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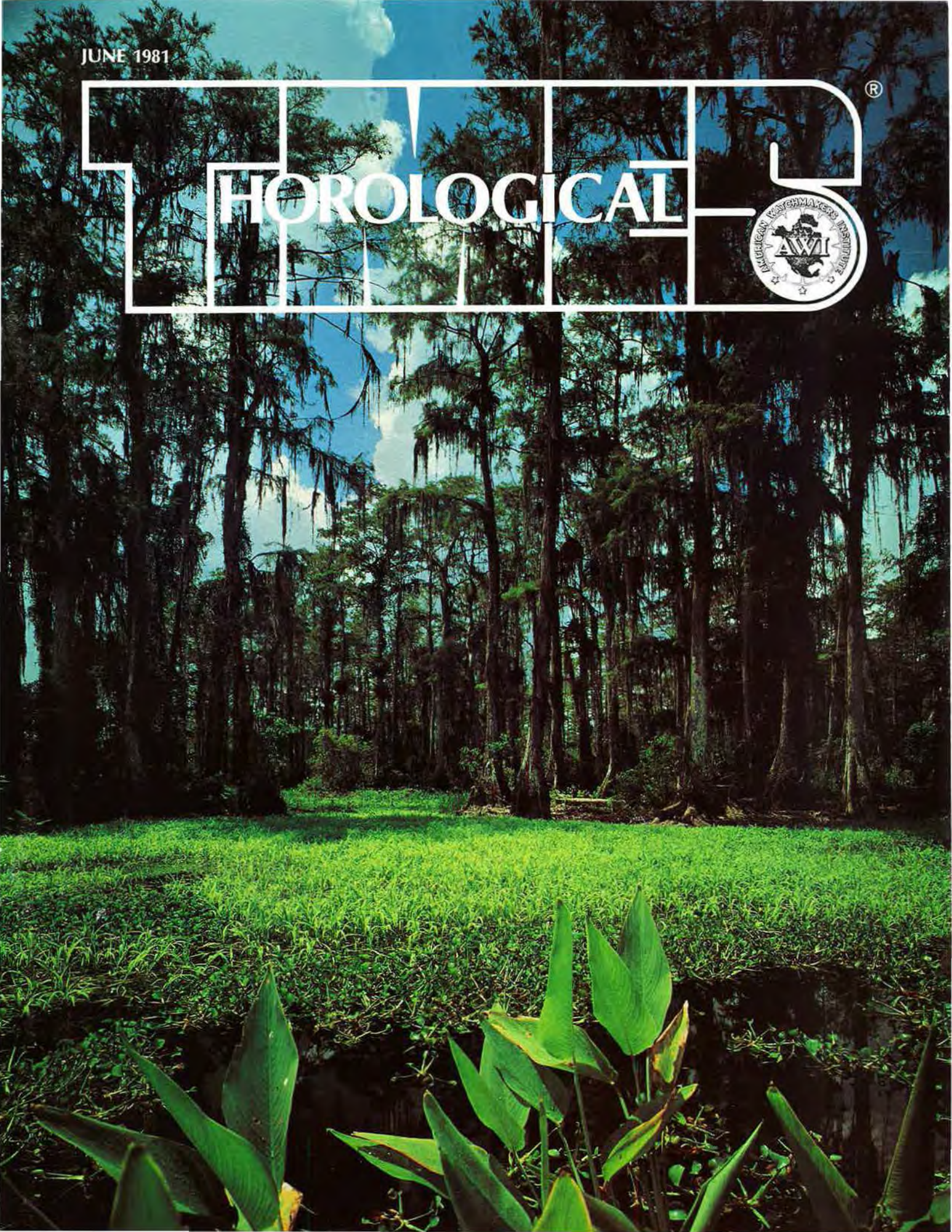

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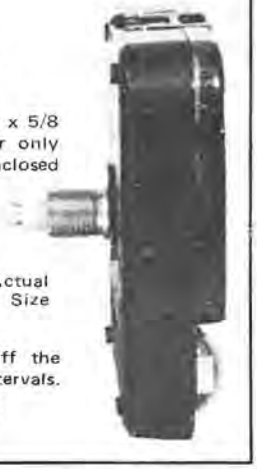
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VOLUME 5, NUMBER 6 JUNE 1981

HOROLOGICAL TIMES

Official Publication of the American Watchmakers Institute

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

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Editorial

To quote the Scottish poet Robert Burns, "The best laid schemes o' mice an' men gang aft a-gley," or, as more commonly stated, "oft go awry." These immortal words may now be haunting some AWI members as they face the seemingly imminent decrease in future Social Security benefits—an event which will drastically affect the many persons nearing retirement in this country.

But have the plans laid out by the skilled watchmaker really placed him in such an unfavorable position? Among those nearing retirement, unskilled and semi-skilled laborers will find themselves continuing to work full time for a period beyond their plans. The "best laid schemes" of the watchmaker, however, put him into a different category. Whether or not you, as the aspiring young apprentice of years ago, foresaw the advantageous position you may be placed in presently is not important now. What is important is that you realize that you can now adjust your own schedule and work load, supplementing whatever Social Security benefits you receive in order to fulfill your personal desires and necessities.

On the Front

The FLORIDA EVERGLADES are featured on our June cover. This picturesque tract of marshland covers a large portion of the southern tip of the state. It is characterized by numerous shallow lakes and streams, dotted with islets of dense vegetation.

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President's Message / Joe Crooks

HOW TIME FLIES!

It is hard to believe that a year has gone by since I began serving as President of the AWI! For making the job easier, my thanks go out to the AWI Directors, instructors, and committee members, as well as to the members of AWI. Thanks also to Hal Herman and the staff of the *Horological Times*, and especially to Milt Stevens, Mike Danner, and the women behind the scenes who get out the work at AWI Central.

By now, the ballots will be in for the new Directors of AWI, to be installed at the Board of Directors meeting on June 28th in Cincinnati. With such a selection of talented individuals, it's a shame all these fine, dedicated people cannot be elected. To the ones who do not make it this time, please try again; your AWI needs your input.

Joe Crooks

This past year has been very gratifying. I have met and made many friends throughout the good old USA. The hospitality has been terrific! I will never forget you wonderful people in our profession.

With your help, our membership has grown to an all-time high. Keep up the good work; talk a friend into joining AWI. You will be doing him a great favor, and we all will benefit from associating with another horologist interested in furthering our profession. HTJES

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Our Readers Write

Publishing Critique

Today's mail brought the most recent issue of the *Horological Times*. I've long admired the colorful, often spectacular, covers of the magazine. Now I think it's time to say something more . . .

I don't read each issue, but I do scan–all the way through. From this I can make a clear-cut determination of expertise in evidence of excellence of both content and presentation. You are doing an outstanding job of publishing. While I lack actual professional horological experience, I think I may qualify at the level of writing-editing-publishing as having some direct knowledge. I wanted to say so.

Herb Mitchell
H. L. Mitchell & Associates
Pasadena, California

HATS OFF TO MR. RICHMOND

My hat is off to Mr. Marshall F. Richmond! I am one of those watchmakers who has never had any training in jewelry repair and soldering. I became so interested in his articles on jewelry repair that I have cut them all out and placed them in a binder for back reference when necessary.

On the strength of his articles alone, I have purchased all the necessary equipment for jewelry soldering and am successfully at it, thanks to his very thorough and detailed explanations of the art.

I would like him to know that I am very appreciative of his articles.

Ted Gielniak
La Feria, Texas

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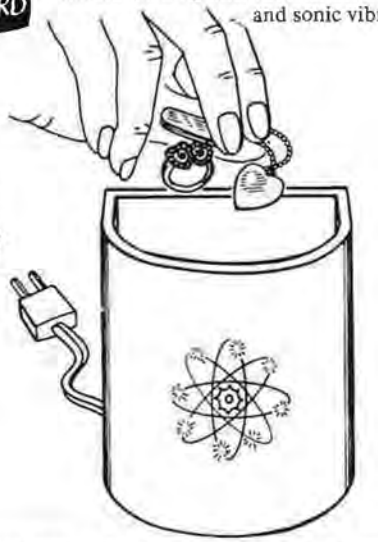

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WATCH ADJUSTMENTS

By Joseph Rugole, CMW

Adjustments of Mean Time

We have discussed the formula for time of one vibration on a number of occasions. It is necessary to have one last look at this before we conclude the discussion on watch adjustments. This time, however, we will look at it somewhat differently, trying to determine under what conditions the time of one vibration will change, so that we can devise some means to change it at will.

This formula may suffice for our discussion and will not be expanded:

$$T = \pi \sqrt{mk^2/s}$$

The components are as follows:

T = time of one vibration
π = constant (ratio of the diameter to the circumference of the circle)
m = the mass of the balance wheel
k = the radius of gyration of the balance wheel
s = the elastic force of the hairspring

At this time, we want to find out how the time of one vibration can be changed without disturbing other adjustments, such as temperature compensation, middle temperature error, isochronism, and adjustments to position. One look at the formula will disclose that only one of the components, i.e., π, can never be changed. It should be noted that the change does not have to be automatic as was the case with temperature compensation. The only condition is that it leaves other adjustments as unaffected as possible.

The change of the mass can be accomplished in a number of different ways. Adding the mass to the balance wheel will always slow down the rate and vice versa. The most frequently used methods to add weight are: a) to place timing washers under the opposite screws; b) to replace a pair of opposite screws by a heavier pair.

To remove weight or mass from the balance wheel, we use the following techniques:

a) undercutting the screws by the use of a lathe and graver
b) undercutting the screws by using the balance screw undercutters or end mills
c) drilling the top of the screw
d) enlarging the screw slots
e) filing the opposite screws
f) replacing a pair of opposite screws by a lighter pair

These are all legitimate ways of increasing or reducing the mass. The least desirable of all is the filing of screws, followed by drilling the tops and enlarging the screw-slots. On fine-quality watches, these three methods are to be avoided because they deface the balance wheel to a certain extent, especially if the work is sloppy. The most desirable method is to undercut the screws as shown in Figure 1. There is a further limitation when dealing with a split bimetallic balance. To maintain the adjustment to temperature, all the alterations of the mass must be done between the arm of the balance and half-way to the cut in the rim.

Monometallic screwless balances present another problem. Because there are no screws, there is no possible acceptable way to add mass to the balance wheel. The mass can only be removed by drilling the underside of the balance rim. This is one of the major disadvantages of screwless balance wheels. If the watch is too fast and the adjustment cannot be made by the regulator, the only solution is to replace the balance completely.

Adjusting a watch to mean time by manipulating the mass is a standard procedure for all watches with screw-type balance wheels, but it is used only to bring the mean rate close enough to switch to a finer adjustment, either by using a regulator or by using the mean time screws. In certain timekeepers, the regulator is omitted entirely and the adjustments are made by other means. Many marine chronometers were made without regulators; on them, the final adjustments are made by mean time screws. Experiments were also made with ordinary 10½ ligne watches to adjust them without the regulator. When the regulation was completed, the watch kept time as well as with the regulator until it needed servicing again.

The second variable in the formula is the radius of gyration. The basic concept of the radius of gyration was explained earlier in this series of articles and need not be defined again. The earliest use of the radius of gyration for purposes of regulation to mean time was the introduction of the mean time screws. Good-quality watches with screw-type balances normally have one or two pairs. They can be identified in Figure 2 as having smaller heads and longer threads, and as being screwed in only part of the way. This allows the watchmaker to change the radius of gyration as needed without changing the mass of the wheel. The opposite pairs of screws are turned either in or out for an equal number of turns, half turns, or quarter turns. The change in the radius of gyration is sufficient to change the mean rate by several minutes in the extreme, but usually only differences smaller

Figure 1

Figure 2

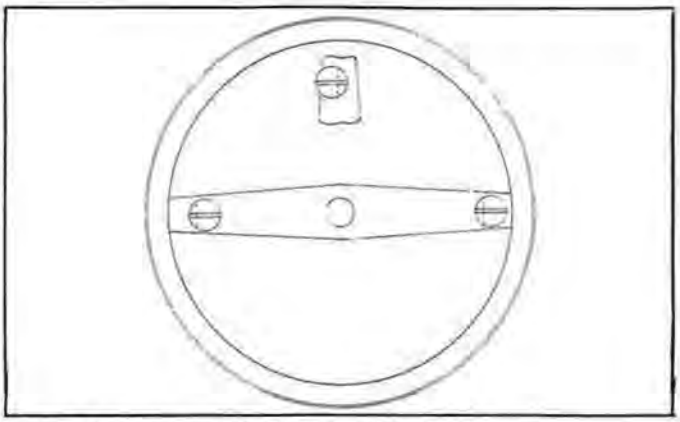


Figure 3. Eccentric weights placed on the balance arm

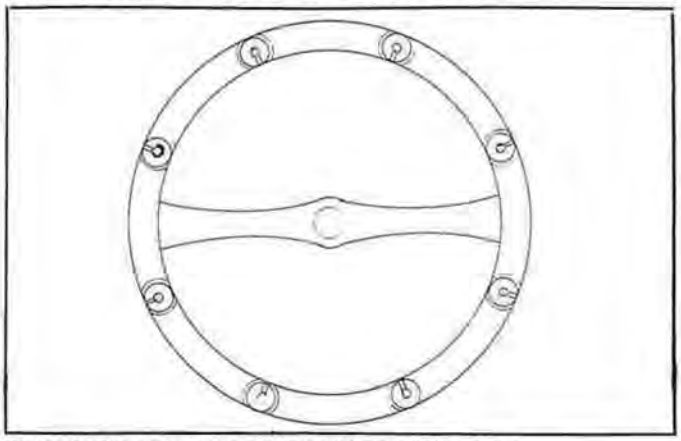


Figure 4. Gyromax balance wheel with movable collets

than one minute are adjusted by mean time screws. These screws must never be mutilated by filing, drilling, or undercutting. They must also be used in pairs, so that the poise of the balance wheel is not altered.

Other methods for regulating the mean rate of the balance wheel by changing the radius of gyration were used by Mauthe Clock Company with the introduction of the floating balance wheel. The regulator on this type of balance wheel is part of the wheel itself. The wheel has a pair of sliding weights mounted near the rim and connected to the regulator arm in such a way that when the regulator is moved, the weights slide either closer to the center of rotation or further away from it, creating a difference in the radius of gyration of the balance. This method was also used by Elgin on one of their wrist watch models with limited success. The problem is to keep the balance wheel in poise. Even the slightest variation in the positioning of the weights could produce serious positional errors, mainly because the weights are rather heavy. In the case of the floating balance used in mantel clocks, this problem does not exist because the clock runs only in one position.

Another suggestion is found in Jandritzki's book on watch adjustments. See Figure 3. Two eccentric weights are attached to the balance arm of a screwless balance wheel in the same manner as on chronograph watches. The difference is only the shape of the head which, in order to allow room for the hairspring, must be very flat. The only problem with this arrangement is keeping the balance wheel in poise. This problem can be somewhat relieved by using the techniques for dynamic poising to check and control the poise of the balance wheel.

The Gyromax balance wheel developed by the Patek Philippe Watch Company under patent No. 261431 is a fine example of utilization of the radius of gyration to regulate the watch to mean time. Figure 4 explains the principle used very clearly. The solid monometallic balance wheel rim is milled out in several places on opposite sides, but a pin is left in the center of the milled-out portion. A small collet is fitted friction tight on each pin, but each collet is slotted like a regular hairspring collet. When the slots are turned outward so that they are on a radial line with the center of the balance, the balance wheel has the smallest radius of gyration, and the watch gains. When the slots are turned inward, the radius of gyration is the largest and the rate the slowest. Any intermediate position is available for regulation as long as any two opposite collets are turned for the same amount. The collets are almost completely hidden in the rim of the balance wheel so that the air friction on the balance wheel is minimal. To illustrate the success of this arrangement, it is sufficient to point out that this type of balance wheel was used in some of the finest Patek Philippe watches produced by the company.

The third and the last variable used in the formula is the elastic force of the hairspring. The methods used to utilize it in adjustments to mean time will be explained in next month's article.

Book Review / Henry B. Fried

QUESTIONS AND ANSWERS of and for the Clockmaking Profession *by Joseph G. Baier, Ph.D., CMW; James L Tigner, CMC; Marvin E. Whitney, CMW, CMC, and others. Published by The American Watchmakers Institue. 11 x 8½ inches, soft covers, 224 pages, 140 illustrations. Published 1981 at $10.95.*

This publication is in the form of a textbook for those studying clock repair and restoration. The American Watchmakers Institute, publisher of this book, has commissioned three of its leading teacher/experts to create this volume, which also includes key sections by other member writers and specialists.

This publication is a fine text which will assist both the student and the practicing clockmaker. The format of this book presents two main sections: the first part contains 92 pages and 466 questions and answers, and the second section contains detailed, illustrated instruction on the various phases of clockmaking and repair. In all, there are twelve chapter-like categories. Among these are: the 400-day clock; carriage clocks; cuckoo clocks; wooden movement clocks; the pendulum; various escapements; train gearing; power sources; strike trains; cleaning the lubrication; electrical clocks; electricity; and theory and mathematics concerned with clockmaking and repair.

Some sample questions answered in detail in the first section are: How is the pendulum adjusted in a Kundo transistorized clock? How is the indexing mechanism adjusted in a Kundo clock? How is the 400-day clock put in beat? What does "center of oscillation" mean? How is a wood movement assembled? What may cause a clock to over strike—that is, strike one or more hours in addition to what is indicated by the hands or snail? And there are many, many more.

In the second section, devoted to the "how-to" of clock repair and restoration, understanding the adjustments to the escapements, heat treatment of metals, adjustments to the striking mechanisms, and a 9-page section of clock definitions, are among the chapter headings. This part of the book is profusely illustrated with 140 excellent photographs and professional drawings.

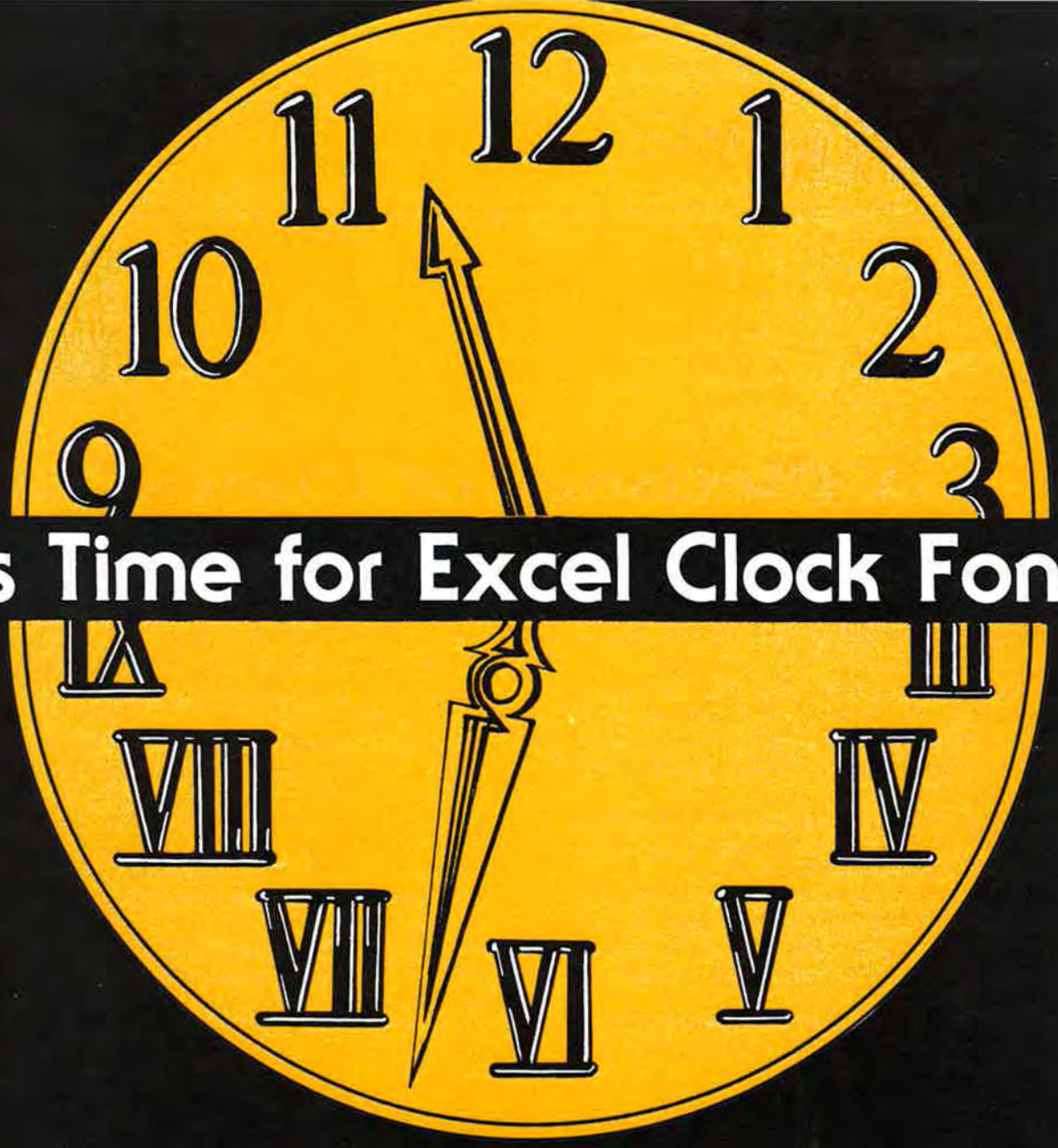
There are detailed drawings of the Connecticut shelf striking movement, chime clock movements, 9-tube triple chime movements, striking arrangement and adjustment, cuckoo striking, and wood-works movements and their striking arrangements.

A section on general repairs, escapements, and heat-treatment of metals presents a detailed analysis of each topic. Also covered are barrel teeth repairs, pivoting and pivot restoration, bushing and hole closing, and remounting of wheels upon arbors as well as securing loose wheels. Repairs and capping of the center arbor, clickwork and clicks, and dovetailing of wheel teeth also make up parts of this section.

Escapements included in the instruction are the Brocot, recoil, dead-beat, and gravity escapements, the Keebler-Lux drum-type, and the floating balance with helical, dual directional hairsprings; all very well illustrated in fine detail. Most of this section was contributed by the main authors and other experts on the AWI technical committee staff.

