller table. The roller jewel must also be perpendicular to the roller table, and its face must be set at right angles to the center line running through the center of the roller table and the roller jewel. Also, the pallet stones must be of the same width and not chipped on their impulse faces.

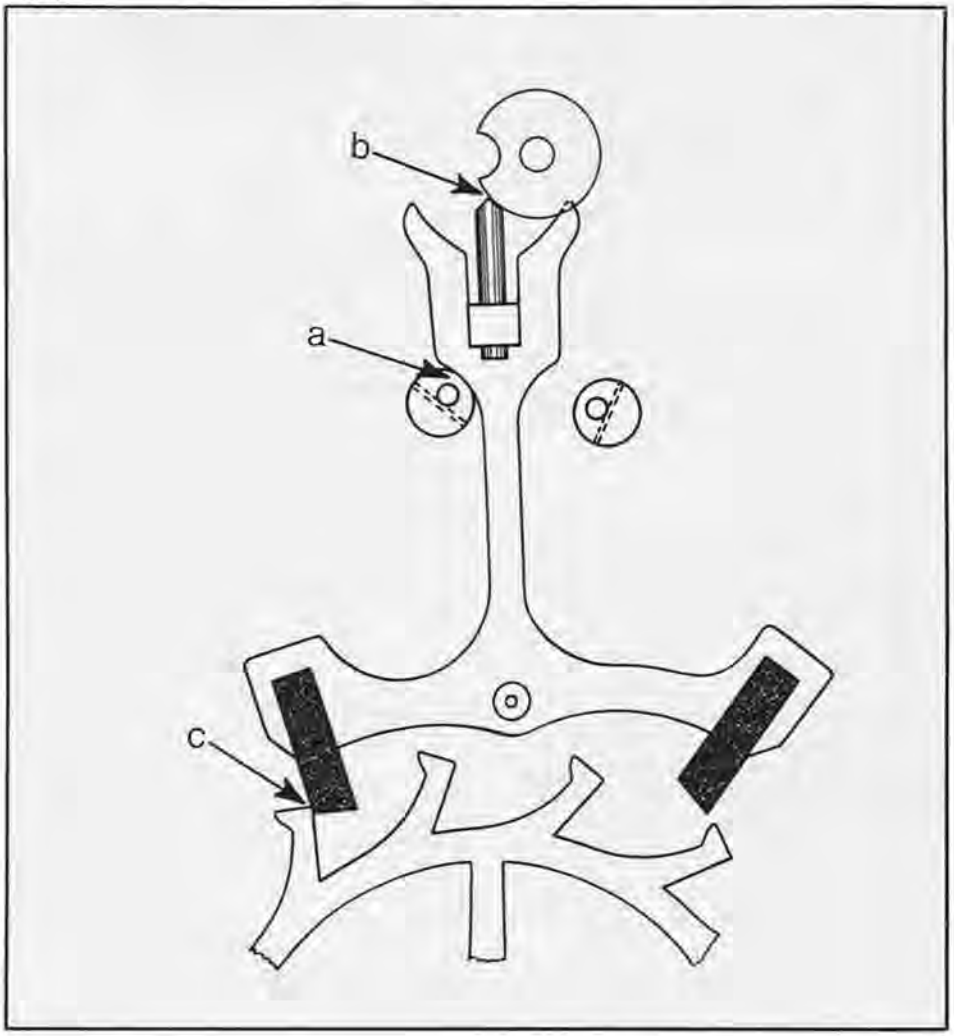
Now, with the balance wheel in the watch and some power on the train, the escapement is banked to the drop by adjusting the banking screws until the escape wheel teeth just escape from the pallet stones. With the escapement banked to the drop, note the amount of overlap the escape wheel teeth have on the locking faces of the pallet stones. This overlap is called drop lock. Drop lock should be 1/6 the width of the stone for high-grade watches and 1/5 the width of the stone for lower-grade watches.

The principle of the bank-to-drop method of setting up the escapement is as follows: As the pallet stones are moved out or in to establish the correct drop lock, the jewel pin shake is affected by being increased or decreased in the following manner. As the pallet stones are moved out the same amount, the jewel pin shake is increased the same amount on both sides of the line of centers. When the pallet stones are moved in the same amount, the jewel pin shake is decreased the same amount on both sides of the line of centers. When the stones are moved out, the pallet fork must travel farther in order for the teeth to escape from the pallet stones. This causes the roller jewel to be farther out of the fork slot at the time the jewel pin shake is checked, thus more jewel pin shake. When both pallet stones are moved in the same amount, the escape wheel teeth escape sooner, causing the fork to travel a shorter distance. This results in less jewel pin shake on both sides of the line of centers. When only one pallet stone is moved in or out, the jewel pin shake is affected on the opposite side of the line of centers. For example, if the R-stone is moved out, the jewel pin shake is increased on the L-stone side of the line of centers. If the R-stone is moved in, the jewel pin shake is decreased on the L-stone side. If the L-stone is moved out, the jewel pin shake is increased on the R-stone side, and if the L-stone is moved in, the jewel pin shake is decreased on the R-stone side. It must be remembered that each time the stones are moved in or out, the escapement must be re-banked to the drop in order to check its condition. If a stone is moved out, the re-banking would require that the banking screw on the opposite side of the line of centers from the stone be moved out to be opened in order for the teeth to escape from the pallet stone that was pulled out. On the other hand, if a stone is moved in, it would require that the banking pin on the opposite side of the center line be closed to eliminate the slide created on the opposite pallet stone.

With the bank-to-drop method, it can be determined whether the pallet fork is the correct length, or if it is too long, too short, or bent. With the stones set for the correct amount of drop lock and the escapement banked to the drop, there should be just enough jewel pin shake to let the roller jewel pass in and out of the fork slot without rubbing the corner of the fork slot. When the jewel pin shake is checked, the escape wheel tooth must remain safely locked on the locking face of the pallet stone. See Figure 2. When the fork is moved away from the banking pin at "a" so it goes against the roller jewel at "b," the escape wheel tooth must remain safely on the

(Continued on page 55)

Figure 3



THE DUPLEX ESCAPEMENT*

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

From time to time, this author receives requests for information and instruction on the duplex escapement—a watch escapement without a pallet and fork and with two sets of escape wheel teeth. Some do not know its name or understand its principles, or know how to adjust or repair it or how to make the staff. The following article should clear up some questions about the duplex escapement.

The duplex escapement was invented by Pierre LeRoy around 1750, although Jean Baptiste Dutertre, in an earlier escapement dated 1724, revealed the germ of this escapement in a two-balances, geared-together system. The Waterbury Watch Co. in this country adopted this escapement in the late 19th century from a model supplied by D.A.A. Buck. The entire watch contained only 58 parts, preparing the way for the dollar watch by Ingersoll, successors to the Waterbury Watch Co.

This escapement is a frictional-rest type but requires precise depthing of the locking of the long escape teeth against the slotted post of the balance staff. Figure 1 is a photograph of a watch with a duplex escapement made by the New England Watch Co. about 1901.

Sunburst appearance

To understand the escapement action, study the drawings of the more formal design as used in many English watches. The English makers thought so highly of it that for a short while some early makers used it in their marine chronometers.

Figure 2 shows the escapement in an isometric view. Refer to this when studying the flat views in Figures 3 and 5 which show the progressive steps in the escapement action.

The escapement is easily recognized by the "sunburst" appearance of the escape wheel with its short teeth alternating between

Figure 1

long, pointed teeth.

Of the two sets of teeth, the long ones supply the locking action. The balance staff is friction-fit to the balance wheel. To this staff is attached an impulse finger (sometimes jeweled as shown in the alternate view). When this finger is in conjunction with the escape wheel, it is intercepted by the wheel's short teeth (which on some wheels are raised triangular studs milled out of the originally thick escape wheel rim). When the raised, short teeth of the escape wheel meet the impulse finger, the teeth whip the balance in one direction only. To allow the escape wheel's long locking teeth to pass, there is a longitudinal slot cut into the staff's post, similar to the passing crescent in the safety roller of lever watches. In some finer watches (see alternate view, Figure 2) using this escapement, a polished, hard steel or jeweled ring with the slot is friction fit over the staff's post to provide the frictional locking rest for the escape teeth. Its slot allows the teeth to pass as shown in Figure 2.

Figure 3 details 14 stages in the step by step process in one complete cycle. Because the impulse finger is situated above the slotted staff post, it normally conceals from view the locking and passing actions. For this reason, the drawing was made with part of the areas of the impulse finger's flange cut away so that the locking and passing action below can be observed.

Counterclockwise impulse

In stage 1, Figure 3, the watch is at rest, without any power in the mainspring. Stage 1 also shows the in-beat position. Here the impulse finger is in contact with a short stud-tooth on the escape wheel rim. When the watch is wound, the escape wheel will travel in the clockwise direction and impel the impulse finger in a counterclockwise direction until this tooth clears the finger as shown in stage 2.

The action is quite brisk and the long tooth of the escape wheel is also free to move clockwise until, as shown in stage 3, it contacts the edge of the staff's locking roller. In stage 3 the staff and its attached balance, whose motion is now arrested by the wound hairspring, have reached the extent of their excursion and the balance now returns in a clockwise direction. In stage 4, the balance and staff unit turn back and its impulse finger just barely clears the nearby impulsing rim-tooth of the escape wheel. The hairspring in the unwinding action causes the balance to gain speed in its return clockwise tour.

In stage 5, the escape wheel's locking tooth has entered the passing slot in the staff's roller. However, as shown in stage 6, the speed and superior leverage of the balance causes the escape wheel to recoil slightly backwards as it momentarily allows the escape tooth to enter the slot. In stage 7, the fleeting balance has pushed the escape wheel back further until the locking tooth is again resting on the locking surface of the staff's roller.

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

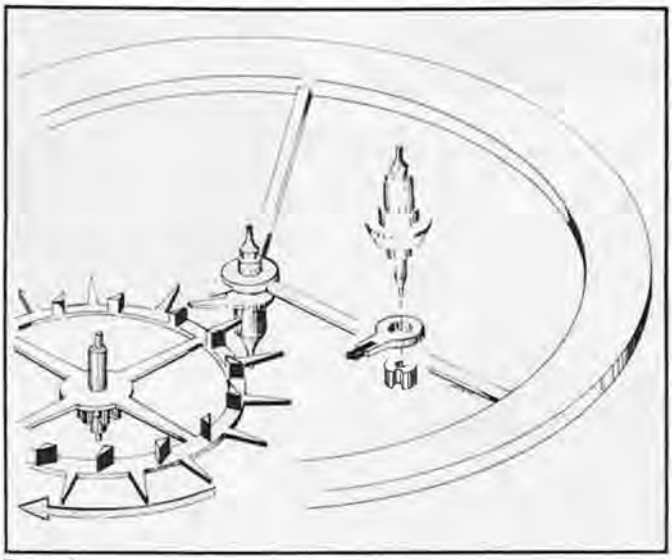


Figure 2

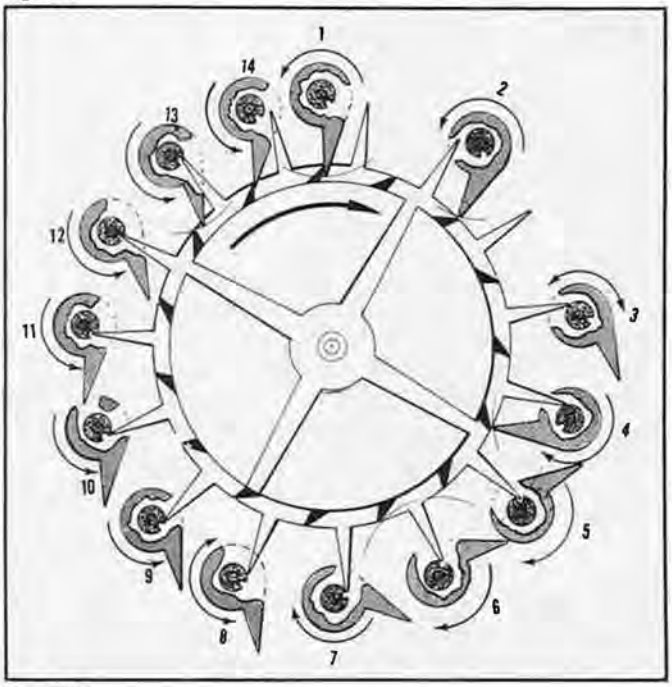


Figure 3

Tensed hairspring

The momentum of the balance continues until as shown in stage 8, when the tensed hairspring causes the balance to come to a split-second momentary rest and then swings in the opposite, counterclockwise direction. In stage 9, this balance motion continues and the passing slot approaches the point where the escape wheel's waiting locking tooth (stages 9 and 10) will soon allow it to enter the staff's slot, as shown in stage 11.

Here the locking tooth is in the slot of the roller and this escape tooth impels the balance slightly in the counterclockwise direction which it continues to do for stages 11, 12 and 13. In stage 12, the balance impulse finger is also rapidly approaching the impulsing tooth of the escape wheel. In stage 13, it arrives near the nadir of its swing ahead of the short, slower advancing escape impulse tooth.

