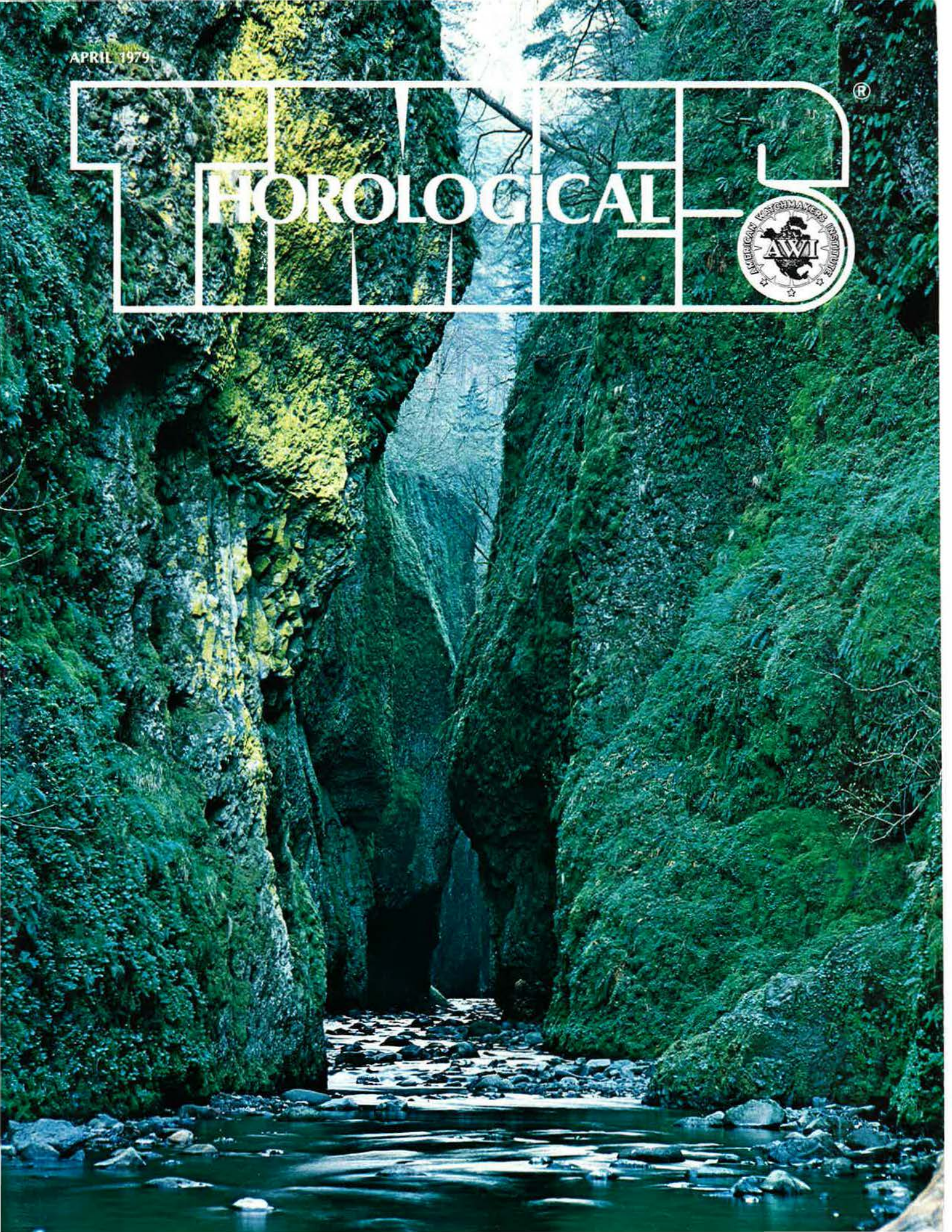
APRIL 1979

HOROLOGICAL TIMES

AMERICAN WATCHMAKERS INSTITUTE
AWI



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HOROLOGICAL TIMES

OFFICIAL PUBLICATION OF THE AMERICAN WATCHMAKERS INSTITUTE

VOLUME 3, NUMBER 4 APRIL 1979

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Editorial

(Due to several requests, the following editorial is reprinted from the October 1977 issue of Horological Times.)

Today there is indeed a shortage of qualified watchmakers in the jewelry store. One reason is that the field has become so diversified with the addition of electronics and complicated watches, that the student learning period time has lengthened considerably. Another is that many competent watchmakers find it advantageous to open their own trade business, whether in the traffic area or at home.

Because of the situation, the retail jeweler is put at a disadvantage. Jewelers voice the need for more qualified watchmakers. If watch repair were not a profit area, the cries would not be heard.

When the retail jeweler does not have a watchmaker on the premises, he could possibly be stymied with giving a customer a price on a repair. Or he could give a quote, and later must adjust it according to the work that had to be completed. At best, that leads to poor customer relations. So what is needed: more complete watchmakers, or those who are not mechanics, but skilled in the art of estimating?

The American Watchmakers Institute experts are available to the Retail Jewelers of America in the field of estimating watch repairs.

About the Cover

Our April cover features the Columbia River cutting through the Oneonta Gorge. The Columbia River is found in the northwest United States, delineating all but 100 miles of the border between Oregon and Washington. The land in this part of the United States was first claimed by Spain in 1775, then by England. After Captain Robert Gray's discovery of the Columbia River in 1792 the United States claimed the territory which led to the Lewis and Clark Expedition. The men in the expedition probably saw many landscapes like the one on our cover.

HOROLOGICAL TIMES

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The Presidents' Message

BY ORVILLE R. HAGANS, CMW, CMC, FBHI

By now you have no doubt learned the outcome of your Executive Committee's meeting in Phoenix, Arizona on February 1, 2, and 3, which was truly three days of hard work in your behalf.

Most all AWI committee chairmen had sent in excellent reports which made it possible for the Executive Committee to have a broader conception of what has taken place and their recommendations for improvement.

According to our Executive Secretary, this meeting covered and accomplished more than any previous Executive Committee meeting. You will be kept informed as many of the issues and programs are finalized and approved by the Board of Directors. National headquarters will be extremely busy between now and June.

On February 4 an Arizona state meeting was held with an attendance of over 75 for the morning session and 40 participants for the bench course in the afternoon.

The morning session which I conducted started with Marvin E. Whitney giving a talk and showing slides on the chronological history of the ship's chronometer, an excellent presentation. Henry B. Fried followed with a slide lecture on watch batteries and new watches being produced. The highlight of Mr. Fried's presentation was the ultra-thin quartz analog watch "Concord Delirium I" made by ETA, Ebauches, S.A. (see the article on this watch in the March issue of *HT*).

At the afternoon session Leslie Smith conducted a bench course on the Seiko LCD Chronograph Alarm, Calibre A-159, a new program given for the first time at this seminar.

It may be of interest to you that the Central Arizona Horological Guild arranged with Channel 3 (ABC) of Phoenix for a TV news report regarding the seminar and AWI's educational work. Henry Fried and I were interviewed and the seminar was filmed in progress with Les Smith instructing and close-up views of a number of individual watchmakers actually working on their watches. The news report was given good coverage—two evening news programs on the 4th and morning news on the 5th. Programs like this for public viewing are truly top publicity.

The Arizona Guilds, Phoenix and Tucson, are well organized and cooperative and will be well represented at the Directors' meeting in June.

In closing, another appeal to all members—the membership drive has been successful, but let's not stop. Make it a daily effort to enroll a new member. If we are to broaden service to our members and profession, we can only do so with a greater membership.

Orville R. Hagans

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SEIKO

OTTO BENESH CMC

"CLOCK CHATTER"

When I look at the title of this article, my first reaction is, "Oh, no! Not another one!" But I have always enjoyed reading about and collecting the different routes people travel to reach the same goal, so I thought, "why not one more time?" In our case the goal is a clean clock, one that looks as if it had just come from the original maker's shop. To achieve that goal, steps must be taken that can be accomplished within the limit of the expenditure of time. In our line of work time is money, therefore, the charge for this type of work must be commensurate with the time spent. If a piece cannot justify the charge, then another method should be used. Obviously you cannot afford to spend the same amount of time on a modern 400-day timepiece as you can on an eighteenth century one. It is a question of economics, not mechanical requirements, that must prevail. The other side of the coin dictates that you must not use minimal time and methods on really fine clocks.

In order to be writing about something tangible as I describe how I clean a clock, I have selected a middle-of-the-road piece for illustration. At one end of the scale are the "Renaissance" clocks with their ornate engraving, pierced work and finely chased steelwork. At the other end are the late "Victorian" clocks with high quality workmanship, but plain finish, with all embellishment reduced, definitely a product of the industrial revolution. The middle of the road, then, will be a clock made prior to the start of the Industrial Revolution, which was about 1830. I have an English spring driven table clock of the period 1770-1790 which will fit these limits shown in Figure 1. It is a small piece only 14 in. tall to the top of the upright handle, 8 in. wide, and the back plate is fully engraved (in a style of a slightly earlier period). See Figure 2. All is contained in a mellow mahogany case. The clock has a verge escapement, runs 8 days, and is an alarm, with the alarm wound by pulling a cord on the right hand side of the case. From the single winding hole you surmise correctly that it does not strike the hours.

Before I start into the details of cleaning, this seems an appropriate place to discuss some cautions and also to set forth some so-called ground rules. First—this is not the only nor necessarily the best way of achieving our goal—a clean clock—but it is my way and has been arrived at by reading, observing, experimenting, and modifying. It is a system that produces excellent results for me. You may like it or you may not. This brings me to another point: in the past as I have described this method to others, I have stressed that if you have a way of cleaning a clock that gives you results with which you are happy and satisfied, don't change just because you have read or heard about another way. However, keep an open mind and if anything in another method appeals to you, or if something new to you comes forth—try it—you might like it as the saying goes. Always set a little time aside to experiment and evaluate, but again do not change until you

Figure 1.

have found good and sound reason for changing. I recall a few years ago, I became dissatisfied with the oil I had been using for years. It was a well known one, but being a classical type, required treatment with stearic acid to be as nearly sure as possible that the oil would not creep. At the end of six months review of existing products, their literature, plus some experi-

My Method of Cleaning Clocks

Figure 2.

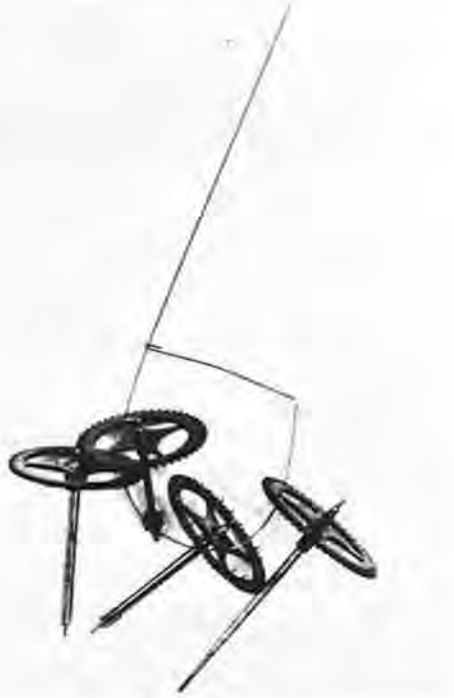

Figure 3.

mentation, an oil was found that fulfilled all the requirements that I had set forth. Now several of my compatriots also are using it and we are all pleased.

After the movement is removed from the case an initial inspection is made as to how dirty the movement is and also any major repairs or parts omissions are noted. If the movement is extremely dirty (I have removed feathers, animal droppings, and dirt so thick it had to be scraped off) a preclean is done. This is in either of two solutions: (1) if the dirt is not too heavy, a scrubbing with a brush and white gasoline, or (2) if extremely dirty, in old clock cleaning solution. Keeping one or two gallons of older, dirtier solution for this type of cleaning (as well as for engraved dials to be resilvered and other brass cleaning jobs) is always a good idea. There is no reason for any clockmaker to work on a filthy piece.

Let's start by getting together the chemicals and equipment to be used. My preference remains with the old solution known as Daniel's or Seth Thomas or Oleic Acid, and just to be different I have named it *Amacol* from the *am*monia, *ac*etone and *ol*eic acid which comprise its basic formulation. You will find the proportions in many of the books on clock repair. The formula I use is 4 oz. oleic acid, 8 oz. acetone, 12 oz. ammonia 26%, and 1 gal. water.

Start with the acetone in a pot or bucket large enough to make the quantity you want, then the oleic acid will dissolve a little more quickly. Then add the ammonia and lastly the water. If the water is warm or hot it will speed up the mixing process. Many of the recipes call for adding water to make a gallon and this is fine, resulting in a slightly stronger solution. It is easier after the first items are mixed to just add 1 gal. rather than 104 oz. If you cannot obtain oleic acid, soft soap or soap flakes can be substituted, about 4 to 5 teaspoons per gallon. Do not substitute a detergent. I experimented using a detergent some years ago, reasoning that the new detergents should be an improvement over oleic acid (a soap acid) or soap itself, in removing old oils and dirt. This worked fine in ultrasonic equipment and I thought I had come up with an improvement. This new formula was passed on to an associate of mine who did not use ultrasonic equipment but let the parts soak in the solution and sometimes for extended periods. The result was disastrous–the acid in the detergent had literally frosted the plates on a carriage clock, but luckily he was able to remove it by cutting with tripoli and polishing with rouge. Needless to say, that ended the great breakthrough, even though it works with short-time cleaning. Oleic acid does not disfigure brass even on several days immersion. The ammonia is 26% to 28%; the type you get in the grocery store is not strong enough.

As you discuss the use of the solution, you will find all sorts of additives being recommended. When you try to find out why they are added or what they are supposed to do, you seldom get an explanation. Some of the additives are glacial acetic acid, hydrogen peroxide, carbolic acid et al.

One last note about the solution–as you use it discoloration sets in and the solution will resemble a thick muddy liquid (I think I have been treated to some of it and it was called coffee). Do not let the consistency bother you; the solution is worn out when it no longer cleans and that is the only test of its efficacy. You will find out that many months of good service is possible depending on the number of clocks cleaned. Don't forget when you change solution to save the old.

The Amacol solution is used on all of the brass clocks, the only exception being platform escapements from carriage clocks, for which I use proprietary ultrasonic cleaner and rinse.

The other two chemicals used are tri- or tetrachloroethylene and good old water. Tri- or tetrachlorethylene is my all-purpose rinse, solvent, and fingerprint remover. The only different between the two forms of chloroethylene is the tetra has one more molecule of chlorine and will form hydrochloric acid more readily in the presence of water, but the

(continued on page 53)

Our Readers Write

. . . *You've Come A Long Way* . . .

It was thoughtful. . to send me a copy of your March issue. It looks as though you've come a long way in a very short time, with quality editorial and a very impressive list of advertisers.

Best of luck for continued success.

Clinton S. Abbott, Jr.
District Manager
Standard Rate & Data Service, Inc.

RE: JOSEPH G. BAIER'S ARTICLE

We are very proud of Dr. Joseph G. Baier, and I was delighted to see the reprint of his article in your excellent journal.

Allow me to congratulate you on the format and content of the magazine. It's enough to entice even someone whose knowledge of timepieces doesn't extend beyond the ability to read them.

Once again, thank you for the copies and for crediting the source of original publication of "John Muir–His Timepieces and Other Ingenious Creations."

James R. Batt
Executive Director
Wisconsin Academy of Sciences,
Arts and Letters
Madison, WI

WELL WRITTEN

I am a new AWI member. Would you please send me a copy of "The Shop" article in the January 1978 issue of *Horological Times* and also a copy of Part 1 of "Repairing Wooden Movement Clocks" from the May 1978 issue.

I enjoy *Horological Times* very much and look forward to it each month. The various articles are very well written and are of considerable value to me as a clock repairman.

Thank you for your effort.

Theodre Ragl
Ellington, CT

BENCH COURSES HELPFUL

I attended the Seiko and ESA quartz watch bench courses presented by you in Boston in February and June and found them very helpful.

We were fortunate to have such able instructors as Les Smith and Gerald Jaeger. They both did an excellent job. Thank you very much.

It is very good it see the progress the organization has made in recent years in keeping us abreast of the latest innovations in timekeeping. Keep up the good work. I look forward to more bench courses in our area.

Orrin E. Booth
Adams, MA

GOOD INVESTMENT

The best investment I made this year was joining AWI. My only regret is not joining 25 years ago. I am honored to be a part of such a prestigious organization. Thank you for all the information and services you supply.

Herman D. Rothstein
New York, New York

AMERICAN CLOCKMAKERS INSTITUTE?

I would like to congratulate you on the new articles on watches of today. In the past, each month when my *Horological Times* came all that I read was the President's Message, AWI News, Bench Tips and some times Questions & Answers. The rest pertained to clocks and antique watches in which I have no interest. In fact I was about to write you and ask why you didn't change the subtitle to Official Publication of the American Clockmakers Institute.

So again let me say congratulations.

J.E. Brack
Houston, Texas

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BENCH TIPS

with Joe Crooks

We have been getting requests for clock repair tips. So here you are! All this month's bench tips are about clock repair.

Mr. Wilson L. Sluggs, Wilcraft Products, of Fort Walton Beach, Florida, sends us the first three tips.

In a French clock when there is a Brocot escapement problem, replace or adjust the jewel or steel pin. When the crutch bracket is removed the escape wheel thinks it is a small circular saw. The solution is a small garden tie (like you use to tie up your bean vines or young tomato plants). Bend it to a 30 degree angle (approximate) and slip it under the escape wheel. Voila! No more saw! This saves time from letting down the mainspring and rewinding a few turns when you want to test your new setting.

This second tip is for comfort only. I use a hot dish mat on the tail end of my lathe during a delicate repivoting operation to keep the lathe from digging into my arm. Try it–it works.

I don't have a large pallet fork holder large enough for Brocot escapements, although I am considering making one. So when setting only one jewel (or adjusting) a small 1/8" thick chamois skin soaked in water and placed on the opposite jewel will help to keep it from shifting during the heat operation. If the small leather dries out–it is too hot.

The following clock tip is from Mr. S.T. Jenssen of Washington, D.C. It was passed on to me by our good past president Marvin Whitney, who is now serving AWI as Treasurer. I strongly feel we would not have received this excellent tip if Marv had not done a little arm twisting. You know how those people from Washington are–always lobbying.

One day recently I was overhauling an English grandfather clock that was supposed to be a troublemaker. I suddenly realized as the clock was going back together that I couldn't see anything wrong with it. All pivots, bushings and depthing were excellent. The escapement was also in fine condition. The clock was finished and put on the stand to test and in a few minutes it stopped; it was then restarted only to come to a stop again.

The trouble was diagnosed as being in the suspension assembly. The suspension was of recent vintage, being of English manufacture, and the trouble was built in when it was assembled. One thing which must be remembered is that the suspension spring is to be free in both the upper and lower blocks and also the pendulum must be allowed to find its own level. When the spring is put together at the factory it is punched and riveted and this puts stresses in the spring. Upon taking one of these from stock, I immediately take the suspension assembly apart, open the hole and rerivet. Freeing both ends will take care of a lot of problems in pendulums.

To explain Mr. Jenssen's tip a little more, the stress put on the suspension springs in the top and bottom blocks can make it act similar to a "cracker jack" that wants to spring back in one direction but resists moving in the opposite direction.