The final section of this book contains various tables of clock-key sizes and millimeter equivalents, heat treatment tables, pendulum lengths and vibration rates, drill and tap sizes and tables, as well as other conversion tables needed in various phases of clockwork. Taps and drills, hints and helps, as well as trade terms defined are included in this last section, along with a page of drawings on the dimensions of various lathe chucks (collets).

This book is unique and effective in its format, contents, and presentation. The authors and editors have done their homework on this three-year effort. It is authoritative and can be highly recommended as one of the best books on clockmaking, equally useful to the professional clockmaker or the novice.



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By Otto Benesh, CMC

A Plethora of Pliers

The most difficult part of preparing this article was coming up with a title. After consulting a crystal ball, Egyptian sand divinations, and pundits from far and near, a six-year-old named Plethora Palmer came up with this suggestion.

Last month, we discussed what could be done to make measuring devices by modifying tools that are readily available. Now that we have a whole set of tools for measuring, let us turn our attention to tools for holding, pushing, pulling, and straightening.

All of these tools are modifications of implements readily obtainable from watch and clock supply houses, hardware stores, and stores stocking automotive tools.

The first tool to be described is shown in Figure 1. It is a pair of pliers commonly called ignition pliers. The jaws are offset, adjustable for width, and are about 5 inches in length. The offset feature allows you to exert considerable pressure.

The first modification makes the pliers suitable for removing and replacing taper pins. This is done by first filing or grinding away the corrugations on the inside of the jaws until they are smooth. Then a notch is filed or sawed on one jaw as shown in Figure 2. Another pair is prepared in the same manner, except that the other jaw is notched as shown in Figure 3. While one pair may be used for both removing and replacing the taper pins, it can be a little awkward holding them because of the offset of the jaws. This second pair eliminates the problem.

The jaws also may be modified by first smoothing out the corrugations and then filing a groove at right angles to the jaw as shown in Figure 4. This pair is excellent for holding round objects, such as arbors, when checking the tightness of wheels, tightening screwed-in pillars, or performing other tasks that require holding while applying considerable pressure.

Another modification is shown in Figure 5. This pair has had brass inserts soldered on, which reduces scratching and marring to a minimum. These pliers provide a lot of pressure and may be used for bending, as a hand press, and for adjusting polished pieces that may be marred by other means.

Figure 1

Figure 2

Figure 3

Figure 4

Figure 5

Figure 6

Figure 7

Figure 8

Figure 9

Figure 10

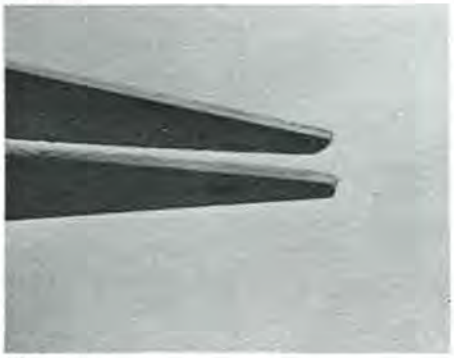

Figure 11

Figure 12

Figure 13

Figure 14

Figure 15

The inserts are easily replaced when they are worn from use.

An old pair of pliers is shown in Figure 6. These have a patent date in the late 1800's, and are different, in that when you squeeze the handles, the jaws open up. They work just the opposite from regular pliers. As they are no longer available, a replacement was sought, and the pair shown in Figure 7 was located. They are known as valve keeper pliers, and you can see that, by squeezing the handles together, the jaws open up. The modification performed was drilling and tapping one jaw so that machine screws of different lengths could be inserted as shown in Figure 8.

Figure 9 shows one of the uses of this pair of pliers. When a wheel in a clock has to be moved one or more teeth, the pliers give you great control in spreading the plates just enough to move the wheel without disturbing all the others. Undoubtedly, one of our sharp-eyed readers will notice that the illustration shows the plates pinned together, making the spreading a bit difficult if not impossible. This is photographic license (a mistake).

Actually, when wooden works are assembled, two rubber bands are used to hold the plates together while assembling: one at the top and one at the bottom. This does make separating the plates a bit easier.

Another modified pair of pliers is shown in Figure 10. This is a pair of smooth-jaw, flat nose pliers. The ends have been altered as shown in Figure 11. The upper jaw is a little shorter than the bottom and has been rounded and polished. They are used to straighten escape wheel teeth that have been bent as shown in Figure 12. The pliers are used by engaging the flat jaw with the flat portion of the escape wheel tooth and pulling the pliers away from the wheel while applying pressure to the pliers at the same time. This allows the rounded portion to follow the curve of the tooth and results in a nicely straightened tooth.

For smaller and more delicate escape wheel teeth, the same idea is used. However, instead of a pair of pliers, a pivot straightening tweezer is used as shown in Figure 13.

Figure 16

Figure 17

Figure 18

Figure 19

Figure 20

Figures 14 and 15 show a pair of pliers adapted for handling small taper pins. These are ordinary, flat-nose pliers, and a notch has been filed in the end of one jaw for removing or replacing a pin as shown in Figure 14. A small notch has also been filed in order to allow for a change in the angle of application. The three grooves on the top of the jaw are for locating the notch. They can be seen more readily than the notch and also may be used to locate the position of the notch by touch.

An additional change is shown in Figure 15. A small groove has been filed across the jaws, in addition to one that goes lengthwise. These are used to hold taper pins while being started in their holes. As you know, taper pins have a nasty habit of twisting and flipping. These grooves help prevent such nastiness. This plan also was applied to a pair of medium heavy tweezers as shown in Figure 16.

Many times, the angle of approach possible with a pair of pliers is not the most advantageous. You must either use them horizontally or vertically, and this can be awkward. Figure 17 shows that by filing or grinding off a corner of the pliers, a much more comfortable position can be achieved.

Figure 18 shows a pair of right-angles needle nose pliers that have had the ends shortened. (Sort of a nose job.) Shortening gives them a lot more strength at the ends. They are used, among other things, for the removal of mainsprings as was explained in a previous article. Also, they are useful for bending the upper portion of the inner hole end of a mainspring, either in the barrel or out of it.

A complement to the above pair is shown in Figure 19. Short concave and convex pieces are hard soldered on the tips of the needle-nose pliers. They are specifically designed to reach down and grab the lower portion of the mainspring for straightening after the spring has been wound in the barrel. This assures that the spring end is parallel with the arbor. This is shown in Figure 20.

P. Palmer wishes you happy horologing and good fortune with all these pliers. THEF

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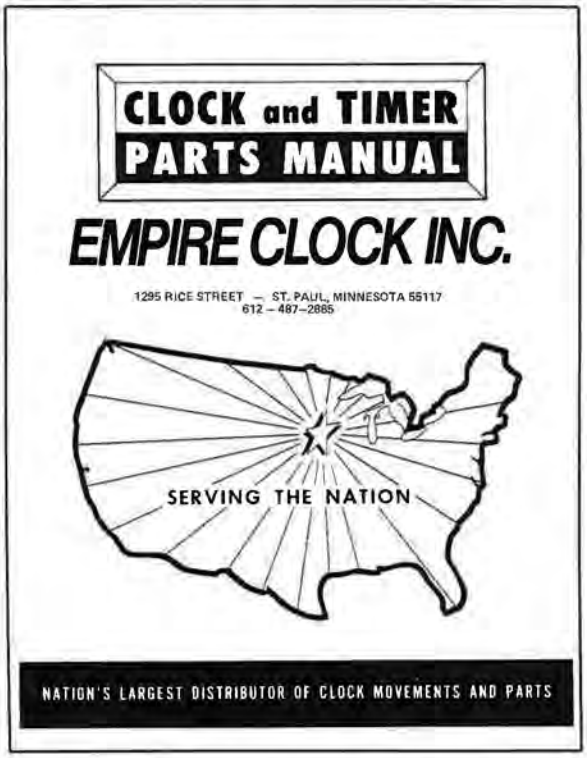

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THE SHIP'S CHRONOMETER © 1981

By Marvin E. Whitney, CMC, CMW

American Chronometer Makers

Part VIII

Before continuing with the exploits of American chronometer makers, it may be well to digress and pursue the use of palladium for chronometer hairsprings, since this practice became quite controversial during the latter part of the 19th and the beginning of the 20th century.

Heinrich was the first American maker to fit a chronometer with a palladium hairspring which is readily understandable since he was a perceptive student of chronometry. Other makers were of the opinion that it had some potential, but as is so often the case when something new makes its appearance which involves a change, whether good or bad, there was a certain amount of resistance shown. Thus, many of the makers were willing to wait for others to pioneer the cause.

Although the Navy was looking for a material that would not be susceptible to oxidation and was nonmagnetic, they, too, were very reluctant to purchase instruments fitted with palladium hairsprings. This was true even when they were aware of the glowing reports that were emerging from the Royal Observatory at Greenwich regarding the excellent performance of those instruments with palladium springs.

Heinrich's first chronometer to be fitted with a palladium spring was number 3458. He believed that it was the answer to many of the problems that horologists had experienced down through the years. John Bliss, Jr. was won over by Heinrich, and he, too, saw the positive advantages of using this phenomenal material. However, Negus was very adamant in proclaiming its unworthiness, as were Bond, Geissler, and the American Waltham Watch Company. The American Walthem Watch Company was not involved in making chronometers, but it was one of several watch companies supplying the Navy with torpedo boat watches which were fitted with steel hairsprings.

On January 24, 1903, Negus wrote the Naval Observatory protesting the use of palladium in chronometers being submitted to the Observatory for competitive trials and purchase by the Navy. This caused great consternation among the Observatory's hierarchy. Upon receipt of Negus's letter, the Observatory wrote the other makers requesting their opinions as to the merits of palladium, for they had been "advised of the suspected use in some cases of palladium instead of steel for hairsprings submitted for trial and purchase by the Navy."

The letter also stated that the Observatory was opposed to the use of any new metal or new method of construction of chronometers submitted for trial and purchase for the use on naval vessels, unless "such metal or methods had either been approved or were expressly under trial as such."

In this connection, the Superintendent stated, " . . . I beg to ask if you know of any chronometers that you have manufactured or repaired for this Observatory and that are still in use which have auxiliary compensation, correctors, or aids to compensation, or flat rim balances."

John Bliss, Jr. strongly defended the use of palladium, citing the results of its performance in chronometers during trials at Greenwich. Bliss, unbeknown to the Observatory, had submitted chronometers with palladium springs which had passed with very excellent results and were purchased. Also, some of the chronometers purchased by the Navy during the Spanish-American War, without trial, had palladium hairsprings. Bliss did nothing dishonorable or fraudulent, for there was nothing in the Navy's specifications forbidding its use. It is evident that Negus got wind of Bliss's success, and, since his instruments were fitted with steel springs, he protested its use. The ironic part about Negus's "tempest in the teapot" was that he, too, had submitted chronometers fitted with palladium springs to the Observatory for trial. They also passed trial and were purchased by the Navy, with the Observatory being none the wiser.

William Bond and Son, C. A. Geissler, and the American Waltham Watch Company agreed with Negus, their reasoning being that palladium was untrustworthy for this purpose. However, all agreed that palladium had certain advantages, such as being rust free, having a much smaller coefficient of expansion, and, best of all, being non-magnetic.

After reviewing the opinions of the various makers, the Observatory, in a letter to the Bureau dated March 11, 1903, wrote, " . . . In view of these facts, it is recommended that makers be notified at once by the Observatory as follows for their guidance in preparing chronometers for the next trial.

"Chronometers with palladium hairsprings will not be admitted to the regular annual chronometer trial until further test of those now under trial and in use shall have shown that palladium is as reliable as steel in actual service."

On March 13th, the Observatory notified all makers that the Bureau had approved the Observatory's recommendations.

This whole controversy arose over the anticipated order of seventy-eight new chronometers which the Navy had notified the makers that they wished to purchase. The Navy had received commitments of twenty-seven instruments from Bliss, ten fron Bond, nine from Geissler, and thirty-two from Negus.

Before receiving the Observatory's letter of the 13th, Negus had written

the Observatory, stating that he wished to withdraw all of his new chronometers from the present trial. He stated, "I do not wish to have them subjected to comparison with chronometers fitted with palladium hairsprings while mine have steel."

The Observatory wrote Negus, saying, " . . . pending consideration of this question which cannot be regarded as an absolute right inasmuch as the chronometers were submitted in accordance with previous agreement for trial and purchased according to specifications that did not specially forbid the use of palladium. Please inform us which of your chronometers entered in previous trials had palladium hairsprings.

"It is desired to keep an accurate record of all chronometers in service with palladium hairsprings in order to study the reliability and endurance of the metal as compared with steel. We already have a complete list of those supplied by other American makers."

When Bliss received the Observatory's letter regarding the prohibition of the palladium hairsprings, he raised the question as to whether the Bureau would allow the entry in the next trial of chronometers with palladium hairsprings. Bliss stated that "unless this decision be rescinded in his favor he would be unable to submit any chronometers for the next trial."

Regarding Bliss's letter, the Observatory wrote the Bureau, stating, " . . . The supply of chronometers is likely to be short next year. The use of palladium is allowed in the Admiralty trials at Greenwich.

"In view of the above and the further fact that Bliss is the only maker who has raised this question or is likely to do so, it is recommended that any maker who applies for such privilege on the grounds stated, be allowed to enter such chronometers provided that he agrees to replace any palladium springs with steel springs, free of cost, if required within five years after date of purchase."

As a testimony to Bliss's perseverance and conviction that palladium would indeed enhance the performance of chronometers, nineteen of his twenty-two chronometers on trial when the controversy began passed trial and were purchased. In comparison, Bond had two of sixteen, Geissler one of three, and Negus three of eleven to pass trial and be purchased. All of these, other than Bliss's, were fitted with steel hairsprings.

During the competitive trial held January 2 to June 22, 1903, twenty-two new chronometers passed and were purchased. Some were fitted with palladium springs while others were fitted with steel. This was the last trial in which makers were supposed to be permitted to submit chronometers with palladium springs since the Navy specifications were ammended to preclude the use of palladium until further experiences with palladium had satisfied the Bureau that it was as reliable as steel. However, the Observatory noted that the performance of those chronometers fitted with palladium springs during trial had a flatter rate curve and better record than those of steel. Nevertheless, they still questioned its permanence and durability while in actual service at sea.

While all of this controversy was going on over palladium, a new nickel-steel alloy had been developed in Switzerland which showed great promise in that its length remained constant in spite of changes in temperature.

In September 1903, the Naval Observatory recommended to the Bureau that they purchase three Nardin chronometers with Guillaume nickel-steel balances and hairsprings since they had performed very well during recent trials at the Canton Observatory at Neuchatel. The Superintendant stated, " . . . It is very desirable to put a few of these chronometers through regular trial at the Observatory and then test them at sea alongside other chronometers, as they embody a newly discovered principle not yet accepted by American makers but utilized in some of the best clocks and chronometers abroad."

Actually, only two Nardins were purchased, numbers 115 and 120. On May 31, 1904, the Observatory notified Mr. Paul D. Nardin that, although the trial was not completed, the present trial number for number 115 was 18.56 and for number 120, 15.45. Upon the completion of the Observatory's trial, these instruments were given a sea trial; number 120 was issued to the U.S.S. *Chicago*, while number 115 was placed on board the U.S.S. *Harford*. Both instruments performed very well while at sea.

The Navy continued to vacillate over the type of hairspring that could be used in chronometers submitted for competitive trials. In the trial held for new chronometers from January 14 to June 20, 1904, twelve of the forty-two chronometers submitted had palladium springs. Ironically, those twelve were submitted by Negus, who the year before had so vehemently protested palladium's use.

The Observatory Superintendent's annual report to the Bureau for the fiscal year ending June 30, 1904, read in part, " . . . The test applied to chronometers shows that palladium is less susceptible to the variations of temperature, which, as our ships go to all parts of the world, is an important factor in their care, but whether the material will retain its spring as long as steel is yet to be determined."

Then, no later than August 13, 1904, the Observatory notified Bliss, Bond, and Negus that for the next trial to commence January 1, 1905, ". . . all chronometers entered must have steel hairsprings and it is preferred that these shall be heat-colored, yellow or blue, to avoid any questions as to their composition."

The Observatory's indecisiveness regarding the merits of palladium continued for several additional years. Finally, after additional trials at the Observatory and at sea, the Observatory "saw the light" and the issue was resolved. They decided that palladium was just as reliable as steel, and that the performance of chronometers fitted with such hairsprings was equal to or better than that of chronometers fitted with steel.

New specifications were formulated and in part read, "The chronometer shall have the ordinary compensated balance, with detent escapement and without auxiliary correctors, and shall beat half-seconds. The hairspring shall be of steel or palladium . . . ."

To this day, this portion of the specification still remains in the Navy specifications for marine detent chronometers. When Hamilton was approached to make a marine chronometer, as were the other watch companies in 1940, they refused to undertake the job of making a marine chronometer if they had to adhere to the above specification. Hamilton was willing only if they could use their monometallic balance and elinvar hairspring which had proved so successful in some of their watches. The navy waved this portion of the specifications and the rest of the story is history, as they produced 8,902 chronometers for the Navy, plus another 3,100 for the U.S. Army, U.S. Air Force, Maritime Commission, and later for civilian use. Hamilton's marine chronometer is known as Model 21, but those made for the U.S. Air Force were known as Model 121, although there were

no changes whatsoever in the design.

With the palladium issue put to rest, let's continue our discussion of American chronometer makers.

LOW, MAX, 44 Fulton Street, New York City. Mr. Low was born in Austria in 1889 and at an early age displayed a keen interest in various mechanisms. Max had an uncle living in Poland who was a watch/clockmaker. Since Max exhibited such an intense interest in mechanical devices, he was sent to live with his uncle who taught him the art of watchmaking. He enjoyed his work immensely, and the desire to excel in his newly learned trade resulted in his going to Bienne, Switzerland. There he continued to fulfill his quest for horological knowledge and improve his technical skill, particularly in the area of complicated watches.

Max came to America in 1910, settling in New York City where he opened a watch shop, specializing in the repair of repeaters. He enjoyed the challenge that complicated timepieces presented and, in seeking further challenges, became intrigued with the chronometer. Being endowed with greater than average acumen and business ability, after he mastered the chronometer, he expanded his business to include not only the sale and repair of chronometers, but also the servicing and selling of other types of nautical instruments and timepieces.

Max had two sons, Jack and Charles. After Jack completed his schooling, he entered the business as his father's assistant. In the early 1940's, when Max brought chronometers to the Observatory, Charles, just a youngster then, traveled with him. In 1962, Mr. Low purchased the firm of T.S. & J.D. Negus.

In the early months of World War II, the Maritime Commission and Navy were experiencing a critical shortage of chronometers. In 1942, Mr. Low, as one of several entrepreneurs

(Continued on page 44)

THE PICKLE BARREL

By Marshall F. Richmond, CMW

MISCELLANEOUS JEWELRY REPAIR

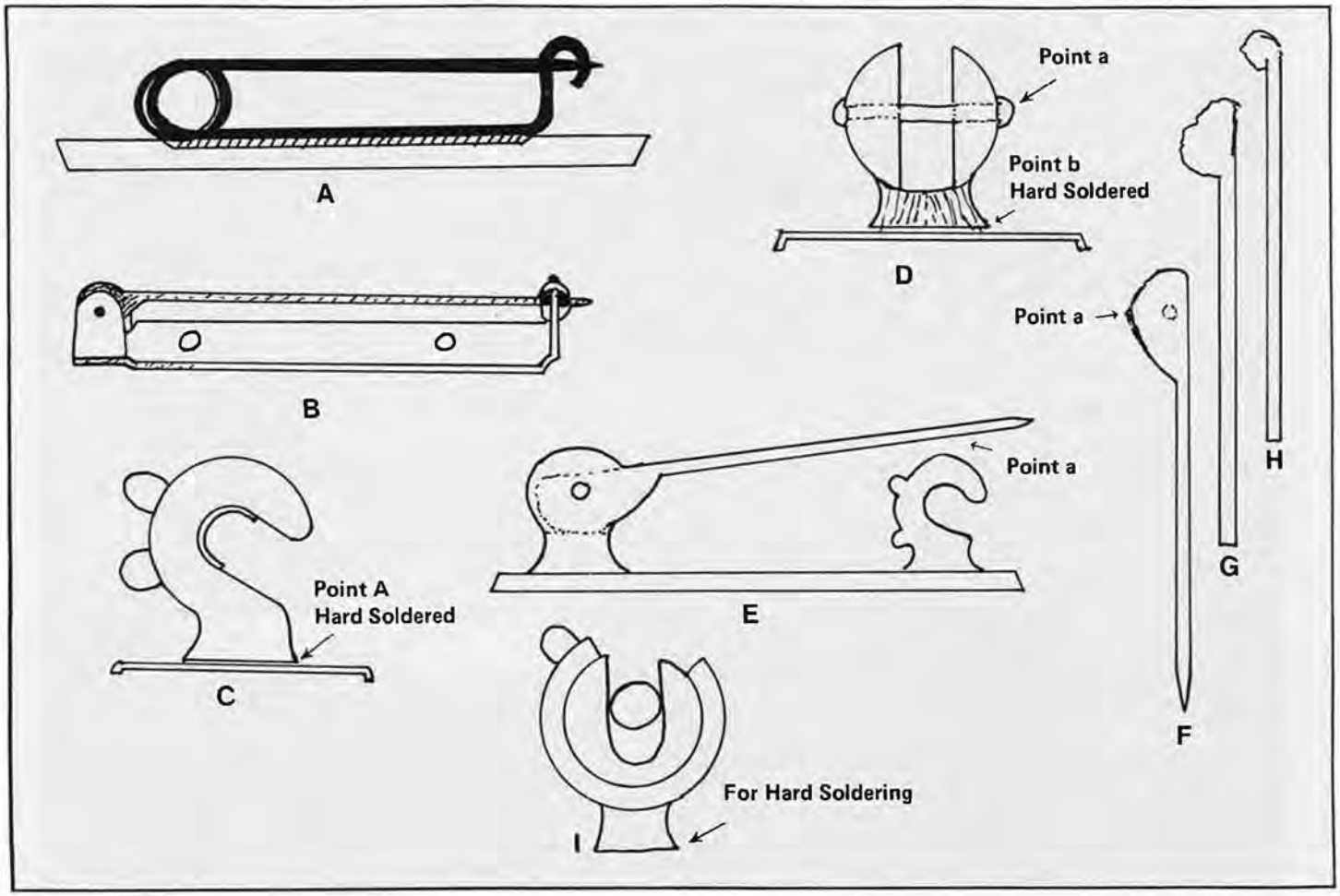
Part II

Broken pinstems, pinbacks, and safety catches are often encountered in doing jewelry repair. Many can be repaired quickly with a small investment in findings and material. As a large portion of these repairs are to costume jewelry, the cost of repair will often exceed the original cost or replacement cost of the article. However, as a strong and durable repair can usually be made, we can in good conscience accept these items for repair when, for sentimental or other reasons, the customer is willing to pay the price quoted.