In stage 14, the locking tooth of the escape wheel has parted company with the slotted roller on the balance

(Continued on page 50)

THE PICKLE BARREL

By Marshall F. Richmond, CMW

SYSTEMATIC JEWELRY REPAIR

The repair of jewelry can be organized systematically just as can the repair of watches. In using a system, better records can be kept, the quality of the work improved, and from ten to thirty percent more work can be produced in the same amount of time as when doing one piece at a time. Manufacturing jewelers have been doing this for many years, using a number of craftsmen. Although they have working in their systems jewelers, setters, engravers, polishers, and platers, whereas we are one-craftsman operations and must do it all, it only makes sense that we can follow the same pattern they use. Already many watchmaker-jewelers are using this or a similar system, and anyone using it will verify the claims of ten to thirty percent more productivity.

The system starts with taking in the work and properly recording all pertinent information on the job envelope or ticket. Then many watchmaker-jewelers reserve one or more days a week to do jewelry work. They lay it out and work it all at one time using a step-by-step system whereby all the precleaning, sawing, filing, fitting, soldering, etc. can be done at once. Each step is performed on every piece before moving on to the next step. I will try to explain a system that I have used for many years which has worked well for me.

Step 1

When taking in work, I get all the information on the job to be performed. This includes name, address, phone number with the best time of day to call, present finger size and the desired size if a ring sizing is involved, a description of the work to be done, and a brief description of the article to be repaired. I also mark on the envelope or ticket the agreed-upon price.

Step 2

The information on the job envelope plus a rough sketch of the article is entered in a record book. The rough sketch can be made by laying the article down and tracing it with a sharp, hard lead pencil. This takes very little time and helps get the jobs back in their correct envelopes. The description entered in the book should carry a more detailed description of the article than recorded on the envelope as this is a permanent record. Such entries as color and karat of gold, type of setting, and number and sizes of stones, should be included. In listing stones on the job envelope, it is wise to list only colors (such as red stone, blue stone, amber stone, etc.) if the job is to be returned to the customer in this envelope. However, as the book is your confidential record, it is wise to list the true identity of the stones as nearly as you can. It is also wise when listing stones to mark on the envelope "shield stones," "do not boil," or "do not quench" if the stones involved are delicate such as opal, pearl, or others that could be damaged if improperly handled.

Step 3

After recording, the jobs can be laid out on a table and grouped in three groups. Put all size changes in one group, heads, prongs, beads or tip replacements in the second group, and others such as pinstem, catches, hinges, earring posts or backs in the third or miscellaneous group.

Step 4

Materials needed, such as pinstems, heads, settings, hinges, etc. should be taken from the material cabinets and placed with the respective jobs. Ring sizing stock and solders needed should be placed on the bench as well, along with the tools which you can see in advance will be needed. This can save several trips to the material cabinets.

Step 5

Start with the first group—rings to be sized. Cut the rings and, on the rings to be made smaller, take out the proper amount to obtain the correct size; on the rings to be made larger, "V" the joints and fit the pieces to be added. As I have previously stated, I always intend to make rings one quarter size smaller when soldered so they can be rounded on the mandrel. This makes it easy to peen the solder joint with a steel hammer to correct size, and it also ensures a good solid joint if no cracks

appear. Also, if this small allowance is not provided and the ring should come out even one quarter size too large, it must be cut and re-soldered.

The rings to be made larger should be spread on the ring madrel, the "V" joints prepared, and the pieces to be added fit into place. As the rings to be soldered are prepared, go on to the pieces needing head changes, remove the stones and then the heads from the shanks. Either saw them out or heat them red hot and, as the solder holding them in place starts to flow, lift the old head out with tweezers or a pick. The new head should be fit to the shank by filing the ends of the shank until a good fit is obtained. These are then ready for soldering. The rings that need prongs, tips, or beads should now be prepared. Remove stones where necessary and, after filing the prongs which need repronging and making depressions for the bead replacements, dip all the items in the alcohol and borax solution and burn this off. A good rule of thumb to follow in replacing prongs or tips is that if there is metal over the stone but it is worn thin, a solder tip is usually adequate; if there is no metal over the stone, a new prong should be used. This was explained in detail in the March, 1980 issue of *Horological Times*.

Once all items in the second group are ready to solder, move on to the third or miscellaneous group. You can usually saw or remove with heat any hinges or catches that need replacing, but broken pinstems sometimes have to be removed by drilling the hinge pin out if it cannot be pushed or driven out. Often safety catches have just been bent, and the center lock is missing. It is much quicker and more practical to see if you have in stock an identical safety catch. If you do, it is simple to bend the sides, remove the center piece, and install it in the broken one. This will save the time required to install and finish a new catch, and the finished job will be just as secure.

This should complete the preparation of all three groups. All items should now be ready for soldering.

Step 6

Light the torch, and start fluxing and soldering each job. Begin with the heavy pieces that require the most heat and reduce the flame as necessary for the lighter pieces. Sometimes it is necessary to change tips to obtain the correct heat. Some costume jewelry is made of a metal that will melt from the heat of the torch, so on these jobs it may be necessary to use a small soldering iron or a solder gun. Solid gold or silver articles that do not contain stones can be quenched in the pickle while still hot, but articles that contain stones should be cooled on the asbestos pad slowly. Then, when the soldering is finished, they can be soaked in cold pickling solution or boiled in the copper pickle pan over the flame of the torch. Stones that will not stand boiling, such as opal, pearl, or coral, should be protected with a coating of wax, grease, or anything that will protect them from the pickling solution which is highly acidic. It is preferable to use a coating that can be removed with a soap and ammonia solution.

Step 7

Again start with the sized rings and put them on the steel mandrel. Round them with the rawhide mallot and then peen the joints to stretch them to the accurate size desired. With a half-round file, smooth the inside of the rings. Then with a flat file, smooth the sides of the shank and shape the outside to match the shank. When these rings are ready for polishing, move to the next group of heads, tips, beads, or prongs and set all stones that have to be set. File the prongs, tips, or beads so they all match as nearly as possible, and then finish with cup burs or beading tools for final shaping before polishing. Cup burs, if touched with bees wax in the cup, will produce a better finish and save wear on the bur. I always keep a small piece of bees wax on my filing block where it joins the bench for this purpose. I also use it to draw saw blades through while sawing which makes the saw cut more smoothly and lengthens the life of the blade.

Finally, move to the last group of miscellaneous jewelry: The pinstems should be riveted and the catches and hinges should be attached by hard or soft soldering as necessary. Earring posts or backs and pendent loops or rings should be attached, and then this group will be ready to prepare for polishing. File away excess solder or cut it away with a hand graver. Remember when doing this that the finer-cut file will leave shallower scratches which are much easier to remove when polishing.

Step 8

Lay out all jobs near the polishing motor so that when a wheel or buff is put on, it can be used on all jobs requiring it before stopping the motor and changing it. I start with a bronze wire wheel and use it on all jobs. It removes all the oxides left by the pickling solution and produces a bright finish, but does not remove file marks. Next, I use an inside ring finger buff wrapped with emery cloth and held in place with a ring. Buff the inside surfaces of all rings that have been sized and remove all file marks, leaving the surfaces smooth with a satin finish. Sometimes where there are deep file marks, a coarse grit is used first, followed by a fine grit which also saves time and effort. While the finger is still on the polishing motor, the emery cloth can be removed and tripoli abrasive used to polish the inside of all rings that have been repaired. Next, a knife-edge hard felt buff is put on the polishing motor and all cracks and crevices that can be reached with this are polished with tripoli. Change to a bristle brush wheel charged with tripoli to get into depressions that have not yet been reached. This is used on all pieces being polished where applicable. A cotton buff charged with tripoli used on all pieces will complete the pre-polishing. Pierced earrings with posts can be held in a pin vise for polishing, but caution must be used that sharp places

(Continued on page 60)

THE SHIP'S CHRONOMETER© 1981

By Marvin E. Whitney, CMC, CMW

American Chronometer Makers

Part V

It is quite evident that the most prolific American makers of chronometers during the nineteenth century were William Bond and Son, John Bliss and Son, and T. S. & J. D. Negus. However, there were a number of lesser known makers, equally as talented as the above, who also produced chronometers or were instrumental in providing and/or servicing chronometers. Some of these lesser known makers and/or nautical chandlers were E. & G. W. Blunt, B & S Demilt, Edward Dillion, D. Eggert, Henry Glover, John Glover, H. H. Heinrich, Calvin Kline, and Arthur Stewart, all of New York City. Outside of New York, there were such firms as Thomas W. Ward and William S. Willard & Son, of Boston; James Monroe & Son, of New Bedford, Massachusetts; William H. C. Riggs, of Philadelphia; Kelvin & Wilfred O. White of Boston, Montreal, and New York, and others.

Little information is available as to the number of instruments made by any of these more obscure firms. Some of them did, indeed, make a complete instrument, but by and large, they were nautical chandlers, i.e., in the business of selling and repairing other makers' chronometers, nautical instruments, and supplies.

Before detailing the contributions made by these lesser known makers, it is important to chronicle some of the events that prevailed during this time.

The U. S. Naval Observatory, the Naval institution responsible for the care and testing of chronometers, was established in 1830 in Washington, D.C. Beginning as the Depot of Charts and Instruments, its mission was to care for chronometers, charts, and other navigational instruments. The Depot was equipped with a small transit for checking and rating chronometers. In 1844, the Depot was re-established under the name of the Naval Observatory. Although the Observatory assumed other responsibilities, it was still responsible for the care and testing of chronometers until 1950 when the chronometer division was moved to the Norfolk Navy Yard.

In the early 1830's, both the Navy and Merchant Marine Services purchased most of their chronometers from abroad. Naval Observatory records show that these instruments were produced by such well-known English makers as Arnold, Arnold & Dent, Barraud, Brockbank & Atkins, Cotterell, Dent, Earnshaw, Fletcher, French, Charles Frodsham, Hornby, Hutton, Litherland & Davies, Loseby, McCabe, Molyneux, Murray, Norris, Parkinson and Frodsham, Poole, Porthouse, Roskell, Tobias, Usher & Cole, and others. However, the majority of the chronometers purchased by the Government were made by Cotterell, Dent, Charles Frodsham, Molyneux, and Parkinson and Frodsham, with the greatest number by Parkinson and Frodsham.

Since so many of the instruments purchased by the Government were Parkinson and Frodshams, it may be well to say something about this firm.

The lineage of the Frodsham family can be traced through four generations. William James Frodsham (1778-1850), from the third generation, was the eldest son of William and Alice Harrison Frodsham. Alice was a granddaughter of John Harrison, the celebrated maker of the first marine timekeeper (chronometer). William J. Frodsham formed a partnership in 1801 with William Parkinson. The firm became known as Parkinson and Frodsham and was located at 4 Change Alley. Both partners were admitted to the Clockmakers' Company in 1802, and Frodsham was granted the status of Master in 1836 and 1837.

Little else is known about Parkinson, except that he passed away in 1842. William J. Frodsham amassed a sizable fortune and, before his death, gave the Clockmakers' Company a gift of 1,000 pounds. He stipulated that these monies be used for charitable purposes and be known as the Parkinson and Frodsham Charities. The inclusion of Parkinson's name was Frodsham's way of honoring his cherished friend and partner.

As American firms, such as Bond, Bliss, and Negus, began producing chronometers, the Navy's Bureau of Navigation adopted a supportive policy in the very early 1860's. The wording stated that this was to be a policy "of encouragement to skilled American workmen," and the Navy began to rely mainly on the above and other smaller American firms for their chronometers.

In the early 1860's, Naval Observatory Superintendent Gilliss stated, "There can be no question that Messrs. Bond and Son and Negus and Company are the only firms upon which the Navy can safely rely for the necessary supply of chronometers." Bliss was probably not included because in June, 1853, his partner, Creighton, had informed the Observatory that he and Bliss "were not upon the best of times." Since it appeared that all was not well between the two partners, and not knowing the outcome, Gilliss probably felt it best not to rely

on either for chronometers. As you recall, the Bliss & Creighton partnership was dissolved, and a long, drawn out lawsuit ensued.

In order for the Navy to have some idea as to the number of instruments it would need to outfit its vessels, a Table of Allowances was established in October, 1861. This can be seen in Table 1.

Table 1. Table of Allowances—October 28, 1861

	Ships of Line	1st Class Frigates & 1st Class Steamers	2nd Class Frigates, Sloops & 2nd Class Steamers	Gun Boats	Smaller Armed Vessels
Chronometers	3	3	1	1	1
Comparing Watch	1	1	1	1	1
Deck Timepieces	1	1	1	1	1
Sextants (lunar)	1	1	1	1	1
Compasses, Std.	3	3	2	2	1
Etc.					

The Government first began purchasing chronometers in 1831 and, from that time until our entry into World War I, relied heavily upon American makers to repair them. In most cases, a contract was drawn up; however, in many instances, upon the expiration of the contract, it was not renewed, but the maker still continued to render his services.

Just before America's entry into World War I, a chronometer repair facility was established on the grounds of the Naval Observatory. Although the majority of chronometers were repaired there, a few were still done elsewhere, some under contract or at other naval facilities.