If it's a double suspension spring, with stress between the top and bottom blocks, the stress on one spring could make it flex better one direction and the other spring could try to flex the other way. Thus with the suspension springs fighting each other, the clock will soon stop and the pendulum would also bobble and side arc as it swings.

We still need some more electronic tips for a bench tip column. Special tools you have made, etc.

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Questions and Answers

by Henry B. Fried
CMW CMC FBHI

"Those Short Pesky Cannon Pinions"

Q. I recently wrote to the AWI for information on assembling an AS 1920 cannon pionion. There was no technical bulletin on this cannon pinion, so I was sent your manual "Those Short Pesky Cannon Pinions."

While assembling the original I thought I had it on well and I went to try setting it. The two parts passed like two ascending astronauts. I bought a new one which looked more like the standard cannon pinion for this type. Strangely enough I found these two parts lying on my bench. I am still puzzled by them. I know that this watch has never been touched by any other watch repairman but myself. My friend had bought it on a trip to Germany.

I thought I would send this to you to see what you think of this set-up. The replacement cannon pinion has long been shipped with no complaints.

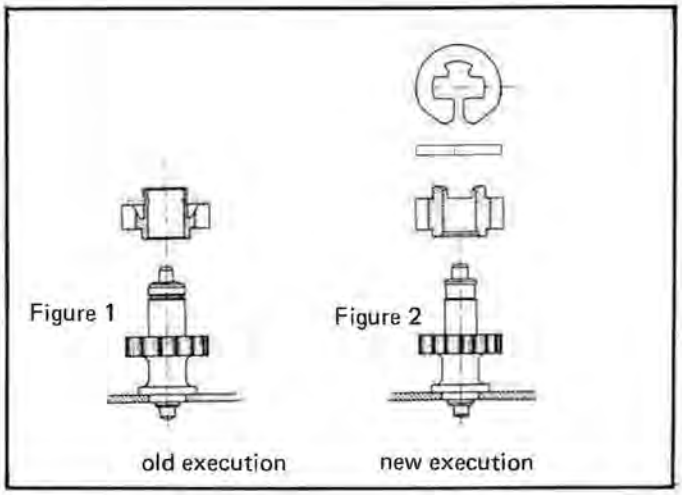
In your booklet you mentioned obtaining service sheets from manufacturers. Can you advise me as to how this is done.

At one point I had inquired from you as to how to make a verge staff. I had intended writing to you and telling you of my success or not. I received your letter and your system sounds very good, however, in your letter you left out one thing–the necessary courage to attempt this job. Sooner or later I know I am going to have to attempt it and I will let you know if I was successful.

Milton Shopnick
Oak Park, Michigan

A. I am quite familiar with this cannon pinion assembly. I was at the A.S. factory in Grenchen in 1974 when Dr. Schild introduced this type cannon pinion to me and later to our AWI tour group.

Enclosed are four photocopies from my files which should tell you the whole story. Evidently, as you can see from the drawings, you are still missing one piece and perhaps Mr. Armstrong may have it somewhere in the thin blue yonder.



Parts Making

Q (directed to James Tigner). One of my mail-in customers wants to know if I can repivot a square strike arbor and replace the gathering pallet. I can do the repivoting but how do you make a square tapered hole in the pallet? This is part of a B-D Monastery German grandfather clock.

The next problem is that I have a small French clock on which someone messed up the adjustable bushing which is used to raise and lower the escape verge arbor. How were they installed–it is flush on both sides. Was it lightly riveted in place and then filed smooth?

I have really enjoyed your articles in the *Horological Times* and appreciate all the information.

Francis H. Roberts
Frederick, MD

A (from Mr. Tigner). A square hole in a gathering pallet can best be made by first drilling a hole in the pallet with a diameter equal to the distance between flats on the locking wheel pivot on which the pallet will be pressed. The hole is then squared by driving in hardened and tempered steel drifts of the right size.

The drifts are filed from drill rod of appropriate size. If a rough file is used, all the better, since roughness on the drifts will help cut the square hole, rather than just spread it. Slightly taper the square part, and make it just longer than the depth of the hole, which will lessen the chance of bending or breaking the drift. The drift should be hardened and tempered to a pale straw.

The drifting will be easier if you make two drifts, a smaller one to start the hole, and a larger one to bring the hole to final size. It's not necessary to square the hole completely,

(continued on page 16)

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(continued from page 14)

just enough so that good, substantial corners are formed. It's possible to bring the hole to exact size, if your final drift is made the exact size. But I think it's safer to do the final fitting with a square, or triangular, needle file.

Do the drifting before the pallet is worked down to final size, since it might split if only a thin shell is left.

Also, the square must be properly oriented so that the pallet will lock shortly after the last tooth in the rack has been gathered, and the last bell struck. This takes a little study. If you should miss it a little, all is not lost. The hole can be closed by brazing and redrifted. You probably have better equipment, but if not, brazing can be done with 10" propane torch.

Now, the eccentric bushing on French clocks. The bushing has a shoulder turned on it, with the slot sawed in the larger, outside part. The bushing is lightly riveted on the inside of the plate, the edge of the hole being first chamfered to receive the rivet. As you said, it's then filed off flush with the plate, and buffed with tripoli.

If you carefully grind off the inside of the old busing near its edge, you should be able to drive it out from the inside, without damaging the hole. Otherwise, you may have to enlarge the hole and counterbore a new shoulder.

Hope this does the trick. Let me know if I can help further.

Advertising Clock

Q. I have an advertising store clock. I have the historyof the store but know nothing about the clock company. The dial is marked "leased by Baird Clock Co., Plattsburgh, N.Y. USA."

The movement is time only, with a very unusual escape wheel, but is not marked as to the manufacturer.

If you have any information, I would appreciate hearing from you.

Marvin Royal
Keokuk, IA

A. The Baird Clock Company of Plattsburg was in business during the 1880 period. Edward Payson Baird was born in Philadelphia, Pennsylvania in 1860. His father worked for Seth Thomas and was a good friend of the original Seth Thomas. Baird later worked in Canada, making electrical-mechanical timepieces. Baird held many patents on locks, telephone signal devices, toll coin devices, key cutting engines, etc. He specialized later in advertising clocks. A small book on Baird was written by Drs. Leonard J. and Joseph L. Schiff of Plattsburgh in 1975.

German Clock

Q. Could you please assist me in finding some information about a grandfather clock I recently acquired? I need to establish a relative dollar value for insurance purposes and am also interested in learning something of its origin and history.

The clock is approximately 19" wide by 83½" high by 10 1/8" deep; has the original beveled glass on the door and the slightly convex glass over the clock face. The movement uses a post and pin attachment method to the face and bears the following markings: a circular stamped seal in

the brass movement backing plate saying "Rocie–Schwenningen A.N.," and the following numbers also stamped on the brass backing plate "PL 116" and "5967." The chimes are configured with five steel rods mounted on a cast metal block behind the movement. About all I know of its history is that my grandparents bought it in Germany around the late 1920's and it was second hand. It is excellent mechanical condition now.

Any information you can provide will be appreciated.

Ronald Doescher
Satellite Beach, FL

A. I have examined your photo of the tall clock. It is, of course, German. Schwenningen is in the Black Forest of Germany and is the center of clockmaking of that country and one might say justifiably, of the world. However, there is no record of a Rocie in any of my records.

Had you reproduced the seal stamped into the movement, we might have recognized it and told you who perhaps was really the maker.

However, the photo which you sent shows a typical clock of the first decade of this century, a German type of clock that was made up to World War I. The long clock was especially designed like yours so that the weights would have enough drop to run the clock at least for one week. These were of modest quality but served well enough.

To supply you with an appraisal regardless of the purpose is not within the domain of this committee; that is a professional service. I will render an appraisal but instead of directing a fee for myself, I waiver the fee of $30.00 if it is made out to The Building Fund of the American Watchmakers Institute. I volunteer my professional services to the Institute so that its heavy mortgage might be reduced. If you will send me a check made out as directed above, I will render an appraisal, something for which I generally charge much more.

Otherwise, in the future, kindly enclose stamped addressed envelopes for any type of informational services.

Source

Q. Can you give me information on where I can buy the following items. I have written several places and can find out nothing.

I need a vertical rotating arm machine, as pictured on page 81 in the jewelry making book by Murray Bovin with 4x6 or 5x7 flask; also a crucible that will hold 700 to 800 dwt to be used on a centrifugal casting machine.

Clarence Woodward
Quincy, Illinois

A. First try AWI'S Sources book and advertisers in Horological Times. *I also contacted Mr. Nathan B. Winkler, an eminent authority of jeweler's procedures and skills who, incidentally, was Mr. Bovin's department head at the school where we all taught our trades.*

Mr. Winkler states that all the items which you want can be obtained from I. Shor of 75 Fifth Avenue, New York, New York 10003. Mr. Winkler said that the device you seek is most likely the Torit-Shor Platinum Casting device, the 700-800 dwt (their No. 34). However, when writing, repeat your request in fine detail, explaining exactly what you want and how you intend to use it. Their experts will advise as well.

In the Spotlight

by Orville R. Hagans

CMW CMC FBHI

From the Manuscript and Photo Library of Orville R. Hagans, CMW, CMC, FBHI

The simple plain cross was the major insignia of the Christians in their humble beginnings in a world almost wholly heathen. The display of the cross escaped the attention of the barbarians, for after all it was but the gallows of capital punishment with no more significance to them. It was not until the sixth century that the Christians were strong enough in their legions of Christ to display his crucified body in likeness upon the cross.

A crucifix was fashioned in high relief for St. Gregory of Tours in 560 A.D. It is claimed that the first crucifix clock was made by one Jehan d'Alemaigne for the Duke of Burgundy circa 1410 A.D. It had a case of solid silver, the figure of the crucifix being ivory. While Christ appeared on the facades of the great Strassburg clocks, the cross was omitted. The Nurenberg clockmaker, Peter Hele, made a colorful crucifix clock in 1512 A.D. It had in its case make-up the Holy Rood carved in wood with Mary and St. John in full vivid color, white, gold, red and blue, finely painted. The mechanism of the clock was fitted within the base of the rood and the time recorded on a revolving numeral ring of silver at the foot of the cross.

The flagellation of Christ was the subject of a clock by Nicolaus Achloss. The captive was bound to a pillar surmounted by a revolving band on its capital recording the quarter hours. The prisoner is being lashed by two Roman soldiers and as the hour strikes they commence their lashing, raising their whips which sound a bell as they strike Christ. The time is recorded on a dial at the feet of the bound victim of Calvary. The figures are gold-gilt brass and the base case containing the movement of the clock is ebony.

A Dublin clockmaker, John Wilkes, in 1566 A.D. made a Calvary clock depicting a full scene and the dying Christ. All the figures were carved in wood and painted in natural colors. The time was recorded on an hour dial mounted on the facade of the case, and as the hours struck on a bell all figures moved on their pivots and the figure on the cross turned slightly from side to side as in agony.

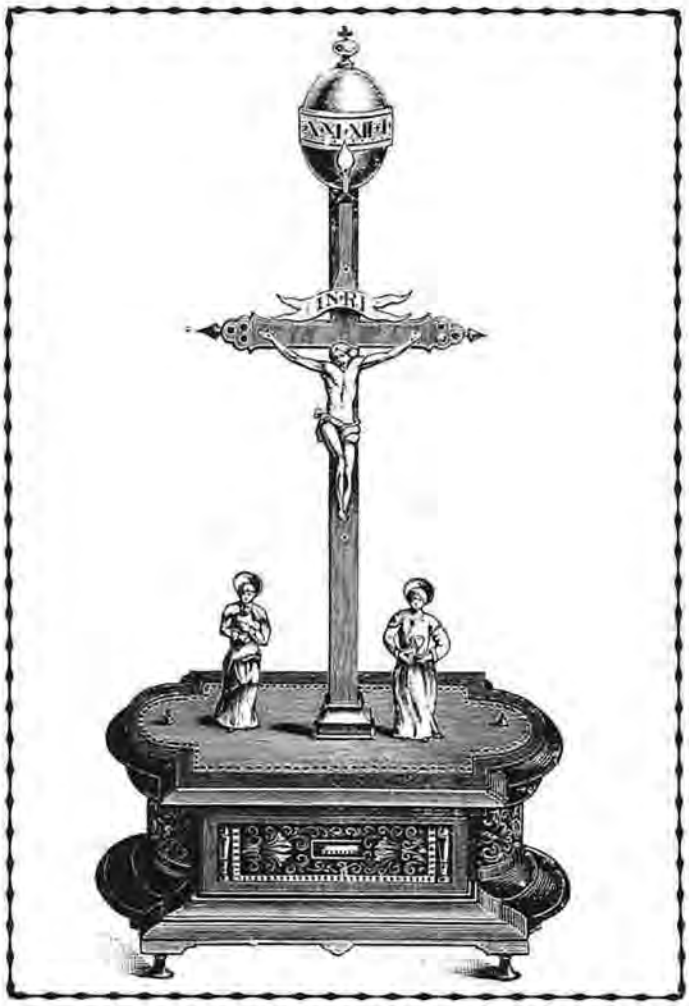
The late seventeenth century French clock illustrated here is interesting. The base of wood and gilt metal is rather ornate and covered with red velvet. The cross is of gilt metal and the figures and mounts are silver. The crucifix figure is beautifully modelled and expressive to the last degree. The figure of St. John, holding the chalice, which he raises when the hour strikes, is very graceful and has the dignity of the solemn Mass.

Time is recorded on the revolving globe ring on the apex of the post of the cross. The movement is of the verge escapement pattern and the clock runs for 30 hours, the action being seen through the filigree panels in the case. This is one of the finest examples of a crucifix clock extant.

Another similar clock by the same maker had a figure of Christ with the head turning from side to side at the striking.

The figure of the Virgin Mary also turned on the strike toward the cross and bowed its head.

Thus, the crucifix was invoked by the horologists of old in the pious phase of their art and craft. □



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Essence of Clock Repair

by Sean C. "Pat" Monk
CMW

Part XXXXV

The Eight-Day, Two-Weight Vienna Regulator

This type of clock was extremely popular throughout Europe and the U.S. during the second half of the last century and certainly well into this century. If it has fallen into any disfavor, one would be inclined to suggest that is because it can be a problem to set up on the wall. Also, with vintage there also is the problem (always involved) in the wear between two similar metals: the steel rack teeth and the steel gathering pallet, or gatherer.

Simply, the mechanism is closely related to that discussed in some of our previous articles on striking clocks. If, therefore, you have been able to digest that which we have discussed previously, this particular clock should come as neither a problem nor as a surprise.

The clock is a good looking wallpiece, mounted in a fine scalloped hardwood case. (See Figure 1.) There are two separate trains, a going and a striking. The movement is a crank key wind, the two trains being maintained by two brass cylindrical weights supported on fine gutline. The guts are secured at one end to the great wheels (or barrels) and at the other free ends to two brass securing hooks which are mounted near the lower edge of the front plate.

The going train is not unusual, consisting of a great wheel (with maintaining ratchet), center (second) wheel, third wheel and escape wheel. The escapement is of the dead beat variety, having a span of 8½ teeth between the pallets. The latter is of the somewhat narrow-gauged, long-armed steel variety giving a good workable angle of impulse to the escape wheel teeth.

The striking train is also not unusual, containing a great wheel (with maintaining ratchet), a pin wheel (supporting the gathering pallet on the front plate), a warning wheel (with warning pin mounted on it) and a fly (or fan) completing the train in order. The fly, of course, may be referred to as the speed control for the striking function.

Hour strike sequence commences when the minute hand moves toward the hour. A pin on the motion wheel (normally represented by a cannon pinion) moves a tooth on the star wheel (Figure 2) which carries the hour snail. The snail is thereby moved into a position so that the rack tail resides against its appropriate face for the particular hour strike. The motion wheel also meshes with the minute wheel, which carries two steel pins, one set closer to the periphery of the wheel than the other. This particular high pin raises the tail of the lifting piece sufficiently high at the hour to allow the rack hook to disengage the striking train. Just before it reaches its zenith, however, the warning takes place. If you will now refer again to Figure 2, you will observe that at the left hand end of the lifting piece, there exists a warning piece. This warning piece actually passes through a slot in the front clock plate and, if you will examine the clock closely, you will discover that this warning piece impedes the motion of the warning wheel (the last wheel in the striking train) by locking against the warning wheel pin. This locking action only occurs during the brief period between the end of the warning and the actual striking.

Just prior to striking, the tail of the gathering pallet (or gatherer) is resting against a steel pin at the left hand end of the rack. However, immediately after the warning has

Figure 1.

Diagrammatic sketch. Rack and Gatherer Strike.
Vienna Regulator

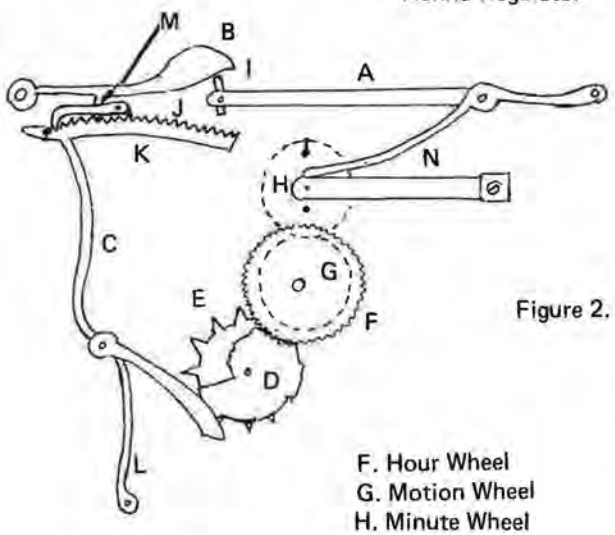


Figure 2.

F. Hour Wheel
G. Motion Wheel
H. Minute Wheel
I. Warning piece
J. Gatherer
K. Rack
L. Tension Spring
M. Rack Hook Toe
N. Lift Piece Tail

A. Lifting Piece
B. Rack Hook
C. Rack Tail
D. Snail
E. Star Wheel

occurred and the lifting piece has raised high enough to free the rack hook completely from the rack, the striking train rotates and physical striking of the gong occurs, via the pin wheel. At the high point of the lifting piece, the rack will fall under its own gravity, so that its tail resides against the appropriate face of the hour snail on the star wheel. This arranges for the correct hour to be struck.

Also, during the striking sequence, the gathering pallet (on the third strike wheel) rotates with the freed striking train. During its rotation it engages the rack teeth at each hour count. At the end of the striking sequence the tail of the gathering pallet comes to rest against the pin mentioned at the left hand end of the rack.

At the half hour striking the sequence is slightly changed. The lifting piece is raised via its tail being moved by the low pin on the minute wheel. This is the pin closest to the minute wheel center. The distance the lifting pin is raised in this case is just sufficient to free the toe of the rack hook from the first tooth in the rack. This tooth is at the very left end of the rack teeth and, upon close examination, one will find that it is shorter than the rest of the rack teeth. Therefore, the clock just strikes once and the toe of the rack hook simply falls back into its original position.

The physical striking of the clock is performed when the striking train is freed, as described, via the pin wheel which resides in the striking train. This wheel is situated next to the back plate and carries a series of steel pins around its approximate circumference. These pins simply activate a hammer, set vertically on the clock frame, against a steel wire gong.

Precautions during Servicing

The motion wheel and the minute wheel should be dot-coded,

(continued on page 54)

Setting Friction Jewels ©1979

The system of setting friction jewels in watch plates and bridges was started in Switzerland about 1920, but it wasn't until the early 1930's that it was used to any extent in the United States. Friction jeweling tools were being developed about this time also.