Some costume pins are so inexpensively made that the pinstem consists of only one piece of wire. This is pointed on one end with a two-coil spring for a hinge and a hook bent to form a catch, making it similar to a safety pin in shape. This is soft soldered to the pin. See Figure 1, View A. These can easily be made from a piece of brass or nickel silver wire of the proper diameter and a pair of round nose pliers. The point can be turned in the watchmakers' lathe or chucked in a pin vise and the point shaped with a fine cut file by rotating it on the filing block while filing it before the wire is shaped.

Better-quality costume jewelry usually has a one-piece pinback that has the hinge, pinstem, and safety catch made in one piece. These are die struck in three pieces. The hinge often has pimples struck so the pinstem can be fitted between the sides and squeezed together with pliers. The pimples fit the hole in the stem, forming the hinge, while the safety catch is squeezed over the hook and rotates to make a lock. See Figure 1, View B.

Figure 1



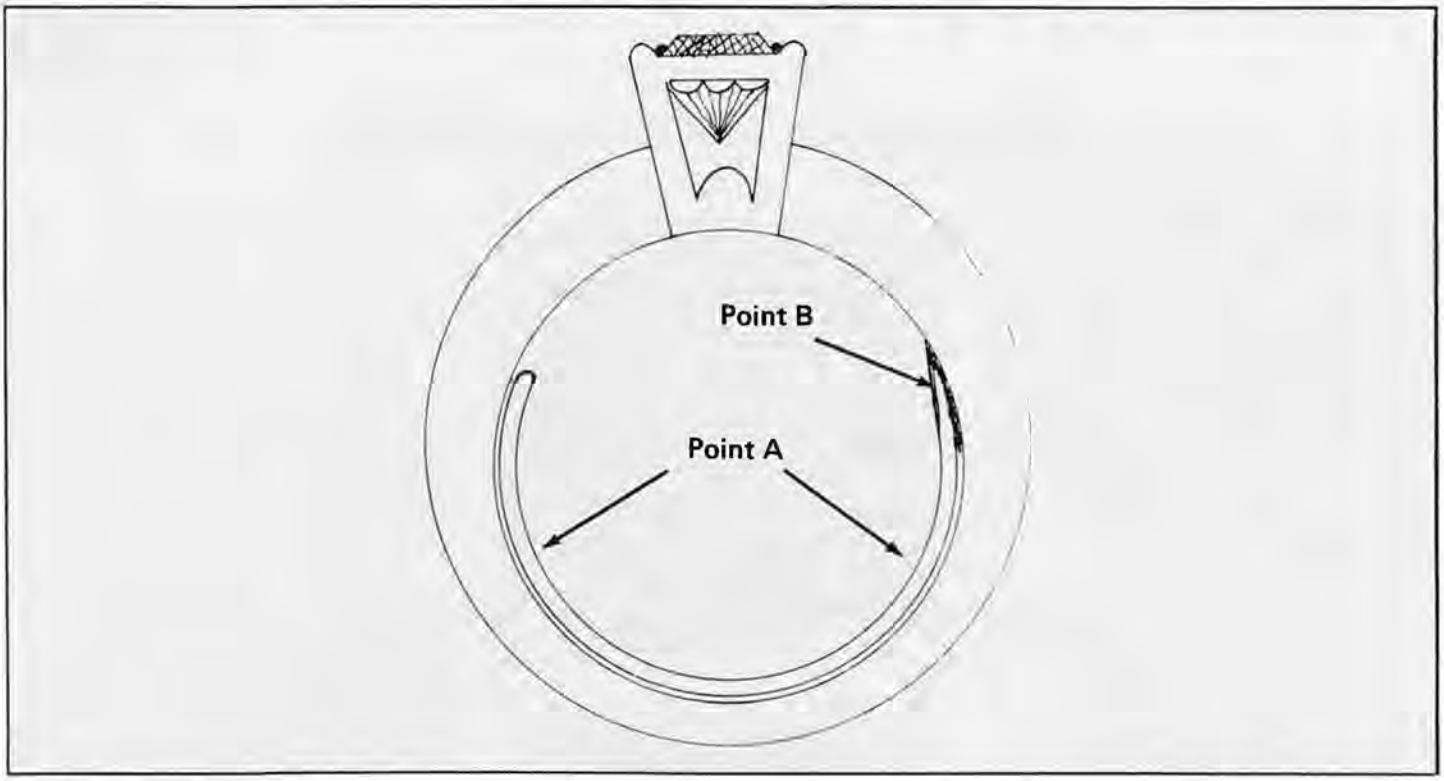


Figure 2

Quality jewelry made of karat gold, gold filled, or sterling silver is made with hinges and safety catches that are hard soldered to the pin with the stem being riveted in the hinge or fitted with a friction tapered hinge pin. Pinstems, pinbacks, hinges, or safety catches are available from the material jobber in assortments or limited numbers, depending on the metal used. The better metals (karat gold) can usually be purchased in a minimum of one piece.

Pinstems are found in such varied lengths that often the correct length cannot be found in an assortment. However, this is no problem as they can be chucked in the watchmakers' lathe, a new point turned at the proper length, and then polished. If no pinstems are available, it is a simple job to make one using a piece of wire of the correct diameter. It can be brass, nickel silver, silver, or karat gold, but should be a metal comparable to the metal of which the pin is made. Hold it in a vertical position with the heavy duty tweezers and apply heat with a torch to the upper end until the end starts to melt and forms a glob or ball at the tip. See Figure 1, View H. Flatten this to the correct thickness with the steel chasing hammer on a steel anvil. See Figure 1, View G. Chuck it in a pin vise and shape it with a fine-cut file; then drill with a twist drill in the flex-shaft tool. Cut to length and shape the point either in the watchmakers' lathe or chucked in the pin vise as previously described. See Figure 1, View F. To make a rivet, a piece of wire of the same size is usually appropriate. The head end can be formed by chucking it up in the lathe or in a pin vise and peening the end with the ball end of the chasing hammer. This will spread the end enough to form the head. Push the wire through the hinge joint and pinstem, cutting it off to leave a protrusion of about .5mm, or enough to peen and form the other end of the rivet. The riveted ends can simply be polished in order to leave no rough edges to catch on fabrics; however, to do a really professional job, they can be finished with a cup bur in the flex-shaft tool, which will leave each end of the rivet with a half-round dome, and then polished. See Figure 1, View D, point a.

An alternative to this procedure is to make a taper pin by using a piece of wire slightly larger in diameter than the hole through the hinge and pinstem. Turn a long taper on the wire in the watchmakers' lathe. Push this through the holes in the hinge and pinstem and cut off with about .5mm to 1mm protruding; then it can be pushed in still tighter with chain nose pliers, or driven in tighter with a hammer on a watchmakers' bench block. Both ends can be cut off flush with a jewelers' saw, then polished smooth. This also makes a very neat repair.

Pinstems on quality jewelry have a rocker-like shape where they fit into the hinge joint; when properly installed, the point of the rocker will allow the point end of the pin to close to within a short distance of the safety catch. See Figure 1, View F, point a, and Figure 1, View E, point a. This creates a spring action, as the pin must be pushed into the catch with the length of the pinstem serving as the spring. Two purposes are served by this spring action: first, it keeps tension on the safety catch which lessens the chance of it working loose; second, when released, the pinstem springs away from the catch, making it easier to remove the pin from the garment.

Two types of safety catches are in general use. One hooks and is locked with a rotating lock. See Figure 1, View C. The other has a slot in the top through which the pin is

(Continued on page 45)

Questions and Answers / Henry B. Fried

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

Repeater Automaton

Q Enclosed are two photos of a repeater watch which I have in for repair. The gold case looks like someone silver soldered a large hand-engraved round plate on the snap corner of the hunting case. The arms of the two figures move when the minute or hour strike. The blue portion of the dial is painted and does not look like it was original. Also, I did not know that Longines ever made a repeater. Can anyone give me some information about this movement?

Thank you.

L. Hawkes
Venice, Florida

A *I have examined the 1912 catalog of Longines, Wittnauer, Majestic, Touchon and Agassiz (all under the Wittnauer agency at that time). I could find nothing resembling the movement or configurations of your watch.*

The Longines dial could be original and could have been fitted to the plate with the automaton figures. That was done more frequently than might be believed. The plate with figures was a separate manufacture, available to anyone who would take the time to fit it to existing repeaters.

The repeater movement doesn't resemble anything that I could positively identify. It might, however, be a LeCoultre ebauch repeater since they did supply ebauches to many who finished them with their names upon them; in your case, the name was omitted completely.

The watch dates from the early 1900's. I wish I could be more positive about it.

Q We have a patron who can't wear watches because they will not work on his wrist. These are regular, old-fashioned wind-up watches—not the digital or quartz type. On other people the watch will run just fine, but it stops when he wears it.

We are trying to find some explanation for this. Several watchmakers in town have heard of this happening, but no one knows the reason. Can you help us? We'd be most grateful if you have any ideas about this.

Sharon Vandercook
San Joaquin Valley Information Service
Fresno, California

A *In my many years as a watchmaker, teacher of watchmaking, consultant horologist, lecturer, and writer, I have come across situations in which a watch will not operate on certain wearers. I have had complaints that certain wearers have too much "body magnetism" and other imagined deterrents to timekeeping devices.*

As for the body magnetism, that has been completely dispelled by interested physicists through experiments and other findings. If a person had enough magnetism in his body to stop a watch, that same person would have difficulty passing a fire hydrant, steel-framed building, or any automobile. To stop a modern watch with magnetism would require many, many Oersteds.

In my own experience with customers who complained that no watch would work on their wrists or in their pockets, I had each wind the watch in my presence and report to me daily for a few days. Few ever returned except for periodic servicing of their timepieces. For the most part, those who complained of this "phenomenon" merely jiggled the winding crown, scared that they'd over-wind the watch. When I urged them to continue the winding, they actually paled, scared that they would destroy the mechanism. Watches should be wound until they just can't be wound any further, similar to winding a clock or a mainspring-driven toy. Watchmakers and jewelers wind a watch in a very few seconds by merely running the side of the index finger, end joint from finger tip to first joint (right hand), across the knurled winding button until, repeating this operation, the finger skin skids against the resisting knurled edge. This should power the watch for over forty hours, although daily winding is best for good timekeeping.

In the case of self-winding watches, some people are very inactive, especially bed-ridden people or older folks who do not have sufficient arm movement to cause the automatic winding mechanism to store enough energy to keep the watch running. Others who wear traditional watches just are very abusive of their watches and get them wet, rusty, or have parts broken by their abuse. Aside from this, any good, knowledgeable watchmaker or jeweler can teach the wearer how to wear and use a watch so that this proven/imagined problem will disappear.

Q I have had a watch come in for repair and would like any information you might have as to the repair of it. It's a Longines Model 19.73N pocket chronograph.

(Continued on page 56)

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FHF 691	6¾ x 8L	4.10mm	Sweep Second	20.05
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ETA 2551	7¾L round	2.90mm	Auto, Date, Sweep	34.95
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AS 1951	11½L round	4.50mm	Sweep, Date	20.30
AS 2066	11½L round	5.95mm	Auto, Day/Date Sweep Second	31.50
ETA 2783	11½L round	5.20mm	Auto, Date, Sweep	34.30
AS 5206	12L round	6.50mm	Auto, Day/Date Sweep Second	22.60
UT 6497	16½L round	4.50mm	Small Second	26.35
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Ultrasonic Clock Cleaning

By Steven G. Conover *

Ultrasonic cleaning machines are a valuable tool for the clock repairer. They permit faster and, in most cases, more thorough cleaning than soaking and brushing by hand. The ultrasonic action, working in conjunction with special solvents and rinse solutions, penetrates deep into the tiny recesses and crevices of the clock movement. In fact, subassemblies or entire movements can be cleaned, rinsed, and dried all in one piece. This is a great timesaver for the repairer, who may judge that a movement or part of a movement does not need disassembly for repairs. Without ultrasonics, it is risky to soak assembled parts because of the danger that the interior surfaces may not be cleaned well enough. The solvent might mix with old oil and dirt to create a mess that rinsing and drying will not correct. Ultrasonics can largely eliminate this worry.

It is important to realize that ultrasonics *can* be overused by people who try to cut corners by cleaning virtually all their movements fully assembled. Much time is saved, of course, by reducing the bench work. But when needed repairs are neglected because movements are not disassembled and examined carefully, the work suffers. If you are going to use an ultrasonic cleaning machine, you should take care to utilize it in a way that will complement *your* repair practices.

For clock cleaning, a machine with a 1½ gallon capacity is required. A smaller machine may not handle larger movements and parts. Three of the machines available are the L&R Model T-28 (tank size 11-3/4 in. x 9-3/8 in. x 6 in. deep), the Zenith Model Z-200T (tank size almost the same at 11-1/2 in. x 9-1/2 in. x 6 in.), and the Branson Model 521 and 52 (same size as the Zenith). It is necessary to cover the clock parts completely, so the cleaning will be effective. If the parts are placed directly in the tank, one gallon of solution is sufficient for most jobs. The use of auxiliary pans or baskets (to be discussed later) may require up to 1-1/2 gallons of solution in the tank.

There are two basic types of solutions you can use: the ammoniated (water-based) and non-ammoniated (petroleum-based). Different cleaning characteristics mark each one, and it is a matter of personal choice which to use. In general, the non-ammoniated (such as L&R No. 677) is a faster solvent, but creates a higher risk of lacquer coming off the plates during the cleaning process. With the ammoniated solution (L&R Clock Cleaning Solution Concentrate is an example), you must be sure to get all the water out of the movement to prevent corrosion.

The way to remove all traces of cleaning solution, including the water-based type, is to use a rinse solution. You should rinse immediately after cleaning, so the solvents will not spoil the finish on the clock parts. L&R specifies a petroleum distillate rinse (their No. 3 Watch & Clock Rinsing Solution) to follow the cleaning process with either ammoniated or petroleum-based solutions. This manufacturer also advises that thorough rinsing is required for a period at least as long as the cleaning. Rinsing should be done ultrasonically; a dip in a container of rinse will just not do the job properly.

Drying is the final step in the cleaning process. Since the movement should not have water in it after the rinse, rust is not

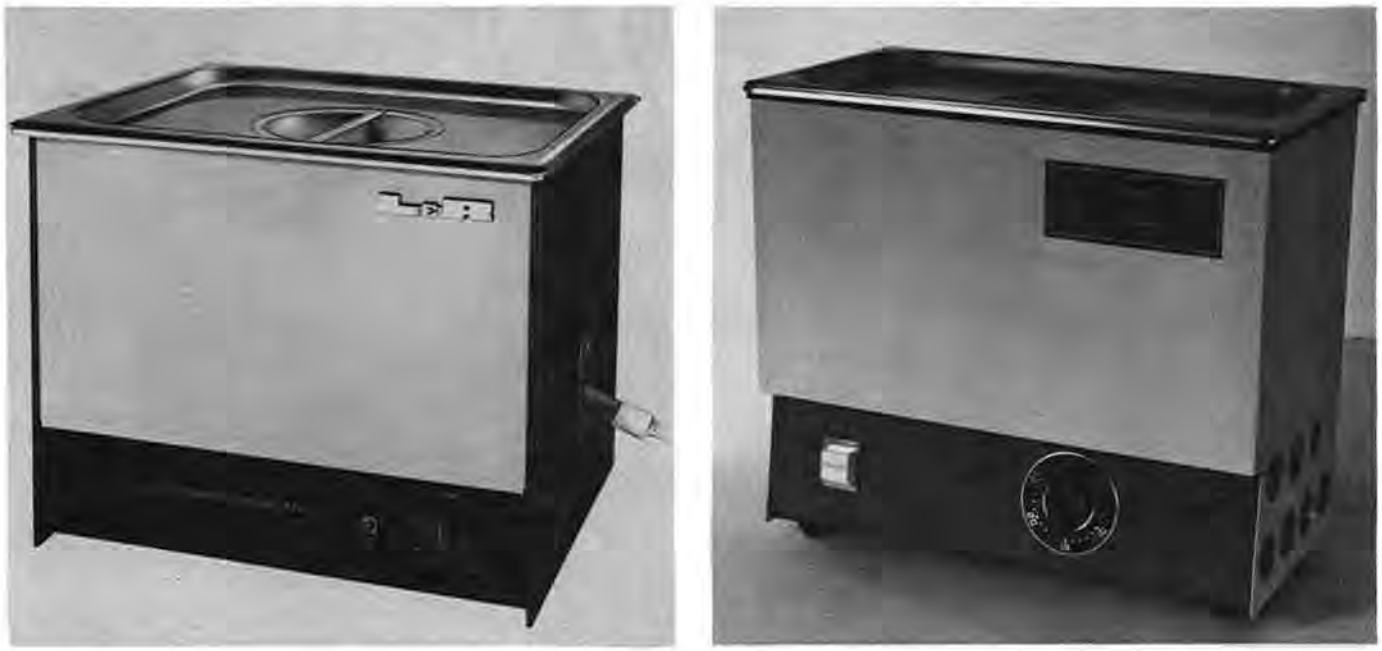

Figure 1. (left) L&R Model T-28; (right) Zenith Model Z-200T. (Courtesy of L&R Manufacturing Co. and Zenith)

likely to occur. Parts will air dry in a few hours. However, the use of a clock movement dryer is still necessary for a good job. The flow of warm air assures prompt and thorough drying of rinse solution which may be trapped in small crevices of assembled movements.

Perhaps the most pressing question about ultrasonic cleaning is that of *cleaning time*. It is your objective to get movements clean, but you must still have concern for the lacquer finish present on most brass parts, especially the plates. Cleaning for too long a period of time will partially remove the lacquer, creating a mottled appearance much worse than a dirty movement. Some lacquer coatings are very weak and will come off no matter how short the cleaning time. In this instance, continued ultrasonic cleaning may remove most of the lacquer. L&R suggests the use of their Hydrosonic solution, a water-based solvent which they say is effective for lifting off lacquer. After a movement is cleaned this way, it is rinsed in warm water, then ultrasonically rinsed, cleaned again in a non-ammoniated solution if necessary, rinsed, and dried. In my own experience, I have had very little trouble getting movements clean and yet keeping the lacquer intact. Many older movements have no lacquer at all anyway.

There is no simple answer to the question of cleaning time. New solution cleans faster than solvent which has been used many times. Oily, dirty movements will take longer than cleaner ones. Include the question of lacquer preservation (which you cannot ignore), and you are faced with several variables. It would be nice to be able to switch on the machine and not be concerned, but it is not as easy as that. You must make judgments, just as you do throughout the entire clock repair procedure.

Five minutes is probably the bare minimum cleaning time for ideal conditions. In my own work, eight to ten minutes is average. Older movements may take 20 or 30 minutes if there is heavy dirt and oil to remove. After some experience with your own ultrasonic machine and solvents, you can judge cleaning times for yourself. If there is waxy or oily contamination left in pinions, pivot holes, or mainsprings, a movement is still dirty no matter how good the plates look.

Cleaning assembled movements is probably frowned upon by many craftsmen who feel the clock will not come out clean and that solvents will remain trapped inside. I am also opposed to cleaning assembled movements in most cases–but for a different reason. A thorough inspection of the various parts of a clock usually turns up a few things that need to be corrected, such as scored pivots, worn holes, and cracked ends on barreled mainsprings. A freshly cleaned movement may run for months, even with these defects. But I do not relish the thought of receiving a clock back from a customer because I failed to repair it properly.

Other considerations aside, I have come to realize that an ultrasonic machine will clean most assembled movements quite well. I have verified that even a barreled mainspring can be cleaned ultrasonically. Recently I disassembled a 400-day clock for cleaning, but left the greasy spring in the barrel. I removed the barrel cover and then cleaned the spring and barrel for about 20 minutes (much longer than the plates). After rinsing and drying, I used my mainspring winder to remove the spring. It was clean. I had left the spring in the barrel for several hours after turning off the dryer, and when I finally did check the spring, it was dry. The only trouble is that, according to my own repair practices, I would have removed the spring *anyway* to check for weakness or a torn end. This gets back to my earlier statement–it is up to you to fit an ultrasonic unit into your repair methods.

There are several accessories available for ultrasonic machines. For clock cleaning, the two items shown in Figure 2 are very useful. The stainless steel mesh basket permits easy handling of the parts of a disassembled movement. On each end of the basket are tabs which hook over the rim of the tank. The basket pictured is by L&R. Branson offers an "insert tray" which is perforated steel

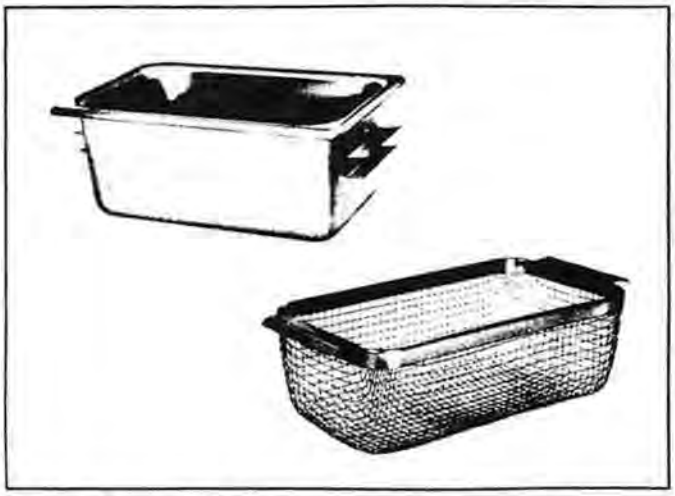

Figure 2. (Courtesy of L&R)

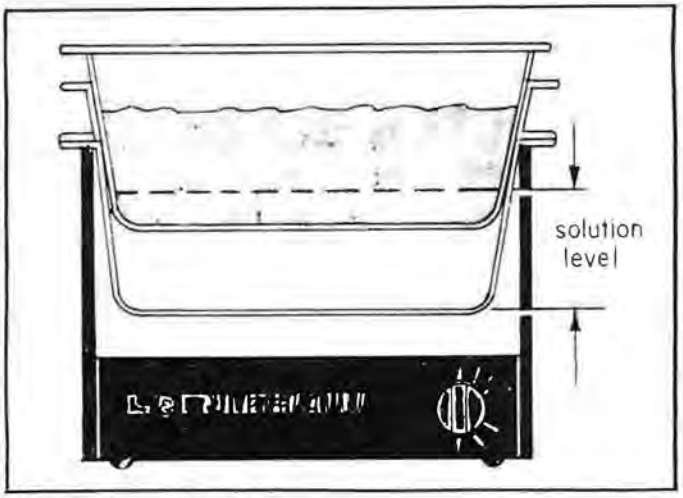

Figure 3. (Courtesy of L&R)

instead of a mesh. The purpose of the basket or perforated insert tray is to hold loose parts safely and yet allow free circulation of the cleaning solution or rinse. There is no harm in placing the parts directly in the bottom of the tank instead of using the basket which suspends them above the bottom. However, L&R warns that if you were to place large parts in exactly the same place repeatedly, their unit could be damaged over a period of time.