In October, 1940, the construction of a new Material Building was begun on the Observatory grounds. On May 29, 1941, personnel and all equipment were moved from the old Nautical Instrument Repair Shop to the Observatory's new Material Building. I can remember it very vividly, for I had just begun serving my apprenticeship as a watch and chronometer maker, and I was one of those who helped hand-carry all of the chronometers over to the new building. Everything else was moved by truck. The new building not only housed the chronometer shop but many other nautical instrument repair shops. The chronometer shop was very well-equipped and, for a young man such as myself, truly a dream shop in which to begin receiving training as an apprentice.

Table 2. Prices at which chronometer dealers in New York offered to keep, rate, and repair Government instruments.

	Negus's Original Offer	E. & E. G. Blunt	D. Eggert & Sons	Negus's Final Offer
Rating during 1st 2 months, the instrument to be sent and delivered	$2.00	$2.00	$2.00	$2.00
Each subsequent month or fraction thereof	$0.50	$0.50	$0.30	$0.50
Cleaning	5.00	4.00	5.00	5.00
Repolishing train or escape pivots, each	0.75	0.25	0.50	0.50
Making or setting in new pivots of escape or balance staff, including alteration to jewel setting	2.50	1.50	4.00	2.00
New jewel holes, each	3.50	1.25	2.00	2.00
Repolishing endstone	0.50	0.25	0.50	0.50
New balance staff	10.00	4.00	15.00	8.00
New mainspring and altering fusee, if necessary to suit adjustment	10.00	8.00	10.00	8.00
Correcting compensation	3.00	1.00	7.50	8.00
Supplying new fusee chain	3.00	3.00	2.50	3.00
Mending fusee chain	0.25	0.50	0.50	0.25
Correcting action of the escapement	0.75	1.00	2.00	0.75
New gold discharging spring	2.00	1.50	3.00	2.00
Respringing & adjusting instruments with worn out or rusty balance spring, including cleaning and small repairs	35.00	30.00	30.00	30.00
If new compensation balance is required	10.00	15.00	20.00	10.00

Now, let us return to the earlier period after this slight digression. During the early fall of 1861, the Naval Observatory contacted a number of American makers and/or nautical chandlers and requested that they furnish the Navy a "price list for taking care and repairing of Government chronometers." Shown in Table 2 are the prices at which chronometer dealers in New York offered to keep, rate, and repair Government instruments. A similar price list was received from Bond and Son and other Boston chronometer dealers, but it was returned to them with the comment that "in the major areas, their prices were too far out of line and that they should review and re-submit."

As can be seen in Table 2, Negus was allowed to make a second offer. An explanation of this is found in a letter dated November 2, 1861, written by Superintendent Gillis to Captain S. S. Harewood, Chief of Bureau of Ordnance and Hydrography, regarding contracts. In this letter, Gilliss states, ". . . I believe the Government will be best served by Messrs. Negus and Company as these makers have consented to modify their terms as per final column of the list. A contract should be offered

for two years."

The first chronometer to be purchased by the U.S. Navy was an 8-day, Parkinson and Frodsham, Number 682, dated January, 1831. For it the Navy paid $420.00. It was issued to the *S. Adams* in April, 1831, and returned to the Depot in March, 1834. It was then repaired by Mr. Montandow that same year. The rate varied through 1835 from +3.7 seconds to +25.0 seconds; 1836, from +23.7 seconds to −3.4 seconds; 1837, from −3.6 seconds to +14.0 seconds. It was then returned and once again repaired by Mr. Montandow in January, 1838. As of November, 1835, the number of chronometers belonging to the U.S. Navy was fifty-four.

The first American-made chronometer purchased by the U.S. Navy was D. Eggert, New York, Number 106, bought in 1839 for $300.00. However, before we discuss the events that surrounded this instrument, it is only proper to find out something about its maker, Dominic Eggert, and later, the firm of D. Eggert and Son.

Dominic Eggert was born in 1785 in the town of Strasburg, Germany. In his early teens, he showed a great deal of mechanical aptitude and was fascinated with various mechanisms, particularly those of timepieces. Upon nearing that point in life when he would be more or less on his own, Dominic left Strasburg for Bristol, England. He felt that since England was the horological center of the world, that this was the place to best learn the art of watch and chronometer making. Furthermore, England was a maritime power and thus devoted more attention than other nations to the chronometer which really intrigued him. At the age of 33, after completing his apprenticeship and working for several makers, he traveled to New York City where he opened a watch repair shop in his Verey Street residence.

Shortly thereafter, he went to work for B & S Demilt, New York's first and largest importer of chronometers. In 1839, after Benjamin's death and Samuel's retirement, Dominic took over the Demilt's business which was located at 233 Pearl Street. He remained there until about 1848 when he turned the business over to his sons, since he was losing his eyesight. Upon taking over the business, the sons moved the firm to 239 Pearl Street and it became known as D. Eggert and Son. They remained at the Pearl Street address until 1874 when they moved to 74 Wall Street.

While Dominic was actively engaged in the construction of chronometers, he took on as an apprentice Simon Willard Jr., the son of one of America's foremost clockmakers. Dominic was responsible for teaching him the art of chronometer making. Dominic passed away in 1872 at the age of eighty-seven.

Dominic was the first in New York City to make a complete chronometer from the plates up. It is said that he also holds that same distinction for making the first pocket chronometer. Dominic began making chronometers while he was employed by the Demilt brothers. Shortly after taking over the Demilt business, he submitted his first chronometer, number 106, for trial. On April 1, 1842, he submitted his second chronometer, number 108, and later on, number 107 for trial. Eggert's numbering system evidently began in the 100 series since none of the Observatory records show any instrument with a lower serial number.

When the sons took over the day-to-day operations of the business, they became the agents for Parkinson and Frodsham chronometers. They not only repaired and rated chronometers, but also handled other nautical instruments and supplies and carried a line of very fine watches.

Even though Dominic was certainly capable of designing and constructing a chronometer (which he did), if you examine those made by Parkinson and Frodsham and those carrying the name of Eggert and Son, New York, you will find that they are identical in construction. Available records seem to indicate that Dominic Eggert actually made very few complete instruments and that the vast majority of the nearly 250 chronometers the firm is said to have produced were made by Parkinson and Frodsham, with Eggert and Son, New York, signed on the dial and movement. See Figures 1 and 2.

Figure 1. Dial view of Eggert & Son, New York, No. 330 chronometer. This instrument passed the Naval Observatory trial and was purchased for $285.00 on October 13, 1858.

Figure 2. Movement view of Eggert & Son No. 330 chronometer.

Parkinson and Frodsham chronometers are easily identified. Although they are of the 2-day type, they are much smaller in size than the standard 2-day or 56-hour chronometer. Another characteristic of all Parkinson and Frodsham chronometers that I have examined is that they have a brass canister-type dust cover which fits over the movement, and to which is attached a four prong shock-absorbing spring. Eggert and Son movements have these identical characteristics.

Eggert's No. 106, the first American-made chronometer purchased by the Navy, was one of twenty-two chronometers received by the Depot of Charts and Instruments on June 25, 1838 for trial. The other twenty-one were submitted by Cotterell (11) and Parkinson and Frodsham (10). At the conclusion of the trial, the Eggert No. 106 was found to have surpassed all the rest and was purchased. It was issued to the *Brandywine*, but within six months after it left the United States, it was reported by the ship's master as "having become useless from irregularity of performance."

When the Depot was notified of its failure, Lt. James M. Gilliss, the Officer in Charge at the Depot, wrote the Naval Board of Commissioners on May 13, 1841, ". . . It would seem just to the maker that he should repair it, but to secure the government and to ascertain the true merit of American manufacture, as compared with English chronometers, I respectfully suggest that the Master of the *Brandywine* be directed to deliver chronometer No. 106 to Mr. Eggert, in the presence of Mr. Arthur Stewart, by whom it shall be examined and defects repaired upon."

Mr. Stewart, in turn, wrote Gilliss on May 22, 1841, that Mr. Eggert had brought the instrument to him on the 21st. Stewart stated that, during the examination, he found "the escapement very much damaged in the adjustment of the detent and rollers." He also found scrape marks on the balance and the lower parts coated with oil. Stewart also informed Gilliss that Mr. Eggert told him that when it was delivered to him (Eggert), he was told that it had been taken to a "watchmaker in Lisbon, Portugal, to look after it when it had lost its regularity." This was the first that Gilliss had known about someone tampering with this instrument.

Gilliss informed the Board of Navy Commissioners on the 25th of Stewart's report and stated, "It is much to be regretted that it should have been sent to a 'watchmaker in Lisbon' as its defects appear to have been increased rather than remedied."

Mr. D. Eggert repaired the instrument. While on a trip to New York, Gilliss picked up No. 106 and brought it back to the Depot on June 20, 1841. Records show that No. 106 was still in service during the 1850's, evidenced by its having been sent to William Bond and Son for repairs, January 25, 1855.

Officer-in-Charge Gilliss did not think too highly of Eggert's set-up. When he wrote the Board of Naval Commissioners, January 18, 1839, after visiting the shops of Arthur Stewart and Eggert, he stated, " . . . The means and method of regulating and rating chronometers by each was carefully examined, and the carefulness, ability, and system of Mr. Stewart was found superior to that of Mr. Eggert. Indeed, the carelessness of the latter in rating his instruments should prevent any prudent person from entrusting a valuable chronometer to his keeping."

Sometime during the late 1850's, the working relationship between Eggert and the Naval Observatory began to deteriorate. In the early fall of 1861, the Naval Observatory asked Eggert to justify the charges for replacing balance springs in six chronometers and ". . . your authority for these repairs, reminding you of your promise."

Then in November 1861, the now Superintendent Gilliss notified Negus that ". . . the chronometers delivered to you by Messrs. Eggert and Son are not to be issued without such trials that will establish their uniformity of performance."

On February 12, 1862, Gilliss, in an answer to an inquiry from Eggert regarding chronometer tolerances and the inference that some makers' chronometers were being purchased which did not meet those tolerances, wrote

(Continued on page 52)

Glossary of Problems

Last month, in our glossary series on the affiliate chapter, we ended with a discussion of guilds. There is another important topic beginning with the same letter.

Grow: to spring up and develop to maturity.

Most of us are familiar with what is needed to have a fine lawn or to bring a vegetable garden to harvest. A plant must have a balanced diet of nutrients, water, sun, and care. Our typical chapter needs much the same attention to earn the respect of its members and our profession. A chapter must grow each year, or it will slide backwards—perhaps beyond rescue. There is no standing still.

I am not talking about growth in membership only. True, membership growth is an important goal, and it is an extremely difficult—but not impossible—task in this day of declining numbers in our profession. Rather, I am referring to growth in service to members, the profession, and the public. The typical chapter exhibits much enthusiasm at its inception, but at some point in time, complacency sets in and the interest of its members tends to wane.

What does it take to solve this situation? Like the plant, this chapter needs a diet. It needs leaders who care and have the ability to provide meaningful programs. It needs members who appreciate the efforts of the leaders and actively participate in chapter activities.

This chapter needs support from AWI and its fellow chapters. This is easy. AWI always stands ready to assist. One of the reasons for the existence of the Affiliate Chapters group is to provide help and inspiration to our fellow chapters by sharing our experiences.

Robert F. Bishop

The slogan of the 1979 World Champion Pittsburgh Pirates, "We Are Family," can just as well apply to us. Perhaps we should adopt it as our motto.

AWI now has made available to the affiliate chapters a new way to help your chapter grow. Earlier, I said that membership growth was extremely difficult. Recently, I sent a letter to all affiliate chapters, urging them to make a determined effort to build membership in their own chapter and AWI.

AWI will aid in this effort by making available to the responsible officers of a chapter a list of AWI members residing in that chapter's territory. In the past, for good reason, AWI would not release its membership list to anyone for any purpose. One of the recommendations of the delegates at last year's Affiliate Chapter Meeting was that this list be made available to affiliate chapters for membership drive purposes only. The AWI Board of Directors and the Judiciary Committee concurred, and now we have a valuable tool, if used wisely.

You may ask, how can a list of members help us recruit new members? First, the chapter requesting this list will find names of AWI members who are not members of their chapter. Mass mailings for membership drives are usually ineffective, but personal contact usually is effective. Obviously, knowing *who* to contact will make the job easier. Also, your chapter may find local members who as yet have not seen the wisdom of becoming a member of AWI. It is sad to report that some chapters have also experienced the situation wherein a few of their members claimed membership in AWI, but in reality, were not members. This list will provide proof. Again, the personal contact can bring new members to AWI. If your chapter elects to make use of this list, please give it your earnest support.

AWI can assist in yet another way to help your chapter grow. Several months ago, I pledged the Affiliate Chapters to a renewed campaign to encourage more widespread use of the AWI National Case Mark which all AWI members receive upon enrollment. In working with Sean C. (Pat) Monk, chairman of the case mark committee, and AWI Central, we now have promotional material and guidelines which will help promote this program in your area. We now have a new name, "**Pos-I-dent**" for *pos*itive *ident*ification, that will be less cumbersome and more easily remembered by the public. This can be a meaningful way for your chapter to grow in service to the public, law enforcement, and your membership. Please contact your chapter leaders for more details if you are interested in participating in Pos-I-dent.