One of the early problems in friction jeweling was to develop a material for the jewels that would withstand the pressure of pressing them into the plate without breaking the jewels. This problem was solved by the development of synthetic ruby and sapphire. This material is much more uniform and stronger than the natural ruby and sapphire used previously. Another problem was that the holes in the jewels were not always in the center of the jewel. Some of the American watch companies solved this problem by first placing the jewel in a brass setting and then, while the jewel and its hole were running true in the machine, the outside diameter of the setting was turned to size. Thus the jewel hole was centered into the setting. This jewel setting was then frictioned ino the plate or bridge. After this, improvements in jewel making made it possible to friction the jewel directly into the plate or bridge and have the hole on center, which eliminated the brass jewel setting.

The following are articles found in a friction jeweling set as shown in Figure 1. The main part in the set is the frame,

Technically
WATCHES

by Archie B. Perkins, *CMW*

Figure 1.

which is very similar to the staking tool except that it has a lever handle which is used to press on a pusher holder when the jewel is pushed into the plate or bridge. There is a set of reamers for reaming out the holes to a predetermined size for the jewel. These reamers are graduated in size from 0.69 mm up to 2.99 mm, in the following manner: 0.69–0.79–0.89–0.99–1.09–1.19–1.29–1.39–1.49–1.59–1.79–1.99–2.29–2.59–2.99. These sizes are 0.01 mm smaller than the jewels that are to be set in the holes that they ream. The reamer is shown in Figure 2A. There is a holder for the reamers that has a tapered hole in its end into which the reamers friction. This is shown being used in Figure 3. Important in the reaming operation is that a back and forth turning of the reamer should never be used. Always turn the reamer in a continuous clockwise direction in order to keep the hole in the plate or bridge round and on center. Also, never hold tight or lock the plate or bridge being reamed since it could very well cause the hole to be reamed off center.

In the jeweling set, there are three types of pushers for pressing the jewels into their holes. For pressing in train and cap jewels, there is a set of flat pushers that are graduated in the following manner: 0.63–0.73–0.83–0.93–1.03–1.13–1.33–1.53–1.73–1.93–2.53–2.93. These are 0.08 mm smaller than the jewel they are to push. See Figure 2B.

There is a set of concave pushers that are graduated in size the same as the flat pushers. See Figure 2C. These concave pushers are used for pressing in convexed balance hole jewels. The concave face of these pushers fits the convex face of a balance hole jewel which causes the pressure to be applied near the edge of the balance hole jewel instead of at its center where the jewel is weakest. This helps to prevent the jewel from being broken when it is being pressed into its hole.

There also is a set of pump pushers as shown in Figure 2D. These are graduated in size the same as the other two styles previously mentioned. The faces of these pushers are shaped like the concave pushers except that in each of these there is a small pump center. The purpose of this type of pusher is for mass production. When there is a large quantity of jewels to be pressed in, the pump center goes into the hole in the jewel and self-centers the pusher on the jewel which makes it quicker to center the pusher on the jewel. This speeds up the operation. It also helps to prevent the edge of the hole for the jewel from getting damaged from a pusher that isn't centered on the jewel. The pushers can be used on either train jewels or balance hole jewels. There is a pusher holder for holding the pushers. This is shown being used in Figure 4.

A set of stumps similar to staking tool stumps is in the set. These stumps are used to support the plate or bridge

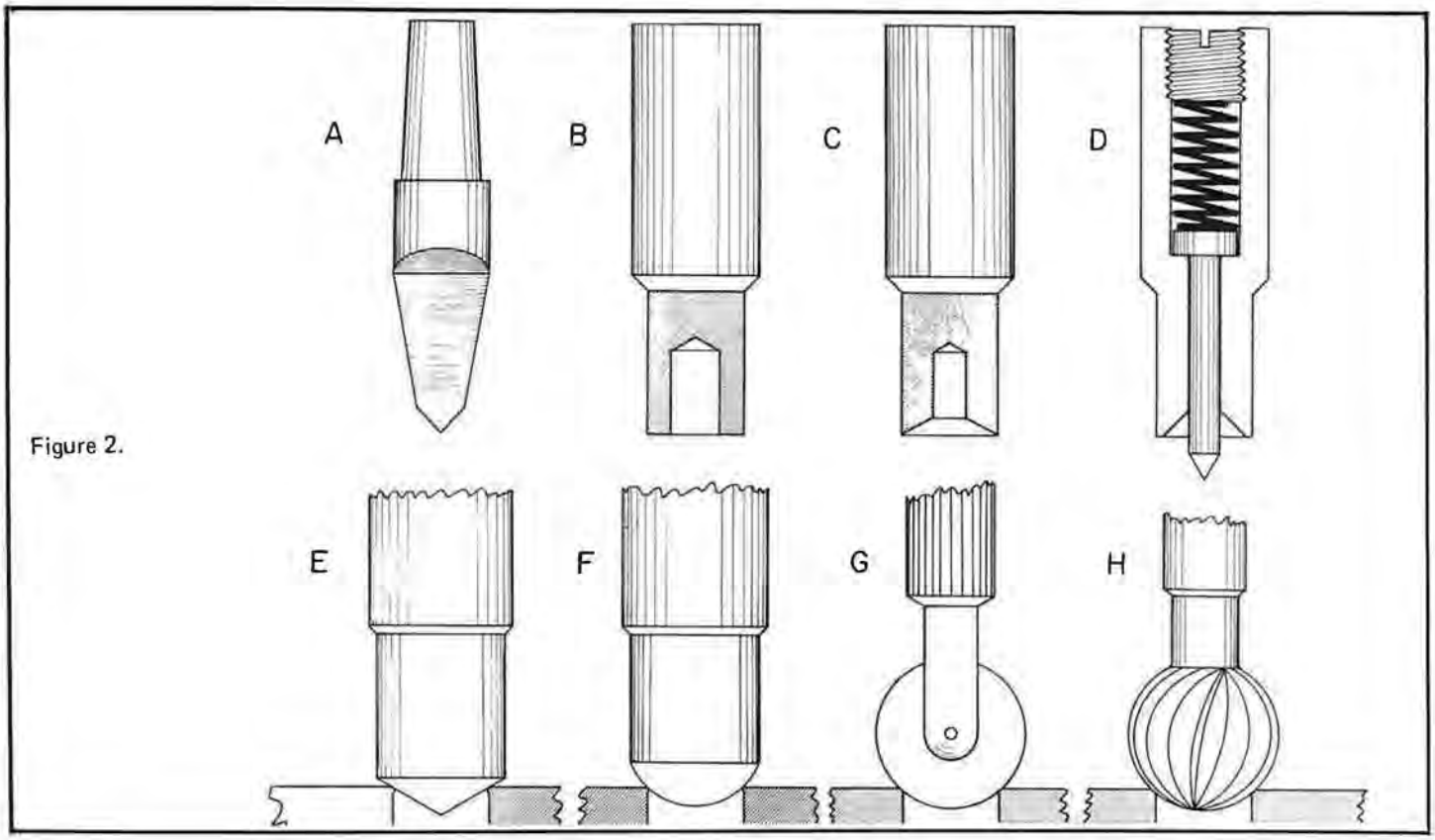


Figure 2.

while the plate is being reamed, or when pressing the jewel into the hole in the plate or bridge. Some of these stumps are solid and others have graduated holes in them.

Hole closers in the set as seen in Figures 2E and 2F are used to close the hole in the plate for the jewel in case the hole is slightly large for the jewel. These are used to close the hole for only 0.01 to 0.02 mm. These hole closers fit into the pusher holder.

A more deluxe jeweling set has a face plate to hold small bridges and balance cocks while reaming the hole for the jewel. See Figure 5. This is a very handy attachment as it is sometimes difficult to hold a small bridge any other way.

Sometimes the jeweling set has a burr removing tool used for removing the burr from around the hole. This burr is created by the reamer when the hole is reamed. If the jeweling set doesn't have this tool, other means can be used to remove the burr. One of the best ways is to use a wheel countersink as shown in Figure 2G. These wheel countersinks can be bought from watch material supply houses. They usually come in sets of six. Some are double ended. On one end there is a disc with sharp edges for cutting or sinking around a hole, and on the other end there is a disc with the edge rounded for burnishing and polishing the sink that was previously cut by the sharp edge disc. These countersinks are also good to use for stripping out around a set jewel.

Another way to remove the burr from around a hole is by the use of a round dental burr as in Figure 2H. If neither of the two mentioned burr removers is available, then the beveled point of the reamer can be used. Select one that is about two times larger than the hole that has the burr to be removed.

To replace a damaged friction train jewel, the old jewel is first removed from the plate or bridge. This can be done with a flat jewel pusher that is slightly smaller than the jewel. See Figure 6A. The plate or bridge is supported on a stump that has a hole in it large enough to clear the jewel as it is pushed from its hole. This stump should be of such a diameter to fit close around the hole for the jewel if the plate is recessed around the hole. Note: if the plate isn't supported down in the sink around the hole, it may become bent as the jewel is pushed out.

Now after the old jewel is removed, if it comes out in one piece, it can be measured with a micrometer to determine its outside diameter to be used in selecting a new jewel. If the old jewel comes out in pieces, the diameter can be determined by using the jewel pushers or reamers as plug gauges. These can be tried in the hole until the size of the hole is determined. Another method is to use the shank of a twist drill as a plug gauge. Jewels come in outside diameters graduated in millimeters as follows: 0.70–0.80–0.90–1.00–1.10–1.20–1.30–1.40–1.50–1.60–1.80–2.00–2.30–2.60–3.00. The hole sizes for balance hole jewels are 0.07–0.08–0.09–0.10–0.11–0.12–0.13–0.14–0.15 and 0.16. Train jewel holes are graduated in the following way. Every size from 0.10 to

Figure 3.

0.20 mm and then 0.22–0.24 and so on up to 0.32 mm. Center jewel holes start at 0.34 mm and go up to 1.10 hole size in graduations of 0.02 mm.

After the diameter of the jewel is determined, then the hole size is determined. If the hole in the old jewel isn't damaged, its size can be determined by the use of plug gauges. If the jewel hole is damaged, the pivot that works in this hole can be measured and a jewel selected that has a hole 0.02 mm larger than the pivot for a train jewel, and 0.01 mm larger for a balance hole or pallet hole jewel.

If a jewel cannot be located with the same outside diameter as the old jewel, then one is selected which is 0.1 to 0.2 mm larger than the old jewel. The hole is then enlarged with a reamer to fit the new jewel as in Figure 3. It is always best to select the new jewel with the same diameter as the old one.

Note: if the jewel is to be pressed flush with the plate, the pusher diameter needs to be larger than the jewel. See Figure 6B. If the jewel is to be pressed below flush in order to have proper end shake on the wheel, the pusher should be slightly smaller than the jewel. See Figure 6C. Figure 5 shows how a small bridge is held in a face plate while it is being reamed and Figure 4 shows how a jewel is pressed into its hole. Figure 7 shows the micrometer adjustment on the jeweling tool frame which is used to gauge the depth that the jewel is pushed below the surface of the plate in adjusting the end shake on the wheel that works in a particular jewel. This micrometer adjustment is graduated in 0.01 mm. Before the old jewel is removed from the plate, this micrometer adjustment can be set while the pusher is down against the jewel. Then, when the new jewel is replaced, it can be pushed to the same depth as the old one. To set the micrometer adjustment, select a stump and a pusher that is to be used in pressing in the new jewel. Then place these in the jeweling tool. Now place the plate into position on the stump and bring the pusher down on the old jewel. Now back the micrometer adjustment up against the head on the pusher holder. This sets the micrometer adjustment so the new jewel can be

Figure 4.

pushed to the same depth. If the new jewel is to be pushed flush with the plate, then the micrometer adjustment is not needed.

To set a friction balance hole jewel, the old jewel is first removed. To do this, select a stump with a hole in it that will clear the jewel as it is removed. Now select a flat pusher slightly smaller than the jewel. Place the stump in the jeweling tool and the pusher in the pusher holder. Now place the plate or balance cock with its outside down on the stump. Then bring the pusher down centered on the jewel and press the jewel out. See Figure 6D. Note: a balance hole jewel is pushed out from the inside of the plate and pushed in from the outside of the plate. Once the old jewel is removed, select a new jewel with proper outside diameter and hole size. Then select a concave pusher slightly smaller than the jewel in order to press the new jewel into its hole.

When the pusher has been selected, place the pusher

Figure 5.

(continued on page 52)

Scholastically Speaking

by Joseph Rugole *CMW*

Chairman, Research and Education Council

In the March issue of this magazine I expressed some ideas regarding the role of the Research and Education Council and asked for submissions on proposed topics for our next meeting. Since this article had been written before most of you received the March issue, to date I have not received any suggestions for the kind of questions we should consider at our next annual meeting. Just to probe into some of the possible directions, I am again poking my nose into other people's business by further exploring some of the problems that concern me, and I believe should concern you.

It seems to me that we are employing the best methods for disseminating the information on electronic watches that has ever been devised by an organization. We are attending regular three- and four-day seminars every year to update our knowledge on new developments in the field. We have at our disposal a number of portable programs offered by the AWI's most competent instructors. We can draw on the services offered by the best known companies producing, marketing or servicing electronic watches. We can use all of these opportunities to further our knowledge of new products.

In our preoccupation with new developments in the electronic watchmaking industry, we may have somewhat neglected our updating on the mechanical aspect of our training. In saying this I am very conscious of the fact that I am treading on dangerous ground, because everyone of us likes to think of himself as an expert in his field. I believe that we are that in our own right, but still there is no denying that some are better in one area and the others in another. To illustrate what I mean, let me cite two examples. Those of us who have seen the shops and the equipment in some of the program at Parkland College in Champaign, Illinois, directed by our colleague Bill Smith, Jr., had to be impressed with the micro-technician program offered by the College. Although I saw it some five years ago, I am sure it has been changed and improved since. Some of us have also seen pictures of Archie Perkins' shop and gear cutting equipment, and although my shops are well equipped, I would love to spend a day in his shop and try out some of his gadgets.

How many more of such examples could be found among the member schools? Perhaps as many as there are schools, or possibly not quite as many. The actual number of unique and outstanding shops and programs is not really important. Seeing those that do exist and learning something about the program, however, could add a good deal of knowledge and a different perspective on what our own school is offering. Going one step further, I believe that visiting any

school, with or without a special program, would add to our knowledge and understanding of different programs that may exist within any given educational structure. I also believe that it may not be impossible for many of us to partake in such a program. One way to do so would be to establish a system of visiting lecturers, such as is practiced at universities. I am sure that everyone of us is quite capable of preparing and delivering a two- or three-hour lecture for the visiting school. The remaining time of the day could be spent on learning something about the school, the program and the people involved. I am also aware that there might be a thousand and one problems in developing such a program, but nothing is ever achieved without trying.

BOWMAN TECHNICAL SCHOOL EXPANDS

Mr. Ned Parkhurst of Lancaster, Pennsylvania announced that the Bowman Technical School has moved into a new one-story building. A 35% increase in floor space will provide ample space for up to 150 students with contigent plans for future expansion.

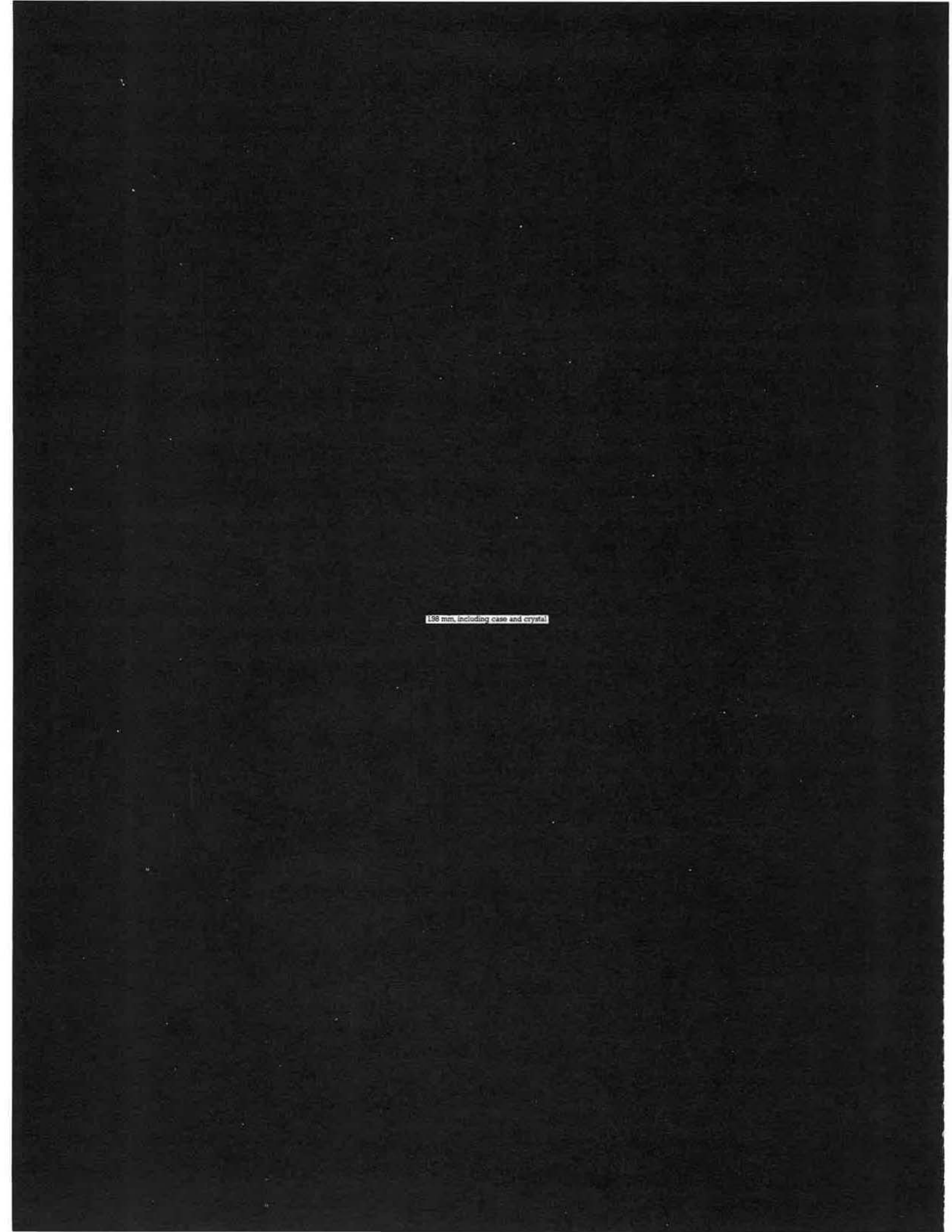
Previously unable to accept the handicapped, the school through its new location will allow registration of these students. Also, Bowman will now accept students on the GI Bill.

The new address is Bowman Technical School, 220 W. King St., Lancaster, Pennsylvania 17603, telephone (717) 397-7484.

NEW HOROLOGY INSTRUCTOR

A new instructor has been added to the staff in the Horology School at Gem City College. Mr. William Crispin is now teaching the Clock Repair Course and Advanced Watch Repair.