The auxiliary pan or solid insert tray serves a different purpose and can save you time if you do a lot of cleaning during the course of a day. The auxiliary pan shown in Figure 2 will eliminate the need to drain the solvent from the machine after cleaning a movement or a batch of parts. As I mentioned earlier, you should rinse ultrasonically right after cleaning. This would mean you would have to drain the solvent from the unit and then refill with rinse solution each cycle. Instead, you can leave the cleaning solution in the tank and fill the separate auxiliary pan with the rinse. First you would clean normally in the main tank, with or without the basket. Then you would remove the movement from the solvent and place it in the pan, which holds the same volume of fluid. The pan is placed on the unit as shown in Figure 3. The fluid level in the main tank must be high enough so the bottom of the auxiliary pan is below the solution level. When the unit is turned on, the ultrasonics penetrate through the cleaning solution and into the pan and the rinse fluid.

One other feature I should mention is ultrasonic lubrication. After rinsing, the movement can be treated ultrasonically in a special solution which is intended to serve in place of clock oil

applied in the usual way. Drying under warm air leaves a thin film of lubricant over the entire movement, which does not feel greasy to the touch. I will withhold an opinion on this technique, except to say that I myself lubricate the traditional way, by applying clock oil with an oiler.

Some thought must be given to proper storage of the chemicals used in ultrasonic cleaning. It is not a good idea to store the cleaning solution (either type) in the unit itself. Sediments will accumulate as the solvent becomes dirty, and these will coat the tank and eventually impede the ultrasonic cleaning. Another thought is that, although the stainless steel tank cover may fit well, it does not prevent evaporation. The best and safest place to store the solutions is in the gallon cans in which they come. Be sure to leave an air space in the can to allow for expansion.

I wish to thank Messrs. Tom Lange and Paul MacKay of L&R Manufacturing Company for the courtesies extended to me during my recent visit to the L&R facility in Kearny, New Jersey. Thanks also to Mr. Ed Pedzy, President of Zenith Manufacturing and Chemical Corporation, for his advice on ultrasonic cleaning.

SALES TALK

By Wes Door, CMW

Lead That Sale

Are you and I leaders? Of course we are. Whenever we show our customers diamonds, watches, or other jewelry, we are in the position of a leader. A leader is a guide, a helper, and the principal actor on the stage of salesmanship.

In selling, a leader is not a pressure salesperson, not a bossy person, but rather a person who has the ability to place customers in the proper frame of mind to decide for themselves.

So we see that leading a sale is important, but *more* important is closing that sale, and *most* important is having our customer completely satisfied after the sale is made and ready to tell others about us.

A friend of mine, who was an executive of one of the major toy manufacturing companies, confirmed this "after the sale" belief. He said that, after all the advertising and promotion of a new toy is completed and Billy buys one of these new toys, the most important thing is how many friends he shows it to and how many of them also buy the toy.

You see, Billy is a leader, too, and our customers are leaders of future sales for us when they tell others who eventually buy our merchandise. We must lead the sale, but this doesn't mean doing all of the talking. In fact, many times we must be careful not to talk too much or we might be typed as "fast talkers" which rightfully carries a negative connotation.

Sometimes just a simple question, such as, "Which one of these do you like the best?" or "Do you prefer white gold or yellow gold?" is sufficient to open the exchange. Then we should stop talking and really listed to the customer, giving him a chance to really express himself. If our customer objects to something we have said or shown, he will have a chance to relay this to us.

It has been said that salesmanship can be expressed in two words: overcoming objections. Of course, we must determine which are true objections.

I remember looking for a new car (I should say . . . a new used car), and I had a special request. My car at that time had a speedometer that changed colors as the speed increased, and I thought it was a neat feature. I asked the salesman about it.

Since he did not have a car with this feature, he had to determine how important this feature was to me. In other words, he had to decide whether this request was a real objection or just something I would like, but would not insist upon. It turned out to be just something I fancied, since this feature just wasn't made anymore. He was a good salesman and led the sale.

Leading sales is important all months of the year; however, one would think it would be a lot easier to make diamond sales in June, as we all know this is the month of brides. At least we have heard this . . .

It is true that June is the month of brides, but it leads by only a small amount over other months, contrary to popular belief. To prove this, just ask your friends in what months they were married. Did you get married in June? Neither did the bride pictured here.

Of course, regardless of wedding dates, some gifts are purchased before that date, and the engagement ring may be purchased several months (or years) ahead of time.

It is most imporatnt for us to ask our customer when the wedding date is so we know the time in which we must complete the sale. If they are getting married tomorrow, then we must sell from our stock, but if we have several weeks, we can order or even make up something special. Knowing this date is also important so that we can size the rings and set the diamonds before the deadline.

Which reminds me! I must finish this bride's wedding ring, so . . .

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AWI News / Milton C. Stevens

It's June! - Time to get

DOWN TO BUSINESS

The Trustees of AWI's Education, Library, and Museum Trust (ELM Trust) will meet Thursday, June 25 to conduct business and consider student loan applications. One important item for consideration will be a plan whereby AWI members will be able to sell their used watch batteries at the current silver price and still have a percentage of the sale revert back to the student loan fund of the Trust. This can be done by having the salvage firm pay its salesman's commission on shipments identified with AWI directly to the ELM Trust. Thus individuals and Affiliate Chapters can "have their cake and eat it too!"

The President of AWI is required to name committee members within thirty days after the Annual Board of Directors meeting. If any member has a specific committee on which he would like to work, please convey this information prior to July 10 to the President at AWI Central, 3700 Harrison Avenue, Cincinnati, Ohio 45211.

Just prior to the Board of Directors meeting, the Affiliate Chapter Delegates will meet on Friday, June 26. Delegates and alternates representing the various Affiliate Chapters share experiences and report on their activities during the past year. They select their officers, and their Chairman automatically becomes an AWI Director and serves on the AWI Board for one year. One of the most important functions of the Affiliate Chapter meeting is that it brings grassroots imput to the AWI Board. At each meeting, the delegates prepare recommendations to be considered by the AWI Board of Directors. In almost every instance, these recommendations have been implemented.

The week of June 22 through 25 has been set aside for the Research and Education Council meeting and in-service training. The REC is comprised of the various schools which teach watch and clock repair. Instructors from these schools traditionally attend this annual program to up-date their skills and curriculums.

George Schlehr, Chairman of the REC, has outlined a very ambitious agenda this year. The schedule appears in his column this month, but just to make certain that no one overlooks this important information, it will be included here as well:

MONDAY, JUNE 22: Bulova Quartz Certification Program presented by Henry Frystak and Leo Helmprecht. This is an **all-day program** offered without charge to REC instructors.

TUESDAY, JUNE 23: **Morning**, 9 to noon: Archie Perkins, instructor and author of technical articles for the *Horological Times*. Demonstration of wheel and pinion cutting. **Afternoon**, 1 to 4: Bill Smith, Jr., instructor and author of technical articles for the *Horological Times*, gives a three-part lecture on: 1) The Escapement; 2) The Oscillatory System; 3) Hairspring Manipulation. There will also be a slide presentation on clockmaking.

WEDNESDAY, JUNE 24: **Morning**, 9 to noon: Erich Lorenz, Manager, Consumer Service Division, Rolex Watch, USA, Inc. Technical introduction with slides; 16mm sound film "Of Time and Men," followed by coffee/cake break, courtesy of Rolex; Q and A session. **Afternoon**, 1 to 4: Business meeting, rap session. Election of officers.

THURSDAY, JUNE 25: **Morning**, 9 to noon: Watchmakers of Switzerland Information Center (WOSIC) will present film on "Delirium" by Jacques Reymond with Q and A session. **Afternoon**, 1 to 4: The Seiko Watch Co. will be represented by Jack Schecter and Scott Chou. A film, "In Quest of Perfection," will be presented, followed by a slide program.

June 27 and 28 are the dates of the Annual Board of Directors meeting. This year's meeting will be held at the Americana Hotel located at the Greater Cincinnati International Airport, Cincinnati, Ohio.

The two-day meeting involves the hearing of all committee reports and includes action on any of the recommendations which any committee might make. The administrators of the Institute present a detailed report on the activities at AWI Central during the past fiscal year, along with recommendations for the coming year. The treasurer's report, along with the audit by the Certified Public Accountant, are discussed in detail; a budget for the current fiscal year is adopted.

All old business is handled by the current Board prior to the opening of new business. The newly elected Directors are installed; they then select the Executive Officers for the coming year. Once the new officers are seated, the meeting proceeds to consider new business before the Board. When all matters have been resolved, the Honor Awards Committee recognizes the retiring officers and directors, along with any others they deem worthy of recognition.

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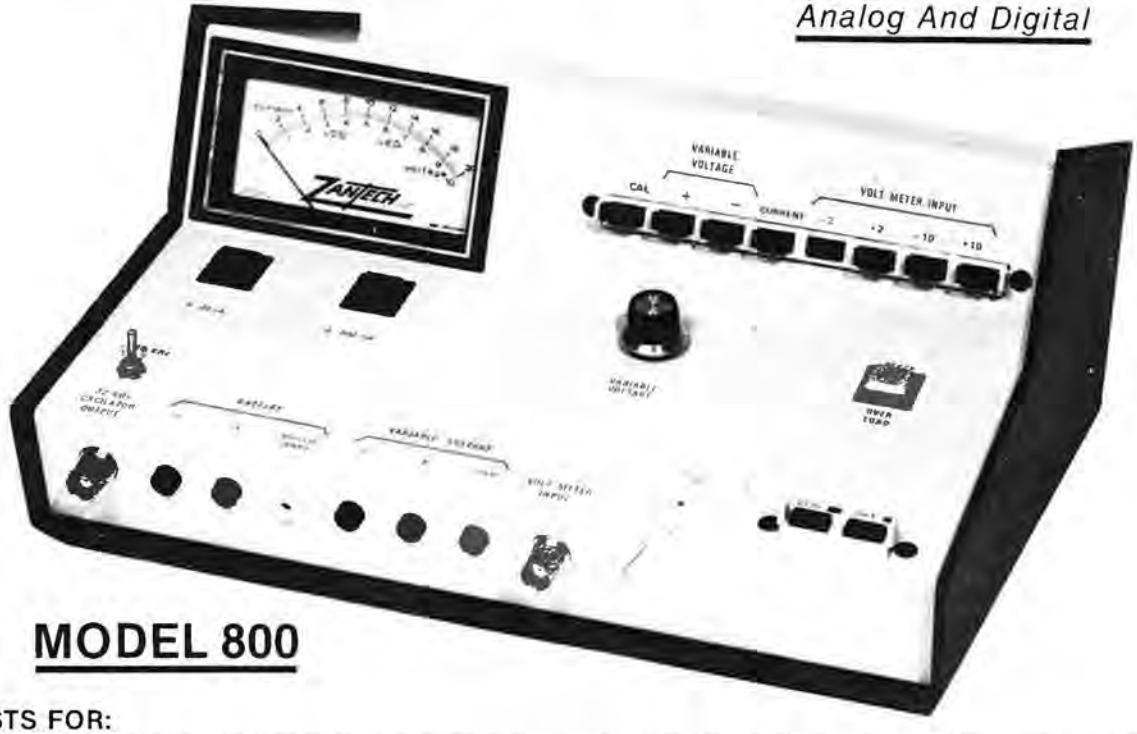

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By Archie B. Perkins, CMW, FNAWCC

THE CYLINDER ESCAPEMENT *

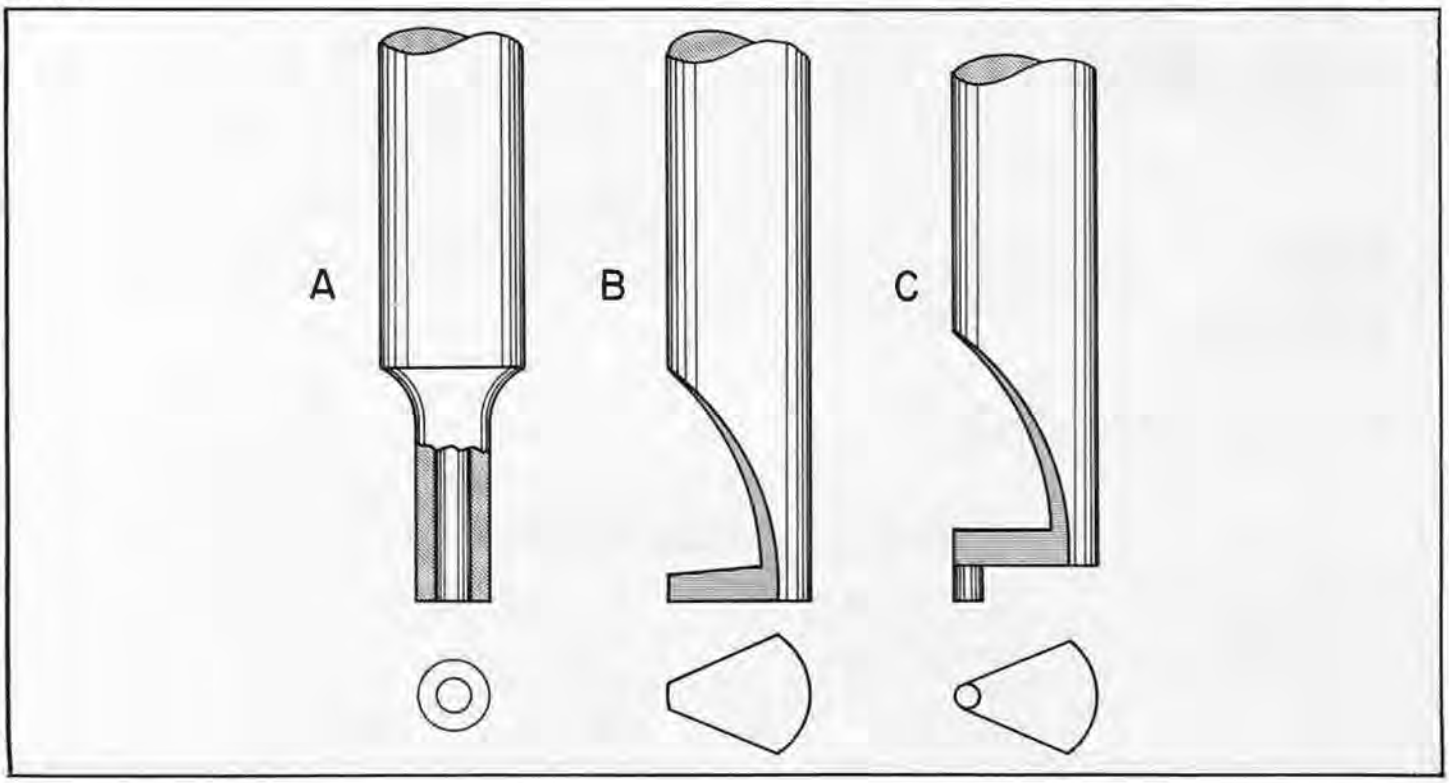
Part II

To repair the cylinder escapement, special punches and stumps are needed. Figure 1, View A shows the type of punch used to remove the cylinder from the hub of the balance wheel. An assortment of sizes of these punches are needed to accommodate all of the different sizes of cylinders. These punches are not always available in the staking tool sets and must be made.

To make a set of cylinder removing punches, it is recommended that they be made as sub-punches. First, select some high carbon steel drill rod in a size that fits the hole in the largest hole end punch of the staking tool set. Cut this material into lengths of 5/8 inch. These pieces are chucked up in the lathe individually and made into punches of different sizes. Chuck the rod up in the lathe; then face the end off flat with the graver. Spot a center with a sharp pointed graver. Then select the proper sized drill and drill a hole to a depth of about 3mm. Now turn down the diameter of the rod to the proper size for about 5mm back from its end, leaving a conical shoulder as in Figure 1, View A.

After the punches are made, they must be hardened and tempered to a straw color. Figure 1, View B shows the style of punch used to stake the cylinder into the brass hub of the balance wheel. This punch is also used to stake cylinder plugs into the cylinder. View C, Figure 1, shows the style of

Figure 1



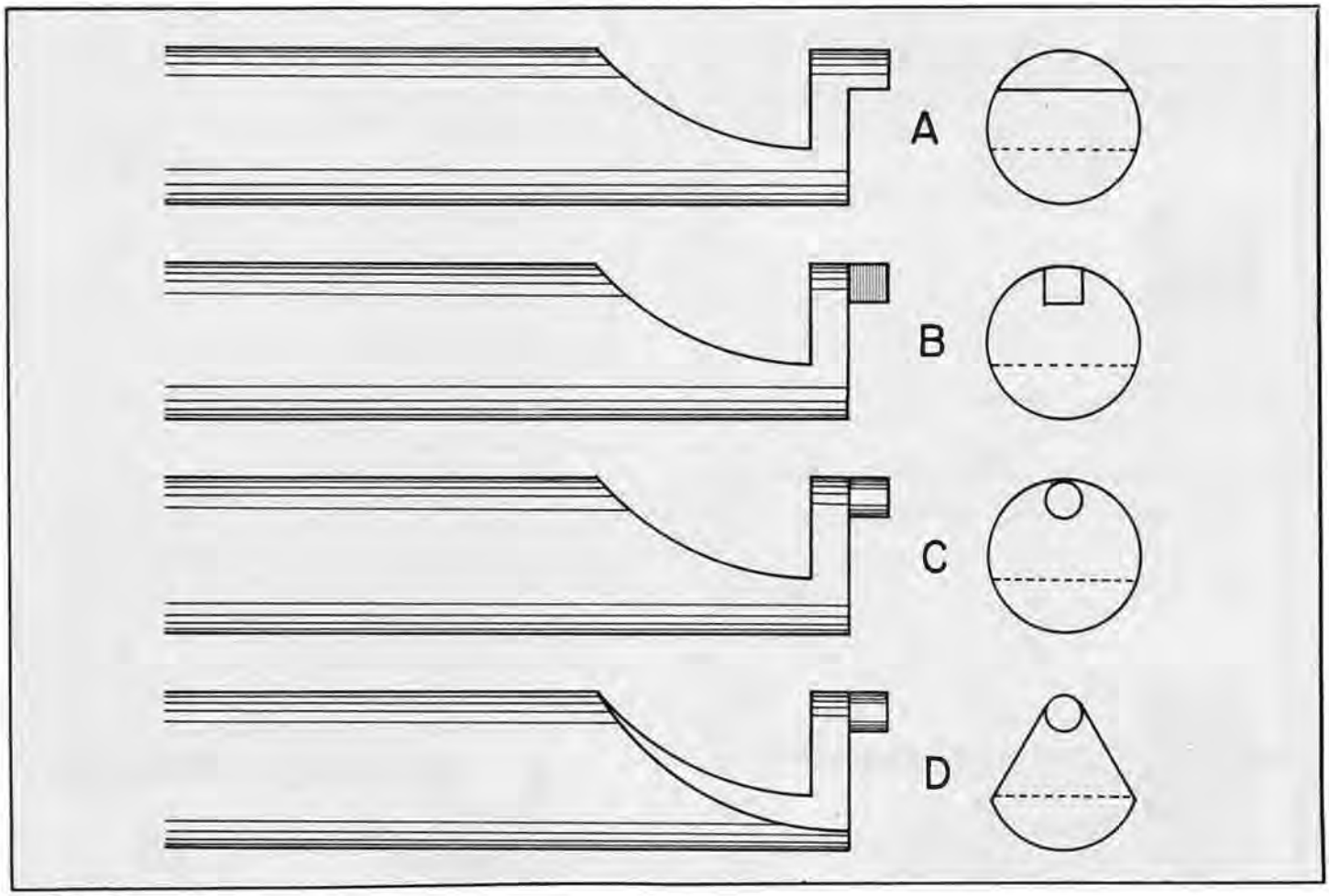


Figure 2

punch used to remove cylinder plugs from each end of the cylinder. Some years ago, the last two styles of cylinder punches were found in the different staking tools, but more recently, they are not included in staking tools. A set of these punches should be available from your local watch material distributor. They are made by Bergeon and are No. 30542. There are 8 punches in the set. If punches of the proper sizes are not available, they can be made.

Figure 2 shows how to make a plug-removing punch. First, select a piece of high carbon steel drill rod that is 4.7mm in diameter, or number 13 drill rod size. Cut this in lengths of about 3-1/4 inches. Take a piece of this rod and place it in the lathe, or it can be fastened in the bench vise. Now use a half-round file to file the rod as in View A, Figure 2. Use a flat file to remove the material at the end of the rod as in View A. The two sides of the end of the punch are then filed as in View B, Figure 2. This forms a square pin on the end of the punch. Then the square is filed round as in View C, Figure 2. Now file the sides of the punch to finish its shape as in View D, Figure 2.