Growth can be accomplished in many other ways. Expanded training, social activities, more frequent meetings, etc., are valuable and possible with a little "sun, water, nutrients, and work." Don't let your chapter down.

"True, membership growth is an important goal, and it is an extremely difficult—but not impossible—task in this day of declining numbers in our profession."

...from all around the ASSOCIATION...

Conventions In California

CALIFORNIA

One of the most famous timepieces ever produced was the Ingersoll Mickey Mouse watch. So what better place to hold the 1981 Horological Association of California Annual Convention than next door to Mickey Mouse's Magic Kingdom—Disneyland. The sight selected to host the March 28-29, 1981 Convention is the just opened (February, 1981) Anaheim Marriott Hotel at 400 West Convention Way, Anaheim, California. The theme of this year's convention is "Profitability in the Watch Repair Department." This theme, in addition to appealing to the watchmaker, should also be of particular interest to the retail jeweler. As such, an invitation is extended to watchmaker and retail jeweler alike.

The convention opens Saturday evening with the Annual HAC Dinner-Dance and Installation of Officers.

Sunday morning will find the convention delegates enjoying a continental breakfast hosted by the Watchmakers of Switzerland Information Center.

Following breakfast, Jean Pierre Savary, President of Watchmakers of Switzerland will present a specially prepared one-hour program for HAC members and guests.

During the break following Mr. Savary's presentation the audience will have an opportunity to view the newest in tools and equipment which will be on display by the various equipment and material suppliers.

The convention will then reconvene for a series of round table discussions. Because of the convention theme HAC is looking forward to welcoming many retail jewelers thus making it possible for the watchmaker and jeweler, during this portion of the program, to exchange problems and solutions, ideas and suggestions on how to make watch repair more profitable.

The noon luncheon will feature special guest speaker Art Gleim. In addition to being the owner of Gleim Jewelers in Palo Alto, this popular speaker is also President of Jewelers of America, Director of the Jewelers Vigilance Committee, Director of the Jewelry Industry Council . . . to name but a few of his positions.

The convention will conclude with a series of technical workshops following lunch.

For additional information contact HAC President Warren Rogers, 410 East Florida, Hemet, California 92343.

The annual convention of the Bay Area Watchmakers Guild was held in Napa, California this past fall.

The approximately thirty-five persons in attendance were rewarded not only with fine accommodations and two delicious meals, but also with the opportunity to enjoy each other's company and to hear two outstanding speakers.

Mr. Art Gleim, owner of Gleim's and Johnson Jewelers in Palo Alto, spoke most interestingly about many of the problems facing the jeweler when accepting, handling, and repairing customers' jewelry, and gave practical suggestions on how to avoid many of the pitfalls. Following his talk, he graciously displayed several antique repeater watches and other high grade watches from his personal collection.

The highlight of the Sunday noon luncheon was a most timely and well-presented talk by Mr. Warren Rogers, President of the Horological Association of California, and a long-time jeweler and watchmaker from Hemet, California. His topic, "Profits Through Professionalism," was intended to reveal to watchmakers that by providing competent repairs, by presenting a professional appearance and manner to their customers, and by charging adequately for that type of services, their businesses would become profitable. It is unfortunate that more of BAWG's members were not in attendance, since all watchmakers face the problem of economic survival in these inflationary times.

The BAWG extends its sincere appreciation to Mr. John Frei of Frei-Borel, Oakland, for generously providing the libations which preceded the dinner on Saturday. We also thank Fried & Field and Marshall-Swartchild Co. of San Francisco, and Mr. Jim Crain, Portescap representative, for the nice items furnished for the door prizes given on both Saturday and Sunday.

The Guild also appreciates the time and trouble taken by Mr. Larry More, representing Seiko, and Mr. Ed Loritz, of L & R Manufacturing Co., to set up their material displays on Sunday morning and being available to discuss them. Mr. Jim Crain, of Portescap, was also good enough to send some of his machines for display.

OHIO

Watchmakers Association of Ohio members should be making plans now to attend the AWI-WAO seminar in Chillicothe, Ohio on Sunday, March 22, 1981. Jim Broughton will be the instructor, and the subject will be the ESA-ETA Quartz Analog. The usual Saturday night Hospitality Room will be open at 8:00 P.M.

The OWA Credit Union is still loaning money at 12% APR, and is paying 6% on savings accounts. All WAO directors have credit union membership applications, and each is willing to assist members in applying for a loan.

A long-time member of WAO (since 1960), Thomas L. Harpster, passed away December 24, 1980. WAO extends deep-felt sympathy to his wife Elizabeth and son Donald.

PENNSYLVANIA

The Allegheny Guild held its regular monthly meeting on Tuesday, January 13, 1981 at the Ray Gaber Company. As usual, the officers met for a brief dinner-meeting earlier in the evening.

The January program was a lecture presented by Mr. Roland Roehrich. The subject was Abraham-Louis Breguet, the watchmaker who ultimately designed the Breguet hairspring. Mr. Roehrich is presently employed at Westinghouse, and holds a Ph.D. from Carnegie University. His father was of French-Swiss background, and a graduate watchmaker.

MICHIGAN

The Michigan Watchmakers' Guild has completed the 1981 survey of suggested (non-mandatory) minimum repair price cards which are now available on colored cards. These cards cover watch repair, clock repair, grandfather clock repairs, digital watch repair, tradeshop watch repair, and jewelry repair.

Anyone interested in acquiring these cards should send $7.50 (printing, handling, and mailing cost) to Michigan Watchmakers' Guild, Inc., 1202 Catalpa, Royal Oak, Michigan 48067.

NEW JERSEY

Watchmakers Association of New Jersey had as their guest in January a representative from Branson Cleaning Equipment Company of Shelton, Connecticut, a firm involved in research and development of products for our industry since 1946.

Gregory Foster, Branson's area sales representative, presented a slide show for the membership and followed it with an open discussion and answers to questions from the floor. His demonstration was directed to the technical aspects of ultrasonic cleaning equipment.

ARIZONA

The Central Arizona Horological Guild held its January meeting at the new meeting place, the Salt River Project Building in Phoenix, Arizona.

The program consisted of a 16mm film entitled "C.P.R." Also discussed were shortcuts to profit with a question and answer period following.

ILLINOIS

The January meeting of the Central Illinois Watchmakers Association was held January 15, 1981. The program consisted of a new AWI slide presentation on selling watches.

The CIWA officers for 1981 are president, Bill Eaton; vice-president, Fred Schroeder; treasurer, Gordon Robinson; secretary, Mary Ann Bilyeu. Board members elected at the last meeting are Jack D. Donovan of Normal, Illinois; Charles Ramsey of Peoria, Illinois; and Mary Ann Bilyeu of Monticello, Illinois. Retiring board members were Earl Lipp, Ben Smith, and Delmar Hancock. Mr. Fred Schroeder is chairman for the 1981 Illinois Watchmakers Convention, sponsored and arranged by CIWA.

NORTH CAROLINA

Piedmont Crescent Watchmakers Guild held their monthly meeting in Mooresville, North Carolina. Present were 13 members and one wife, Doris Crooks. The meeting was presented by Technical Director Joe Crooks with an AWI film on "Designing Jewelry for the Watchmaker" by Wes Door.

State secretary Walter Hanson reported the state convention would be held the first week in April at the Holiday Inn in Charlotte, North Carolina.

FLORIDA

In the December issue of *Horological Times*, the Florida State Watchmakers Association Convention was featured in "Association News." Here we present some scenes from that event which took place November 1st and 2nd, 1980.

Flordia's Greater Miami Watchmakers Guild spent time at the last meeting making "T" shirts. President David Miskie was the artist. The Guild is taking orders for shirts. Anyone interested may write David Miskie, Miami Guild, 12577 Biscayne Blvd., N. Miami Beach FL 33161.

Paul Finne, President of FSWA, opening their 35th annual convention in Palm Beach, Florida.

We Salute These New Members!

ABBOT, Edward A.—North Carolina
ABRUE, Adriano—New York
AIELLO, Daniel—Michigan
ANDRUS, Owen K.—Ohio
ANGLIN, Winford—Oklahoma
ARMSTRONG, Jack C.—Illinois
BAILEY, Donal B.—Michigan
BARNARD, Bill R.—New Mexico
BAXTER, John M.—Ohio
BEAM, Edward—New York
BUSSE, John R.—California
CARTER, Walter Lee—California
CHARANIA, Firoz—Alberta, Canada
CHRESTENSON, David I.—Illinois
CROMWELL, Forrest L.—Washington, D.C.
DANT, Lawrence P.—Nebraska
DOYLE, John J., M.D.—West Virginia
DRYSDALE, Brent—Ontario, Canada
ERBE, Loren R.—Oregon
EVASKOVICH, Zoltan J.—New Mexico
FARISH, Edward L.—Arizona
FULLER, David H.—Connecticut
GEORGE, Richard—Utah
GREGORY, Rod A.—Ohio
GRUBBA, Stephen L.—Wisconsin
HARCHENKO, Paul—Montana
HARRIS, William J.—New York
HASSELBACH, William D.—Ohio
HEISTAND, John B.—Pennsylvania
HILEMAN, Jesse C.—California
HOUK, Tamara—Illinois
IVESTER, Kenneth—Georgia
JOHNSON, Arnold W.—Minnesota
JOHNSON, Robert D.—Wisconsin
JORDAN, Darrell R.—Illinois
KALE, Marty—Texas
KAUFMANN, Roger C., Sr.—Wisconsin
KERESZT, Joseph F.—Colorado
KOUKL, Joseph F., Jr.—Illinois
LaCHAPELLE, James T.—Illinois
LARSON, Alvin—Wisconsin
LARSON, Donald W.—Washington
LEECH, Charles A.—Maine
MacKINNON, James A.—New Zealand
MARTIN, Harold L.—California
MOLLOY, Bronwyn—Illinois
MOSER, Gaylord L.—Wisconsin
NICHOLSON, Carl E.—Mississippi
NIELSEN, Marvin C.—Wisconsin
OBERMILLER, Dennis C.—Michigan
OLSEN, Donald W.—Nebraska
ORR, John P.—Florida
OSKAR, Donald L.—Wisconsin
PANKRATZ, John R.—Wisconsin
PATTERSON, Wayne C.—Montana
PERREAULT, Jean R.—Quebec, Canada
POLISENA, Nino E.—Florida
POTTER, James B.—Alberta, Canada
PREISS, Richard G.—Arizona
RAMOS, Julio Colon—Washington
REIMER, Herbert L.—Wisconsin
SABY, John S.—Ohio
STOEHR, James D.—Wisconsin
TAYLOR, Ray—Florida
THIES, Hank—Montana
TRUMMER, Juan A.—Buenos Aires, Argentina
VEECK, William L.—Minnesota
WALTER, William A.—Wisconsin
WINTERS, Donald J.—Iowa
WIMBERLY, Joe W.—Tennessee

THE DUPLEX ESCAPEMENT

(Continued from page 39)

staff. This allows the free escape wheel to drop forward until the impulsing escape tooth contacts the impulse finger on the balance staff, giving to it and the balance a true and vigorous impulse. From there the cycles start anew.

Thus this escapement is one of a great variety of *coup perdu* (lost beat) escapements in which impulse is given in one direction only. Thus, with a balance with four vibrations a second, impulse and hand advance occur once each half second.

Chinese duplex

The Swiss made many such watches for the Far Eastern market and enjoyed great sales in China. In a further effort to please the Chinese buyer who wanted a watch whose seconds hand would jump full seconds, Charles Eduard Jacot, about 1850, invented the double duplex, popularly termed the "Chinese Duplex" escapement. These were mainly made in Fleurier in Switzerland and later, by Ilberry in England, often in conjunction with Bovet of Fleurier. In those calibres the rear plates were highly engraved and chased. The plates were sturdy, although with skeletonized shapes and rich ornamentation, the latter an invention of Jean Tixier, a French-Swiss watchmaker about 1857.

Jacot reasoned that if this escapement jumped half seconds because of the "lost beat," why not split the escape wheel's locking teeth Siamese-twin style, giving them two points. This would cause two lost beats with each tooth and allow a full second's jump with each hand advance.

Figure 4 shows the "Chinese Duplex" escapement in an isometric view. This is also called a *double duplex* or *crab-claw* escapement because of the crab's claw appearance of the escape wheel's locking teeth.

Figure 5 shows that the balance is virtually the same as that in Figure 2. The impulse finger and slotted roller or roller post are virtually alike in both escapements.

Crab-claw teeth

The chief difference is in the escape wheel with its crab-claw locking teeth. Because this is a double lost-beat escapement, there are but six (double) locking teeth and but six short impulsing teeth. The sequential action of this escapement is shown in Figure 5.

In Figure 5, Stage 1, the front of the double tooth is locked on the balance staff's slotted roller. The dotted view in this same stage indicates that the impulse finger can easily clear the triangular impulse teeth on the escape wheel.

Stage 2 of this drawing shows that the momentum of the returning, clockwise motion of the balance has allowed its roller slot to ride past the locking tooth, causing a slight momentary recoil of the escape wheel. The balance has reached the end of its clockwise excursion and its tensed hairspring will cause it to return in the counterclockwise direction.