He has been in the watch and clock repair business for 25 years and is past president of the St. Louis Chapter of the National Association of Watch and Clock Collectors, Inc.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WATCH ADJUSTMENTS

by Joseph Rugole, CMW

In the February and March 1979 issues of *Horological Times* some theoretical concepts of the balance oscillating system were discussed and it was pointed out that it is quite susceptible to a number of outside influences which cause the irregularity of motion. Although there were quite a number of external forces mentioned, the detailed analysis of their effects on balance motion has yet to be presented.

The force of gravity is one of the forces which presents considerable problems in precision timing and adjusting. Because the balance and hairspring may be found in any one of the infinite number of positions during the normal wear of the watch, it is essential for its proper operation to have all of the mass of the balance unit evenly distributed around the center of rotation. This, however, is easier said than done. Since we are faced with gravitational problems, or rather with an out of poise condition with practically every watch we service, it is important that we understand every aspect of the problem. We will begin by analyzing how a heavy point on the balance unit affects its performance in various positions and at different amplitudes. Next we will examine the causes of the out of poise condition, and then propose some currently used practices and adjustments which are used by the industry and by individual watchmakers.

It was mentioned before that a heavy point on the balance unit has no effect on its performance when the watch is placed in one of the horizontal positions. This fact can be easily proven by a simple experiment. Take a watch with a screw type balance wheel in good mechanical order and add two timing washers under two opposite screws. Time the watch in one of the dial positions. After obtaining a good rate remove one of the timing washers and move it to another screw near the other washer. Time the watch again, making sure that it is perfectly horizontal. You will notice that there is no difference between the two rates. If you now turn the watch in one of the pendant positions, the rate will be either fast, slow, or there will be no change from dial positions. Turning the watch a full circle in vertical positions while still on the timing machine will produce a complete range of rates from extreme fast to no variation from dial positions, to extreme slow. Furthermore, if we experiment with different amplitudes of the balance wheel by first winding the watch just a little and then progressively more and more, we will find that when the watch is slightly wound the differences are the greatest. As we wind it more and more to increase the amplitude and keep taking rates in various pendant positions, we will find that the differences become smaller and smaller until we reach a point when all pendant positions will be the same as if the balance were not out of poise at all. Winding the watch still more from this point, we again obtain differences in rates, but those positions which were slow in short amplitudes will be fast, and those that were fast will become slow.

This very peculiar behavior of the balance follows a certain predictable pattern which can be explained if we take a closer look at what is happening when the balance is out of poise. To begin with we will take an example where the heavy point is placed in such a way that it lies directly below the balance pivots when the roller jewel is on the line of centers. Figure 1 illustrates this example. If the balance wheel is deflected for 90° to the left, the heavy point on the balance is now located on the horizontal line, and the hairspring is under tension. When the balance wheel is released from this position, the elastic force of the hairspring will tend to bring it back to the line of centers. Because the force of the hairspring is acting continuously on the balance wheel, and the opposing forces are small, the balance will accelerate until it reaches the line of centers. By now it has gathered some momentum and it will continue to move past the line of centers. In doing so it will force the hairspring to bend and resist the motion of the balance until its kinetic energy is spent and the balance is brought to stop. Let us now go back to the beginning of the accelerating arc and analyze the action of the heavy point. If we remove the hairspring and repeat the experiment, we will find that the heavy point on the balance wheel acted exactly the same way. When the balance is released, the heavy point will tend to bring it to the line of centers. After the line of centers the kinetic energy of the balance will have to be used to raise the heavy point along an inclined path, and when the energy of the balance is spent, it will stop. It is now easy to visualize what will happen when the two forces, i.e., the force of the hairspring and the force

(continued on page 34)

The Effects of an Out of Poise Condition in the System

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*LED and LCD cells not included.

AWI NEWS

By Milton C. Stevens

It's Election Time!

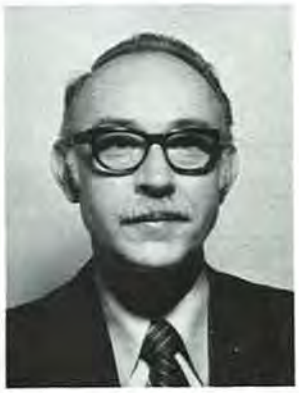
Each year AWI's membership selects five of its members to serve a three-year term of office on the AWI Board of Directors. The five Directors elected this year will join the other members of the Board during the Annual Board of Directors meeting which will be held June 16-17, 1979. At the annual Affiliate Chapter meeting, the Affiliate Chapters will select a sixteenth Director who will serve a one-year term on the AWI Board.

During the annual Board of Directors meeting this June, the 16 AWI Directors will meet to select from among themselves the Executive Board for 1979-1980. The Officers selected will be President, First Vice President, Second Vice President, Secretary, and Treasurer.

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

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

The single ingredient that has made the American Watchmakers Institute the success it is, is the quality of the people who serve AWI on the Board of Directors, as Officers, and as members of AWI committees. Everyone should give careful consideration to the qualifications of each candidate when the election material is received. We hope each member will take the time to cast his vote during this year's election.



Fred Burckhardt

Robert Leach

Dorothy Aderman

Dr. Joseph Baier

James Broughton

Joe Crooks

Mark Davenport

Jerry Harris

Walter Riegler

Eric Samuel

Don't Forget

. . .

To Vote

WATCH ADJUSTMENTS

(continued from page 30)

of gravity, are combined. During the acceleration arc both forces are acting in the same direction, namely speeding the balance wheel toward the line of centers. The result of the two forces acting on the balance wheel is that it reaches the line of centers sooner than it would if propelled by the force of the hairspring alone. After the line of centers is reached both forces oppose the motion of the balance wheel so that it is brought to stop sooner. The net result is that the balance wheel has travelled the distance in shorter time than it would take under the force of the hairspring alone.

In the next experiment we move the watch 45° clockwise so that when the roller jewel is on the line of centers the heavy point is at 45° below the horizontal line as in Figure 2. The amplitude is kept at 90° so that the effect of the location alone can be observed. We again deflect the balance for 90° to the left and examine the interaction of the forces. If there were no heavy point the balance would behave the same as described in the first experiment. The heavy point, however, will not act the same. During the first 90° of the arc both the hairspring and the force of gravity will act in the same direction. When the balance has reached the line of centers, the hairspring has spent is energy, but the heavy point is still 45° from the vertical line. After the line of centers the hairspring begins to slow down the balance wheel, but the heavy point tends to accelerate it further, so that during this 45° motion it opposes the force of the hairspring. After the heavy point has reached the vertical line it agains acts with the hairspring tending to slow down the balance and stop it sooner. During this portion of the amplitude the inclined plane is not as steep as it was in the first experiment because the balance stops when the heavy point reaches 45° past the vertical line. Since we have the force of gravity working with the force of the hairspring for a total of 135°, and against it for only 45°, we could expect that the rate of the watch would still be fast, but not as fast as when the heavy point is located at the bottom as in the first experiment. There is yet another difference between the first and the second situation. Figure 1 clearly shows that after the heavy point has reached point B and the balance has stopped, the return motion of the balance will be identical but opposite. Figure 2 must be further analyzed to explain the action during return motion. During the first 45° of the return motion both the hairspring and the gravity act in the same direction, causing the balance to complete this portion of its motion faster. The next 45° the hairspring accelerates the balance wheel toward the line of centers, while the force of gravity tends to slow it down. The next result during this part of the amplitude will be a slight loss of time. When the line of centers has been reached the two forces will again act in the same direction, tending to stop the balance wheel sooner than it would without the force of gravity. To summarize briefly, when the heavy point travels from A to the line of centers, the rate is fast, while from the line of centers to point B the effects nullify each other. The gain is registered only during the acceleration arc from A. When the heavy point travels from B to A the acceleration arc shows no variation, but the deceleration arc will show a gain. When comparing the two experiments, we find that Figure 1 shows gain during the total amplitude of 180°, while Figure 2 shows gain only during 90° of the amplitude. Therefore in the second case we should have a gain which is considerably smaller than in the first one.

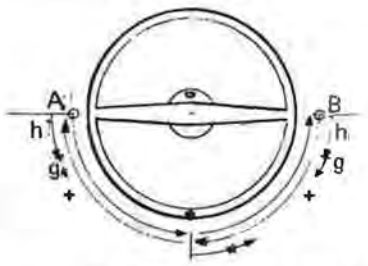


Figure 1. Heavy point at the bottom, amplitude 90°. Rate: Maximum gain. (h = hairspring force, g = force of gravity).

In the next experiment we place the heavy point at 90° to the left of the vertical line and keep the same amplitude as before. The analysis of this situation shows the following conditions. When the heavy point is deflected to point A and the balance released, the force of the hairspring and the force of gravity combine to accelerate it. The line of centers is reached in shorter time. During the deceleration arc the hairspring acts against the motion of the balance, tending to stop it, while the heavy point acts with the motion of the balance, tending to accelerate it. This action favors the kinetic energy of the balance wheel and it will take the force of the hairspring longer time to bring the balance to stop. Thus during the decelerating arc the watch will lose as much as it has gained during the accelerating arc. When the balance motion is reversed so that it travels from B to A the hairspring will cause the balance to accelerate, but some of its force will have to be spent on lifting the heavy point to the horizontal line so that the net force of the hairspring causing acceleration will be somewhat smaller. Because of that the accelerating arc will be slower than normal. During the decelerating arc, both the hairspring and the heavy point will combine forces and bring the balance to stop sooner. Since we have 90° of the arc gaining and 90° losing, the rate on the timing machine will be the same as if there were no heavy point on the balance.

If we follow the same procedure for the heavy point at the top, Figure 4, we find that when the balance wheel is released from point A the heavy point acts against the force of the hairspring until the line of centers is reached. From the

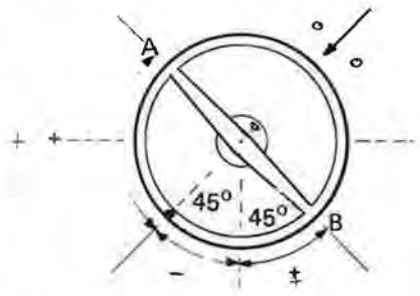


Figure 2. Heavy point 45° to the left, amplitude 90°. Rate: Small gain.

(continued on page 54)

Temperature and Gemstones

Heat can affect gemstones in different ways. In some stones heat can induce a color change. For example, when amethyst, a variety of quartz, is heated, it can become colorless, orange, green or in some cases yellowish or reddish-brown, resembling the citrine variety of quartz. Yet, with careful application of heat, the color of an amethyst could become more uniform, making a more desirable stone. Other varieties of quartz such as citrine, smoky quartz (often incorrectly called smoky topaz) and rose quartz can become colorless under high temperatures.

Under certain temperatures, purple sapphires sometimes become a rose red or pink color. Some topaz and zircons are heat-treated to produce more desirable colors which are more salable on today's market. Many stones are heat-treated for this reason. Usually, low quality material is used and the resulting colors, induced by heat treatment, are of a permanent nature.

In other cases, heat can have a very damaging effect on some types of gemstones, resulting in fracture or decomposition. Pearls will split or crack and turn brown. Heat could cause additional fracturing or even complete breakage in emeralds. Jade will "bubble"; turquoise will react like a famous cereal–snap-crackle-pop! Topaz and peridot, if subjected to a rapid change in temperature, may crack internally or a complete separation may take place.

Most of the above will take place under high temperatures, such as that produced by a jeweler's torch. Our main concern at this time will be with the heat produced by a "boil-out" pot and a steamer. Many stores, if they offer free ring cleaning, will have these two pieces of equipment even if they do no repair work. This added service is very good to build customer relations but it can also work the other way. Suppose a customer asks you to clean her ring. You drop it in the boil-out pot or under the steamer and you find that instead of having one stone, you may have several pieces or some other damage has occurred. It gives you the same feeling you get when you tighten a stud screw and then slip, running the screwdriver through the hairspring. You pray it hasn't happened, but miracles don't come around too often–you're stuck! Some picky customers will become upset if this kind of thing happens to their jewelry.

The chart at the end of this article lists the names of some gemstones that should be kept away from the boil-out pot and steamer. This doesn't mean that all these stones will be damaged if you give them a quick dip in the boil-out pot or pass them under the steamer for a few seconds. It does mean that there is always a chance of injury to those stones listed, so use these pieces of equipment judiciously. Always keep in mind, *never subject any heavily flawed gemstone to a rapid change in temperature.*

Acids and solvents should also be used with caution. Recently a young woman came into the store, quite upset, claiming the ultrasonic machine we sold her ruined her rings. These machines are designed for home use and have a very mild action. They come with a bottle of jewelry cleaning solution and directions for its use. One of the rings contained a piece of coral which had been reduced to almost half its original size. The other ring had a piece of lapis lazuli, severely pitted and completely ruined. At first she said they were only left in the machine for a few minutes and she had used the solution that came with the machine. Later, she did admit, she used some household cleaning solution and turned the machine on just before she bathed and washed her hair. Always recommend that your customers use a prepared jewelry cleaning solution. When used according to instructions, it won't damage jewelry.

A pearl's delicate surface can be damaged, even by some commercial jewelry cleaners. These cleaners will state on the label that they shouldn't be used to clean pearls. If you sell jewelry cleaner, read the label and be sure your customers understand the directions. Pearls can also be attacked by body acids, perfumes and hair sprays. They should be wiped off with a soft cloth after each wearing.

Your lady customers should be advised to remove

THE ROCK QUARRY

Basic Gemology for the Repair Shop

by **Fred S. Burckhardt**

their jewelry when using fingernail polish remover. Some stones, if dyed, could be damaged if some of the solution is accidentally dropped on them.

Any strong solvents such as acetone or epoxy remover should never be used on any assembled stone such as an opal triplet. The same goes for any organic material like pearl, coral and amber.

Some stones will react to certain acids and not to others. Hydrochloric acid, even in a diluted form, can attack surfaces of stones such as coral, malachite, lapis lazuli, and peridot. We all have hydrochloric acid in our digestive tracts, so don't swallow any of these stones!

One other thing should be mentioned–toothpaste. For some reason, many customers have mentioned that they have been told to clean their jewelry with toothpaste. Toothpastes contain an abrasive. This is what keeps your teeth nice and shiny. It could react just the other way with some of the softer gemstones, abrading or dulling their surface. The metal doesn't benefit much from the polish either.

The following chart lists those stones which should not be subjected to ultrasonics, boil-out pot and steamer, and strong solvents and acids.

Gemstones not to be subjected to ultrasonic action

Assembled stones–doublets, triplets and foil backs

Coral	Opals
Emerald	Pearls
Lapis lazuli	Peridot
Malachite	Turquoise

Not to be subjected to boil-out pot and steamer

Assembled stones	Pearls
Coral	Peridot
Emerald	Topaz
Lapis lazuli	Turquoise
Malachite	Opals

Keep away from strong solvents and acids

Assembled stones	Opals
Coral	Pearls
Emeralds	Peridot
Ivory	Shell (Cameo)
Jade (possibly dyed)	Turquoise
Lapis lazuli	Malachite

This is by no means a complete list nor is it a list designed for use in a jewelry repair shop. It is only for those handling stones at the service counter and contains the most popular stones handled by the average store in a normal day.

Once again, if you are not sure about a particular stone, don't take a chance! Treat all gemstones with respect and handle with care. To give you an example, I just received an emerald from a supplier–a beautiful stone weighing a little over a carat, with a wholesale price close to $3,000. How would you like to have to replace a stone like this if you damaged it by careless handling? □

THE SHIP'S CHRONOMETER © 1979

by Marvin E. Whitney
CMC CMW

Very often when a chronometer is brought in for repairs because the rate has suddenly become very erratic, the cause can be traced to a pitted upper balance cap jewel. Although it is a diamond, set in a steel setting, the pivot will often cut a small pit in the face of the jewel.

There are two hypotheses offered for the cause of this oddity. The first is due to the crystalline formation of the diamond. When the gem cutter is cutting these rose cut stones, he is interested in having on its underside a large and broad face and thus pays little attention to the lines of cleavage. If the stratum of the diamond is at a slight angle to the face of the jewel, numerous and extremely thin angles are formed.

The balance wheel of a ship's chronometer, being of considerable weight and running continually in a horizontal position, exerts its entire weight on the end of the upper balance pivot. Should the end of the pivot come in contact with any of these thin segments, a fracture may occur. Small fragments then become imbedded in the end of the pivot which then becomes a diamond charged drill.

The other assumption is that pitting is the result of improper heat treatment of the staff. Diamond is crystallized carbon and since most staffs are made from high carbon steel, when the steel is subjected to extreme heat during the hardening process, the carbon crystallizes, forming extremely small particles which possess all the abrasive properties of a diamond itself and will cut any stone, even a diamond. Tests have been conducted which give credence to this theory, for staffs made of high carbon steel when heated to a white heat would cut a diamond cap jewel in a relatively short period of time.

Regardless as to how the cap jewel becomes pitted, it must be either replaced or repolished. Replacing such a jewel requires a great deal of patience and skill for the jewel must be set perfectly level in a steel setting. First, a hole is drilled in a piece of tempered steel stock and the seat is enlarged to accommodate the diamond. The depth of this seat should be slightly deeper than the thickness of the diamond so the face is slightly below the hole's edge. The steel setting is then cut off allowing enough for finishing. The setting is placed on a bench block and the diamond is set in the hole. With a pointed staking punch, carefully peen the edges of the setting over the diamond. Great care must be exercised here since the face must be kept perfectly level with the setting. The jewel has to be peened in instead of being burnished because of the faceted crown, which makes it almost impossible to keep the jewel level when the burnisher is applied.

After the diamond has been peened in, brass solder is flowed around the diamond in order to fill any open areas created by the diamond's irregular shape.

Once the soldering operation is completed, the excess metal is carefully removed by either filing or turning it down level with the face of the jewel. Then the setting is placed face down on a flat piece of ground glass charged with oilstone powder. Moving the setting on the lap in a circular motion, grind the surface evenly out to its edge. Great care must be taken here so that flatness is maintained across the entire width of the setting.

After thoroughly cleaning the setting, the face side of the setting is shellacked to a cement brass and trued with a pointed piece of pegwood against the side of the setting, since the bevel area is filled and thus, cannot be trued from its center. The bevel area is opened by turning out the excess brass solder and shaping the bevel without encroaching on the faceted diamond. This is a rather difficult job since any contact between the tip of the graver and the facets will break off the tip of the graver. Strip the setting and if there are any remaining pieces of metal around the bottom facets, pick them out with a small needle mounted in a pin vise whose point has

Repairs - Pitted Jewels And Lapping

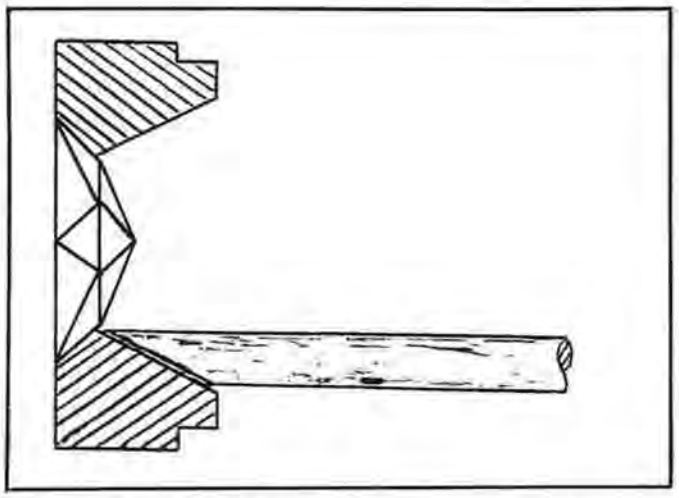


Figure 1. Polishing the bevel of a diamond endstone.