After the punch is completed, it is hardened and tempered to straw color. Figure 3 shows how a cylinder is removed and replaced in the brass hub of the balance wheel. View A shows the cylinder being removed. To remove a cylinder, a hole is selected in the die plate of the staking tool that will just clear the cylinder. This hole is centered up with the die set punch and the die plate is locked up at this position. Now select a cylinder-removing punch that is slightly smaller than the ouside diameter of the cylinder. This punch must have a hole in it large enough to clear the pivot portion of the cylinder plug, as is shown in View A, Figure 3. Now with the brass hub supported on the die plate of the staking tool and the punch in position, the punch is tapped lightly with a brass hammer to drive the cylinder from the brass hub. Care should be used so the punch won't go into the hole of the brass hub far enough for the conical shoulder of the punch to enlarge the hole in the brass hub. Note: If the cylinder wall is not worn and the cylinder is not bent or broken, it will not need to be removed from the brass hub, since the cylinder plugs can be replaced while the cylinder is still in the hub of the wheel. After the cylinder has been removed, a new one is selected that is the same outside diameter and length as the old one. The outside diameter is first measured with the micrometer. Then the new cylinder is selected and checked for length by first laying it on the bench along side the old cylinder. Now check the fit of the pivots in the jewel holes. If they are too large for the jewel holes, they will need to be reduced. When chucking a cylinder to work on the pivots, it must be chucked at the end of the cylinder nearest the pivot being worked on. See Figure 7, View B. If the pivots are too

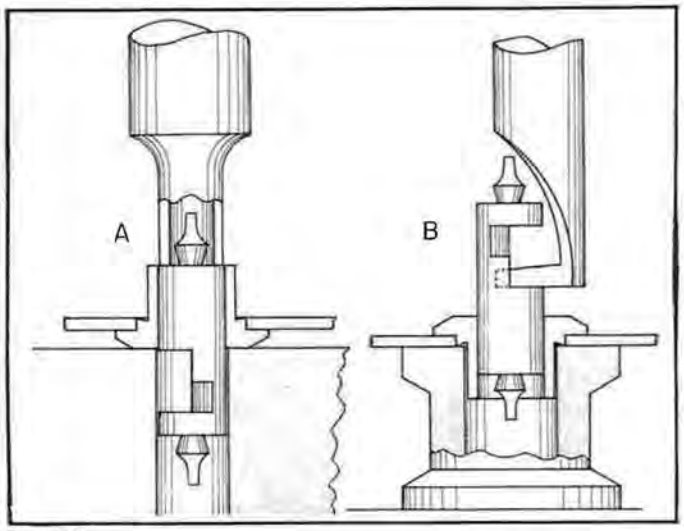
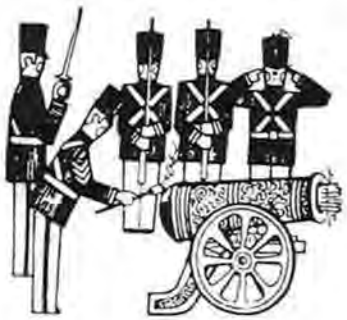


Figure 3

small for the jewel holes, then a new cylinder can be selected with larger pivots.

After the pivots have been made to fit the jewel holes, the cylinder is then tried in the watch to check the length. If the cylinder is too long, it can be shortened by chucking it in the lathe and shortening the pivots with an Arkansas stone and finishing with a jasper stone. When the cylinder has been fitted with the proper end shake and side shake, it is then staked into the brass hub of the wheel. This is shown being done in Figure 3, View B. To stake a cylinder into the brass hub, a staking tool stump is selected that has a hole that will just clear the tube on the brass hub. This stump supports the balance wheel when the cylinder is inserted into

(Continued on page 53)



We Salute These New Members!

ABSTON, Loretta—Florida
AMAN, William B.—California
ANDREWS, Carla—Florida
BANDY, William H.—West Virginia
BAUMBACH, Richard A.—Arizona
BEAUDOIN, Bob—Oregon
BECKMAN, T. R.—Texas
BERARD, Brian A.—New York
BEYER, Edward C., Jr.—Illinois
BLIZZARD, Tom C.—Florida
BRADSHAW, Guy C.—Florida
BRYAN, John A.—Georgia
CADDELL, James P.—Indiana
CARTY, Ivan E., Jr.—New York
CARVEY, John—Connecticut
CHIAPPETTA, Joseph T.—Florida
CONNOR, James P.—Pennsylvania
DELORENZI, David P.—Pennsylvania
DINGESS, Tom—Ohio
DONOHOE, Thomas W.—Washington, D.C.
DOUD, Donald A.—Washington
DOWNEY, Patrick L.—Colorado
EPKES, Fred—Iowa
EVERMON, William—Illinois
FAICHNEY, D.A.—Ontario, Canada
FARRELL, Dan A.—California
FIELD, Joseph B.—Illinois
FINE, Lisa M.—Texas
FRANCK, Alexandre J.—Florida
GARRICK, James J.—New York
GARRISON, Gary—Oklahoma
GRANDSTAFF, Robert E.—Ohio
GREEN, James R.—West Virginia
HALBERT, Gerald E.—Arizona
HAMMER, David C.—California
HAMPARSUMOGLU, Minas—California
HARLEY, Jacob T.—Florida
HEFNER, Mel—Alabama
HEMPT, John F.—California
HOLLAND, Tom—Florida
HOWARD, William J.—Texas
JACKSON, Mrs. Marilyn—Arizona
JAWORSKI, Michael J.—Iowa
JONES, Earl W., Jr.—Maryland
JOCZ, Edward I.—California
JONES, George—Pennsylvania
JORGENSEN, James I.—Illinois
KARSTENS, R. V.—Oregon
KISTLER, John M.—Pennsylvania
LAMER, Ron—Ontario, Canada
LEONARD, V. A.—Texas
LOWE, David B.—Illinois
MARTIN, Norman J.—Missouri
MATSIKAS, Peter K.—Connecticut
MECHURA, John—New Jersey
METZ, John—Kentucky
MORGAN, Hope—Texas
MORGAN, Lewis J.—Missouri
NATHE, Michael W.—Illinois
OLICHNEY, Michael J.—Virginia
ONO, K.—Tokyo, Japan
PAIGE, John C.—Pennsylvania
PARK, Bong S.—Wisconsin
PHILLIPS, Paul—Ontario, Canada
PLANK, Robert C.—Iowa
POLLARD, James V.—Florida
PURVES, Robert P.—Indiana
REILLEY, W. A.—New York
RELIFORD, Pat—Illinois
ROBERTS, Hurley E.—Georgia
RODRIGUEZ, Manuel E.—Florida
RUBIN, Jack—New Jersey
SANCHEZ, David—New York
SCHOMAKER, Thomas D.—Ohio
SEELEY, R. R.—Texas
SHAFFER, Mark C.—Pennsylvania
SHAW, David S.—Illinois
SKAER, Russell W.—Illinois
STEVENS, Wilferd R.—California
STEVIG, Paul J.—Utah
STROUP, Jonathan—Florida
TABOR, David M.—Virginia
TAING, Keo—Ontario, Canada
TERWILLIGER, Robert—Florida
TICHENOR, Bernard E.—Kentucky
THOMAS, W. H.—Illinois
THOMPSON, Robert G.—Maryland
TUCKER, Eugene—Virginia
TURNER, Lloyd R.—Washington
UHLIG, Paul E.—Pennsylvania
WALKER, William B.—California
WALLACE, Larry E.—Indiana
WEISS, S. A.—New Mexico
WORMELLE, F. W., Jr.—Massachusetts
ZIMMERMAN, Alan E.—Indiana
ZIMMERMAN, Karen Lee—Indiana

Affiliate Chapter Glossary

Robert F. Bishop

June is upon us again, and for many of our chapters, it is a time to close down for the summer months. New officers have been elected in many cases, and they should begin planning the new chapter year. Our next word in our Affiliate Chapter Glossary may apply to some of these chapters.

LETHARGY: n. The quality or state of being lazy.

Last October, we discussed "apathy," which in some ways is similar to lethargy. However, apathy denotes indifference, while lethargy may include the best of intentions. In many chapters, those "best of intentions"become bogged down in the quagmire of lethargy. This is particularly true during the summer months, when there seems to be plenty of time to plan for the fall. The temptation is strong to put things off until later. (I know this from experience—writing this column, for example.) Early planning and early action are goals for which we should all strive. If accomplished, your chapter will grow both in size and productivity.

MEETING: n. An act or process of coming together.

All chapters hold meetings of one form or another. Some hold regular monthly meetings; others meet only once or twice a year. The ideal frequency depends on a number of factors. Monthly meetings are no problem for a guild located in a large city, because distances are short. The guild that covers a large area may have members that may have to travel a hundred miles or more to a meeting. This may suggest that fewer meetings be held. An all-day meeting with a quality program would make the travel worthwhile.

The meeting place can be a problem, also. Hotel meetings rooms are expensive, but can usually be obtained free if accompanied by a meal. Civic rooms are sometimes made available by banks or other commercial institutions in many areas. The YMCA and YWCA are also potential sources of a low-cost meeting place. If your chapter covers a large area, you may wish to rotate your meeting location in different sections of your territory in fairness to your members. One big advantage of the guild system within a state organization is the ability for small groups to hold frequent meetings. Fellowship and sharing within these small groups are usually strong.

NEWSLETTER: n. A newspaper containing news or information of interest to a special group.

The newsletter is one of the most important services a chapter can offer to its members. It is the most complete and inexpensive way to communicate with the entire membership. It can instill a feeling of "family" among members. It can be a platform where issues vital to the members can be exposed. It can be an inspiration to encourage greater participation by the member in chapter activities.

It can be all of these things—and more—with the right editorial staff. Yes, I mean *staff*. Too many times, the newsletter is a one-person operation. The editor must be writer, composer, bench tip specialist, graphic designer, printer, advertising salesman, stamp licker, typist, and whatever else comes up that needs doing. This is not good. The editor must have a staff that will carry out its duties faithfully. *You* must respond to requests for contributions, whether they be bench tips, news items, articles, or help.

Newsletters are expensive. Postage and printing are high and many chapters pay for all or part of their costs by accepting ads or asking for sponsorship from businesses servicing our profession. Others own their own duplicating equipment. If you have sufficient circulation, you may qualify for reduced postage available to non-profit organizations. It is very important, however, that you do not allow quality to suffer at the expense of economy. The newsletter without content becomes the content of the waste basket.

PUBLIC SERVICE: n. a service rendered in the public interest.

Watchmakers deal with the public, either directly or indirectly. The image that the public perceives of our profession is important, and the intelligent chapter serves the public interest as well as its members. It can do this in several ways. The AWI Pos-I-dent watch and jewelry marking program can be a great help to law enforcement in returning stolen valuables to their rightful owners. The wise chapter will police its own ranks and inspire adherence to a code of high business ethics. It can support licensing laws or register its own members, as the Pennsylvania chapter has done. We depend on the public for our livelihood; don't let them down.

...from all around the ASSOCIATION...

INDIANA

On April 5 and 6, 1981 the Watchmakers Association of Indiana held a two-day seminar at the Indianapolis Sheraton Airport Hotel in Indianapolis.

The seminar got off to a good start with the words of Sean Monk, AWI instructor and author of the "Essence of Clock Repair" series which appears in the *Horological Times*. After a coffee break, an AWI film, "Sales Talk," was presented.

Following lunch, those attending were instructed in "Production Repairs" by *Horological Times* Editor, Hal Herman.

Featured Monday was a bench course by WOSIC's Jacques Reymond. The bench course was presented in the morning and again in the afternoon.

OHIO

The Annual Convention is nearly upon us. This year, many enlightening slide programs are on the agenda, so leave the tools at home. If enough members are interested, there will be a "swap shop" of old tools and other various items. The convention will be held at the Marriott Inn in Columbus, Ohio.

The Central Ohio Watchmakers Guild (COWG) reports that the regular monthly meetings have been very well attended and they have been having some very interesting programs.

The OWA Credit Union is still functioning and looking for new members.

PENNSYLVANIA

The Allegheny Guild held its regular monthly meeting on April 14, 1981 in the Ray Gaber Building in Pittsburgh.

The program for the evening was presented by fellow member Andrew Doedyns of the Digital Repair Service Co. in New Brighton.

On March 22, members of the Allegheny Guild, along with their spouses, enjoyed a festive buffet dinner at the Horn of Plenty Restaurant. It was a pleasant evening and offered everyone a chance to get better acquainted.

The March meeting of the Delaware Valley Guild was very well attended. Two new members were in attendance: Samuel Sherman and Peter Wilkin. They received a warm welcome when they were introduced to the guild.

Prior to the regular meeting, the officers and Board of Directors met to discuss plans for future guild meetings. It is hoped that future guild meetings will be as interesting as those in the past. New ideas are always welcome.

The formation of Keystone Guild took place on Sunday, March 15, 1981 in State College, Pennsylvania. The advice and assistance of Ralph Henning, Bob Bishop, Bub Murtland, and Paul Fehrenback was greatly appreciated. Also appreciated was the attendance of area watchmakers who demonstrated their support and interest by coming out to this meeting.

Door prizes were donated by the Ray Gaber Company. A set of screwdrivers went to Gile Fedder of St. Marys, and a cell tester went to Jack Docman of Altoona.

Officers elected were George H. Jones, president; William A. Jaggard, vice-president; and Stanley R. Well, secretary-treasurer.

After the meeting, everyone enjoyed a slide presentation, "Casing Made Easy," by Bob Bishop.

ONTARIO

The Annual Meeting of the Ontario Watchmakers Association was held Sunday, April 26, 1981 at the Loews Westbury Hotel in Toronto, Ontario.

The morning began with registration at 9:30. This was followed by a business meeting at which past-president Barthau reported on the continuing certification of the trade, as well as the apprenticeship program.

After lunch, members attended a technical seminar on Marine Chronometers. The speaker was Mr. Marvin Whitney who is one of the world's foremost authorities on marine chronometers.

The President's Reception was held courtesy of Ebauches, S.A. The day's activities ended with the Annual President's Banquet. The wine was served courtesy of H. & W. Perrin Co., Ltd. and Toronto Jewellers Supply Co., Ltd.

(Continued on page 43)

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

JUNE

7	E	Rochester, NY	Nelson
14	D	South Bend, IN	Smith
14	A	Clark, NJ	Jaeger

JULY

19	E	Roanoke, VA	Nelson
19	A	Chicago, IL	Jaeger
21	A	Toronto, Canada	Jaeger
26	A	Syracuse, NY	Jaeger
31	A	Portland, ME	Jaeger

AUGUST

3	A	Hartford, CT	Jaeger
4	A	New York, NY	Jaeger
11	A	Pittsburgh, PA	Jaeger
29,30	H	Indianapolis, IN	Benesh

SEPTEMBER

20	A	Cincinnati, OH	Jaeger

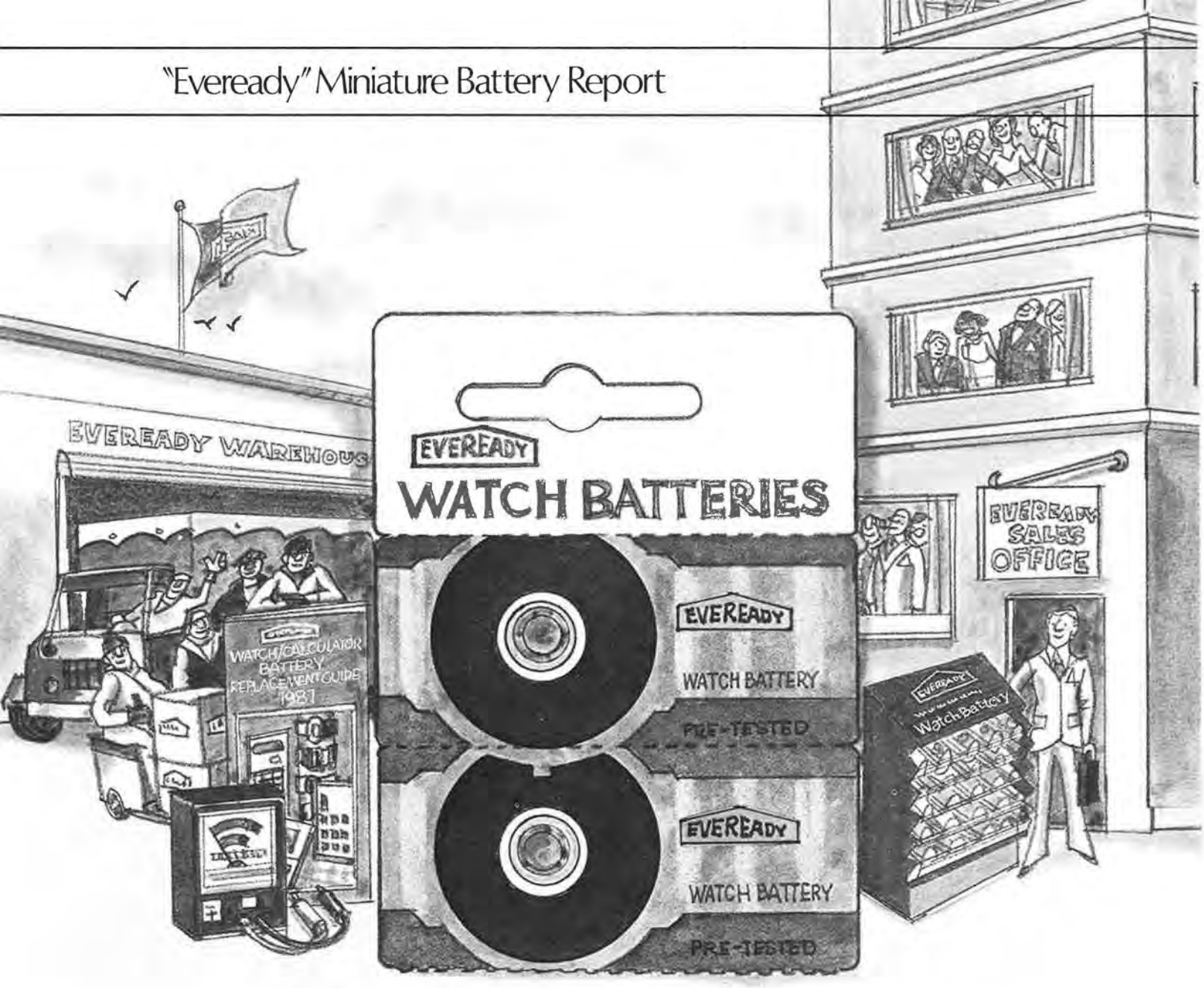
I AM INTERESTED IN YOUR BENCH COURSE TO BE PRESENTED ON _____ AT _____ PLEASE SEND ME MORE INFORMATION.

NAME: _____

ADDRESS _____

CITY, STATE, ZIP _____

"Eveready" Miniature Battery Report



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At "Eveready", what we put behind our watch batteries is just as important as what we put in them. That's why with the watch batteries we sell, we offer displays to put them in. A battery tester to measure their condition. And replacement catalogs to specify their uses. Plus, we have the largest and we think the most knowledgeable sales force in the industry, supported by twelve sales offices to service your daily needs. And we have nine warehouses strategically located around the country for fast shipment.

At "Eveready", what we sell we service...and then some. And that's what separates "Eveready" from all other battery manufacturers. That's what makes "Eveready" the leader in miniature batteries.

Follow the leader..."Eveready."

"Eveready" is a registered trademark of Union Carbide Corp.

UNION CARBIDE

Birds of a Feather

'Tis the beginning of summer and all through the land,
Instructors are happy because they have planned
To attend the June meeting of REC,
In Cincinnati, "Home of WKRP."

We'll listen to Bulova, Seiko and Rolex,
WOSIC and others with techniques quite complex.
We'll pick our peers' brains in the hours that remain,
Between dinner, TV, and the lights out refrain.

Many old friends we'll find now are gray
From looking for years for that P F and A.
We'll have a fine meeting, sure as you're born,
With a program quite useful, no more of this corn.

Research and Education Council
1981 Annual Seminar,
Workshop, and Meeting

June 22 through June 25, 1981
Americana Hotel,
Greater Cincinnati Airport

In planning this year's workshop and seminar, all participants were asked to present a more technical program than has been the custom in the past. It was felt that this would be more useful to REC instructors in terms of practical information which could be incorporated into the curriculum, as opposed to the usual promotional type of presentation.

Specifically, we have asked watch manufacturers and others to emphasize three phases:
1. Engineering design for new products.
2. Quality control in manufacture.
3. Human inspection in final assembly.

We anticipate that the following schedule will keep everyone productively busy and provide topics of interest to all:

George Schlehr

MONDAY, JUNE 22: Bulova Quartz Certification Program presented by Henry Frystak and Leo Helmprecht. This is an **all-day program** offered without charge to REC instructors.

TUESDAY, JUNE 23: **Morning**, 9 to noon: Archie Perkins, instructor and author of technical articles for the *Horological Times*. Demonstration of wheel and pinion cutting. **Afternoon**, 1 to 4: Bill Smith, Jr., instructor and author of technical articles for the *Horological Times*, gives a three-part lecture on: 1) The Escapement; 2) The Oscillatory System; 3) Hairspring Manipulation. There will also be a slide presentation on clockmaking.

WEDNESDAY, JUNE 24: **Morning**, 9 to noon: Erich Lorenz, Manager, Consumer Service Division, Rolex Watch, USA, Inc. Technical introduction with slides; 16mm sound film "Of Time and Men," followed by coffee/cake break, courtesy of Rolex; Q and A session. **Afternoon**, 1 to 4: Business meeting, rap session. Election of officers.

THURSDAY, JUNE 25: **Morning**, 9 to noon: Watchmakers of Switzerland Information Center (WOSIC) will present film on "Delirium" by Jacques Reymond with Q and A session. **Afternoon**, 1 to 4: The Seiko Watch Co. will be represented by Jack Schecter and Scott Chou. A film, "In Quest of Perfection," will be presented, followed by a slide program.

Every Minute Counts

ASSOCIATION NEWS

(Continued from page 39)

NEW YORK

At the April meeting of the Horological Society of New York, Don DeWolfe presented a short history of the quartz watch. Mr. DeWolfe also showed members some of the latest instruments which can diagnose quartz watch problems for the watchmaker. These timing machines can be used for mechanical watches as well as electronic and quartz watches.

IOWA

The 1981 Iowa Jewelers and Watchmakers Convention and Trade Show is scheduled for September 12 and 13, 1981, at the Best Western Airport Inn, 1810 Army Post Road, Des Moines, Iowa.