In Stage 3, the returning balance has allowed the point of the forward part of the double tooth's tip to enter the roller slot. This also will allow a slight impulse to the balance as well as a hardly perceptible advance of the escape wheel and the sweep seconds hand.

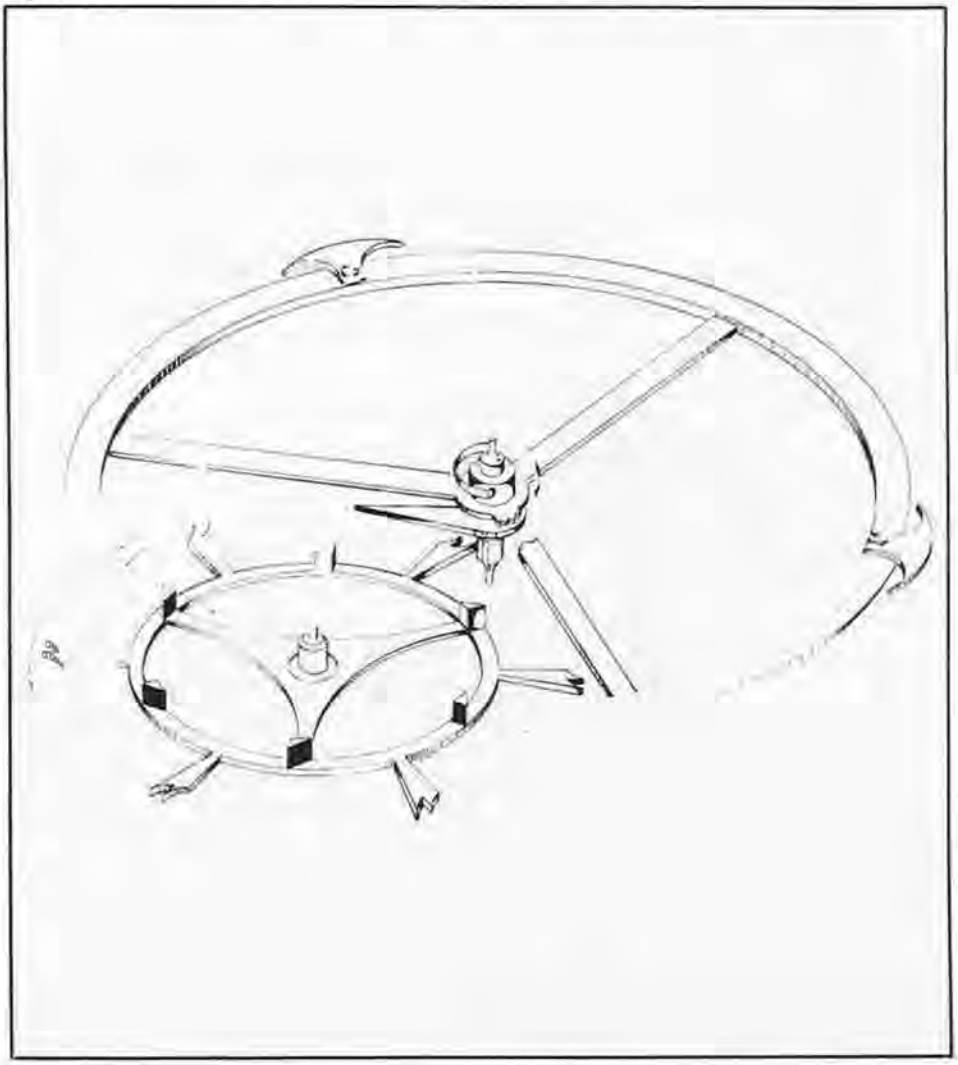
When the tip of this tooth drops off the roller, the rear tip of this double tooth will lock on the slotted roller's locking surface. The balance will continue in its arc until arrested by the wound-up hairspring and return again in the counterclockwise rotation until, as shown in Stage 5, the rear tip of the double locking escape tooth enters the slot of the roller, supplying a slight impulse to the balance.

This action continues until as shown in Stage 6, the rear tip clears the slot of the balance staff roller. Then the escape wheel and train and the sweep seconds hand jump freely forward. The impulse tooth then contacts the long impulsing finger of the balance as shown in Stage 7.

In Stage 7, the balance is being impulsed forward until the finger and impulse tooth part, as shown in the dotted and shaded view. At that exact moment, the next double locking tooth is at the position shown in the dotted view. It will drop onto the slotted roller as shown in Stage 1, but a bit further up on the locking surface of the roller, completing a full cycle.

Repairs to these escapements deal mainly with broken pivots on the escape wheel pinion or balance staff or bent escape wheel teeth. Also, should one locking tooth tip be slightly short, skipping will occur, resulting in the symptom of a watch gaining about 20 minutes a day. Most requests are for instruction in the repair and construction of a new balance staff, mainly on the proper method of slotting the safety roller post to allow the locking tooth to pass. Therefore, next month, we will deal with adjustments and repairs to the escapement and instructions on making a staff with its passing slot. HTJ

Figure 4



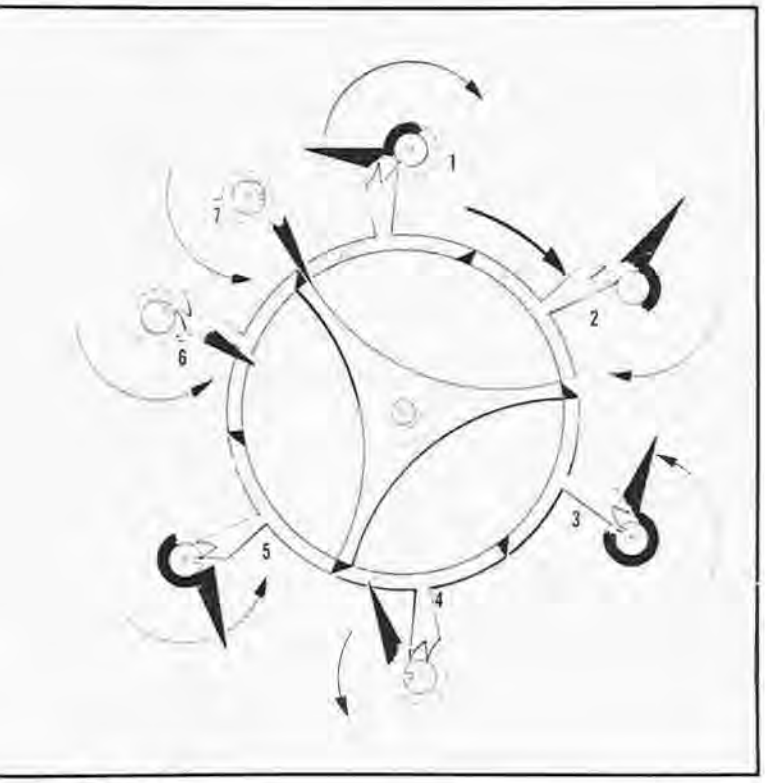


Figure 5

THE SHIP'S CHRONOMETER
(Continued from page 45)

". . . I have not yet accepted for purchase any chronometer whose extreme daily variation during the whole four months for which their rates were required has exceeded 1.0 seconds. Not one of yours has performed near that limit."

In December 1863, Eggert and Son charged that some chronometer makers were resorting to unethical business practices. However, when the Superintendent of the Naval Observatory requested their names, Eggert refused to identify them. At this time, Superintendent Gilliss notified Eggert and Son that the Navy would no longer have any business dealings with them.

During the latter part of 1864, the Navy requested the various manufacturers and importers of chronometers to make known the number of instruments they had available for immediate purchase. Bond, Bliss, Eggert, Negus, and Willard of Boston responded. Bond stated that he would have to have $400 for each of his instruments and would not accept anything less. Negus demanded a like sum, the reason being that "because of the present state of currency and at the present rate of exchange, first-class chronometers cannot be imported for less than $400 each." However, Eggert and Son informed the Navy that they had fifteen chronometers (ten American and five English) which were available for $300 each. When Bond and Negus were informed of Eggert's offer, they countered with an offer of $350 or even $325 each for their instruments. Eggert's offer was never accepted, nor was there any reason given. Gilliss was evidently standing by his statement made in December, 1863 that the Navy would no longer do business with Eggert.

It appears that Eggert may have underbid the others, hoping to even the score against those whom he felt were engaged in collusion, but whose names he would not divulge.

Sixteen years passed before any further communication took place between Eggert and the Naval Observatory. On February 13, 1880, Superintendent John Rodgers wrote Eggert, thanking him for his letter of the 11th, regarding the existence of a fixed bright light at Celestun on the northwest coast of the Yucatan. Eggert was informed that his letter was being forwarded to the Hydrographic Office as they were collecting this type of data.

During May, 1883, Superintendent Shufeldt sent letters to Bliss, Bond, Eggert, and Negus, requesting each to submit four chronometers, wholly made by American makers, for a competitive trail, whereby the top four would be purchased. Eggert was notifed by the Observatory on January 4, 1884, that ". . . Your chronometers submitted for test cannot be considered as made by American makers and cannot be received for competitive trial with the obligation to purchase, should they pass the best trial."

Negus took the honors during this 1884 trial. Actually, there were six chronometers purchased: three from Negus (Nos. 1597, 1615, and 1655), two from Bond (Nos. 509 and 510), and one from Bliss (No. 2768).

Next month, we will discuss the histories of Adamson, Blunt, Demilt, Dillion, and other American chronometer makers.

To Sell a Watch, You Must

KNOW IT!

Know how the watch OPERATES
The customer may not know he really wants a watch if you do not know how to show him its features.

Know the ACCURACY

Know the difference between WATERPROOF and WATER-RESISTANT

Know your customer's NEEDS
Know what your customer expects from the watch.

Know the meaning of QUARTZ
The other day, we received an LCD watch for service. The jeweler's note with the watch read: "Please change mainspring."

Know the TRACK RECORD of the watch
The watch to sell is the one that has the best service record & thus will give you the best reputation.

Know that your STOCK WATCHES WORK
Checking the stock also helps acquaint you with the proper operating procedures of each watch.

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

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City _____ State _____ Zip Code _____

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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 _____

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

MARCH, 1981

7-12		Los Angeles, CA	Residence Course
14	A	Kansas City, MO	Jaeger
22	C (b)	Chillicothe, OH	Broughton
28,29	H	Chicago (Rockford) IL	Benesh

APRIL, 1981

5	G	South Carolina	Biederman
5	E	Rochester, NY	Nelson
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

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ADDRESS: _____

CITY, STATE, ZIP: _____

(Continued from page 37)

locking face of the pallet stone which is shown at "c." This is called safety lock at jewel pin shake. A small oiler can be used to move the fork back and forth when checking the jewel pin shake. The guard pin shake should be slightly less than the jewel pin shake. The guard pin shake is checked when the guard pin is outside the crescent in the safety roller. When the guard pin shake is checked, the escape wheel tooth must remain safely locked on the locking face of the pallet stone. See Figure 3. As the fork is moved away from a banking pin at "a" and the guard pin goes against the safety roller at "b," the escape wheel tooth must remain safely locked on the pallet at "c." The jewel pin shake should be equal on both sides of the center line. The guard pin shake should also be equal on both sides. If the jewel pin shake is unequal when checked on both sides of the center line, then either the stones are maladjusted or the fork is bent.

If the pallet stones need to be moved out different distances from the backs of their slots in order to equalize the jewel pin shake, it is likely that the fork is bent. The fork can usually be straightened by using a pair of brass or bell metal tweezers between the fork and the pallet while holding the pallet between the thumb and index finger.