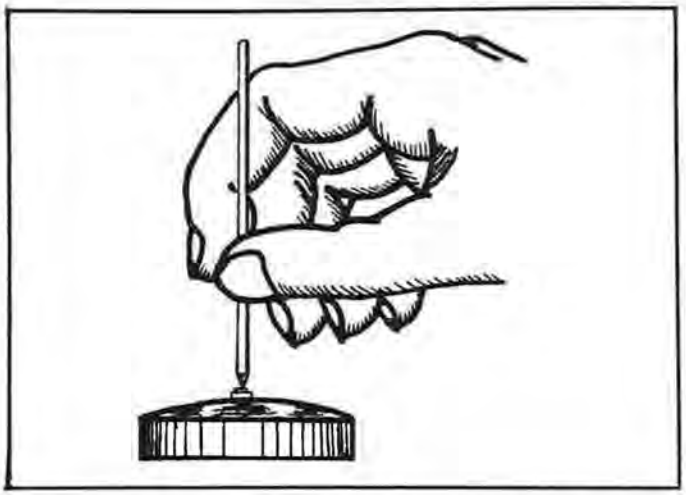


Figure 2. Polishing the pit out of a diamond endstone.

been ground off and shaped like that of a lozenge graver. While the setting is shellacked to the brasses, the outside diameter of the setting is trimmed to fit closely in to the stepped opening of the balance bridge.

The bevel may be polished with a chamfered pointed piece of pegwood. The point is first dipped in alcohol and then in Vienna lime. The chamfered point is held against the bevel and as the setting is rotating, the pegwood is drawn out. Constant motion is required in order to produce a perfect finish without lines. See Figure 1.

Many pitted diamond cap jewels can be refinished and reused. A boxwood lap with a slightly convex surface, charged with No. 6 diamond powder is used. The cap jewel is placed on the lap and while holding it down with a pointed piece of pegwood, move the stone about the lap with a circular motion. See Figure 2. After the pit is removed, which does not take too long, clean the jewel and setting thoroughly so no traces of the lapping compound remain.

Another method is to polish the pit out by holding it against a 1-in. boxwood lap charged with No. 6 diamond powder mixed with oil in the lathe. The jewel is held against the lap with a slight pressure while running the lathe fairly fast. This method is a little faster than the aforementioned one, but it is more arduous because of the difficulty encountered in keeping the jewel level against the fast moving lap.

The pivot that has worn a pit into the cap jewel must also be ground and repolished. I have seen several cases where the pit was polished out but because the pivot was not refinished, the pit reappeared in a short time.

Remove the hairspring, rollers and balance wheel from the shaft. Mount the staff in a lathe collet with the upper pivot extended and center until the point of the pivot is turning perfectly true. Then scrape the end of the pivot with a sharp graver, removing the imbedded particles. Then refinish the end with a burnisher. Replace the staff in the movement and check the end shake.

If the end shake is found to be excessive, the height of the step on the hole jewel setting must be thinned which will permit the setting to seat deeper into the balance bridge opening. The setting may be stepped by utilizing either a stepping device, used in conjunction with a regular lathe collet, jewel chucks, or it may be shellacked to a small piece of brass rod. The shoulder should be thinned just enough to allow the setting to sit into the balance bridge opening so the balance pivot reaches just the top of the balance hole jewel.

After such an adjustment, since the cap jewel is held in place by two screws which are seated in countersinks in the bridge, the countersink at the edge of the balance bridge must be deepened. See Figure 3. A counterboring cutter with a pilot pin, the size of which fits the screwhead countersink, is used to deepen the countersink.

When repairing a chronometer all pivots must be carefully inspected to see that they are straight, unmarked, and polished. When an instrument came into the Naval Ob-

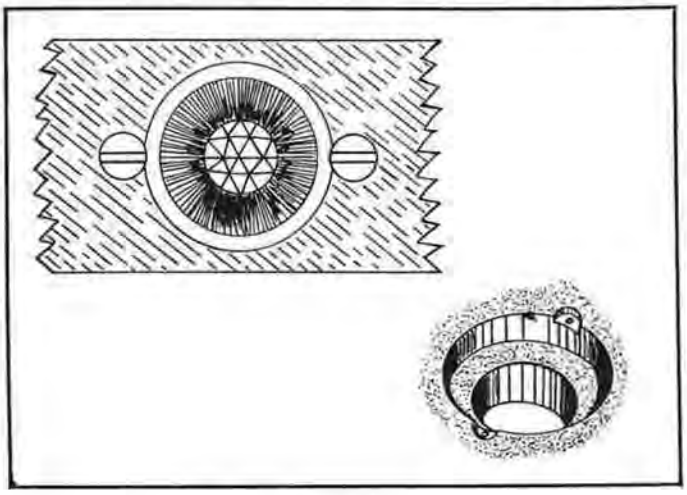


Figure 3.

servatory for repair, it was standard procedure to polish all pivots, even the barrel and fusee arbor bearings. It has been a well established fact that a well polished pivot, whether it be straight or conical, increases oil retention and reduces wear and friction. Therefore, one of the prerequisites for fine timing is a properly finished pivot.

Although nice work may be done by hand during lathe grinding and polishing, it cannot compare to work done by a mechanical pivot polisher, particularly when it comes to square shoulders or beveled surfaces. All rotary pivot polishers consist essentially of a spindle (on which the laps are mounted) working in two bearing and arranged to allow longitudinal movement and also a rocking motion. These motions play a very significant part in producing a fine polish.

The pivot polisher provides a continuous and rapid motion of the lap with the lap being applied in the reverse direction from that in which the work is turning. The swivel is mounted on a cross feed slide that provides the pivot polisher with a micrometer longitudinal adjustment. The base of the swivel is graduated 180 degrees and may be set at any angle. The nose of the spindle is ground so as to hold internal and external tapers. The pivot polisher is driven from a countershaft with the belt running from a speed pulley up over the idler stand pulleys and down to the pivot polisher drive pulley. See Figure 4.

Grinding and polishing are one and the same operation as far as the action of the abrasives on the metal is concerned—the difference being entirely one of degree. In any grinding and polishing operation, the lap must be given a slight reciprocating motion so not to produce ridges. Thus, the finer the desired finish, the finer the grinding or lapping compound must be. Also, the hardness and the composition of the steel will also make a great difference, for the harder it is and higher the grade, the finer polish it will take.

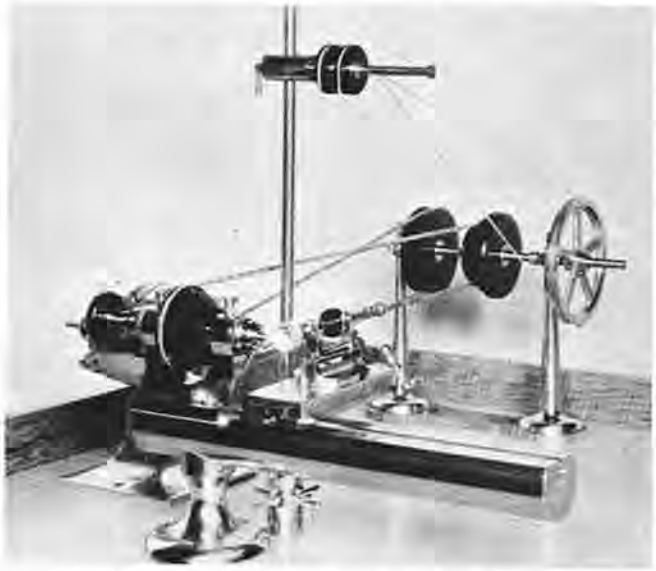


Figure 4. Pivot polisher set up on lathe for lapping.

Many different types of materials may be used for laps, but the lap must be made of a softer material than the work. At the Naval Observatory, laps of iron, soft steel, copper, bell-metal, lead, tin, ivory and boxwood were used. There was always a different opinion among the Observatory's chronometer makers, as to what types of laps produced the best finish but laps of iron, soft steel, copper, bell-metal and boxwood were the predominant choices. When one type of lap and/or lapping compound did not produce the desired

finish, another type of lap and mix was tried.

Each chronometer maker made his own laps and they were trued on a taper chuck where the taper corresponded to the taper of the pivot polisher spindle. After the laps were trued, the lapping surface was scored by drawing a fine file across the surface so that the fine corrugated folds were at right angles to their movement. These folds enabled the laps to hold the lapping compound and yet be nearly smooth.

When lapping cylindrical surfaces, the pivot polisher spindle is set parallel to the work. To lap the cone of a balance or escape wheel pivot, the polisher is set with the spindle at right angles to the pivot. The polisher is further adjusted so that the center of the lap is above or below the pivot. Thus, the shape of the cone can be varied by raising or lowering the spindle of the polisher. A lap with a slightly rounded edge is used here. When lapping a delicate taper, such as the back taper of a chronometer balance or escape wheel pivot, use a lap shaped like the frustum of a cone. From time to time, the laps must be remounted on a taper chuck and redressed.

Admittedly, with a pivot polisher the work can be brought to a given dimension with greater accuracy and a finer finished produced than has been obtained by any other method, but if you do not have such a tool, a fairly acceptable job may be done with slips or a wig-wag. A couple of the older chronometer makers at the Observatory disdained the lathe pivot polisher and polished all of their pivots by hand. But they were two of a few skilled workmen from the "old school" whose work was so painstakingly carried out and beautifully done that when their work was compared with that done mechanically, it was impossible to tell the difference.

If slips are your only recourse, cylindrical surfaces are best ground and polished with slips that are slightly narrower than the pivot length. The slips are moved forward and backward with a slight sideways movement. The slips are made of the same material as that used for laps and scored with a file across the grinding surface. The slips must be filed perfectly flat with the sides curved and slightly "undercut." One edge is rounded for lapping conical pivots, while the opposite edge is left square for square-shoulder cylindrical pivots.

Great care must be taken when grinding and polishing pivots. The lap or slip must be brought into contact with the work carefully and then moved along the work until the lapping compound is spread equally around it. Then proceed, bearing in mind that grinding is not polishing and vice versa, so do not press too hard against the work nor use too much speed. The amount of contact can be checked by watching the slip or lap as you move it by watching the black track it makes. Frequent stops are necessary to clean the pivot and to check the size and/or the finish. An important rule to remember in any polishing operation is to keep everything very clean. When laps or slips are changed, be certain that they are cleaned. The work itself must be kept scrupulously clean, not only before, but during the polishing operation, for if there are any recesses which may catch some of the polishing compound, streaks may appear in the work. The end of the pivots must be ground perfectly flat and polished.

The final finishing strokes are done with the lathe running at a faster speed. The polishing operation should not be continued for a long period or the surface may become discolored which can only be removed by again grinding it off and repolishing the work. In this case the old adage, "If a little is good, a whole lot more is better" does not apply.

After the balance or escape pivots are ground and polished, be it a new or a scored pivot, it is burnished. With a smooth burnisher, lubricated with a drop of oil or a light smear of mutton tallow (mutton tallow was used almost

exclusively at the Naval Observatory), the pivot is rounded very slightly by passing the burnisher from the cylindrical portion of the pivot over the end.

Some of the chronometer makers choose to use a jacot drum when burnishing the cylindrical and/or conical portion of the pivot. The drum is a rounded fluted steel block which fits in an attachment to the tailstock. A groove is selected and centered with a pump center which will allow the upper half of the pivot's diameter to ride above the top surface of the groove. Then as the pivot is rotated in the groove, a lightly lubricated burnisher is passed over the pivot. For finishing the ends of the pivots, the drum was removed and replaced with a thin disc with a series of graduated holes. A small drop of oil is placed in the countersunk hole where the pivot passes through the disc.

Again, there were differences of opinion as to how the end of the pivot should be burnished. A few of the makers felt that the burnisher should be used from the pivot end toward the cylindrical portion of the pivot, but the majority felt that by applying the pressure first on the end of the pivot and then over, increased the chances of a burr being formed. If a burr is suspected, it can be easily checked by rubbing the edge of a fingernail over it and can be removed by passing the burnisher over the top of the burr several times.

The list of lapping compounds is as varied as are the materials used for laps. In the case of a badly scored pivot or when reducing a new staff and/or a pivot to size, oilstone powder mixed with watch oil was used in conjunction with an iron, soft steel, bell-metal or copper lap. For polishing, diamantine, rouge, or levigated alumina or a combination thereof was mixed with watch oil, or Vienna lime and alcohol were used. At the Naval Observatory, for polishing we used a compound consisting of levigated alumina, light grease (Hamilton's PML or equal) and mutton tallow. The grease and mutton tallow was heated until liquified and then the levigated alumina was added and mixed. After cooling, it becomes a salve-like paste, very easy to handle and when used with a boxwood lap, produced a superb finish.

Straightening a Pivot

Very seldom was a pivot straightened on a balance or escape wheel pivot at the Nabal Observatory. Generally, it was broken off and repivoted. If the amount of the bend was negligible, the staff or arbor was set up in the lathe with the bent pivot resting on a jacot drum. Then a steel burnisher with a smear of mutton tallow was passed over the pivot, pressing down with sufficient force to straighten the pivot. The wheel may turn under the pressure but if it does not, remove the belt from the lathe and rotate it by rolling the palm of your hand back and forth across the headstock pulley. □

STRONG FUTURE PREDICTED FOR ELECTRONIC WATCHES

The rising and falling graph curves of the market share in the world watch sales picture make fascinating study for those interested in product marketing.

From the days when the mechanical and self-winding watches were on a steady but rising curve, to the present-day sweeps of the LED, LCD, quartz analogue, and mechanical watch market shares, gauging the correct path for the future has become as technical an art as watchmaking itself.

Laurent Gremaud, marketing manager for ASUAG, the largest group of watch movement and component manufacturers in Switzerland, feels the future belongs to the quartz analog watch and the Liquid Crystal Display (LCD) watch for many years to come.

"Over the next few years we foresee a four to five percent overall increase per year in sales in the watch market made up entirely of the quartz analog and digital field. We also expect to see a leveling in the mechanical watch sector. As this gentle increase occurs, there will be a stagnation in the jewelled movement watches, that is, the high quality precision manual and automatic watches," he predicted. "Except for gold watches with a high brand image, there may be a smaller demand for medium-priced non-electronic watches."

At the bottom end of the market, the sector known as "Roskopf" (a type of inexpensive movement) will experience a steady decline as will the Light Emitting Diode (LED) push-button, red-light watches. On the short term, there may be a temporary increase in certain markets or in certain brands for those products.

"Everybody learned a lot from LEDs, about the quality of electronic watches, product life, and most importantly perhaps, about the marketing of these inexpensive watches through mass channels," he said.

"There appear to be two future levels for LCD as far as we are concerned," he said. "There will be relatively simple LCDs which give the time, day and date, and then there will be the more complicated LCDs with a multitude of functions such as time zone readouts, stopwatch action, alarms, battery wear indicators, etc. These are known in the industry as LCDs with 'product plus.' "

Some of these "product pluses" are also being added to quartz analog watches.

"The LCD with 'product plus' will be also marketed through the traditional channels (jewelers) while the less-complicated models will mainly be sold in mass outlets, such as electronic stores, supermarkets and discount houses as well as in some jewelry stores dealing with the low end of the market."

As far as quartz analog is concerned, it is thought of as the watch of the future because of its link with the traditional face and hands coupled with the latest in modern technology. For these reasons, the quartz analog will become the mainstay of the retail jeweler's range of electronic watches in the future.

AFFILIATE CHAPTER COLUMN

by Willard Blakley CMW

Annual Affiliate Chapter Meeting

Affiliate chapters, it's that time again for you to select your delegate for our annual affiliate chapter meeting. You need to inform your delegate what he or she should do at the chapter meeting. Also they are to send in an early report on which the chapter should be working now. Please don't leave this up to the delegate to do alone. This report should be a project in which all your members can participate. All reports are to be to the AWI Central Office six weeks prior to the meeting. Mark the outside of the envelope "Affiliate Chapter Report." Last year we had an excellent response from the chapters; however, it was not 100%, which I would like to see. This year the reports will be in book form, so please do your job and send your report in on time. Also, if you will include a couple of sheets of your guild or association letterhead, your reports can be on your own stationery. If you have recommendations, send them with your report, but on a separate page. As mentioned, your reports will be compiled in book form and mailed to all delegates before the meeting so that all can be prepared to discuss the reports and have some questions to ask of the other delegates. This is not to say that anyone will not have the opportunity to either read their report or make comments at the meeting. This just gives everyone a better chance to be prepared. All delegates will have time on the floor to speak. Delegates should bring their copies of the report to the meeting with them, as there will not be many extra reports available. If there are any chapters that will not be sending a delegate for some reason, I encourage you to also send an affiliate chapter report so that we may know of your activities during the past year. This is a great boost to the directors and administration and is an excellent way for you to offer input back into AWI. By listening to and going over these reports and recommendations, we can develop an even better organization. This is also a good opportunity to say thank you to AWI for services they have provided for us during the past year.

We do plan to display the banners of the organizations around the room as we did last year. If your guild has a banner, please bring it to the meeting. If you do not have a banner for your association bring your affiliate chapter banner with the name of your group on the outside. This attracted a great deal of attention from other guests at the hotel last year. They were certain that there was a group of watchmakers there. It was quite colorful and certainly added to the atmosphere throughout the room.

Many of you who were delegates last year donated money toward the purchase of a banner representing the affiliate chapters. I am happy to report that the banner is completed and will be proudly displayed with the other banners. It really looks nice and I'm sure you will all take pride in the banner and knowing you were instrumental in making it possible.

Our meetings are always beneficial and always prove to be a rejuvenating experience. I always look forward to attending the chapter meetings and seeing old friends and meeting new ones. Our meetings are very important. The affiliate chapter meeting is one of the most important functions of the affiliate chapters. By being so widely separated geographically it would be almost impossible to select our directors without the benefit of the meetings. The affiliate chapters are the roots of AWI. So, don't be left out. Get your delegate ready and we will look forward to greeting all of you at the meeting.

NEW JERSEY

Don DeWolfe of Portescap had several new pieces of equipment to show at the February 13 meeting of the Watchmakers' Association of New Jersey. All were impressed with the new "timers" they have come out with to rate all timepieces. Mr. DeWolfe had his equipment available for all watchmakers who took the Bulova Quartz bench course at the Bulova Watch Factory on January 28.

The Association thanks Henry Frystak of Bulova Field Training for the January program on the new Bulova models, the Accuset feature being one of their outstanding features. Mr. Frystak also gave an AWI report of the last convention held in Cincinnati and listed the many reasons for being an AWI member.

FLORIDA

No snow to shovel in Florida–so the watchmakers are spending their time at the educational programs, especially the AWI-sponsored bench courses. Les Smith, vice president of AWI, was instructor of the Seiko bench courses recently at Lakeland and Ft. Lauderdale. Joe Liebman and Clint Aderman are busy making plans for more programs throughout the year. The next one will be in Lake Worth, with "meter" work and clock work. The annual convention is planned for Daytona Beach the last week in October.

George Cordes and Les Smith renew old acquaintances in Lakeland, Florida.

No snow to shovel in Florida, so the watchmakers take time out to attend an A.W.I.-sponsored bench course.