Due to cancellations, new exhibitors this year are Dana-Camtra, Ltd. of Des Moines; J. P. Lifestyles of Minneapolis; and Pulsar Watch Company.

There will be a Saturday night banquet and dance. A larger dance floor of 27 x 30 ft. is being arranged for everyone's dancing pleasure.

NEW JERSEY

The guest speaker at the April meeting of the Watchmakers Association of New Jersey was Mr. Charles Terwilliger. Mr. Terwilliger, of Horolovar, is an author, lecturer, and a recognized authority on the 400-day clock. He presented an illustrated talk on "The History of the 400-day Clock in the United States."

Well known as author of "The Horolovar 400-day Clock Repair Guide," a standard reference work which has run through eight editions since it appeared in 1953, Charles Terwilliger had no idea of becoming a specialist in the field back in 1947 when he set out to resolve difficulties in regulating the timekeeping of these clocks. After he traced his trouble to the suspension spring, he began searching for a more serviceable type, and inquiry in the scientific world led him to discover that what was needed was a temperature compensating alloy. From this came the birth of the Horolovar suspension spring in 1950.

Thirty years later, Horolovar has achieved worldwide recognition and, in 1980, sold over 150,000 springs. Charles Terwilliger predicts the so-called anniversary clock will be around for a long time because he estimates that there are at least 10 million in existence. By following his book's step-by-step guide and using Horolovar materials and equipment, he claims a clock repairman can turn these clocks into a very profitable line of business. THJ

THE SHIP'S CHRONOMETER

(Continued from page 18)

was given a letter by the Naval Observatory identifying him as having the Government's blessing to purchase chronometers which in turn would be delivered to the Observatory for possible purchase. Most of the instruments delivered to the Observatory by Mr. Low were purchased for the Maritime Commission.

After the passing of Max, the firm was moved to 110 Hudson Street, and, although the two sons still operate the firm of M. Low at that address, they are primarily dealing in real estate.

MANNING, GEORGE, 90 Wall Street, New York City. Mr. Manning received and kept chronometers for the Navy, but there is no evidence that he repaired and/or rated chronometers. During March 1851, Eggert was directed by the Observatory to pick up from Manning, chronometers belonging to the Navy and repair them. When Arthur Stewart informed the Observatory in 1852 that he wished to give up the Navy's New York agency for the care of Navy chronometers, as he desired to retire, he was directed to turn over all Government chronometers in his keeping to George Manning.

It appears that Manning's primary contribution to the maritime service was providing charts, nautical almanacs, logs, tidal datums, plotting sheets, and instruments. Most of the correspondence between George Manning and the Navy dealt with furnishing naval ships with the aforementioned items. In addition to these services, Mr. Manning apparently acted as an agent for the Navy in selling off surveyed instruments, for in a letter dated January 7, 1853, Superintendent Maury directed Eggert to deliver those chronometers to be surveyed to Mr. Manning.

Apparently Mr. Manning was a very astute businessman and the Navy had high regard for the manner in which he operated his business. Correspondence between the Naval Observatory, the various Bureau Chiefs, and Congress as to why Manning was favored with the majority of requisitions, indicated that his dependability was unmatched and that he maintained quality control. Hence, it was to the best interest of the Government to deal with Mr. Manning.

MEEKS, BENJAMIN F., Frankfort, Kentucky. Benjamin was a mechanical genius whose talents were virtually unlimited. There is no question that he was better known by early 19th century American game fishermen than he was by horologists, for he designed and produced the famous Meek's fishing reel. Although he is known for his fishing reels, this gifted, trained watchmaker produced a very fine ship's chronometer.

Benjamin received his training as a watchmaker in 1835 from his older brother Jonathan who had a watch/jewelry store in Frankfort. However, before he completed his training, he became interested in making fishing reels. Judge Mason Brown, a rabid fisherman, asked Benjamin to make him a reel, "as perfect as a watch." Benjamin envisioned this mechanism to involve the use of a gear arrangement. Facilities to cut such gears were not available in Frankfort, so he had to go elsewhere.

The judge was very pleased with Meek's reel and soon the word spread about this young man's ingenious device. Consequently, he was soon swamped with orders—so much so that he abandoned his watchmaking training and turned his attention to producing fishing reels.

In 1839, he and his brother Jonathan entered into a partnership which was dissolved in 1852. While he

(Continued on page 47)

(Continued from page 21)

pushed, and the lock is rotated to hold it. See Figure 1, View I.

Hinge joints and safety catches come in two types, one for hard soldering and the other for soft soldering. The ones for soft soldering have a cup-like base that is hard soldered to the catch. This gives more surface for the soft solder, which is necessary to make a solid, strong bond. Soft solder does not have the holding strength of hard solder, nor does it require such a large amount of heat. Thus, there is no danger of melting the hard solder when soft soldering the hinge joint or safety catch to the pin.

To convert the soft-solder type of hinge joint or safety catch into one for hard soldering, the cup base can be removed simply by heating red hot and, when the hard solder starts to melt, removing it. It can also be sawed off with the jewelers' saw using a fine blade (6/0 or finer). Usually the type to be hard soldered is only available in karat gold, so to use one of lesser-quality metal, it is necessary to remove the base.

In installing hinge joints or safety catches, alignment is always a problem whether using hard or soft solder. The "third hand" tool can be used to advantage until sufficient skill and a steady hand are developed, allowing one to use a pick or tweezers to hold the item while soldering. The techniques for hard and soft soldering have been explained in previous articles.

Another common problem faced by the jewelry repairman is fitting rings to fingers with large knuckles. Some people have naturally large knuckles, while others have what are called arthritic knuckles–large knuckles which have developed due to arthritis. The problem is that any ring other than a plain band which is large enough to go over the knuckle has a tendency to turn on the finger. There are several patented expansion shanks and other devices on the market made to take care of this problem; however, most are fragile and do not last very long before ceasing to function properly. They are also quite expensive, as they have to be made of precious metal to match the rings on which they are installed. There is a way to overcome this problem with a durable type of installation which many jewelery repairmen use. This device can be made and installed for a fraction of the cost of the patented device. A spring can be made from white or yellow gold to go inside of the ring shank and extend about two-thirds of the way around the shank. This is hard soldered to one side. Figure 2, point a shows the spring, and Figure 2, point b, shows the hard solder joint. Make the ring about one size larger than

(Continued on page 56)

THE ROCK QUARRY

By Fred S. Burckhardt

Venting My Frustrations In Two Vignettes

Have you ever noticed how some things start to bug you after a while? I have one pet peeve—CRYSTAL CEMENT. I have yet to use a tube all the way to the end. Through the years, I guess I've thrown away at least 50 gallons.

Maybe it's just me, but how come the first or second time you use a tube, the wire stopper pulls loose from the cap? After subsequent use, the old glue builds up on the wire until there is as much on the wire as there is in the tube.

Once I had a streak of luck and was able to use up almost half a tube, before, one day, without my knowing it, the tube split and the cement dripped onto my lap. I didn't realize what had happened until an hour later when a customer came in, and I got up to wait on him. My pants legs were stuck together, and I had to waddle over to the repair counter. When the customer saw me walking that way, he said, "Look, if you have to go to the bathroom, I don't mind waiting a minute!"

Did you ever have a tube leak in your drawer? It happened to me once. I reached in to get a pair of hairspring tweezers and came up with the tweezers, three screwdrivers, a poising tool, and two buttons of pithwood. The tube is still stuck to the bottom of the drawer.

Granted, not everyone has a problem with crystal cement. I heard about a fellow over in Syria who used a tube all the way to the last drop. He's listed in the Guinness Book of World Records.

There was a time when I decided to switch brands to see if that would change my luck. It did—from bad to worse! It was the lousiest crystal cement I ever used. In fact, that was the name of it—LOUSY CRYSTAL CEMENT, made by the Lousy Crystal Cement Co., Joe Lousy, President. I had a rather embarrassing experience with this particular tube. Somehow it got punctured, so I wrapped some tissue around it to keep it from leaking. The next time I used it, some of the tissue stuck to my hand. Did you ever wait on a customer with tissue stuck on your hand?

How about the tube that gets plugged up? You squeeze a little and nothing comes out, so you squeeze a little harder. Still nothing. A little harder still . . . sorry, nothing yet. By this time the old Yuletide Spirit is about gone. One last squeeze and it finally comes out—from every place around the tube except the needle!

I have to admit there was one time when I had no trouble. The only reason was the tube was empty. Brand new and not a drop of cement in the thing!

Some seek fame and fortune. The only thing I ask for before I go to that big repair shop in the sky is just ONE tube of crystal cement that will endure to the last drop.

While I'm in this frame of mind, there's something else I'd like to get off my chest here and now. Isn't it disgusting how some people keep their benches so clean and neat? I visited a fellow a while back who had just opened a shop, and when I walked into the place, I thought I would be snow blinded. Everything was pure white, even his tweezers and screwdrivers. I thought to myself, "Operating rooms aren't even this clean." This guy even had the walls and ceiling waxed.

After my eyes got accustomed to the brightness, I looked at the top of his bench. It was like the old saying, "A place for everything and everything in its place." I almost threw up! When he sat down to work, I knew for sure he would put on a pair of rubber surgical gloves, but I was mistaken—he wore white linen gloves.

It took me back to the days when I first started in this line of work. My bench wasn't white, but it was just as neat. As well as I can remember, the neatness lasted close to twenty minutes. It got to the point that if I flipped a part, there wasn't any sense looking for it as it would take days to find.

Finally, the situation got so bad, I installed a jewelers bench pin so I would have a clean place to work. I kept having to make it longer and longer until I was working about three feet from the bench.

One day, I decided to clean it off. The reason was that a customer came in to pick up his grandfather clock and I couldn't find it anywhere. Lucky for me, it started to chime, and I was able to trace the sound to somewhere around the bench. It took three days to uncover it, but at least I had another happy customer.

Why is it that watchmakers are like pack-rats? I've never seen a watchmaker yet who didn't have a little box or something filled with old balance staffs, crowns, broken wheels, and even old broken crystals. I even used to let old cells lay on the bench, till one day, one exploded. That sonofagun ricocheted for three minutes before it finally hit me behind the ear. I went out like a light. The boss almost fired me for sleeping on the job.

I would like to make a proposal: All watchmakers show how patriotic they are by cleaning off their benches and sending the scrap to the Navy Department. Surely they would have enough metal to build at least one battleship! HT

THE SHIP'S CHRONOMETER

(Continued from page 44)

and his brother were in business together, he produced his chronometer.

After several unsuccessful business ventures in the watch/jewelry business, he returned to the reel-making business with his two sons. The business remained in force until 1898 when it was sold to the Horton Manufacturer Company, Bristol, Connecticut.

Benjamin's chronometer has a detent escapement, helical hairspring fitted to a bimetallic balance, and a going barrel. The top plate is skeletonized.

The late Jesse Coleman, one of America's foremost horologists, had the pleasure of examining this beautifully constructed instrument. He told me in 1972 that Benjamin was one of those rare individuals whose mechanical ingenuity and ability were indescribable.

JAMES MONROE & SON, New Bedford, Massachusetts. Here again, we have two makers of which little is known concerning their contributions to the chronometer-making market, other than what is found in several pieces of Naval correspondence.

On October 7, 1863, Superintendent Gilliss stated in a letter to the Bureau of Equipment that it would be in the best interest of the Navy to inspect the six American chronometer-making firms in order to ascertain not only what facilities were possessed by Messrs. Bond and Son at Boston, James Monroe and Son at New Bedford, and Bliss, Eggert, Gray, and Negus, all of New York, but also to what extent they were willing to use those facilities to construct all the chronometers needed by the Navy.

Shortly thereafter, Gilliss was directed to make such an inspection. In his October 23rd report to the Bureau, he stated that he visited all of the above firms and that a series of questions was addressed to each. He added, "So far as I could ascertain, excepting the chiefs of the firms, there are no more than that number of thorough chronometer makers in each of the cities of New York and Boston. Mr. Monroe and Son are the only two in New Bedford."

As a result of Gilliss's trip, the Navy purchased three more of Monroe's chronometers, numbers 262, 264, and 275. Monroe had previously sold two chronometers, numbers 251 and 266, to the Navy in October 1862, for which he was paid $225 each. Monroe was directed by Gilliss to deliver the three instruments to Negus and Company, who was the agent for the care, rating, and issuing of Government chronometers in New York.

(Continued on page 57)

Figure 2. Movement view of Meek's Chronometer. Courtesy of Orville R. Hagans.

Figure 1. Dial of Benjamin F. Meek's Chronometer, made in 1852. Courtesy of Orville R. Hagans.

In the Spotlight© 1981
by Orville R. Hagans

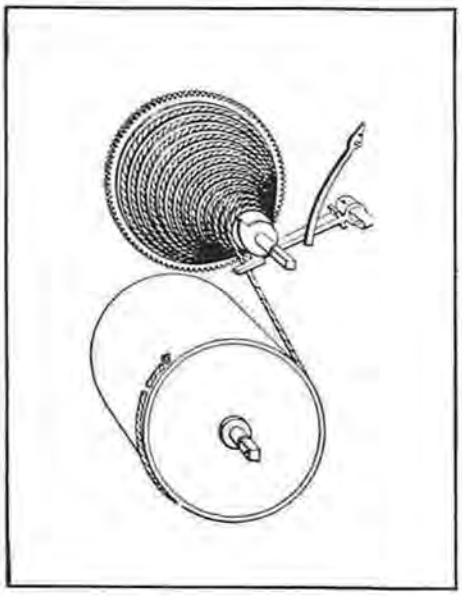
Orville R. Hagans, CMC, CMW, FAWI, FBHI

THE FUSEE

This old horological term comes down to us from the French *fusee*, derived from the Latin *fusus*, a spindle. The term was applied to a graduated cone, around which a driving cord was wound to maintain an equal driving power from the weight or mainspring in a clock or watch. It has been claimed by antiquarian historians that Jocob Zech of Prague was the inventor, circa 1599, but this cannot be correct, as a German clock of 1520 has one. The fact is that research so far has not revealed the name of the inventor.

When the clock or watch is wound up, the force of the weight fall or spring is the greatest, and the driving cord or chain of the fusee acts from its smallest end, exerting the lowest leverage on the train of the timepiece. As the driving weight of the clock falls or the spring of the watch unwinds, the drive from the thicker part of the fusee acts with the same measure of force on the train so that the power on the escapement is thus rendered more constant. Catgut was the driving cord used on the older fusees, as it was for the driving weights. In 1664, a Swiss watchmaker by the name of Gruet, used a chain for this purpose, but we are not certain that he was the first to do so. These fusee chains were very finely made in the days of long ago; they were indeed works of very fine mechanical skill, and we have often admired their minute perfection. The fusee was rather rare in tower clocks, though some examples have been recorded; cast iron was used in one case for the conical barrel, and hardwood in others.

Very few "grandfather" clocks of the fusee type have survived, though many were made in 18th-century Ireland where clockmaking was a great local cottage industry. About forty years ago, we saw one made by Creighton of Ballymena in which the fusee barrel was a solid brass casting graduated from a conical shape by hand cutting. The drive



was catgut and the clock was dated ca. 1780. The fusee fell into disuse in clocks, but survived longer in watchmaking and has come down to our time in the marine chronometer. Fusee clocks are rare collectors' pieces, and the fusee watch is in demand by those who treasure horological antiques.

THE IMPORTANCE OF A WELL-FITTING "TRAIN"

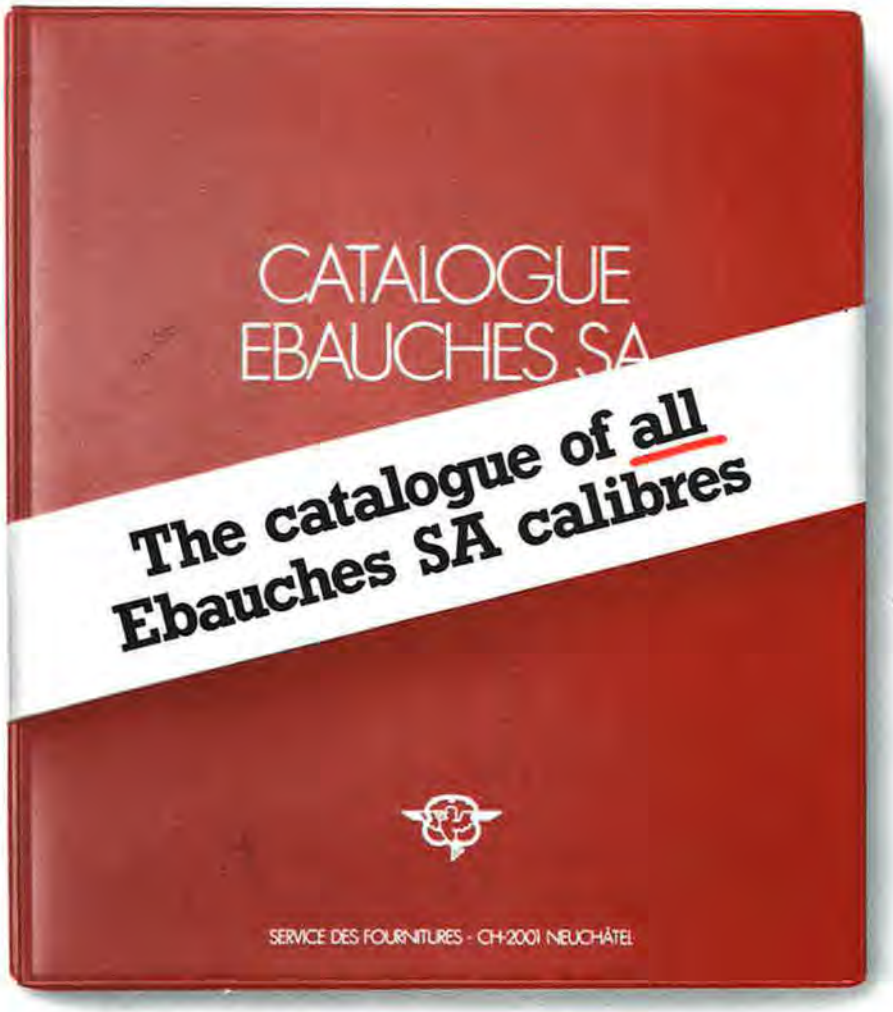
The subject we are about to discuss is one that, in the opinion of the writer, is usually not given the consideration it deserves. From experience accumulated over a period of many years, I have observed that the average workman seldom suspects anything wrong with the "train" unless it absolutely "hangs up" and fails to function. If it will run down with reasonable freedom, although it may have a rumbling, noisy sound, it is generally accepted as being O.K., and troubles are looked for elsewhere. Then, after the watch has been repaired and it fails to take good motion, a stronger mainspring seems to be the one and only sure remedy when, in reality, the spring already in the watch is stronger than it need be if the watch otherwise were in condition.

This is only one of many illustrations that could be presented as evidence that every ambitious young watchmaker should not be content to merely acquire an apprenticeship education unless it be under the direction of an extraordinarily capable workman. Schooling acquired from schools, textbooks, trade journals, etc., is generally the road to success, and bear in mind that good watchmaking cannot be acquired in a few months. It takes year of experience.

In returning to our subject (the train), I am not attempting to convey the idea that a correctly designed and fitted train will be a "cure-all" for all watch troubles. However, it does play a very important part. It will transmit the motive power to the escapement with a minimum amount of lost power, and if allowed to run freely, it will attain its maximum speed almost instantly with a smooth, even, whirring sound (free from rattle). If, on the other hand, it should be noisy and sluggish in attaining speed, this is evidence that something is wrong. The diameters of the wheels and pinions may be incorrect; there may be thick leaf pinions, wheel addenda which are too short, or bad depths. To make matters worse, the wheels could be too thick and heavy, particularly the fourth and escape wheels, which would give excess inertia, a very bad fault and generally overlooked. Excess inertia is much the same as attempting to get up quick speed in an automobile with the brakes applied. As it is the speed of the escape tooth passing over the face of the pallet that determines the amount of energy (or impulse) given, it is obvious that if the train were lighter, the motive power could overcome

(Continued on page 56)

CONSTANTLY UPDATED AND EXPANDED.



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WMJDA Looks Into the Eighties

Editors Note: Our available editorial space in the May issue did not permit complete coverage of this year's annual meeting of the WATCH MATERIAL AND JEWELRY DISTRIBUTORS ASSOCIATION (WMJDA) *held in March at Rancho La Costa in Carlsbad, California. We are happy to present additional coverage this month.*

Newly elected WMJDA president Karl Esslinger, Esslinger & Co., St. Paul, MN, received an engraved gavel from immediate past president, John R. Cassedy, Cas-Ker Co., Cincinnati, OH.

Gregory S. Staszko of Main, Hurdman and Cranston, Cincinnati, OH, above, presented an in-depth orientation in the use of computers by parts distributors. He was assited by T.A. Foster, not shown.

Curtis Mick, formerly with L&R Manufacturing Co., Kearney, NJ, is shown with his wife Eva. Mick received an Honorary Life Membership Award and gave a tribute to the upcoming generation of leaders of the Association in his remarks summarizing a life in the watch materials industry.

MAN OF THE YEAR honors were bestowed upon William J. Kilb, Kilb & Company, Milwaukee, WI by the WMJDA. He is shown above expressing his appreciation to the audience at the special honorary luncheon.

Gladys Endman, President of Marshall Swartchild Co., Chicago, IL, discussed the state of the industry with Harold Perlman, President of the American Perfit Crystal Corp., New York, NY, during the Associates' Tables display.

In Memoriam

At the WMJDA meetings, moments of silence were observed by the gathered members of the watch material industry in memory of:

Edward L. Endman, Owner of Marshall-Swartchild, Chicago, IL

Ted Lampert, M. J. Lampert Co., New York, NY

Bernard Nest, President of The Nest Company, St. Louis, MO

Jerome Shiffman, President of Rocket Jewelry Box, Bronx, NY

Otto Stern, President of Stern, Inc., Columbus, OH



A panel of WMJDA members discussed "Computers As We Know Them" as part of the business program. Participants shared their experiences in the acquisition and operation of a wide range of computer systems and services for their distributorships. Left to Right, above: Ken Weil, The Gould Company, Dallas, TX; Roger Borel, Jules Borel & Co., Kansas City, MO; Norma Nest, The Nest Company, St. Louis, MO. Left to Right, below: Frances Horowitz, L&R Manufacturing Co., Kearney, NJ; Robert Moengen, Jewelmont Corp., Minneapolis, MN; Arthur Bush, United Tool & Material Co., Denver, CO.