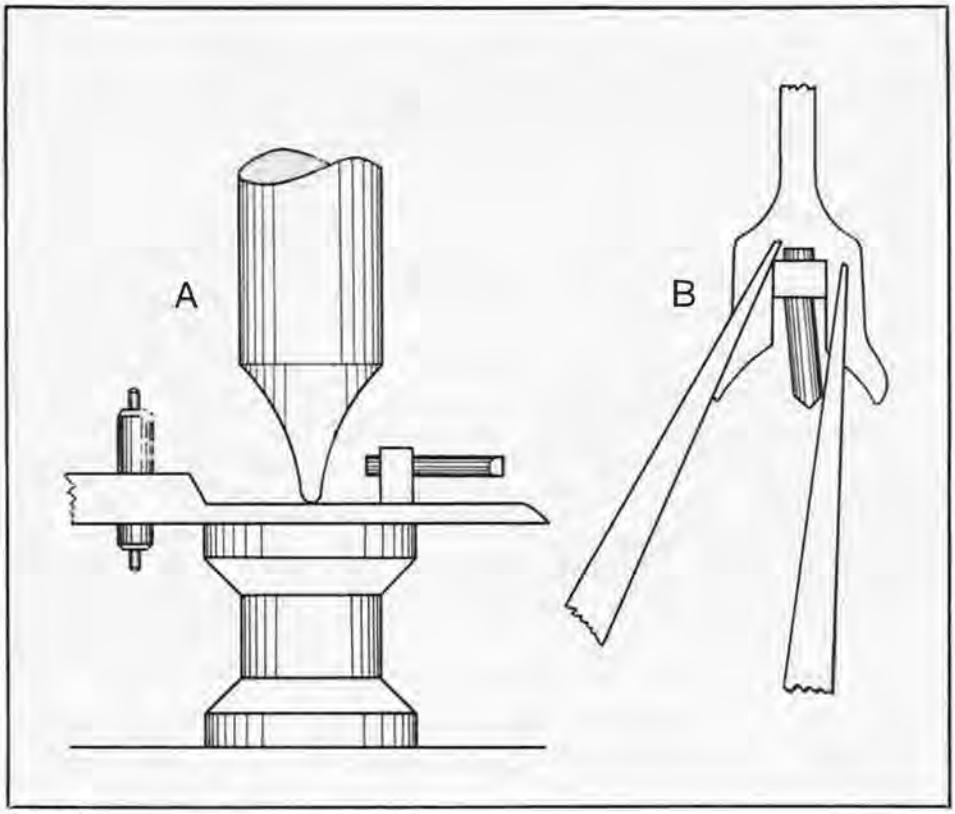


Figure 4

If the drop lock is correct but there is too much jewel pin shake, either the fork is too short or the roller jewel is too close to the balance staff. Some-

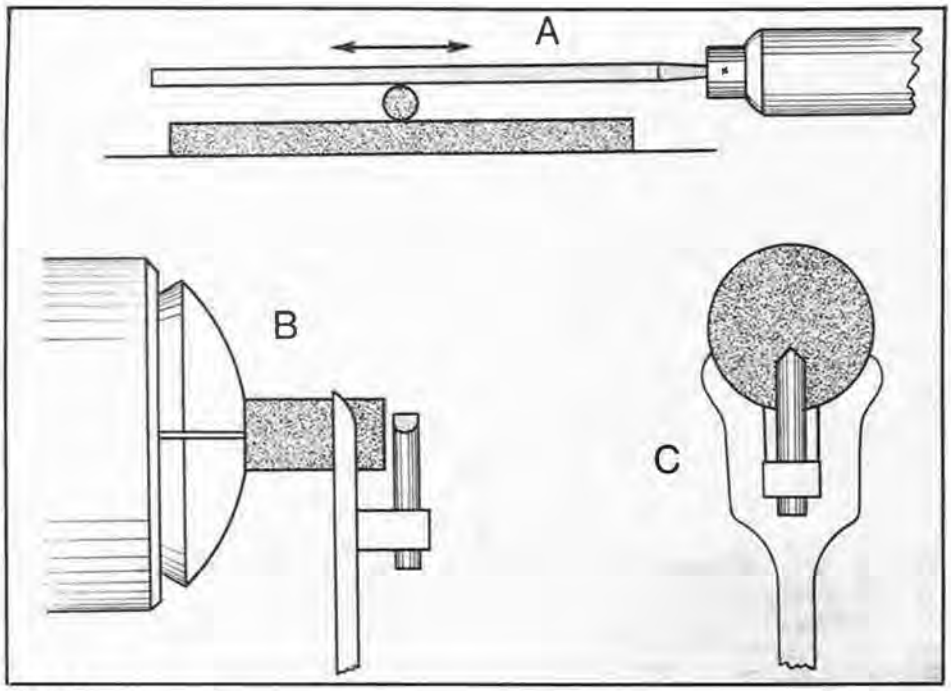


Figure 5

times this short-fork condition can be corrected by heating the roller table with the combination tool over the alcohol lamp and shifting the roller jewel away from the balance staff. If the roller jewel cannot be shifted enough to correct the short-fork condition, then the fork can usually be stretched a small amount by placing the neck of the fork upside down on a flat, polished staking tool stump and using a stretching or peening punch on the neck of the fork to stretch the neck. See Figure 4, View A. A small brass hammer is used to tap the punch lightly. Note: Stretching a pallet fork must be done with caution because if the fork is hard, it could be broken during the stretching operation. If the fork is made of soft metal, it could be cut into during the operation. Stretching a pallet fork should be done only as a last resort.

If the drop lock is correct and the jewel pin shake is too little, either the fork is too long or the roller jewel is too far forward in its hole. First, try

to shift the roller jewel in its hole toward the balance staff. If this doesn't correct the condition, the fork horns can be ground out to shorten the fork. To grind out the fork horns, a diamond-charged soft steel wire of the proper diameter can be used. Diamond-charged wires can be made by placing some diamond paste on a piece of plate glass or a smooth hard steel plate. Then use a burnish file to roll the wire over the diamond paste to charge it. See Figure 5, View A. For grinding out the horns, the diamond-charged wire can be chucked in the lathe and turned slowly while the fork is held against it. See Figure 5, Views B and C. The wire can also be held in a pin vise while it is being used. The pin vise is rotated with the fingers during the grinding operation.

When the pallet stones are being set for the correct amount of drop lock, it is very important to check the inside and outside drops to make sure they are sufficient and equal. The drops are affected by moving the stones in and out. The drops are also affected by spreading and closing the stones in their slots. To spread one or both stones in their slots increases the inside drop and decreases the outside drop. To close one or both stones decreases the inside drop and increases the outside drop. Pallet stones that are too narrow cause excessive drops and stones that are too wide cause close drops. When the drop lock and jewel pin shake are correct but the drops are unequal, it is possible that the fork is bent or that one or both stones need to be spread or closed in the pallet frame to equalize the drops. (See the January and February, 1981 "Technically Watches" columns for other results of moving the pallet stones.)

After the correct drop lock, jewel pin shake, and drops have been established, the guard pin shake should be checked and adjusted if necessary. If the guard pin shake is unequal, chances are the guard pin is bent. The guard pin can be straightened with a pair of brass or bell metal tweezers as in Figure 4, View B. If the guard pin is too short, it must be stretched or replaced. If the guard pin is too long, it must be shortened. This can be done with an Arkansas stone slip or a steel burnisher. The methods used to lengthen, shorten, and replace guard pins are shown in the February, 1981 "Technically Watches" column. After the correct guard pin shake has been established, the banking pins are opened slightly to allow for slide. Slide should be about 1/4 to 1/2 the amount of drop lock, depending on the grade of the watch.

The following are some problems that may be encountered when using the BANK-TO-DROP mothod in setting up the escapement. Following each problem is the solution to that problem.

First, we will deal with several (A through H) possible drop lock and jewel pin shake problems.

Conditions in Problem A:
1. Jewel pin shake insufficient on both sides of the line of centers.
2. Drop lock insufficient on both stones.

Solution:

By moving both stones out the same amount, the drop lock will be increased and the jewel pin shake will be increased also.

Conditions in Problem B:

Both the drop locks and jewel pin shakes are excessive on both sides.

Solution:

By moving both pallet stones in the same amount, the drop lock and the jewel pin shakes will be reduced.

Conditions in Problem C:

There is insufficient drop lock and the jewel pin shake is excessive on both sides.

Solution:

Move both pallet stones out to correct the drop lock. Shift the roller jewel away from the balance staff or stretch the fork to correct the jewel pin shake.

Conditions in Problem D:

The drop lock is excessive and the jewel pin shake is insufficient.

Solution:

Move both stones in an equal amount to correct the drop lock and grind out the fork horns to shorten the fork to allow for sufficient jewel pin shake.

Conditions in Problem E:

The drop lock is correct and the jewel pin shake is excessive.

Solution:

Stretch the pallet fork or shift the roller jewel away from the balance staff to correct the excessive jewel pin shake.

Conditions in Problem F:

The drop lock is excessive and the jewel pin shake is correct.

Solution:

Moving both pallet stones in to reduce the excessive drop lock creates insufficient jewel pin shake which can be corrected by shifting the roller jewel toward the balance staff or by grinding out the fork horns.

Conditions in Problem G:

1. The drop locks are excessive.
2. The jewel pin shakes on both sides are insufficient.

Solution:

By moving both stones in an equal amount to correct the excessive drop lock, the jewel pin shakes diminish even more which indicates a long fork. If the roller jewel cannot be shifted toward the balance staff enough to allow for sufficient jewel pin shake, then the fork horns would need to be ground out to create the necessary jewel pin shake.

Conditions in Problem H:

1. The drop locks are insufficient.
2. The jewel pin shakes are excessive on both sides.

Solution:

By moving both stones out the same amount, the drop lock is increased. The jewel pin shake is made very excessive which indicates a short fork. If the roller jewel cannot be shifted away from the balance staff enough to correct the problem, then the fork would need to be stretched to allow for the correct jewel pin shake.

The following examples show some faulty conditions in the escapement, together with their corrections:

Conditions in Problem A:

1. The drop lock is inadequate on both stones.
2. The inside drop is inadequate.
3. The outside drop is excessive.
4. The jewel pin shake is correct on the R-stone side of the line of centers.
5. The jewel pin shake is insufficient on the L-stone side of the line of centers.

Solution:

By moving the R-stone out, the drop lock will be increased equally on both stones. The inside drop will be increased. The outside drop will be decreased. The jewel pin shake will be increased on the L-stone side.

Conditions in Problem B:

1. The drop lock is excessive on both stones.
2. The inside drop is excessive.
3. The outside drop is inadequate.
4. The jewel pin shake is correct on the R-stone side of the line of centers.
5. The jewel pin shake is excessive on the L-stone side of the line of centers.

Solution:

By pushing the R-stone in, the drop locks are decreased equally on both stones. The inside drop will be decreased. The outside drop will be increased. The jewel pin shake will be decreased on the L-stone side of the line of centers.

Conditions in Problem C:

1. The drop lock is insufficient on both stones.
2. The inside drop is excessive.
3. The outside drop is insufficient.
4. The jewel pin shake is correct on the L-stone side.
5. The jewel pin shake is inadequate on the R-stone side.

Solution:

By moving the L-stone out, the insufficient drop locks are corrected. The inside drop is decreased. The outside drop is increased, and the jewel pin shake is increased on the R-stone side.

Conditions in Problem D:

1. The drop locks are excessive.
2. The inside drop is insufficient.
3. The outside drop is excessive.
4. The jewel pin shake is correct on the L-stone side.
5. The jewel pin shake is excessive on the R-stone side.

Solution:

By moving the L-stone in, the excessive drop locks are corrected. The inside drop is increased. The outside drop is decreased and the jewel pin shake is decreased on the R-stone side.

Conditions in Problem E:
1. The drop lock is correct on both stones.
2. The inside drop is inadequate.
3. The outside drop is excessive.
4. The jewel pin shake is excessive on the R-stone side.
5. The jewel pin shake is inadequate on the L-stone side.

Solution:

By moving the R-stone out and the L-stone in the same amount, the drop locks still remain correct. The inside drop is increased. The outside drop is decreased. The jewel pin shake is decreased on the R-stone side. The jewel pin shake is increased on the L-stone side.

Conditions in Problem F:
1. The drop lock is correct on both stones.
2. The inside drop is excessive.
3. The outside drop is inadequate.
4. The jewel pin shake is inadequate on the R-stone side.
5. The jewel pin shake is excessive on the L-stone side.

Solution:

By moving the R-stone in and the L-stone out the same amount, the drop locks still remain correct. The inside drop is decreased. The outside drop is increased. The jewel pin shake is increased on the R-stone side. The jewel pin shake is decreased on the L-stone side.

Conditions in Problem G:
1. The drop locks are correct.
2. The jewel pin shakes are correct.
3. The inside drop is inadequate.
4. The outside drop is excessive.

Solution:

By spreading both of the stones in their slots, the drops will be equalized without changing the drop locks or jewel pin shake a noticeable amount.

Conditions in Problem H:
1. The drop locks are correct.
2. The jewel pin shakes are correct.
3. The inside drop is excessive.
4. The outside drop is inadequate.

Solution:

By closing the stones in their slots, the drops will be equalized without changing the drop locks or jewel pin shakes a noticeable amount.

Conditions in Problem I:
1. The drop locks are correct.
2. The inside drop is excessive.
3. The outside drop is insufficient.
4. The jewel pin shake is excessive on the R-stone side.
5. The jewel pin shake is insufficient on the L-stone side.

Solution:

By moving the R-stone in and the L-stone out the same amount, the drop locks remain correct. The inside drop is decreased. The outside drop is increased. The jewel pin shake is made excessive on the R-stone side. The jewel pin shake is diminished on the L-stone side. This indicates that the fork is bent and must be straightened. To correct this condition, the fork would need to be straightened toward the L-stone side in order for the jewel pin shakes to be equalized.

Conditions in Problem J:
1. The drop locks are correct.
2. The inside drop is insufficient.
3. The outside drop is excessive.
4. The jewel pin shake is insufficient on the R-stone side.
5. The jewel pin shake is excessive on the L-stone side.

Solution:

By moving the R-stone out and the L-stone in the same amount, the drop locks remain correct. The inside drop is increased and the outside drop is decreased. The jewel pin shake is diminished on the R-stone side and made excessive on the L-stone side. This indicates a bent fork. When the fork is straightened, it should be straightened towar R-stone side. THEB

(Continued from page 41)

do not catch in the cotton buff and cause damage. The final finish can be obtained using rouge on duplicate buffs, starting with the inside ring finger. This will produce a fine, mirror-bright finish.