NEW YORK

At its January meeting the Horological Society of New York installed its newly elected President Howard Levy and its new slate of officers. Later that same evening the membership heard a highly informative talk on beta light watches delivered by Henry B. Fried.

The installation proceedings were officiated by Ben Matz who began by extolling the considerable achievements of outgoing president Irving Albert and presenting him with a HSNY gift and a plaque commemorating his two terms of office. Then, Howard Levy, a former student at the George Westinghouse Vocational High School, who now runs a successful watch repair business, was eulogized by Richard Safran, Assistant Principal of George Westinghouse and by Henry B. Fried, Mr. Levy's former instructor.

At the conclusion of the speeches a gavel swapping ceremony took place, Irving Albert relinquishing his gavel to Howard Levy.

The installation of officers was completed with the recognition of the new officers: president, Howard Levy; vice president, Geoffrey Levy; executive secretary, Alvin Rudnick; recording secretary, Aaron Rennart; treasurer and financial secretary, Peter Davis, Sgt. at Arms, Victor Hull; trustees, Julius Grenetz and Irving Albert; executive committee, Jack Klass, Ben Matz, Morton Silver, Harry Fisher, and Aaron Cohen.

Following the business meeting, a lecture on the beta-light LCD watch was scheduled but, at the last moment the speaker reported that he was unable to attend. Undaunted, Henry B. Fried stepped into the breach and saved the day.

Mr. Fried's exposition in his inimitable and humorous style captivated his audience. Of particular interest was his prediction that beta-light (tritium gas trapped in a circular tube) would be applied to analog watches.

It was a very full program filled with high interest.

Seated left to right:
Aaron Cohen
Al Rudnick
Howard Levy
Geoffrey Levy
Standing left to right:
Harry Fisher
Morton Silver
Julius Grenetz
Jack Klass
Peter Davis
Aaron Rennert
Victor Hull
Irving Albert
Ben Matz

ARIZONA

The regular monthly meeting of the Southern Arizona Horological Guild was held on Tuesday evening, January 9. A dinner was held at 6:30; the meeting began at 7:30. Rex Stafford arranged a fine program for the evening. Dr. Joseph G. Baier presented a comprehensive talk of interest to all. The program included wheel making, repair processes, some history of clocks and watches, along with case repairing. The theme emphasized the repair of "antiques" as a great potential source of income to the watchmaker and clockmaker.

The AWI held an executive board meeting in Phoenix on February 2, 3, and 4, 1979. This was a first for Phoenix. In conjunction with these meetings, there was a seminar, a noon luncheon for those attending, and other events associated with the board meeting.

The main attraction was the Seiko bench course held on Sunday, February 4. Other features that interested horologists were a one-hour program on the ship's chronometer by Marvin E. Whitney, a feature writer for the *Horological Times*, and Henry B. Fried who held a 90-minute question and answer period.

The meetings, seminar, and luncheon were held at the Quality Inn West. This event gave all an opportunity to meet the AWI Officers, both in formal

sessions and at informal gatherings.

The first state convention is scheduled for the weekend of May 19-20, 1979. It will be held at the Francisco Grande Resort in Casa Grande. Members, nonmembers, and their families are welcome. There will be fun events, golf, tennis and other outdoor activities on Saturday, the 19th, with an educational program scheduled for Sunday, the 20th. The educational programs will include two outstanding members of AWI, Gerald Jaeger and Robert Nelson. Mr. Jaeger will present a program on fundamentals of electricity and their application to electric watches of all categories; Mr. Nelson will present a program on escapements. Francois Girardet, a representative of the Watchmakers of Switzerland Information Center, will present an exciting program, in part relating to the events of the Basel Fair, which he will have just attended.

TEXAS

At the February 20th meeting of the Texas Watchmakers Association of Houston, the members were pleased to have Sargeant Herb Armand of the Crime Prevention Division of the Houston Police Department as guest speaker. The topic of discussion was "Security Measures for the Small Business Owner." Sargeant Armand discussed a number of security systems that can be combined to give each individual store owner the best possible amount of protection against burglaries and robberies. An informative question and answer period followed.

COLORADO

On March 25 Mr. Howard Opp presented "Repair of the Bulova Accutron Quartz SMQ Calibre 242" for the Colorado Horological Society. On May 6, Mr. William Biederman will conduct his bench course on "Repair of ESA 9362 and ETA 940111 Swiss Quartz Analog Watches." Both programs were scheduled for the Continental Denver.

Orville R. Hagans, AWI President, and his committee are working on a bench course for the clockmaker and Colorado chapter may be the first to present this.

More interest was indicated in clock case refinishing than in any other one area of repair, so President Emery Brittenham is negotiating with an expert in this field.

NEW MEMBERS

ADAMS, Joseph A.–Union, WA
ALLEN, Bruce A.–Tacoma, WA
AMANDI, Fernando R.–Homestead, FL
ARMENTROUT, Dean–Laguna Niguel, CA
BATT, H.R.–Laurel, MT
BATES, Charles–Lake Wales, FL
BAUMGARDNER, Hurley R.–Dallas, TX
BLACK, V.G.–San Antonio, TX
BLANCHARD, Linda S.–Seattle, WA
BLUME, Jack–Pasco,WA
BRULOTTE, Richard–Thetford Mines, Quebec
CAPEHART, Dan B.–Gainesville, FL
CRANOR, F. Carlton–Ponte Vedra Beach, FL
CARVER, Mike–Westminster, SC
CORWIN, Timothy G.–Paris, TX
COUSINEAU, L.L.–Vero Beach, FL
DANIELS, Marion–St. Petersburg, FL
DAVIES, James E.–Great Falls, MT
DAVIS, Ernest W.–Great Falls, MT
DAVIS, William T.–Spanaway, WA
DEVERELL, Henry–Clearwater, FL
DI BONA, Donato–Quincy, MA
DOBBS, Charles E.–Port Orchard, WA
GLASS, Curtis A.–West Reading, PA
GOOSZEN, Wilfred D.–San Francisco, CA
GRANT, James R., Sr.–Jacksonville, FL
HAASE, William D.–Natchitoches, LA
HAM, Scott E.–Pittsburgh, PA
HAYNES, Elmer R.–Bassett, VA
HENDERSON, William G.–Great Falls, MT
HIGGS, Lawrence C.–Dallas, TX
HOFERT, Herbert W.–Kenmore, NY
HOLT, George–Wynnewood, PA
HOOVER, Gary–Spokane, WA
HORTON, William E.–Dallas, TX
JACOBUCCI, Sarah–Waukesha, WI
JAHRAUS, Wayne D.–Great Falls, MT
JENKINS, William A.–Wyoming, PA
JONES, Robert E.–Dahlgren, VA
KAYE, Alfred S.–Miami Beach, FL
KE, Kent Lea–Great Falls, MT
KEELING, Weldon B.–Humble, TX
KIM, Jai–San Antonio, TX
KRESS, Gregor–North Highlands, CA
KRIPLEAN, Chester–Pompano Beach, FL
KUS, Stanley F.–San Antonio, TX
LARGEN, Loman L.–Miami, FL
LEWIS, Bill B.–McPherson, KS
LOEBBAKA, Otis K.–Kettering, OH
LUEDTKE, Robert M.–Overland Park, KS
LUNDQUIST, Roy–Chicago, IL
LUTZ, William R.–North Vernon, IN
McLEES, W.H., Jr.–Walhalla, SC
MILLER, David G.–Alliance, OH
MORAIES, David–Dallas, TX
MOREY, Sandy–Houston, TX
MURPHY, Barbara S.–Great Falls, MT
MYERS, Henry W.–Omaha, NE
NORTHERN, Eloise I.–Largo, FL
PARIGIAN, Ernest–N. Miami Beach, FL
PAYNE, Grover E.–Omaha, NE
PHILLIPS, David–Denver, CO
PIKE, Ray–Bellevue, NE
POWELL, Bernard J.–Manitowoc, WI
RANDALL, Glenn T.–Kilgore, TX
RHODES, Bill R.–San Luis Obispo, CA
RIDDER, James–Fort Richardson, AK
ROWE, Christa F.–Clearwater, FL
RUSS, Kenneth E.–Diamond Bar, CA
SCHIEGG, Robert L.–Sunnyvale, TX
SCOTT, Robert M.–Franklin, OH
SETNICK, Abraham–Dallas, TX
SHEREN, Tom–Traverse City, MI
SMITH, Claude E.–Cynthiana, KY
SMITH, John W.–Tacoma, WA
SMITH, Thomas R.–Union, SC
SOBCZAK, Bernard J.–Chicago, IL
SOMES, M.E.–Rosemount, MN
STRATMAN, Stayton S.–Houston, TX
STROM, C. Ron–Sioux City, LA
SUMMERS, John–Dallas, TX
SUTHERLAND, Charles C.–San Diego, CA
TIPPENS, Leslie–Dallas, TX
TRAUGER, Donald W.–Pittstown, NJ
WELDNER, William–Kenneth City, FL
WILSON, Donald E.–Brandon, FL
ZWENIG, Karl–Bramalea, Ontario

News In The Trade

BASLE: A MAJOR EXPANSION PROGRAM AT THE EUROPEAN WATCH, CLOCK AND JEWELLERY FAIR

A major building program is now under way to add badly needed floorspace at the European Watch, Clock and Jewellery Fair. The two floors going up over the main building will increase its total floorspace to over 70,000 square meters. Everything will be ready for the 7th Fair, scheduled for April 21 to May 1, 1979 in Basle. Along with invaluable extra floorspace, this scheme will allow the organizers to rearrange the floorplan of many halls and improve communications within the Fair itself.

Ever since its inception in 1973, the European Watch, Clock and Jewellery Fair has proved hugely successful. The number of exhibitors has grown steadily year after year, reaching 1,228 from 14 different countries in 1978. But the organizers have regularly had to turn down requests for a booth from prospective exhibitors or even for a bit more space from current ones. So they decided to provide at least a partial solution by starting construction of the two new floors above Hall 5 as soon as the 1978 Fair closed in late April.

The extra space enables the Fair to accept about 250 new European exhibitors for a total of nearly 1,500. But more space was only one of many objectives. Other included:

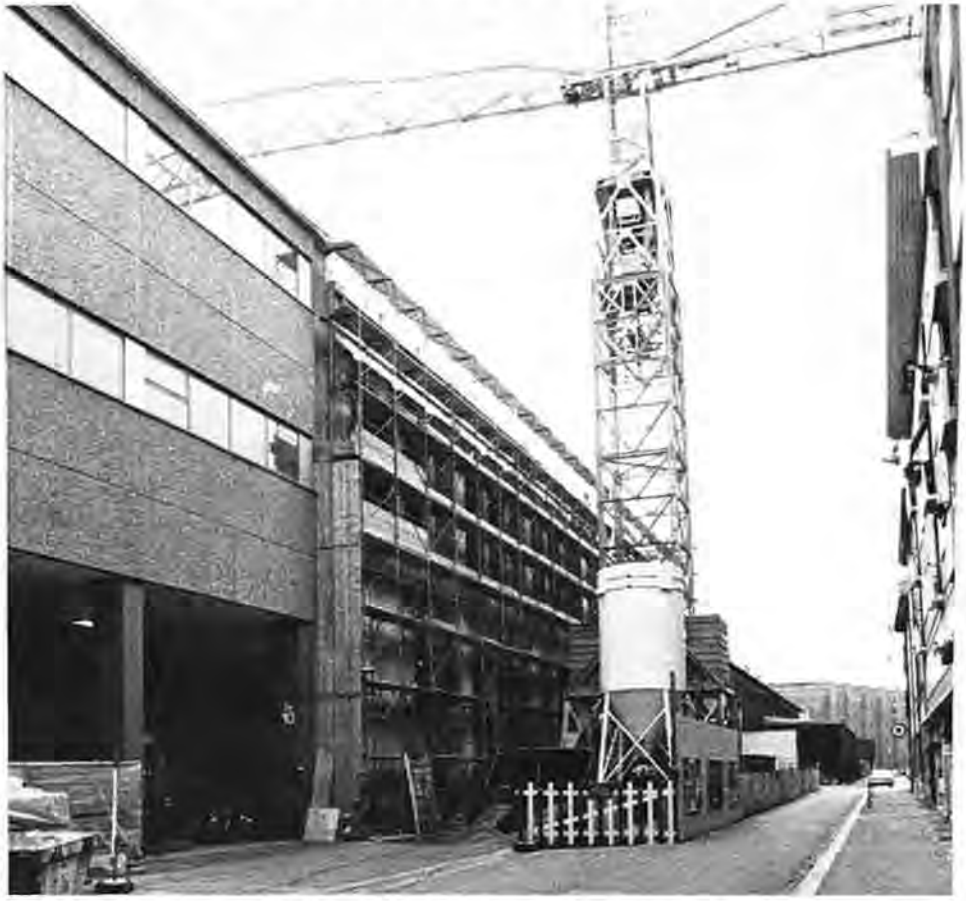
—enabling the European Watch, Clock and Jewellery production with the inclusion of new countries (Greece, Norway) and new product lines;

—reorganizing number of existing halls by grouping together similar kinds of products;

—streamlining internal communications between halls and between floors.

In a word, the authorities are doing their best to make the Fair as attractive and convenient as possible for the tens of thousands of trade buyers and professionals expected next year.

But the 10,000 extra square meters won't all be allocated to new exhibitors. A substantial share has been reserved for current exhibitors needing additional space and for theme presentation (in Hall 5).



Basle's European Watch, Clock and Jewellery Fair is adding more space: two extra floors, each 6,020 sq. m., are now being built. The new premises will be ready for opening day at the 7th European Watch, Clock and Jewellery Fair, scheduled for April 21 to May 1, 1979. The extra floorspace means that the Fair can now provide room for nearly 1,500 exhibitors from 16 European countries.

The new arrangements will be welcomed by anyone familiar with the European Watch, Clock and Jewellery Fair (and that includes practically everyone in the trade: a 1978 survey revealed that 76% of the trade visitors had traveled to Basle once before). Escalators in the center of Hall 5 will facilitate access to the upper floors which until now could only be reached through Halls 1 and 2. At every level, horizontal circulation will be greatly improved, with aisles connecting all exhibition units. The new Hall 51 (first floor) is reserved for watch manufacturers, particularly electronic time specialists, and clockmakers. Hall 52 (second floor) highlights fashion items: goldware, jewelry and "couturier" watch collections.

Never before in the history of jewelry and watchmaking has there been such an incredible variety in every product area. It's all there at the European Watch, Clock and Jewellery Fair—the only show in the world to give the trade such a golden opportunity to compare, evaluate and pinpoint the newest and most attractive items turned out by an entire continent's specialist manufacturers. Reason enough to guarantee that the trade will be present in Basle in greater numbers than ever in late April 1979.

(More News in the Trade on page 58)

Mathias Schwalbach: Milwaukee's Master Mechanic, Inventor, and Tower Clock Maker

By Joseph G. Baier, Ph.D

Mathias Schwalbach has been recognized by several writers for his contributions as a master mechanic and inventor, primarily in connection with the early development of the sewing machine and the typewriter. But recognition for his major work as a church and tower clock manufacturer and an inventor of a related escapement mechanism is only now coming to the fore. The story of the typewriter has been told many times, and the part played by Christopher Latham Sholes, Carlos Glidden, Samuel Soule and James Densmore forms the major part of that story. But here and there, Mathias Schwalbach is given credit for his role as the fabricator of experimental parts and for certain design features, some of which were unique and patentable.

It was while searching for information on early American clocks and clockmakers that the writer discovered several Wisconsin residents who had been involved in clocks and clock mechanisms. Of these, Mathias Schwalbach made the greatest contributions over the longest period of time. During his lifetime he made and installed over fifty-five clocks in some eleven states, probably a record for a small manufacturer working independently and in a small shop.

Mathias Schwalbach was born in Germany on December 17, 1834, and died in Milwaukee on February 29, 1920, at the age of eighty-six. He outlived three wives and fathered twenty-three children, many of whom died in infancy or early childhood. Several sons joined him and succeeded him in his machine shop and tower clock manufactory, a business which began in 1875 and continued until the years immediately preceding the depression of the late nineteen twenties.

Mathias Schwalbach arrived in Milwaukee in May of 1863 and located work in Kleinsteuber's Machine Shop, which was then at 322 West State Street. Frederick Heath, writing in the *Wisconsin Magazine of History* on "The Typewriter in Wisconsin," states, "The old Kleinsteuber Machine Shop–it was located between third and fourth streets–was a favorite place for Milwaukee's early inventors and would-be inventors." Further, "at the Kleinsteuber shop Sholes had the assistance of the head machinist Matthias [sic] Schwalbach, an able workman . . . He was himself something of an inventor."

Also writing in the *Wisconsin Magazine of History*, Richard N. Current, in his article "The Original Typewriter Enterprise," says, "to make their models, they, (Sholes, Soule and Glidden) hired one of Kleinsteuber's machinists, Matthias Schwalbach, who had got much of his experience as a blacksmith and tower clock maker in German [sic]." Current further states, "He (James Densmore, the founder and editor of Oshkosh's first newspaper) helped coordinate the efforts of several inventors–Sholes, Glidden, their machinist Matthias Schwalbach, and others . . . . . " in their work on the typewriter. Schwalbach said of himself, according to Current, "while he continued to work for Mr. Sholes for $3.00 a day, during the winter of 1870, he took up the work independently in his home." And, again, Current says, "Working for them (Sholes, Glidden and Soule) was one of Kleinsteuber's men, Matthias Schwalbach, formerly a builder of tower clocks in the Rhine country. These four–Sholes, Glidden, Soule and Schwalbach–had constructed the writing machine that was displayed in the shop on that September day in 1867." A diorama of that event is on exhibit at the Milwaukee Public Museum today and at the southwest corner of State Street at Fourth, is a plaque designating the location of Kleinsteuber's Shop and commemorating the invention, naming as well the four involved, including Mathias Schwalbach.

There is no doubt that Mathias played a significant role in the development of a workable typewriter, which, with the efforts of James Densmore, led eventually to an early arrangement with the Remingtons, of Ilion, New York, in the formation of the Remington Standard Typewriter Company. This story has been told very well. But what of the later life and major effort of Matthias [sic] Schwalbach?

Several references to Mathias Schwalbach and his tower clock work have been found.

A brief biographical sketch appears in the *History of Milwaukee, Wisconsin*, published in 1881:

M. Schwalbach, manufacturer of church and tower clocks, large and small models, and all kinds of small machinery; also a dealer in accordians, clocks and sewing machine fixtures, No. 1002 Galena Street; born in Prussia, December 17, 1834, came to America in 1857, and located in Albany, New York. He worked two years as journeyman in the machine business, and then moved to Syracuse, New York, where he engaged in the same business four years. In May, 1863, he came to Milwaukee, and was with C.F. Kleinsteuber nine years, establishing his present business in 1873. He has obtained a number of patents for sewing machines, tower clocks and typewriters.

In the *Geschichte der Katholischen Kirche in Wisconsin*, published in 1899, on pages 1043 and 1044, there is the following paragraph:

Mr. Mathias Schwalbach belongs to the very best-known makers of tower-clocks. He has been carrying on his trade in Milwaukee very successfully for over a quarter century. What created an especially great fame for him is his ingenious invention of a mechanism which makes the clockwork into a reliable chronometer. The tower-clocks built by him in a solid and durable way have been distributed in all states of the union. Above all, we find the products of his firm on numerous towers of churches and public institutes in Wisconsin. Mr. Schwalbach

is a long-time member of the parish of St. Joseph in Milwaukee, and he is a member of several Catholic organizations.