Bench Tips / Joe Crooks

Is There A Safecracker In The House?

This month we have a clock tip from Joseph G. Baier, Ph.D., CMW, 10624 N. 24th Place, Phoenix, Arizona 85028.

Did you ever have a boudoir clock movement a prisoner in its own case? I have on several occasions.

In these jeweled escapement time and alarm clocks, the winding key for some clocks is screwed onto its arbor. If the click spring breaks, there is no way to unwind that key; the mainspring just turns off the arbor hook, and there you are. There is no way to remove the case.

However, I have found one solution to this problem, and there may be others. Tap the clock gently with a soft wood or plastic mallet, rotating the clock slowly in the hands, and after each tap, try turning the key in the unwinding direction. I have yet to find a boudoir clock in which the click will not eventually catch onto the ratchet wheel.

Thanks, Joe, for a nice tip. I would have become so flustered with this problem, since it's never happened to me, that I would probably have sawed off the key with a hack saw!

Incidentally, Dr. Baier is 2nd vice-president of AWI and has authored, along with James L. Tigner and Marvin E. Whitney, AWI's new Questions and Answers of and for the Clockmaking Profession. *The book has taken more than five years of preparation. Order one now before the first issue runs out!*

TIME TO EAT A LITTLE MORE CROW

With last month's bench tip on tightening the pinion on the center wheel of the 218 Accutron (May issue of Horological Times*), I thought I finally had a tip for Mr. Henry Frystak, my Bulova technical consultant, instructor, and "friend."*

Remember when I promised not to publish another Accutron tip until it was cleared with Henry? Well, against my better judgment, I broke that promise and am in hot water once again.

I saw Henry at the North Carolina Watchmakers Convention and couldn't wait to tell him about the Accutron tip I had used without his knowledge. (Chalk one up for me.)

Mr. Frystak, in his gracious way, stated:

"Joe, that does sound like a safe way to tighten the 218 center wheel pinion. However, never bend the arms of the center wheel to tighten the pinion until you first try the much quicker and easier way—turning the wheel over on the pinion. About 98% of the time, it's tight as new. Rarely will the arms need to be sprung in unless the wheel has been turned over before.

"Also, a loose pinion on the 218 is usually caused by improper lubrication or by a customer who has not been taught the proper way to advance the day of the month by turning the crown clockwise with the stem pushed in."

O.K., Mr. Frystak, I know that. Rub out my chalk mark, pass the crow, and could I have a little ketchup on it this time, please?

Don't forget to send your bench tips to: Jingle Joe, 265 N. Main St., Mooresville, North Carolina 28115.

(Continued from page 36)

the hub. The punch used to insert the cylinder does not have a pivot on its end, but is flat and somewhat pointed so it will enter the opening in the cylinder as is shown in View B, Figure 3. Before the cylinder is staked into the brass hub, it must be started into the hole in the correct position in relation to the banking pin in the rim of the wheel. To position the cylinder, grasp the cylinder with a pair of tweezers across the impulse lips as in Figure 4, View B. The jaw of the tweezer that is on the cylinder lips should be at right angles to the banking pin. When inserting the punch into the cylinder, the die plate of the staking tool is left free so it can be turned enough to let the punch enter the opening of the cylinder. After the punch is in the proper position, the die plate is then locked tight. Usually the cylinder can be pressed into the brass hub without the use of a hammer. The cylinder is pressed in until the punch goes against the bottom of the hub.

Figure 5 shows how the plug punch is used to remove a cylinder plug. To remove a cylinder plug, select a tapered mouth staking tool stump of suitable size to support the corner of the end of the cylinder as shown in View A of Figure 5. The hole in the stump must be large enough to clear the pivot section of the cylinder plug. The taper mouth in the stump allows the plug to be driven out a slight amount. Then select the proper size plug punch. The pivot on the punch should be slightly smaller than the diameter of the plug being removed. To position the punch, the die plate of the staking tool is left free until the punch is positioned; then the die plate is locked up. It usually takes very light taps of the hammer on the end of the punch to start the plug moving out. After the plug has been shifted out slightly, a hole in the die plate is used to finish removing the plug. The size of the hole selected should be large enough to just clear the cylinder plug. This is shown in View B, Figure 5. Note: Sometimes a cylinder plug fits into the cylinder very tightly and is stubborn to remove. If this is the case, the cylinder can be rolled on a hard, smooth surface with a polished steel burnisher as shown in Figure 4, View A. This stretches the cylinder wall which loosens the plug so it can easily be removed. When replacing cylinder plugs, they usually have to be made specially for the particular job. An assortment of cylinder plugs can usually be obtained from watch material distributors, but the proper size plug cannot always be found in an assortment; therefore, it is necessary to custom-make the plug.

Cylinder plugs are made from blue steel because if they were made from soft steel and then hardened, there would be a danger of burning the delicate pivots in the hardening process. When fitting a cylinder plug to a cylinder that is already staked into the wheel, it would be best for the pivot to be already turned and finished. Figure 6, View A shows a cylinder plug being made in the lathe. To make a cylinder plug, the following procedure is used. Take a piece of blue steel pivot wire and chuck it true in the lathe. Use a sharp graver to turn the diameter "a" of the plug until it will enter the cylinder and go to a depth of about 2/3 of the way to its correct seated position. It will be noted that there is a slight taper to the plug. This is needed because the hole in the ends of the cylinder is slightly tapered. Therefore, to have a good

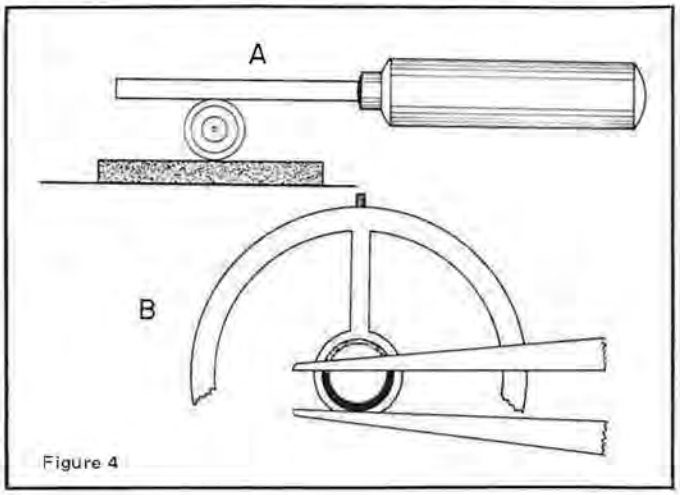


Figure 4

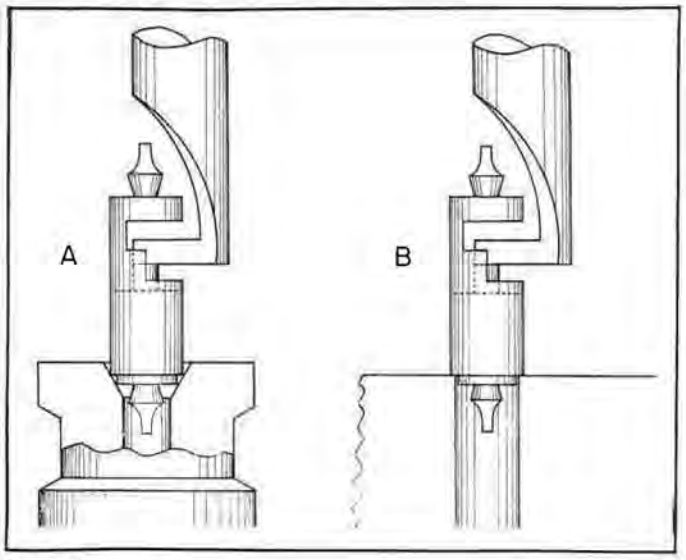


Figure 5

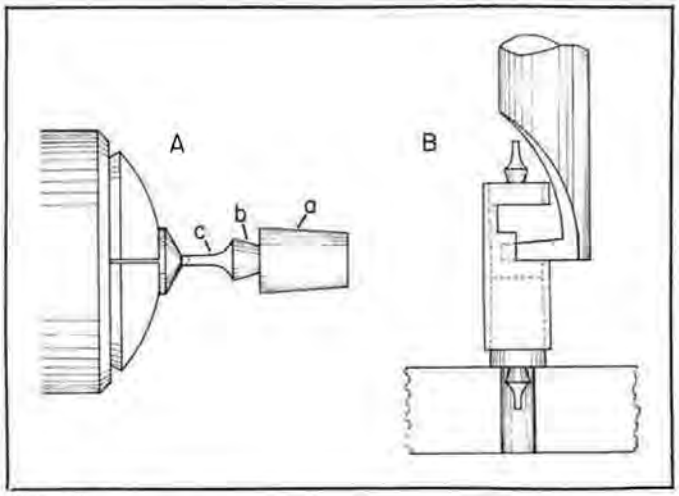


Figure 6

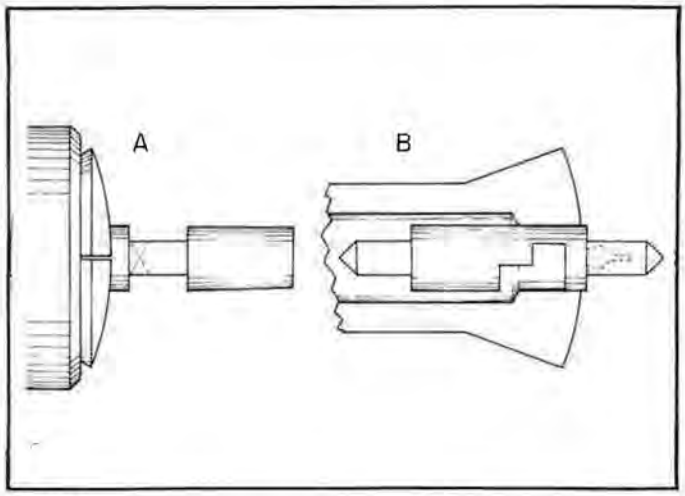


Figure 7

friction fit, the tapers on the plug and the taper in the cylinder should be about the same. Mark off the length of the body of the plug and turn the oil groove "b." Then turn the pivot "c," and cut the plug off at the dotted lines at the end of the pivot. Then the plug can be chucked with the pivot extending outside the chuck to finish the pivot. Make sure the pivot runs true before starting to finish it. After the plug is completed, it is pressed into the cylinder. Figure 6, View B shows the plug being pressed into the cylinder. To press the plug into the cylinder, first select a hole in the die plate of the staking tool that will just clear the pivot portion of the plug. Now use the same style punch that was used to press the cylinder into the brass hub, to press the plug into the cylinder. Sometimes the cylinder plugs are made without the pivots and are inserted into the cylinder before the cylinder is staked into the balance wheel. Then the pivots are turned and finished. Figure 7, View A shows the plug being made. View B shows how the cylinder is chucked up for finishing the pivots. When chucking the cylinder, it should be chucked close to the pivot being worked on, especially on the lower end where the passage for the escape wheel is made. This part of the cylinder is very weak and delicate, making it easily broken.

After a cylinder or a cylinder plug is replaced, the balance wheel must be checked for truth and poise. When truing a cylinder balance wheel, the wheel must be removed from the caliper to make the necessary bends. The cylinder is so fragile where the escape wheel passage is cut that it could bend or break at this point if held in the caliper while being

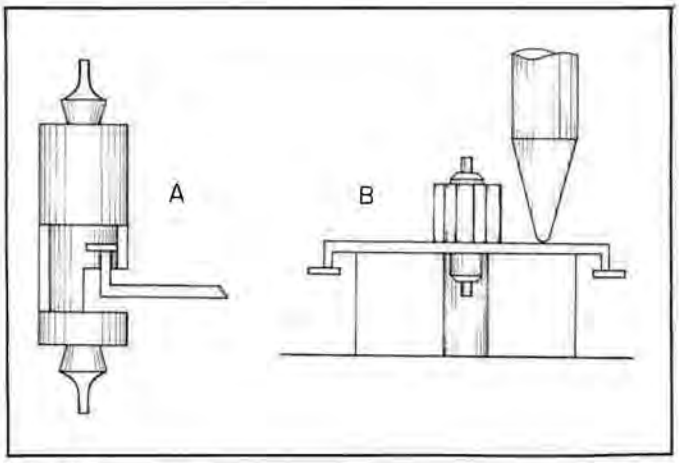


Figure 8

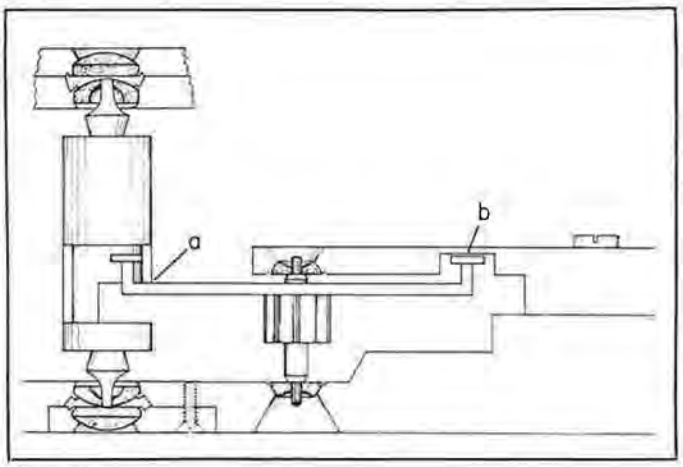


Figure 9

trued. It is very important not to close the caliper jaws too tightly on the cylinder as this could bend or break the cylinder. The wheel should be held in the fingers while being straightened. When poising the balance wheel, weight is taken from the underside of the rim of the wheel on the heavy side with a pivot drill.

When replacing cylinders or cylinder plugs, it is very important to have the notch in the cylinder at the proper height for the escape wheel. The escape wheel teeth should be positioned in the middle of the discharging lip of the cylinder and the rim of the escape wheel should be centered in the notch of the cylinder as shown in View A of Figure 8. If the lower end of the cylinder is too short or the lower plug too short, the cylinder notch will rub the rim of the escape wheel as shown in Figure 9, View "a." If the lower end of the cylinder is too long or the lower plug too long, the lower end of the slot in the cylinder could rub the underside of the escape wheel rim. If the lower end of the cylinder is too short, a longer plug must be selected and the upper pivot shortened. On the other hand, if the lower end is too long, the lower pivot can be shortened the correct amount, and usually the upper plug can be pressed out enough to correct the end shake or a longer plug can be used to correct the end shake.

A very handy depth gauge can be made to measure the height of the escape wheel and escape wheel cock in order to determine the height of the notches in the cylinder. To make the tool, take a piece of clock bushing wire and chuck it in the lathe. Then face the end of the wire flat with a graver. Now take a piece of piano wire that fits the hole in the bushing wire very closely. Chuck the piano wire up in the lathe. Then turn and finish a conical shoulder pivot on the end of the piano wire. Make the pivot .10mm in diameter. Now on the other end of the piano wire, solder a small watch crown. The watch crown is used to hold onto while the piano wire is moved back and forth in the bushing wire. If the piano wire is slightly loose in the hole in the bushing wire, it can be curved slightly which will tighten it in the hole. To use this depth gauge, the pivot is placed in the lower jewel hole and the bushing wire is moved to the height of the escape wheel which will determine where the notch in the cylinder must be. This gauge can also be used to measure from the balance cock to the escape wheel cock. When a measurement is taken with the gauge, the measurement can be compared on the cylinder or can be measured with a depth micrometer.

A common problem in cylinder escapements is an out-of-true escape wheel. When the escape wheel is out of ture, it could rub on the underside of the escape wheel cock as in View "b" of Figure 9, or the escape wheel could rub on the cylinder notch as in View "a" of Figure 9. To true an escape wheel, it is placed on a brass stump as in Figure 8, View B , and the spoke of the wheel nearest the high spot is tapped with a peening punch to lower the teeth on that side. The peening must be done with caution to avoid breaking the escape wheel spoke or stretching the spoke which would make the wheel out of true in the round. The end shakes and side shakes must be kept to a minimum on the cylinder and the escape wheel if the best performance is expected from the cylinder escapement.

QUESTIONS AND ANSWERS

(Continued from page 22)

I would like to know if parts are still available. I also need a technical sheet for disassembly and reassembly, as well as any other information pertaining to the repair of it.

Ralph Campbell
Keene, New Hampshire

A We have contacted the Longines Watch Company in search for parts to your 19.73N pocket chronograph. We were informed that this calibre has long ago been discontinued and that parts for it have not been available for a very long time.

The material catalogs printed in the 1960 period do not list this calibre at all. Neither does the one I did for the WMJDA in the 1950's. However, I've just searched through my library and come up with a 1912 Longines parts catalog and I am enclosing a photocopy of the parts sheet. I hope that at least this may help.

The Esembl-O-Graph library of chronograph instruction lists one 1940-ish wrist chronograph and tells how to assemble and repair it in detail. Should you want that volume, write to AWI Central.

IN THE SPOTLIGHT

(Continued from page 48)

the inertia more quickly and produce a greater escape wheel speed and more impulse without increasing the motive power. It will thus be seen that proper designing and fitting of the train is the only means of acquiring a maximum escape wheel speed from a given amount of motive power. With this object in view as a step nearer to better watchmaking, I cannot too strongly emphasize, "Don't overlook the train!"

The reader may wish to ask, in cases where faults exist as outlined above, what is the remedy? This would be difficult to answer without examination of the job. In many instances, such as may be seen in many of the very small wrist watches, faulty design and construction are in evidence on account of insufficient space for correctly designed parts. In such cases, the repairman is confronted with the same handicap as was the manufacturer, and is generally helpless. However, the better watchmaker, having the necessary technical knowledge and equipment at his command, can usually find a way to improve the condition of any "bad actor watch." To become one of the better class requires first a love for the work that increases as you progress, the proper schooling under the direction of a capable workman, and a complete watchmaking outfit; experience will do the rest.

PICKLE BARREL

(Continued from page 45)

required to go over the knuckle. Then roll out a piece of metal (matching the metal of which the ring is made) to a thickness of about 1mm, and cut this to the width of the shank. Round it and hard solder one end to the inside of the shank. It can then be tightened and fitted by placing on the ring mandrel and tapping with the rawhide mallot. The end which is hard soldered should be filed to taper smoothly with the inside of the shank, and then be polished. Tension on the finger can be adjusted by bending the spring to a smaller circumference with a pair of chain nose pliers. At the point where the spring is soldered to the shank, it will be annealed dead soft; however, hammering with the rawhide mallot and bending to make ajdustments will harden it, and as it is worn, continual vibration will continue to make it harder and more springy.

If it is necessary to install one of these springs on a platinum ring, it is better to make the spring of white gold. Platinum has a tendency to remain soft and not temper with vibration, so the necessary spring action will not be achieved.

(To be continued next month)

THE SHIP'S CHRONOMETER
(Continued from page 47)

So far as I can ascertain, only seven chronometers were purchased from Monroe. Several were still in use in the 1930's, for number 262 was issued to the U.S.S. *Salinas*, May 16, 1930; number 266 was sent to the Boston Navy Yard, October 15, 1931; and number 300 was issued to the U.S.S. *Dewey*, October 19, 1934. HT

Figure 3. Close-up view of Meek's Compensation Balance and Escapement. Courtesy of Orville R. Hagans.

Figure 4. Close-up view of Meek's Escapement. Courtesy of Orville R. Hagans.

AN OMEGA WATCH ON THE WRIST OF EACH ASTRONAUT IN SPACE SHUTTLE

All the American astronauts participating in the Space Shuttle program were wearing Omega Speedmaster Professional chronographs on their wrists. Omega is once more in a position to make a tangible contribution to the exploration of space. Orbiter Columbia is the first in a series of flights which should result, sometime around 1985, in the establishment of space work stations. The United States will then have four orbiters, Columbia, Challenger, Discovery, and Atlantic, making trips from their bases at Cape Canaveral and Vandenberg. A total of 44 missions of a scientific, meteorological, technical, industrial, or medical nature, have been planned for the next six years.

Omega chronographs have been familiar to NASA for many years. The watch is a standard production article which is part of the astronauts' official equipment. The Speedmaster Professional was chosen in 1963 after a series of rigorous tests administered to watches of various brands bought in a Houston jewelry store.

Since 1965, an Omega chronograph has accompanied each astronaut with total reliability on some 30 missions including the Gemini, Apollo, Skylab, and ALT/Shuttle programs. One was on the wrist of Neil Armstrong, July 21, 1969, when he became the first man to walk on the moon. One was worn by the American astronauts and the Russian cosmonauts during the Apollo-Soyuz space rendezvous, July 17, 1975. However, the Speedmaster Professional's most dramatic performance took place April 12, 1970 during the Apollo 13 mission when the pilots of the damaged module depended totally on the accuracy of the Omega chronograph to fire the rocket engines in order to return to earth safely from the far side of the moon.

The Speedmaster Professional chronograph—by the way—is a mechanical, hand-wound instrument as required by the NASA.

Space Shuttle Orbiter Columbia

In the words of the Chairman of the Board of Omega's New York subsidiary, former astronaut General Thomas P. Stafford (member of the Apollo-Soyuz crew), "Today, the Space Shuttle puts America and the world on the threshold of a new capability to investigate the universe. Just one of its missions will be to place in orbit a space telescope that will bring into view countless celestial features invisible from earth. Great breakthroughs can be expected. And Omega is again proud to be part of great space adventures."

LEVY AND McKENNA NAMED TO POSTS AT MARSHALL-SWARTCHILD

Harold B. Levy has been named general manager of Marshall-Swartchild Company, Chicago. His responsibilities include the branches in Dallas, Houston, San Francisco, and Seattle, as well as operations at the home office. At the same time, Gladys Endman, Marshall-Swartchild president, appointed Lorain McKenna assistant manager of the company. Both Levy and McKenna are long-time employees of the firm which distributes watches and watch materials, jewelry, and jewelers' supplies.

JA ANNOUNCES DATES FOR CHICAGO SHOW

The Jewelers of America's 1981 Chicago Jewelry Trade Show & Conference will take place Sunday, August 9 through Tuesday,

August 11, at Expocenter and Mart Plaza, it has been announced by JA Chairman Michael D. Roman.