It is not unusual to process as many as fifty items at one time through this polishing process. To polish each item separately would require stopping the polishing motor and changing buffs or wheels eight to ten times. This would mean four to five hundred changes if all fifty pieces were polished individually. However, in doing all fifty systematically, only eight to ten changes need be made. Several years ago, I made a study of time required to do watch and jewelry repair work. The results, in a nutshell, were that individually, it took eight to ten minutes to do a polishing job; in doing fifty pieces systematically, the time required to do one piece averaged out to three minutes and forty-two seconds. Through this time study, I have proved to myself that much more work can be produced by using a system. I believe that many of the people now using systematic watch and jewelry repair will agree that figures of ten to thirty percent more work produced in the same amount of time as when done individually is conservative.

Step 9

Now that the polishing is complete, only the cleaning remains to be done. If you have an ultrasonic cleaning tank, these pieces can be cleaned ultrasonically using the soap and ammonia solution or a commercial solvent. The items should then be rinsed in hot water and dried in a drier or under a heat lamp. If ultrasonic equipment is not available, the jewelry can be cleaned in a pan of soap and ammonia solution with a washout brush to scrub the depressions and crevices, then rinsed and dried. When ultrasonic equipment is not available, I have used a glass jar of about one quart capacity with the soap and ammonia solution in it. With this method, you simply drop in the jewelry, cap the jar tightly, and then shake the contents for about two minutes. As I usually saved watch cases and bands to be polished and cleaned along with the jewelry, they were also put in the jar. The agitation produced by shaking penetrates even into the deep recesses of the watch bands and removes or loosens all the dirt and polishing abrasives. The solution is then poured out of the jar, leaving the jewelry, watch cases, and bands, and then the jar is filled with hot water and shaken again several times. Filling, shaking, and emptying is repeated until the hot water remains clear which is a good indication that the articles are absolutely clean. When dried in a drier or under a heat lamp, the articles show no streaks but are bright, clean, and ready to put into the job envelopes to deliver to the customers.

Step 10

Putting the final finished repairs back in the envelopes is the final step, and the final recording should be done at this time. The sketches and descriptions made when laying out the work will identify each piece so thay will be put in the correct envelopes. If warranties are given on work performed, then the records should be kept at least until the warranties expire.

Similar systems can be worked out for doing watch repair. In fact, there have been some excellent programs presented to watchmaking organizations by various individuals and by manufacturers of equipment and solutions. Multiple watch repair has become popular enough that manufacturers of equipment are now making cleaning equipment that will clean up to one hundred movements at one time.

As I have stated before, anything that I pass on works for me, although there are certainly many other ways to do the same thing and some, no doubt, are better. I hope my ideas and thoughts are helpful to anyone who is now working out a system of servicing.

The next article will be about the "Junk Jeweler" who, contrary to this handle attached to him, is the most versatile craftsman when it comes to repairing jewelry.

(Continued from page 33)

aluminized edge of light panels has been known to cause shorted segments by shorting the zebra. The exact location of a short between two segments of a display can easily be pinpointed by cycling through all of the numbers. When two segments are shorted, the current will be high when one of the segments is supposed to be on and the other off. When both of the segments are either on or both off, the current will be normal. When this type of short occurs, the entire display will go off because the up converter is shorted to ground.

10:30 **Normal Current**–If the current is normal, ask the following:

- 10:31 Is the oscillator running?
- 10:32 Do all the switches function properly? Are all of the button contact points clean.
- 10:33 Is the night light working? (What is its current consumption?)
- 10:34 Are all segments functioning properly?
- 10:35 Is current normal during all number combinations?
- 10:36 Is the setting logic normal?
- 10:37 Is the alarm functioning properly? (What is its current consumption?)

Step 11:00 **Insert new batteries**

- 11:10 Be sure all cell contacts are secure.
- 11:20 Be sure the case contact fingers are adequate.

Step 12:00 **Casing**

- 12:10 Be sure the case is clean
- 12:11 Verify that all buttons work.
- 12:12 Insert module into case
- 12:13 Test button travel–Visually inspect with microscope (10x magnification)
- 12:14 Insure proper module–case electrical contacts.
- 12:15 Close caseback
- 12:16 Test all buttons
- 12:17 Set all functions of the watch to the exact time.
- 12:18 Check the timing of the closed watch case.
- 12:19 Wait 24 hours and check for timekeeping accuracy.
- 12:20 Return watch to consumer.

SUMMARY OF TEST PROCEDURE

1. Remove module from case
2. Apply power to module
3. Is the oscillator working?
4. Do all of the switches function?
5. Check all segments
6. Does the alarm work?

Seminar In Spokane

A three-day seminar was held at Spokane Community College, Spokane, Washington. Ron Neibauer of Simon Golub and Sons, San Mateo, California, "Omichron" branch, and Seiko instructor, Bob Watanabe, from Los Angeles, used Seiko quartz watches, Models 0903, 7813, 1600, M159, and L012. Thomas H. Imai, CMW instructor at Spokane Community College and Vice Chairman of the Research and Education Council of AWI, hosted the seminar.

Those attending the Seiko Seminar at Spokane Community College were: (Back row, left to right) Gary Hoover, Spokane, WA, student; Jim Handley, Missoula, MT; Paul Schuman, Omak, WA; Ray Mitchell, Coeur d'Alene, ID; Leslie Meigs, Omaha, NE, student; Rich Frederick, Bozeman, MT; Allen Denny, Kellog, ID, student; Jim Graynieze, Moses Lake, WA; Chris Harrison, Okanogan, WA, student; Bill Gaebe, Coeur d'Alene, ID; Richard Gaab, Spokane, WA; Ed McNalley, Spokane, WA; Ransberry Scott, Spokane, WA; Bob Watanabe, Seiko Instructor; Jim Wahl, Spokane, WA; Ron Neibauer, Omichron, Spokane, WA; (Front row, left to right) Mike McDonald, Mead WA, student; Gary Thompson, Great Falls, MT; Stuart Hall, Helena, MT; Gary Grocholski, Billings, MT; Dan Robinson, Havre, MT; Gerald Nyette, Whitefish, MT; Thomas H. Imai, CMW instructor Spokane Community College; John Evans, Great Falls, MT, student.

ZANTECH, INC. EXPANDS FACILITIES

Zantech, Inc., has announced completion of their newly constructed offices and Digital Watch Service Center, just 10 blocks from their original location.

The new address is Zantech, Inc., 77 Shady Lane, Trenton, New Jersey 08619. Phone number (609-586-5088) and cable address (ZANTECH Trenton, NJ) have not changed.

Louis A. Zanoni, president of Zantech, has stated that their new modern facility provides space for a larger inventory of digital watch replacement parts, modules, and instruments. The new building also contains space to hold the "Digital Watch Repair Course." This portion of the building will be completed this spring.

Mary and Louis Zanoni would like to thank all of their many customers who have made this expansion possible. They expect to be better equipped to serve the ever-growing need for digital watch parts and equipment.

MATCHING THE MODULES TO THE MARKETPLACE

Standardization and rationalization are two key words for today's complicated world of watch calibres at the world's largest watch component manufacturer, Ebauches SA, an affiliate of the ASUAG group.

Andre Beyner, Assistant General Manager of Ebauches, said in a recent interview that standardization of calibres and rationalization of production facilities are vital in the drive for efficiency and profitability in the future.

"For example, in the mechanical field, five years ago we had between 50 and 100 different calibres. We have standardized this drastically to between 10 and 15 different calibres. It has evolved through 'natural selection' in terms of sizes and thicknesses required by our own brands and our clients," said Mr. Beyner.

Andre Beyner, Assistant General Manager of Ebauches SA

At the present time, "We have only a small effort underway in the mechanical watch development field. One or two new calibres are in development, but they are large programs concentrating on new dimensions and concepts."

Today's technological wizardry is not simply to improve the state of the art. In fact, the rapid advances find their way into the everyday watch in remarkably little time, according to Laurent Gremaud, ASUAG's marketing manager.

"For example, the new horizons we saw with the ultra-slim Delirium watches allowed us to improve components that can be used in all watch manufacture. The first step came with the miniaturization of batteries which were quickly used in other watch production," he said.

In addition, new production techniques had to be developed in order to create the new breakthroughs, and this production capability has helped ASUAG factories in manufacturing their existing models.

"Yesterday's stunning new features are tomorrow's commonplace ones," he said, citing the alarm, chronograph, and second time zone features.

"In marketing terms, the watch industry 'created the need' in the consumers' minds for such features as alarms. Soon they became functions the consumer comes to expect as part and parcel of the watch he buys.

NEW PLANS OUTLINE POSSIBLE ONE-DAY TOUR OF BASLE FAIR

Watch and jewelry retailers and distributors increasingly recognize just how valuable an annual visit to the Eruopean Watch, Clock and Jewellery Fair in Basle really is. One of the leading trade shows of its kind in the world, it offers trade visitors a huge variety of unique features and advantages:

- a once-a-year opportunity to collect information, compare products and prices, and shop around for new items.
- product lines presented by 1,500 exhibitors from 16 countries, all of them reputed manufacturers showing their complete manufacturing programs.
- three product areas: watches and clocks, jewelry, and related industries.
- world premieres for the novel designs starring in every spring collection prepared by the industry.
- the latest developments in quartz electronic time technology.
- eye-catching window and showcase displays—a mine of ideas for store decoration.

But, some will say, a visit to Basle presents a number of problems in terms of time, distance, and the difficulties of finding accommodations inherent in every trade fair as successful as this one. However, show authorities claim that a well-organized visitor can cover the major exhibits in a single day. Write for more information to European Watch, Clock and Jewellery Fair, CH-4021 Basle, Switzerland. Specify "one-day visit" if you would like this information. Documentation and information to help you prepare your visit to Basle will be mailed to you promptly.

RECORD 2,200 WATCHMAKERS TRAINED BY BULOVA

Quartz training and certification programs in Fall River, Massachusetts and Pittsburgh, Pennsylvania, completed the Bulova schedule for 1980. Fifty watchmakers were awarded Certified Quartz Technician diplomas. This brought the total for the year to 2,200.

Henry Frystak, a Bulova instructor, is shown in this picture with W. E. Smitherman of Elberton and W. Riegler of East Brunswick, both of New Jersey, in a recent training session that took place at the Joseph Bulova School of Watchmaking in Woodside, New York.

MARCIA DAY NAMED LONGINES-WITTNAUER'S SALESPERSON OF YEAR

The Longines-Wittnauer Watch Company's outstanding representatives were honored at its annual sales meeting held in January at the Cerromar Beach Hotel.

Marcia Day of Englewood Cliffs, New Jersey, who covers primarily department stores but also jewelry chains and select jewelry stores in New York, New Jersey, and the Long Island area, received the Outstanding Salesperson Award. Ms. Day, who is reportedly the only woman salesperson in the watch industry, also was honored by the Longines-Wittnauer Watch Company as a repeat member of the $1 Million Club.

In making the presentation at the Longines-Wittnauer banquet, John L. Davis, President, stressed, "As the jeweler's watch company and with our tradition for quality and service, we are extremely proud to present Ms. Day with the highest award attainable in her profession."

On receiving the award, Ms. Day said, "It is a great honor as both the only female salesperson in this company and in the watch industry to be selected as the Outstanding Salesperson of the Year."

Ms. Day lives in Englewood Cliffs, New Jersey with her husband, Ted Davis, vice-president of sales of the Bell Container Corporation, and her son, Jeff, 10.

NORTH AMERICAN WATCH NAMES NEW PERSONNEL DIRECTOR

Anthony P. Ruggeiro has been named personnel director of North American Watch Corporation.

Ruggiero, who is married and the father of three daughters, resides in East Meadow, New York.

North American Watch Corporation is the leading U.S. importer and distributor of fine gold watches from Switzerland. Its brands are Piaget, Corum, and Concord.

NEW JEWELRY AND SUPPLY CATALOG FROM MARSHALL-SWARTCHILD

Marshall-Swartchild Company has issued a new spring jewelry and supply catalog, No. 181, probably its finest seasonal catalog to date. It is available to new customers at $3.00 per copy, postpaid, and that charge may be credited against any order of $50.00 or more. Write Marshall-Swartchild Company, 2040 Milwaukee Ave., Chicago, IL 60647, or ask for it at M-S branches in Dallas, Houston, San Francisco, or Seattle.

"EQUAL ACCESS TO JUSTICE" IS VICTORY FOR SMALL BUSINESS

"The January, 1980 White House Conference on Small Business, to which Jewelers of America (JA) sent a representative, has begun to pay off," commented JA Chairman Michael D. Roman upon receiving news that former President Carter had signed the Equal Access to Justice Act before leaving office.

The legislation, a priority recommendation of the participants in the Conference, requires the federal government to reimburse legal fees to small businesses and individuals for costs incurred in agency proceedings or court cases if the government action was found not to be "substantially justified."

The bill, which becomes effective October 1, 1981, defines a "small business" as one with fewer than 500 employees and a net worth under $5 million. The small business owner is required to have a personal net worth under $1 million in order to be eligible for the legal expenses refund. Attorney's fees are limited to $75 per hour.

Top White House and Department of Justice officials lobbied extensively against the Equal Access bill, arguing that the "substantially justified" doctrine was too broad.