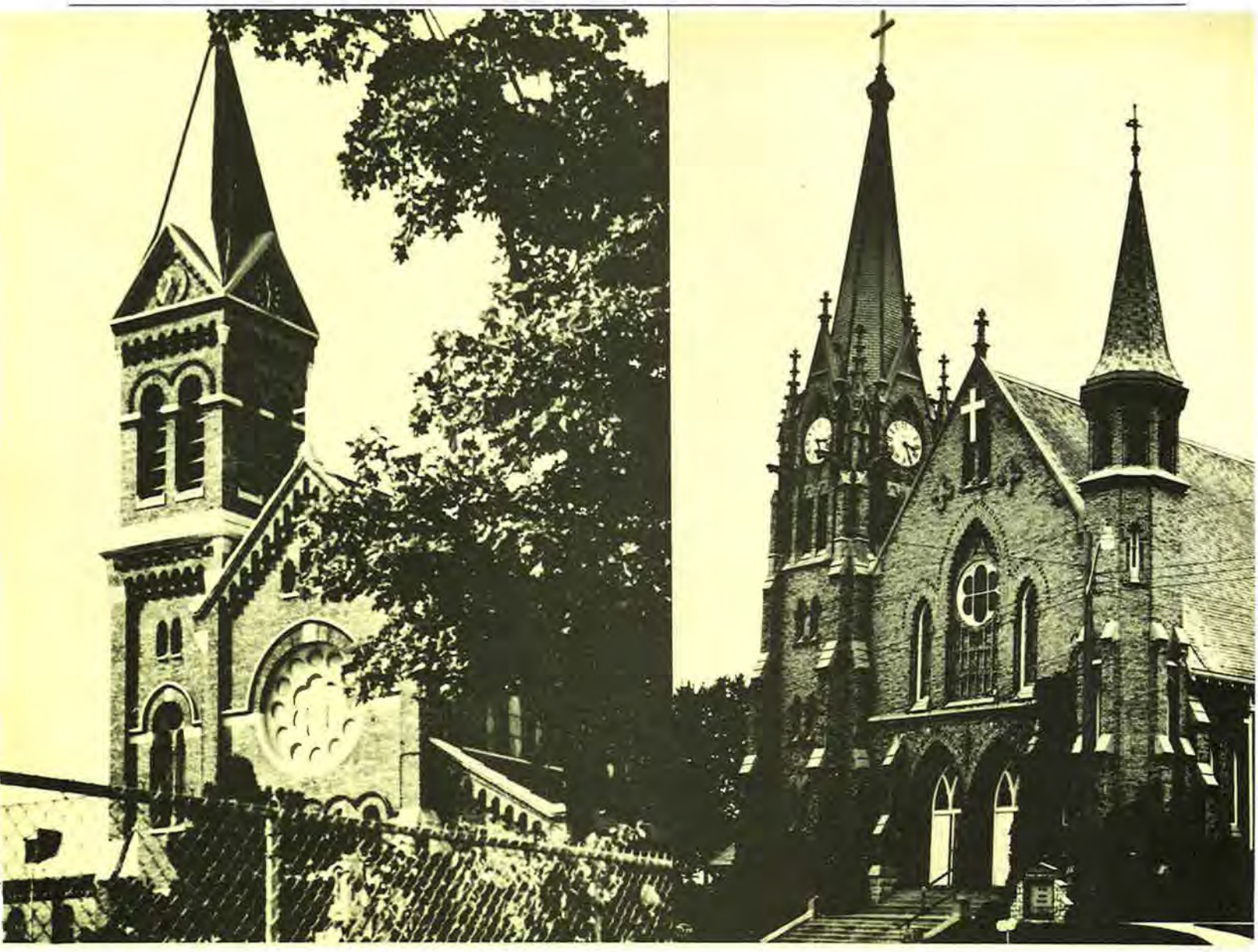
A picture of the clock manufactory accompanies another reference to Schwalbach in *Milwaukee of To-day, The Cream City of the Lakes,* published in 1893.

One of the best skilled mechanics in Milwaukee is Mr. M. Schwalbach, manufacturer of the Star church and tower clocks, models, etc. Mr. Schwalbach, who was born in Germany, where he learned his trade, came to the United States in 1856 and five years later located in Milwaukee. Since 1870 he has been established in business, and for a time at 1002 Galena Street, removing six years ago to the building now occupied at 426 Ninth Street, which he owns and built. It is 22X60 feet in dimensions, two stories high with basement, and made conspicuous by a tower and clock. Every facility and convenience is provided for all purposes of business, including a five horsepower steam engine. Mr. Schwalbach manufactures to order large clocks for churches, towers, schoolhouses, public buildings, etc., and executes work for all parts of the country. He also manufactures all kinds of small machinery, also large and small wood and metal models, and attends to repairing. He is popularly known throughout this section, and is the leading recognized representative of his line of business in the Northwest, having secured several gold medals.

In the *Industrial History of Milwaukee,* published in 1883, on page 150, along with a picture of one of the Schwalbach movements, is the following:

Math. Schwalbach, Manufacturer of Tower Clocks. 1002 Galena Street. This clock is an improvement on Church and Tower Clocks. The invention greatly simplifies the construction of this kind of clocks, and correspondingly cheapens the price, and at the same time increases the reliability of the clock and durability of the work. Any one can keep this clock in good order. The clock is seven feet high, four feet wide, and three and one half feet long. The striking part pulls a hammer from thirty to forty pounds; the quarter striking part from twenty to thirty pounds. Pendulum ball scales one

Fifty-five tower clocks manufactured by Mathias Schwalbach were listed in the company catalog printed around 1907. Several are in existence today. At left, the clock of St. Francis of Assisi Church in Milwaukee is still operating. The movement of St. John's Evangelical Lutheran Church (right) in Jefferson was installed in 1905.



hundred and twenty five pounds.

Other references to the tower clock and associated interests of Mathias Schwalbach are to be found in advertisements such as that in the *Erinnerungsblaetter aus der Geschichte der St. Josephs-Gemeinde,* published in 1905 as a part of the golden jubilee of the congregration. In that advertisement, on page 180, not only is there a reproduction of a clock movement, but in addition it is stated that window frames and ventilators are made to order and automobiles are made and repaired. Mathias had many interests and specialities, and was even getting read ready for the horseless buggy.

The most important item uncovered was a copy of the *Illustrated Catalog of M.Schwalbach & Sons, Manufacturers of Church and Tower Clocks* obtained through the courtesy of John Loehrer of Milwaukee, a grandson of Mathias. The catalog was printed around 1907. Its twenty-four pages describe the several clock models available for purchase and include testimonials certifying their reliability as timepieces. Some fifty-five clocks, identified according to model type, are recorded by city, state, and building, giving the name of the pastor or building owner at the time of installation. Of the clocks listed, nineteen are located in Milwaukee and suburbs; sixteen are in Wisconsin outside of the Milwaukee area; and twenty clocks are to be found in ten additional states, as far west as Oregon, and as far east as New York state. The listing shows the extent of the work of this small manufactory, small in comparison to the E. Howard and Seth Thomas companies so well known to horologists as tower clock manufacturers.

Despite the fact that he is most often associated with his work in developing the typewriter, Mathias Schwalbach made many major contributions to the art of manufacturing church and tower clocks. (Photo courtesy of Elmer Schwalbach.)

The Schwalbach catalog describes the many innovative features and special details associated with each type of movement, whether designed for time only, for time and hour strike, or to include a third train of wheels for quarter-hour strike. According to the catalog:

The Star clock is built of the best material. The shafts are made of steel and are polished. All gearings, wheels and pinions are cut gears. Every piece is made of the best material and is tempered hard where it is necessary. Three large brass wheels. The pendulum is 8 feet long. The clock pulls a hammer up to 60 pounds for the hour strike on two or three bells, every quarter hour. The quarters on two bells it strikes as follows: the first quarter it strikes one on each bell, one right after the other, at the second quarter two on each bell, at the third quarter three and at the fourth quarter four on each bell. The hour is struck on the large bell.

The Star Clock Company, as the manufactory came to be known, made five different movements, with variations to permit either thirty-hour runs between windings or to run for eight days. Other variations in design permitted the clocks to strike one or more bells of differing weights and tones, as well as to permit hour strike only or to include quarter-hour striking.

All clock movements were large and rugged because tower clocks are ordinarily subject to the vagaries of weather: temperature changes, moisture (whether rain, snow, or simply high humidity), along with dust and dirt in the air. Escape mechanisms must be designed to overcome these adverse situations if the clocks are to run at all, let alone keep time. That they do well as timekeepers is testimony to their excellent design features and construction. It is here that Mathias Schwalbach made some outstanding contributions to the art and was awarded patents for improvements in escapements.

The three patents issued to Schwalbach are of interest to the general reader primarily to demonstrate his innovative mechanical capabilities. He had experiences with the typewriter in designing and patenting the plan of pivoting the type bars in a circle, an arrangement in use today, as well as conceiving the spring motor, the key buttons and levers, and the means of connecting the latter with the type bars. But these inventions were performed as a member of a team. The tower clock inventions were his own creations even though he may been encouraged by his earlier patents on the typewriter and the sewing machine to develop improvements for the escapements of clocks.

" . . . . . removing six years ago to the building now occupied at 426 Ninth Street, which he owns and built. It is . . . made conspicuous by a tower and clock."

The first patent, granted on November 10, 1874, No. 156,677, is for an "Improvement in Clock Escapements." The invention was designed to "to secure greater accuracy in the movement of the pendulum . by imparting a steady motion to the pendulum." The second patent, granted on September 7, 1880, No. 232,073, relates to an improvement on the first. It is for a "Clock Escapement." In the patent Schwalbach states, "Heretofore the motive power acted directly upon the pendulum with greater or less force, according to the heft of the weight . . . while in my improvement the motive power stands at rest while the pendulum vibrates many times . . . . "after being impulsed. "The improvement over the first patent, to achieve this independence from the driving force was to attach a triangular escape wheel loosely to the shaft yet coupling the escape wheel to the shaft by means of a coiled spring given a preset tension. Using a set of levers, an impulse is imparted to the pendulum by the escape wheel" permitting "levers to be brought to bear upon the arm which imparts motion to the pendulum rather than gradually as in the original patent."

A third patent granted February 18, 1890, No. 421,622, also for a "Clock Escapement," relates to an improvement on the second patent. In this invention, "the motive power of the clock will be expended in simply rewinding" a coil spring at intervals, "said spring being wound to exactly the same tension previous to each impulse it imparts . . . ." to the pendulum. "In consequence of the above-described operation the force applied to the scape [sic] wheel is at all times equal and independent of the

heft of the weight that drives the clock."

Many Schwalbach clocks are still in daily use, some in their original condition being wound daily or weekly depending on the movement type and the length of available drop for the weight cables. Often this depends on the dedication of the clock-tender and his ability to repair the mechanism to keep it in good running order. In most instances, however, the winding mechanisms have been electrified to make the clocks independent of daily care. In others the original movements have been completely disconnected and replaced with synchronous motors.

From the list one can gain some idea of the extent to which Mathias was able to obtain orders for clocks and to note the generally wide distribution of his work. It may be that the reader will have additional information concerning some of them. When the writer first made inquiry concerning Mathias Schwalbach the invariable answer given referred to his work in developing the typewriter. It is hoped that as a result of this article Mathias Schwalbach will be recognized properly for his more outstanding work as an inventor of escapements and builder of tower clocks, a work carried out in his own right for a period of over forty years.

I wish to express my appreciation to Professor Gerhardt Rauscher of the University of Wisconsin–Milwaukee for translating several paragraphs from the German; to Professor Frederick I. Olso, also of the UWM, for suggesting several references to the development of the typewriter; to August Wagner, National Association of Watch and Clock Collectors member of Milwaukee, for making available the copies of Milwaukee of Today *and the* Erinnerungsblaetter; *to John Loehrer for the copy of the Schwalbach catalog; and to Elmer Schwalbach for the photograph of Mathias.*

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Company Catalog List of M. Schwalbach & Sons Clocks - c.1910

Church or Building	Year	Movement	Condition*
Milwaukee			
Cross Lutheran Church 1821 N. 16th. St.	1905	3	(e)
Holy Ghost Lutheran Church 606 W. Concordia Ave.	—	3	(c, e)
Holy Trinity-Our Lady of Guadalupe 613 S. 4th St.	1890	1	(e)
Notre Dame Convent N. Milwaukee & E. Knapp St.	1889	4	(f)
Sacred Hearts Church St. Martins	1893	2	(a)
St. Casimir Parish 2618 N. Bremen St.	1900	2	(c, d)
St. Cyril and Methodius Church 1547 W. Windlake Ave.	—	—	(c, d)
St. Francis of Assisi Church 1927 N. 4th St.	1910	—	(c, d)
St. Hyacinths Church 1414 W. Becher St.	1905	2	(c)
St. Johns Ev. Lutheran Church 816 W. Vliet St.	1890	2	(g)
St. Josephat's Congregation 2333 S. 6th St.	1901	2	(c, d)
St. Joseph's Congregation 11th & Cherry St.	—	—	(f)
St. Lucas Ev. Lutheran Church 2605 S. Kinnickinnic Ave.	1901	3	(c, d)
St. Matthew's Ev. Lutheran Church 10th & Garfield St.	1890	2	(f)
St. Michael's Congregation 1445 N. 24th St.	1892	2	(c)
St. Paul's Ev. Lutheran Church Tess Corners	—	—	(a)
St. Stanislaus Church 524 W. Mitchell St.	1875	—	(e)
St. Vincent de Paul Congregation 2114 W. Mitchell St.	—	2	(c)
Trinity Ev. Lutheran Church 2375 N. 4th. St.	—	4	(g)
Wisconsin			
St. Joseph's Church Appleton	1898	2	(b)
St. Mary's Church Brillion	—	3	
St. Mary's Church Burlington	1889	2	
St. Mary's Church Chilton	—	4	
St. John's Ev. Lutheran Church Jefferson	1905	3	
Puerner Block Jefferson	1907	—	
——— Juneau	1903	5	
Holy Cross Church Kaukauna	—	3	
Holy Trinity Church Kewaskum	—	3	
LaCrosse Cathedral LaCrosse	—	—	
St. Patrick's Church Mauston	—	—	
Holy Trinity Church Newburg	1903	3	
St. Peter's Catholic Church Stevens Point	1897	3	
St. Mary's Church Tomah	—	4	(e)
St. Thomas of Aquin Waterford	1899	4	(c)
St. Henry's Catholic Church Watertown	—	—	(d)
Outside Wisconsin			
St. Hyacinth's Church LaSalle, Illinois	—	2	
St. Michael's Church Chicago, Illinois	1894	1	
St. Matthew's Church Mt. Vernon, Indiana	1890	4	
St. Mary's Church Muscatine, Iowa	1904	3	
St. Joseph's Church Ellingwood, Kansas	—	2	
Church of Immaculate Conception Earlington, Kentucky	1888	4	
First Reformed Church Grand Haven, Michigan	1890	4	
St. Mary's Church Westphalia, Michigan	1897	2	
Guardian Angel Church Chaska, Minnesota	1890	2	
Guardian Angel Church Chaska, Minnesota (To replace clock lost in fire)	1903	2	
Holy Trinity Church New Ulm, Minnesota	—	2	
St. John the Baptist Church Jordan, Minnesota	1890	2	
St. Joseph's Church St. Joseph's, Minnesota	—	2	
St. Mary's Church New Munich, Minnesota	1897	3	
St. Mary's Church Norwood, Minnesota	—	3	
St. Mary's Church Stillwater, Minnesota	1905	2	
St. Peter and Paul Church Glencoe, Minnesota	—	4	
St. Mary of Rosary Church Buffalo, New York	1903	1	
St. Augustin Church Minster, Ohio	1903	—	
Mount Angel College Mt. Angel, Oregon	—	—	

* (a) = Original clock in use (b) = Movement may be original (c) = Clock electrified (d) = Original movement used in part (e) = Original clock removed (f) = Building demolished (g) = Original movement present, not in use

(continued from page 25)

into the pusher holder. Then position the balance hole jewel into place in the hole in the bridge or balance cock. Now place this bridge on the stump. Bring the pusher down on the plate beside the jewel, then back the micrometer stop up against the head of the pusher holder. Now the pusher can be brought down centered on the jewel and the jewel pushed into the hole. See Figure 6E. The balance hole jewel must be pushed down until the top of the jewel is 0.02 mm below flush with the plate. Therefore, the micrometer stop must be lowered and the jewel pushed down until it is set the correct amount below flush. The reason the balance hole jewel is set 0.02 mm below flush is to allow for oil space between it and the cap jewel. See Figure 6F.

To check the jewel for being 0.02 mm below flush, a small straight edge can be used. The light space between the straight edge and the top of the center of the jewel should be about the thickness of a piece of watch tissue. To actually measure this 0.02 mm, the micrometer stop can be used. To do this, select a stump to support the plate or balance cock. Place this in the jeweling tool frame. Now select the smallest flat pusher in the jeweling set and place this in the pusher holder. Then place the plate or balance cock on the stump in the tool. Now bring the pusher down on the plate beside the jewel. After this is done, the micrometer stop can be backed up against the head of the pusher holder, which sets the micrometer adjustment. Take a reading of what the micrometer adjustment shows. Now move the plate on the stump until the pusher is over the jewel. Then change the micrometer stop until the pusher will touch the top of the center of the jewel. The difference between the two readings will be how far below flush the jewel is.

It might be well to mention that a cap jewel is set the same as a train jewel.

This concludes the article on friction jeweling. Future articles will deal with the making of a balance staff and a stem. □

Figure 7.