"Jewelers should make a special note that the Show will be opening on SUNDAY this year," Roman advises. "This gives jewelers in the area a chance to remain in their stores on Saturday, if they wish, or to arrive on Saturday and be able to start shopping the Show bright and early on Sunday."

"Chicago is truly the big time show with the hometown touch," Roman comments. "With more than 600 exhibitors expected to participate, it is the largest jewelry trade show outside of New York City. It is also in a central location, so that it is easy to reach either by air, train, bus or car, and there are ample parking facilities for those jewelers who drive in."

A special format will be developed for the Conference Program. Jewelers attending will be given the opportunity to listen to experts and participate in workshop sessions designed to update the jewelers' expertise in many aspects of jewelry store management.

STRONG DEMAND FOR SWISS QUARTZ WATCH TRAINING

The Ebauches SA Training Centre at Marin, Switzerland, last year organized a total of 67 technical courses, lasting an average of three days each. Forty-three of the courses were held at the Centre which is near Neuchatel in the heart of the Swiss watchmaking industry. The remainder were held at a variety of centers around the world, including one in Belfast last Autumn.

Retailers were the largest group attending the courses. Of all participants, 14.8% were retailers from Switzerland, 62.5% were retailers from abroad, 12% were importers or distributors, and the remaining 10.5% was accounted for by teachers, instructors, and company personnel.

The pace of technological change is so fast that the present course will run until Summer 1981, after which time a new course dealing with the latest advances will be introduced.

RICHARD P. KALINA APPOINTED BY BULOVA

Richard P. Kalina was recently promoted to Sales Manager, National Accounts, for the Bulova Watch Company. Jerry Josephson, vice-president of sales, in commenting on the appointment, said, "Rick Kalina brings over fifteen years of sales and marketing experience to his new poisition. He will be responsible for national account sales and the

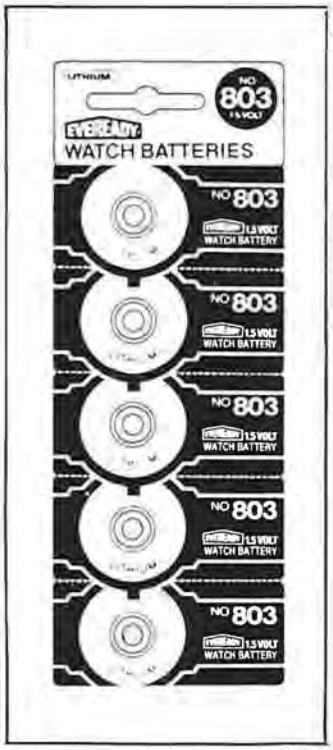
planning, organization, and implementation of new programs."

"SUPER SAVINGS" EVEREADY PROMO BY BATT-TRONIC

The most popular Eveready watch and calculator batteries are being offered at "Super Savings" by Batt-Tronic Corporation through July 4, 1981.

"We are just doing our small part to help put the brakes on inflation," says William Hillson, President of Batt-Tronic Corporation. The promotion features "Order by the Dozen" Eveready battery paks and "30-Pack Super Savings" specials.

Batt-Tronic, P.O. Box 10, Orangeburg, New York 10962, is America's largest exclusive distributor of watch and calculator batteries: Lithium, Silver Oxide, Mercury and Manganese Dioxide. The company maintains toll-free telephone numbers for the trade: Nationwide (10 a.m. to 5 p.m.): 1-800-431-2828. New York State: 1-800-942-1944.



GEMOLOGY STUDENTS GRADUATE FROM PARIS JUNIOR COLLEGE

Twenty-two students from 10 different states and one foreign country were graduated in the eighth class of Paris Junior College's professional gemology program recently, announced Paul Clayton, chairman of the PJC division of horology and jewelry technology. Guest speaker for the event was Horace Simon, chairman of the board of Simon Jewellers Inc., Shreveport, Louisiana.

The guest speaker, who transformed a low-profile store into a high-class jewelry business, gave graduates information on the importance of attaining knowledge and being able to "talk to customers with knowedge, with integrity." He noted that the most important words in business relationships are "I'm sorry I made a mistake," "You did a good job," "What is your opinion?" "If you please," "Thank you," and "We."

A certified gemologist, Simon is a fellow of the Gemological Association of Great Britain, Gemological Institute of America, Jewelers of America, and various Louisiana jewelers' associations, professional and civic organizations. He was introduced by Orlando Paddock, director of PJC's gemology program.

Graduating were Paul R. Barnes of Warren AFB, Wyoming; Linzy Bauer of Kingman, Kansas; Dave Blakley of Amarillo; M. G. Brewer of Jonesboro, Arkansas; John Eric Coleman of Hope, Arkansas; Diane Elizabeth Davis of Sacramento, California; Garrett Dean Gray of Salina, Kansas; Terese Gregory of Jacksonville, Florida; Patty Mike Harlow of Amarillo; Ytaka Kakuma of Japan; Tim R. Kokkeler of Garrison, North Dakota; Robbin Keith McKeel and Wallace O. McKeel Jr. of Ahoskie, North Carolina; Daniel Lee McNutt of North Little Rock, Arkansas; William Peter Perinis of St. Petersburg, Florida; Larry P. Popovich of Metairie, Louisiana; Angela Lewis Seago of Dallas; Stephen John Sovell of Fairmont, Minnesota; Sandra Swann of Las Cruces, New Mexico; Robert E. Walton of Meridian, Texas; Dean A. Wile of Pomeroy, Iowa; and Paul Young III of Dallas.

Louis B. Williams, Paris Junior College President, gave greetings and presented certificates to the graduates.

JADOW ANNOUNCES IMPROVED ULTRASONIC CLEANER

B. Jadow and Sons Inc. announces the availability of a new version of the Vigor Clean N' Brite Ultrasonic Cleaner.

This small, powerful, and quiet Mini Ultrasonic cleaner is greatly improved and offers new features. Its non-abrasive action reaches places brushes can't, and its quiet, solid state circuitry is safe and efficient. It is compact and lightweight, measuring 5¼" x 4¼" x 5".

The unit is excellent for cleaning jewelry, including gold castings, rings, bracelets, watch bands, fine filigree, and small link chain. It cleans beneath mounted stones and removes oil, grease, wax, lacquer, glue, paint, polishing abrasives, and rouge. Sanitizing pierced earrings and cleaning small tools are other uses.

A special plastic contact lens holder is included with the unit, perfectly designed for cleaning all sizes and styles of contact lenses. Cleaning dentures is another application of its ultrasonic capabilities.

The new Vigor Clean N' Brite Ultrasonic Cleaner, CL-1755, comes complete with general purpose cleaning powder; ultrasonic silver cleaning powder; denture (acidic) cleaning powder; contact lens holder; and plastic scoop. It retails for $59.95 and can be obtained from your local jewelry/lapidary supply house.

THREE RAILROADS APPROVE BULOVA POCKET WATCHES

Two quartz pocket watches, one in stainless steel and the other in yellow gold tone, have been approved for use by the operating personnel of the Atchison, Topeka and Santa Fe, the Chessie System and the Union Pacific railroads.

Equipped with a scratch resistant Dura-Crystal®, a white enamel dial with black arabic numerals, and a sweep second hand, both models are water resistant in an individually numbered case.

In stainless steel, model 91A00 (illustrated) sells at a suggested retail price of $150.00. In yellow gold tone, model 91A14 retails at a suggested $175.00.

Bulova Watch Co., Inc. is located at Bulova Park, Flushing, NY 11370. (212) 335-6000.

ZANTECH INTRODUCES A COMPLETE DIGITAL WATCH REPAIR CATALOG

Zantech Inc. announces the release of a complete catalog of quartz watch instruments, parts, and tools. This 32-page, fully illustrated catalog contains a complete line of quartz watch test equipment, as well as 125 full-scale photographs of the most popular LCD and LED modules. Zantech, Inc. has published this catalog in order to better inform the quartz watch service industry of the modules, parts, and instruments that are in use throughout the world.

According to Louis A. Zanoni, President of Zantech and one of the foremost authorities and teachers of digital watch repair, "This easy-to-read catalog contains all of the information necessary for the digital watch repairer."

Zantech, Inc. is located at 77 Shady Lane, Trenton, NJ 08619.

"ADVERTISING: PURE AND SIMPLE"

"Advertising: Pure and Simple" by Hank Seider is a gutsy book by an outspoken pro which presents the real nuts and bolts of advertising: How to create advertising which sells, rather than just costs. Probably few business subjects are afflicted with the halo/smoke screen of fun/games/wishful thinking which is the curse of advertising. This author knows exactly what to do and how to do it, and tells you so.

An enjoyable book which can make you money. With 208 pages, 5¾" x 8½", hardbound, it sells for $12.95 and is available from Amacom, 135 W. 50th St., New York, NY 10020.

NEW G-S WATCH CRYSTAL CATALOG

Germanow-Simon Machine Co., Inc., a leading producer of cast optic watch crystals since 1916, has just issued a complete new catalog covering their expanded complete line. The 64-page Catalog No. 200 has a die-cut, thumb-notched index for easy location of any size, shape, and style of crystal.

Various crystal sets and assortments are illustrated, as well as cross-reference charts of popular watches.

This latest catalog is available to watch repair shops on request from: Germanow–Simon Machine Co., Inc., Dept 420, P.O. Box 1091, Rochester, NY 14603.

SWEST STONE SCOOP/TWEEZER

Now available from Swest, Inc is a unique all-in-one diamond tweezer with a stone scoop on the opposite end. For those who handle loose stones a great deal, this imaginative tool is a timesaver. For a FREE order form showing price, contact Swest, Inc., 10803 Composite Drive, Dallas, TX 75220, or Swest, Inc., 1725 Victory Blvd., Glendale CA 91201.

A CLASSIC: HAMILTON'S PENNYWEIGHT SCALE

Some originals can be copied but never exactly duplicated. This is the case with the long-established Hamilton pennyweight scale. Priced at $11.00, the original Hamilton scale costs about the same as the imported look-alikes, so the real thing is also the better value.

The simplicity of the Hamilton pennyweight scale has made it a favorite with professional jewelers, goldsmiths, and metals dealers for more than 25 years. Its fulcrum action eliminates the need for weights and springs. It is easy to set up anywhere; a leveling screw permits use on uneven surfaces. Capacity is 35 dwt. Its weight is only 10 oz., and it is very compact—the base being 4-3/8" x 2-1/2" and pan height 5-1/2". The genuine Hamilton pennyweight scale may be specified by ordering No. 40-445 from your jewelers' supply house.

SUEDE 'N SILVER WATCH DISPLAY FROM RADO

Suede, silver, and a full-color scene are the background for a floating four-watch counter/window display introduced by Rado Watch Company, Inc., 1140 Avenue of the Americas, New York, NY 10036.

An easeled, full-color horse scene laminated against a silvered frame provides a background for four Rado watches that seem to "float" on invisible lucite holders. The display measures 10½ x 12½" and is available to all Rado jewelers.

BULOVA TWINS

Dressed with Polonais mesh bracelets, a new men's and ladies' Bulova quartz watch has the coordinated total look of jewelry. The gadrooned (ornamental notching) bezel ring surrounds a linen-textured silver dial, which is protected by a scratch-resistant Dura-Crystal. Both in yellow gold tone. The men's watch, model 92M17, retails for a suggested $295.00. The ladies' watch, style 92L03, for $250.00.

NEW FROM CITIZEN: THE DIGI-ANA TIME TRACK

Time flies with the speed of light on the Digi-Ana TimeTrack, newly introduced by Citizen Watch Company of America, Inc. The watch features a unique "time track" that surrounds the perimeter of the watch face. The time track is broken up into 60 segments, each of which lights up as a second passes. At the end of a minute, the lights go dark and the process starts again. The dual-mode watch has all the features of a digital–date, alarm, hourly chime, timer, and stopwatch.

The watches, available for Fall delivery, will retail for $195.00 (in stainless steel) and $250.00 (gold tone). TIMES

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

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

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

ANTIQUE POCKET WATCH REPAIR. Fast service, quality work, thorough repairs. Electroplate and polish your watch cases to their original brilliance. NO POCKET WATCH IS UNREPAIRABLE; it is just a matter of economics. Now accepting new accounts $15.00 and up. Mail Order is my specialty. FREE estimate given on your watch. JOHNSON WATCH REPAIRS (NAWCC, AWI), Box 121, Keenesburg, CO 80643. (303) 536-9235.

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

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

WATCH REPAIR FOR THE TRADE: ACCUTRON, STEP-MOTOR QUARTZ, DIGITAL ANALOG & MECHANICAL. The Watch-Repair Shop, 2616 Kendall Ave., Madison, WI 53705. 1-608-231-3606.

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

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

WATCH 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.

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.

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.

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.

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.

CLOCK REPAIR. Trade work–Cleaning, repairing, repivoting, bushing, teeth repairs, wooden works. Mark R. Pellmann, Clock and Watch Repairs, 110 Railroad Ave., Homer City, PA 15748.

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.

Situations Wanted

Competent clock repair person seeks apprenticeship situation with certified watchmaker in L.A. area. Contact Janice Ritter, 1140 East Third St., Apt. 11, Long Beach, CA 90802. 213-432-7081.

WATCHMAKER, CLOCKMAKER: A recent graduate with an Associate Degree in Applied Science in Horology and one year's experience in a retail repair shop seeks position in the Southwest. For information, contact Roy Burkey, 25½ Pierpont St., Petersburg, WV 26847.

British trained young American horologist specializing in antiquarian horology seeks employment in this field commencing in the Fall of 1981. This uniquely talented craftsman will consider any opportunity that can make use of his speicalized skills and training. Contact: Coleman Fund Committee, c/o *Horological Times*, 3700 Harrison Avenue, Cincinnati, OH 45211.

WATCHMAKER, CLOCKMAKER: A recent graduate with an Associate Degree in Applied Science in Horology and one year's experience in retail repair shop seeks a new position. For information contact Roy Burkey, 25½ Pierpont St., Petersburg, WV 26847.

STATE CERTIFIED WATCHMAKER/CLOCKMAKER 17 yrs. experience with a BHI certificate seeks position in Southwest, with preference for Arizona. Call (313) 434-1180 after 5 p.m. EST.

Wanted To Buy

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.

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.

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

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

Watchmaker's shop set-up, bench, Vibrograf B100 timing machine, Watchmaster Ultrasonic cleaning machine, Accutron service set, Bulova ring sizing machine, 2 large systems of glass and plastic crystals, crown assortments, etc. Call (302) 994-7436.

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.

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

NOW AVAILABLE: SWISS 6-3/8 x 8 ANALOG QUARTZ MOVEMENTS TO TRADE SHOPS, WATCHMAKERS, SERVICE CENTERS. Replaces all usual 6-3/4 x 8 mechanical movements as FHF 69; H.B. 90; Russian, etc., in customers' own cases using existing dial and hands. Dials and hands available for private label. A perfect fit up movement. Parts and service always available. Trial order 1 or 2, $19.00 each; 3 to 5 16.95 each; 6 to 10, 16.00 each; all postpaid, check or money order. Write for quantity prices. VALE WATCH PRODUCTS, 104 EAST 25th ST., New York, NY 10010.

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.

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.

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25 ft. TIARA CRUISER, 1978, 260 Merc., 2 station controls, complete galley, 110 dockside, 100 hours, head, Holsclaw Trailer, Bemini top, sleeps 4. Sale $23,000.00, will trade for diamonds, gemstones, gold or other. 502-893-2336.

RETIRING. Busy watch, clock repair and engraving business. One-man store in small town just south of Santa Maria, California. Clean air, healthy climate, relaxing life style. Very reasonable rent with lease. Priced at a low $2,800. Stock, tools and parts extra/optional. 805-937-1218 mornings only 'til 1 p.m. 149 S. 1st Street, Orcutt, CA 93455.

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, Ohio 45211.

Jewelry store for sale. North Marin County in sunny California. $95,000 including inventory. Fully equipped for retail sales in rapidly growing shopping center. Agent, Valley of California (707-763-0966.)

Retail and Trade Repair Store in busy shopping mall. Great opportunity for watchmaker and/or jeweler. Busy location for 15 years. Includes all trade accounts and inventory. Excellent good will and reputation. Contact "It's About Time," 706 So. Decatur Blvd., Las Vegas, NV 89107. Tel: 702-870-4687.

Valtec (Zantech) 1000 Quartz tester, also Seiko QT-10 step-motor Quartz tester. Both mint condition. $1,000. Southern Time, 835 Common, New Orleans, LA 70112. 1-504-525-3961.

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

U.S. HEADQUARTERS FOR ALL SCHATZ PARTS. PARTS FOR THE NEW 400-DAY ELECTRONICS. ALSO FOR KUNDO ELECTRONICS. GREENHILL CLOCK SERVICE, P.O. BOX 172, SANTEE, CA 92071.

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.

Dates To Remember

JUNE

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

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

6-7—Kansas Jewelers Convention; Holidome, Hutchinson, KS

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

20-21—Pennsylvania Jewelers Association Pittsburgh Jewelry Show: Greater Pittsburgh Merchandise Mart Expo Center, Monroeville, PA

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

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

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

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

JULY

4-10—Christmas in July Gift and Jewelry Show; Dallas Market Center, Dallas, TX

6-8—University of Maine at Orono, Second Annual Course in Antique Jewelry and Gemstones; Orono Campus, Orono, ME

11-18—Pacific Northwest Jewelers Association, and Washington, Alaska, and Oregon State Jewelers Association Quadrennial Western Jewelers Conference; M/V Sun Princess, Inside Passage, British Columbia and Alaska

19-24—93rd California Gift Show; Los Angeles Convention and Exhibition Center, the Los Angeles Mart, Los Angeles, CA

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

19-22—New Orleans Gift & Jewelry Show; Rivergate Convention Center, New Orleans, LA

24-26—Watchmakers Association of Ohio Annual Convention; Marriott Inn East, Columbus, OH

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

AUGUST

9-11—Jewelers of America/Central USA International Jewelry Trade Show and Conference; Expocenter and Mart Plaza Hotel, Chicago, IL

9-12—Minneapolis Gift & Jewelry Show; Hyatt Regency & Merchandise Mart, Minneapolis, MN

15-17—Fall Pacific Jewelry Show; Century Plaza Hotel, Los Angeles, CA

15-17—Mississippi Jewelers Association Annual Convention; Biloxi Hilton, W. Beach Blvd., Biloxi, MS

22-25—74th Denver Gift and Jewelry Show; Denver Merchandise Mart and Exposition Center, Denver, CO

Advertisers' Index

Simple repairs are simpler with genuine Seiko replacement parts.

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

Seiko Bracelet Replacement Screw Assortment STC-144.

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

Seiko Stainless Steel Bracelet Spring Bar Assortment STC-44.

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

Seiko Battery Hatch Gasket Assortment HG-72

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

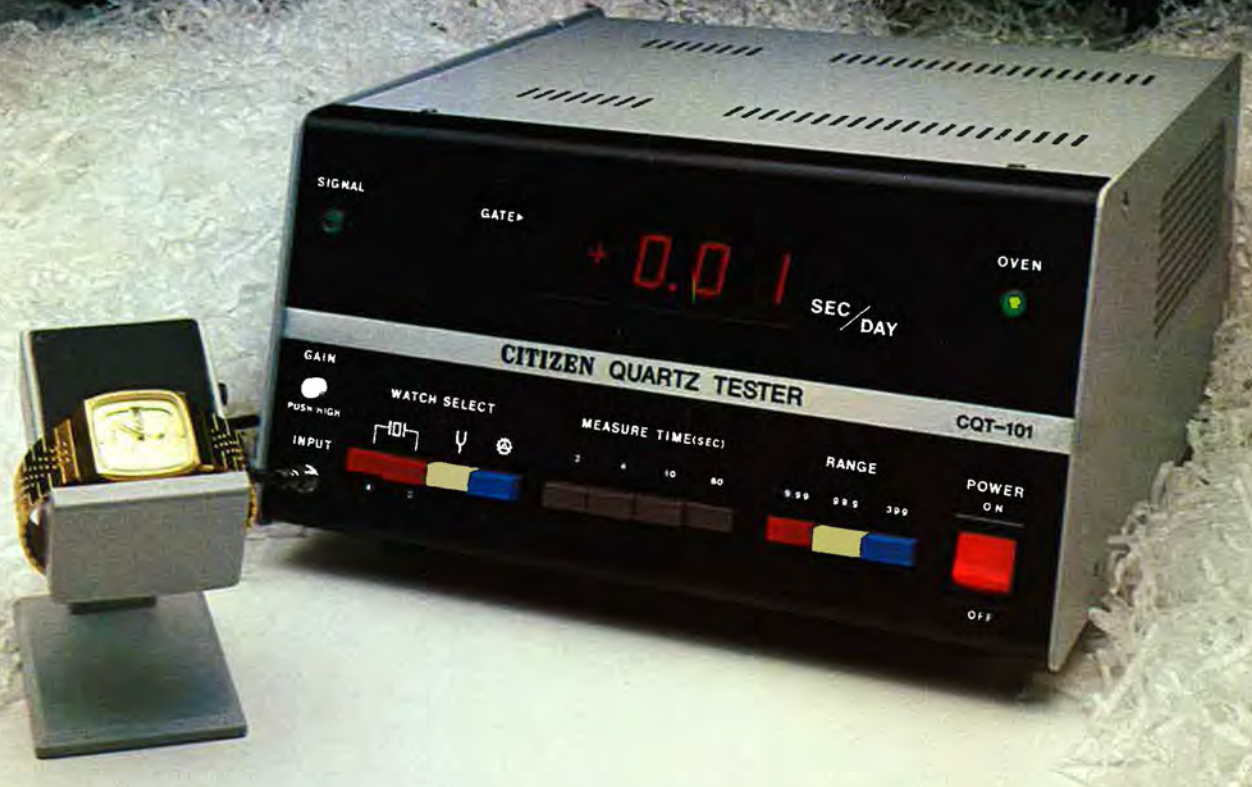
These lightweight, compact kits are professionally designed to offer the utmost in convenience. So you can perform professional, convenient and profitable service for your customers. All kits available only through Authorized Seiko Material Distributors.

SEIKO

Someday all watches will be made this way.

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

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



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

But it isn't necessary.

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

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

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

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

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

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

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

CITIZEN

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

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