On the other hand, the bill enjoyed widespread support in Congress, from the small business community, and from the Small Business Administration (SBA).

"We believe that this significant reform legislation will act as a strong deterrent to end arbitrary regulatory and court actions against small businesses by the federal government," concludes Roman.

CARPENTER PROMOTED BY BULOVA

David Richardson, national sales manager for Bulova, has announced the appointment of 36-year old Jack Carpenter to Regional Manager in Cleveland, Ohio.

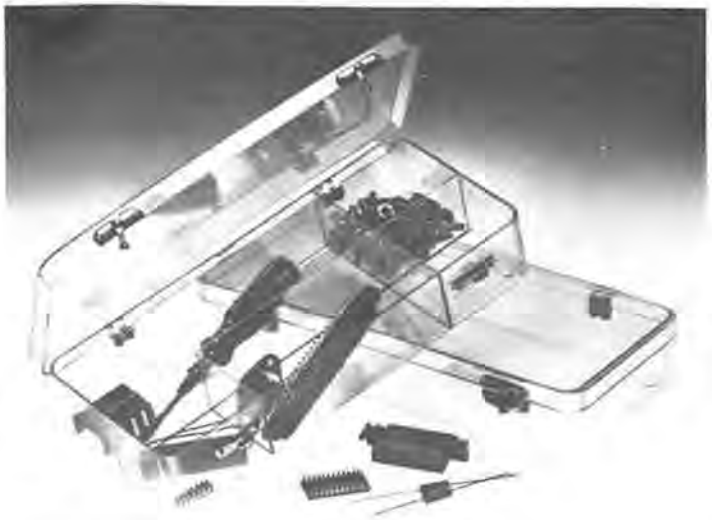
Carpenter joined Bulova and rose to Eastern Regional Sales Manager of the Presentation Division. Before his latest promotion, he was sales representative for Bulova in Milwaukee.

NOT JUST A PRETTY FACE

This Swiss-made Longines watch is a prize-winning example of how the quartz revolution has influenced the fashion world.

Less than three millimeters thick—about the same as a match—and featuring 28 diamonds set in a gold case, it shows how fashion conscious watch designers can turn accurate timepieces into fine jewelry.

This is the watch which recently won the Bijorhca d'argent in Paris—the jewelry industry's "Oscar." For further information, contact ASUAG, The General Corporation of Swiss Horological Industries Ltd., Faubourg du Lac 6 CH-2501, Bienne, Switzerland.



NEW CLEAR NYLON BOX GUARANTEED FOR FIVE YEARS

Strong enough for a 200-lb. man to jump on and unaffected by hundreds of harsh chemicals, the new "LifeLong" clear nylon utility boxes from Lite-Tuff® are guaranteed for five years. Manufactured by DeWitt Plastics Division of RPM Industries of Auburn, New York, the new boxes are injection-molded from Trogamid T® nylon, and are available in a variety of sizes and compartment layouts. Trogamid T is a registered trademark of Dynamit Nobel AK. For further information, contact: Raymond J. Paleczny, DeWitt Plastics Division, RPM Industries, Inc., 26 Aurelius Avenue, Auburn, New York 13021. Phone (315) 255-1105.

HOROLOVAR HAS TWO OUT-OF-PRODUCTION PARTS FOR THE 400-DAY

The Horolovar Company has available for immediate delivery the solid anchors and first wheels used in Schatz Standard 400-Day Clocks, which have been out-of-production and unavailable for several years. The same two parts are also used in Standard movements made by the Wurthner, Herr, Reiner, and Neueck factories whose clocks were imported into the United States by the hundreds of thousands in the 1950's.

Send to The Horolovar Company, Box 400T, Bronxville, NY 10708 for leaflet giving details and prices of the parts. The leaflet also lists the numbers of the 80 back plate illustrations in "The Horolovar 400-Day Clock Repair Guide" that identify the movements into which the parts will fit perfectly.

For more information, contact the Horolovar Company, Box 400, Bronxville, NY 10708.

NEW WAX PEN FROM SWEST

A new electric wax pen, described as the most sensibly designed, efficient and trouble-free wax pen ever, is now available from Swest, Inc.

"One of the most useful tools ever designed for wax working is the electric wax pen," said Earl R. Weaver, President of Swest. "There have been several models offered for many years," he continued, "but problems in performance and/or availability invariably arose."

Now, after years of research and development, the Swest Electric Wax Pen has been created, featuring a wax release valve and trigger design that is superior to any offered in the past in terms of durable construction and simplicity of operation; the finely machined tip and precisely heated handle provide excellent wax flow; the cork-insulated handle allows cool and comfortable handling; and the control unit holds the temperature precisely for consistent results.

With this unit, the operator is able to build the most complicated wax patterns through the "added wax" technique. It adds a new dimension to a wax designer's creative abilities.

For a FREE brochure showing price and description, request from Swest, Inc., 10803 Composite Drive, Dallas TX 75220 or 1725 Victory Boulevard, Glendale, CA 91201.

BULOVA GEMINI® MAKES ITS DEBUT

A novel group of six ladies' quartz watches, incorporating the latest LCD technology, is now being introduced by Bulova. Instead of a digital readout, LCD "hands" tell time the analog

way. The liquid crystals are enclosed between two layers of hardened glass. These crystals are "excited" by an electric current and form the configuration of regular hands. There are no moving parts whatever in the quartz movement.

Models with square dial openings have an additional feature. In each quadrant of the dial, a dot pulsates for 1/4 of a minute, in turn, to indicate the passage of the seconds.

Setting is done electronically by simply pulling out the crown.

Jineane Ford, the 1980 Miss U.S.A., is shown holding one of the Gemini models. Prices range from $140.00 to $185.00 suggested retail.

ZAM™ BUFFING COMPOUND: NEW LABEL AND NEW MARKET

A bright new label means an end to anonymity for Zam™ buffing compound. Ever since it was first introduced, Zam has been packaged in a plain, unlabeled tube. Its austere package notwithstanding, it has become a great favorite among professional jewelry makers. The new label marks Zam's move into the growing market created by the increasing number of hobbyists working in jewelry crafting, and the new package is designed to make selection of a buffing compound more convenient for these new jewelry makers.

A product of GFC of 750 Washington Ave., Carlstadt, NJ 07072, Zam is a green compound which has proved effective in buffing jewelry of silver and turquoise. Since Zam will not scratch soft stones such as turquoise, craftsmen do not have to remove stones before buffing a new piece, saving a great deal of time and avoiding possible damage to stones. The compound produces a high lustre without leaving residue, is easy to remove after polishing, and does not cling to or penetrate the surface of the stone. Many goldsmiths prefer Zam to rouge as a final polish, and metalcrafters working in chrome plate and various steels have found that Zam delivers a mirror-bright finish on those metals as well.

Zam buffing compound is available in two sizes—1/4 lb. and 1 lb. Both are packaged in a convenient-to-use, tear-away tube. It is currently available at jewelers' supply houses. The GFC line of products for the jewelry field also includes Pro-Craft dust collectors and polishers, Batterns self-pickling flux, Fabulustre buffing compound, and an economical precious metals test kit.

"MORE PROFITS THROUGH ADVERTISING"

This new book, "More Profits Through Advertising" by Harvey Cook, is directed specifically at the small business and could be an excellent introduction for a newcomer to advertising in a retail store or consumer-service firm. Except for printed brochures, catalogs, etc., it touches upon everything—the purpose of advertising, media, direct mail, lists, magazines, newspapers, radio/TV, directories, outdoor and transit, ad agencies, setting a budget, etc. 133 pages, 6" x 9", and in paperback, it sells for $4.95. It is available from Drake Publishers, Inc., 801 Second Avenue, New York NY 10017.

JACOBY-BENDER INTRODUCES NEW HIS & HERS TWO-TONE IDENTS

Jacoby-Bender has announced the expansion of the exclusive "Right Connection" line of men's and women's engraveable identification bracelets with the creation of eight new "his and hers" matching styles. All have satin finished rhodium plate plaques with a layer of 22K yellow gold electrolytically deposited into the deeply engraved design on the plaque. Intricately detailed, the yellow gold patterns contrast with the satin finish of the plaque to offer that dramatic "two-tone" look.

All "Right Connection" idents feature J-B's patented moveable plaque arm for secure, comfortable wear. The hidden closure on the side of the plaque is completely undetectable for a continuous bracelet look. With ample plaque space for engraving names or initials, these idents make a most practical, personal gift with retail prices of $22.95 to $26.95.

For further information, contact Jacoby-Bender, Inc., 62-10 Northern Boulevard, Woodside, New York 11377.

ASSAY CERTIFICATE WITH JOHNSON MATTHEY GOLD BAR WATCH

Johnson Matthey Jewelry, Inc., has introduced a unique gold watch: the face is a numbered fine gold bar. An accompanying assay certificate attests to the purity (99.99%) of each gold bar. Ten gram and five gram versions are offered. An elegant 14K gold case frames the gold bar face and the quartz movement.

Johnson Matthey Jewelry, Inc., is headquartered at 11401 16th Court N., St. Petersburg, Florida 33742 (Phone: 1-800-237-8562). It is part of the Johnson Matthey group, which has been engaged in the refining, assaying and marketing of gold for over 150 years. Currently, Johnson Matthey is one of the five largest bullion dealers in the world which establish the twice-daily London gold price.

"A HELPING HAND" FROM GIA

Gemological Institute of America commemorates its fifty years of service to the jewelry industry with the publication of "Helping Hand" booklets, made available for store owners to give their employees. There is no charge for the booklets. The Institute will send as many copies as needed to each store, but the request must be made on your store's letterhead.

This unique twenty-four page booklet explains the language and customs of the jewelry business, as well as the operations of the industry.

Please send your request on your letterhead for as many copies of "Helping Hand" as you need for your staff. Write to: GIA, P.O. Box 2110, Santa Monica, CA 90406.

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

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.

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.

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.

CLOCK SERVICES wheels, gears, barrels, retoothing, repivoting, mainspring winding, bushing, jeweling. Send sample for estimate. Roy H. Niegel CMC, 21837 Woodbury, Cupertino, CA 95014. Phone (408) 253-4927.

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.

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.

CLOCK WHEEL AND PINION CUTTING Fast Service—Write for free brochure and price list. Fendleys, 2535 Himes St., Irving, TX 75060.

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.

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

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.

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

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.

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

Situations Wanted

WATCHMAKER, CMW, CMC. Certified Accutron Technician. Seeks position: North East Coast. For information contact: Ron Yost, 2417 Woodside Lane, Apt. 8, Colorado Springs, CO 80906.

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: Experienced watchmaker/jeweler/sales/combination man. 40-hour week. Salary open. Many, many benefits. Beautiful family-owned Guild-type store, employing 10 people. In beautiful Ohio. Reply to *Horological Times*, Dept. HW-302, P.O. Box 11011, Cincinnati, OH 45211.

Wanted To Buy

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. Phone: (414) 351-0933.

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.

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.

For Sale

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, California 93010.

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.

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.

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.

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.

Portescap VC-10 in excellent condition for sale. These are fine machines for production work. Steven Thornburgh, 911 8th Ave. So., Nampa, ID 83651. 208 467-2863.

FOR SALE: Jewelry store in N.E. Texas town of 15,000 population. Annual sales gross $125,000. Thriving repair shop. Eighteen months left on lease at prime location. Selling due to personal reasons. 214-885-2355.

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.

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Payment enclosed for: 1 yr. regular membership $30.00
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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

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Dates to Remember

MARCH

1-3—MJ&SA Expo/East; Sheraton Centre, New York, NY

7-12—AWI Solid State Residence Course; Los Angeles, CA

14—Hawaii Jewelers Association meeting and banquet; Hawaiian Regent Hotel, Honolulu, HI

15-18—Minneapolis Gift & Jewelry Show; New Hyatt Regency, Minneapolis, MN

21-22—Michigan Jewelers Association Annual Convention and Show; Hyatt Regency, Dearborn, MI

21-22—Missouri Jewelers & Watchmakers Association Annual Convention; Howard Johnson's, Springfield, MO

22-25—MJ&SA Expo/Providence; Providence Civic Center, Providence, RI

22-26—Annual Exhibition of Fine Jewellery & Sterling Silver; Goldsmiths Hall, London, England

24-29—Watch Material & Jewelry Distributors of America Inc. Annual Convention; The LaCosta, Carlsbad, CA

27-29—Antique & International Jewelry Bazaar; National Guard Armory, St. Petersburg, FL

27-29—Texas Jewelers Association Convention; Adams-Mark Hotel, Houston, TX

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

Advertisers' Index

The best way to keep up with what's happening is through the company that's making it happen.

Everything you need–technical information, special equipment, parts and materials– is available to you.

1. The Seiko Technical Library: Six volumes containing everything about repairing watches. For mechanical watches, it's all-inclusive, and designed to put all the facts at your fingertips. In a time-saving, easy-to-use format. Includes a Technical Guide to all basic Seiko movements, a Watch Parts Catalog, a Parts Interchangeability List and a Casing Parts List. For quartz information, there is a sampling of Analog and Digital Quartz Technical Guides as well as the current quartz casing catalog.

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