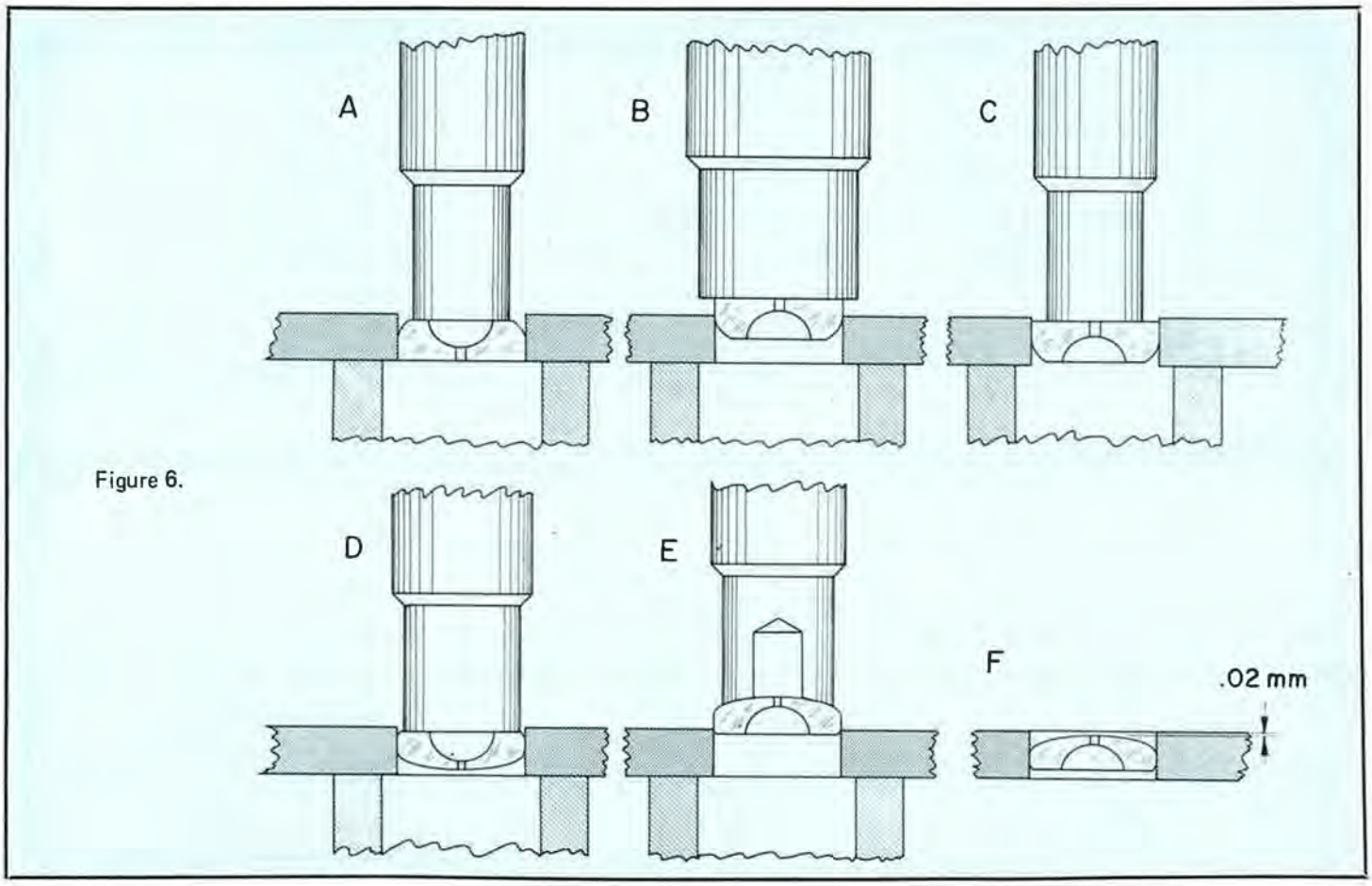


Figure 6.

CLOCK CHATTER

(continued from page 7)

little time spent in contact with water in the shop precludes such action being harmful to the metals. These solutions are used by dry cleaners, usually tetrachloroethylene, and you will find it under different names, e.g., Perclor. It is reasonably priced and is nonflammable.

The Amacol solution is stored in glass bottles, plastic jars, or as many do, in porcelain or agate-ware pots. This is the total list of chemicals for clock cleaning–Amacol, water, and tetrachlor.

This is a good place to repeat the usual warnings about working with chemicals, including taking care in working with flammables, and assuring adequate ventilation with heavier than air and noxious compounds.

Equipment is flexible. I use ultrasonic equipment for cleaning, but a pot may be used (the parts left immersed for from 15 minutes to overnight), stainless steel wire hangers for parts, plastic scrub buckets for rinsing, a small diaphragm air compressor for drying, aluminum baking pans 12" x 14" or larger for brush rinsing, a plastic dishpan for sawdust, oval sash brushes for rinsing with tetrachlor, and a watch or clock brush for the final touches in polishing with the sawdust.

The procedure is as follows:

1. The movement is disassembled. On all of these older pieces I recommend that the screws be placed in the holes from which they came. Very few of these screws are interchangeable and spending a couple of hours in determining which one fits into which hole is no way to try to earn your keep. Another point–look for marks made by the original maker or other repairmen as they worked on the pieces. There is no need to add to the already existing confusion of marks. If there are no marks I recommend using dots to identify the pieces going with the different trains. I have seen bits with seven and eight marks saying the same thing. I do make new marks when the originals are in Cyrillic (Russian), Chinese, and Japanese, all of which I have had.

2. All springs are removed from their barrels, cleaned and checked. It is bad practice to leave the springs in the barrel. All you need is to have the hole end pull out after you have finished a three train job. I clean the springs by putting the hole end in the jaws of a vise (mine has 5-in. jaws) and with a piece of round material in the inner portion stretch the spring out, cleaning it with tetrachlor on a rag. If the surface does not feel smooth go over with steel wool.

3. As the disassembly continues the parts are placed on the stainless steel hangers. The solid wire used for fishing leaders works fine and can be made from a piece about 15 in. long with the lower end bent into a circle about 3 in. in diameter and a snap formed to hold it on the longer tail (Figure 3). An entire train of wheels can be "threaded" on, also small pieces belonging to a particular train as well as miscellaneous small parts. The hangers are also of great help in removing parts from the cleaning solution without getting your hands and fingers in the solution.

4. After all the parts have been cleaned they are put in the plastic mop bucket which has been filled with ordinary cold tap water, and sloshed about a few times. The water is poured off and the bucket filled again. This is done three times. The fourth filling is with hot water and the parts are allowed to stand with occasional agitation for about 5 minutes.

5. The parts are then lifted out and wiped and dried using compressed air.

6. At this time all repairs are made.

7. Now all brass is polished using a revolving brass circular brush on a polishing motor.

8. All the steel work is polished using a steel circular wire brush on a polishing motor.

9. The parts now get their final rinse. The aluminum baking pan is used and the parts are placed therein. A small container of tetrachlor is set near the pan and the oval sash brush is used by dipping it in the tetrachlor and scrubbing the pieces. The brush is a 1-in. size and I usually "haircut" it a bit shorter to stiffen it. The rinse at this point does two things: it removes all fingermarks left from the handling while repairing and it removes a black residue left from interaction of the brass brush on the brass pieces. Failure to rinse will hasten the discoloration of the brass.

10. As each piece is scrubbed it is buried quickly in the plastic dishpan which is nearly full of sawdust (jewelers). While the tetrachlor evaporates quite rapidly, the sawdust assures thorough drying and when the pieces are removed and brushed with a watch or clock hand brush to rid them of the sawdust, it has the additional advantage of putting a final sheen on the brass. This method of rinsing assures you of never using dirty rinse solution as what is not used in the small container is discarded.

11. The final step before reassembly is to peg out all oil sinks.

These are the basic steps taken and the results in my estimation are well worth the time involved.

There are a couple of ancillary procedures that are used in conjunction with those outlined above.

As was mentioned, when cleaning carriage clocks the platform escapement is cleaned in a watch cleaner and rinse and done in the same way you would do a watch movement. Incidentally, the silver dip cleaning products are excellent for brightening the silver or nickel plated parts of the platform. You will find the black disappears quite easily. Just make sure you rinse it in water and then give it the regular cleaning. On carriage clocks I polish the back plate, the mainspring barrels and the visible side of the front plate with either white or pink rouge using a soft buff on the polishing motor. The tetrachlor is excellent for removing rouge from the parts.

One other procedure used is that all engraved back plates are lacquered. Lacquer with regard to clockmaking appears to have two meanings. In England lacquer means shellac and is available in clear and colors, such as pale gold or medium gold. These colors do not correspond to our white and orange shellac and are not easily obtainable in the U.S. When we speak of lacquer it is a synthetic product and can be obtained as a "clear brushing lacquer," and by cutting this as high as 50% with appropriate thinner, a mixture suitable for application by brush on the brass plate is obtained. The brushes used are camel hair and 1 in. wide. The application of lacquer is not difficult using fairly long brush strokes and tilting the work so the light shows that you are covering all areas, work quickly and with sureness to cover the entire area in one operation. You cannot go over areas after a very few moments; a mistake requires removal with thinner and then needs to be redone. As soon as the lacquer has set, clean out all oil holes and sinks with peg wood, leather strips, nylon cord, cloth strips or whatever you fancy. The English call our lacquer synthetic, and as George Bernard Shaw said, " the United States and England are two countries separated by a common language."

While not directly related to the cleaning process, a

hint that does help keep the polished brass clean during assembly is to use cotton gloves. I use photographic cotton gloves which come ten pairs to a box from the largest U.S. manufacturer of photographic material. As I am basically right-handed, I use one glove on my left hand. The gloves are half-gloves and are interchangeable as far as which hand they fit. They can be washed and dried and reused many times and at about fifty-five cents a pair, you can see how inexpensive it can be to avoid fingerprints while assembling and adjusting while retaining the dexterity of using your fingers in handling the pieces.

So we come to the end of "Oh, no, not another one" and I can only say "Oh, yes! Here is another article on *How I Clean a Clock.*" □

ESSENCE OF CLOCK REPAIR

(continued from page 21)

Figure 3.

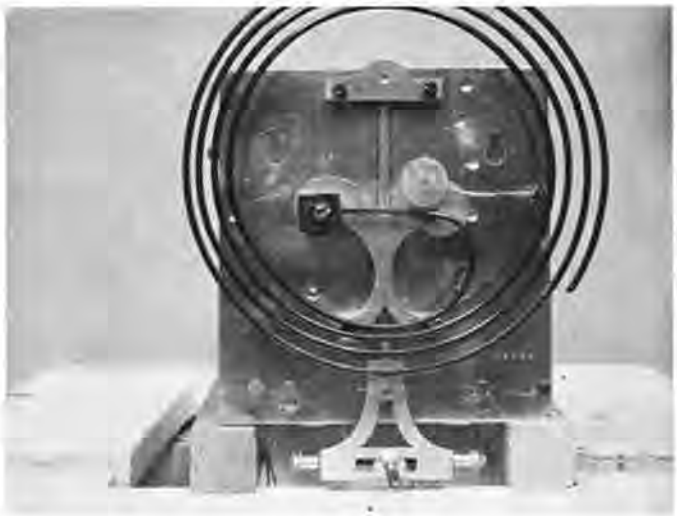


Figure 4.

if this has not already been done, so that these wheels can be correctly repositioned after the clock has been dismantled.

The attachment of the gut to the great wheel barrels can only be done by removing the front covers from the barrels. Disassembly of the clock is necessary in order to achieve this.

Care should be taken to ensure that the friction-tension washer between the front plate and the motion wheel is placed correctly. This should be just enough to allow the hands to move without binding.

Problems with these clocks have occurred in the past due to warped cases, the result of aging. This can cause the pendulum to rub on the back of the case. Wood shims may be used to tilt the clock away from the wall at the top.

Because of the almost inevitable problems occurring during set up on the wall in the home, it is recommended that the repairman suggest to the customer that the set up be done by the repairman himself.

Figure 3 shows the front plate of the movement, dial removed.

Figure 4 shows the back plate, steel wire gong, pendulum leader and hook-up for pendulum.

The diagrammatic sketch is not made to any scale. It is made only to emphasize the main features of the striking mechanism. However, it should help explain the text.

Note: Out thanks go to our mechanic, Dan Castner (late of the Bowman School) for working on this old clock prior to discussion and also for eliminating a number of the problems stated herein, and finally, for a successful set up. □

WATCH ADJUSTMENTS

(continued from page 35)

line of centers to point B the hairspring tends to stop the balance wheel while the heavy point tends to accelerate it. The result on the timing machine will be a loss of time which is equal and opposite to the situation with the heavy point at the bottom.

Since the method of predicting the effect of the heavy point is by now well understood, it will be left up to the reader to predict the behavior of the balance in all intermediate positions. There is yet one more variable to be considered. Thus far we kept the amplitude constant in all experiments. This can be achieved by winding the mainspring only enough to produce an amplitude of 90° in vertical positions. If we now wind the mainspring a little more and test it again in the same positions, we will find that the effect is the same as before but with one exception, namely that the variations are smaller than before. By slowly increasing the amplitude and checking the performance of the watch we will notice that the heavy point has less and less effect on the alance unit as the amplitude increases. At one point hte differences will disappear completely. The watch will behave as if the balance were perfectly in poise. When the watch is fully wound and the amplitude is greater than 1¼ turns, we will again notice the differences in rates, but this time they will be completely reversed. When the heavy point is at the bottom the rate will be slow, and when at the top it will be fast. The only other

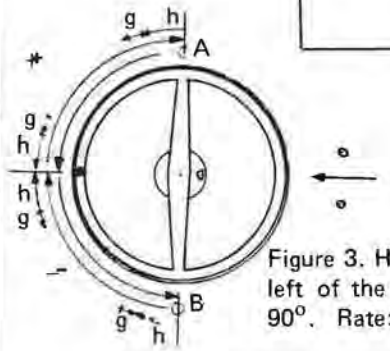


Figure 3. Heavy point at 90° to the left of the vertical line, amplitude 90°. Rate: No effect on time.

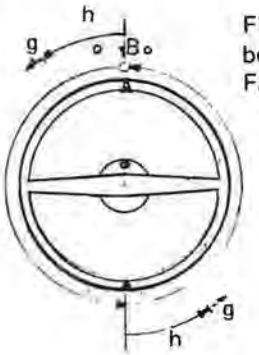


Figure 5. Heavy point at the bottom, amplitude 180°. Rate: Fast but much less than at 90°.

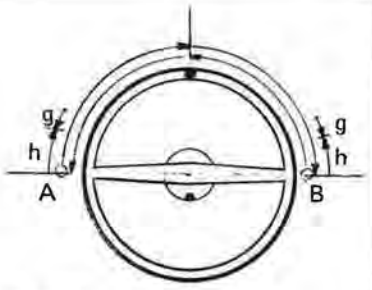
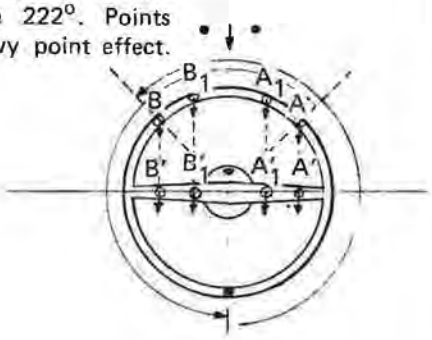


Figure 4. Heavy point at the top, amplitude 90°. Rate: Maximum loss.

Figure 6. Heavy point at the bottom, amplitude 222°. Points A, A_1, B, B_1 heavy point effect.



furthest point past the vertical line. This can be better understood by examining the law of the lever which states that the further away from the center of rotation the force is applied, the greater its effect will be. Figure 6 is an attempt to show that when the heavy point is at A, its effect is the same as if it were located at A', and when the heavy point is at A_1 its effect is the same as if it were at point A'_1. Consequently, the closer the heavy point is to the vertical line the less effect it will have and vice versa. One other consideration is that when the balance wheel is stopped, its kinetic energy is zero. When it starts moving from point A the kinetic energy is gradually increased. The opposing force of gravity has the greatest effect at this time. If the effect of the heavy point is smaller at the amplitude of 180° than at 90°, when it is further increased, the force of gravity will work against the force of the hairspring part of the way. By gradually increasing the amplitude a point will be reached when the small gain will be offset by a small loss, and the balance wheel will behave as if it were perfectly in poise. The experts tell us that this equalization occurs when the amplitude reaches 222°. An increase of the amplitude beyond this point will cause a small loss. The reason why the loss is small has already been given by explaining that the proportional increase of the force of the hairspring renders the effect of the force of gravity less prominent.

The knowledge of the effects of gravity is of practical value to every watchmaker. Many of us have experienced the frustration in attempting to poise very small balances. Even after we believed that the poise error was removed, we still found that positional variations did not decrease to the acceptable limits. By using the timing machine and by reducing the noticeable difference is that the rate variations are much smaller than when the watch is only partly wound. At least three of these observations need further explanation. They are as follows.

1. Why are the differences smaller as the amplitude is gradually increased?

2. Why is there no effect at one specific amplitude, and how large is this amplitude?

3. Why are the effects reversed when the watch is fully wound? The answer to the first question is somewhat difficult to explain from Figure 5. The argument should be that if the heavy point at the bottom with the amplitude of 90° produced substantial gain, then when the amplitude is increased to 180° the gain should be even greater because the force of gravity is acting in the same direction as the force of the hairspring over twice the distance. This obviously is not the case and the real reason for the reduced gain is to be found elsewhere. It has been pointed out earlier (February 1979 issue) that the force of the hairspring is proportional to the angle of deflection. When the amplitude is doubled, the force of the hairspring is also doubled, but the force of gravity remains the same. It can be shown mathematically that when two forces act on a body, whichever force is increased will have greater influence on its motion (vector theory).

The next two questions can be answered from a similar point of view. As the amplitude is further increased (Figure 6), the force of gravity works against the force of the hairspring during part of the motion when the heavy point has to be raised to the point directly above the center of rotation. We must also consider the fact that the force of gravity has the greatest effect at the time when the balance is stopped at its table limits. By using the timing machine and by reducing the amplitude to 180° or slightly less, it is possible to locate the remaining heavy point on the balance unit and dynamically poise the balance. The various methods of poising, both static and dynamic, will be explained in the next article. □

New Products

SEIKO'S HIGH QUALITY DESIGNER QUARTZ CLOCK COLLECTION

Seiko Time Corporation's high quality designer quartz clock collection ranging in retail price from $85–$250, encompassing more than 100 decorative-styled quartz table clocks and wall clocks, has been well received at leading department and specialty stores nationwide.

Perfect accessories for desks, end tables or mantel, these elegantly-styled clocks, with colorful dials, will enhance any room. Many of the clocks have alarms. They provide beautiful dimensions for both contemporary and traditional home furnishings.

Among the popular clocks available are:

–Model QP002G, a stunning textured gilt case oval-shaped clock, with round gilt dial and hour markers which features an electronic alarm, synchronized second-setting and a second hand which moves in step-motion at precise one-second intervals. Measuring 4¾" x4" x2¼", it retails at $90.

–Model QP013G, which offers a square striped gilt case, with round gilt dial and hour markers, features synchronized second setting and a second hand which moves in step-motion at precise one-second intervals. Measuring 4"x4 1/8" x2 1/2", it retails at $110.

–Model QP007K, featuring a square black matte case with rounded sides, black dial and hour markers. Its functions include an electronic alarm, synchronized second setting, second hands which move in step-motion at precise one second intervals. This 4"x4"x 2 1/4" clock retails at $95.

All Seiko clocks are available for immediate delivery through Seiko's nationwide network of distributors.

SNOOZE ALARM

This beautifully styled six-digit water-resistant Bulova Quartz liquid crystal display (LCD) digital watch is equipped with a sophisticated electronic alarm system, and reports the time of day, month, day and date, and seconds in 15-second increments (at lower left corner of display). The alarm system is set using the alarm button (left). When the alarm goes off, as set, it beeps three times, pauses for 10 seconds, and then goes into a series of short beeps lasting 30 seconds. The alarm is turned off by depressing the alarm button twice. But the sleeper who wants just a few more minutes to snooze can depress the alarm button just once, activating the snooze feature: this immediately stops the alarm, which then starts beeping again after ten full minutes. The tritium LCD display assures illumination and legibility at dusk, at night or in the dark. Suggested retail price is $160. Additional information is available from National Sales Manager, Bulova Watch Company, Bulova Park, Flushing, New York 11370.

Book Review

by Henry B. Fried

Encyclopedie de Diderot et d'Alembert (Paris 1751-1772) Horlogerie et Orfeverie–Dictionaire Raisonne de Sciences, des Arts et des Metiers. Reissue, 240 pages on handmade paper bound in silk with stamped gold lettering. Hard covers with silk-bound slip cover case. Published by Scriptar, S.A., 1001 Lausanne, Switzerland at 150 Swiss Francs, 1978. 240 pages.

To honor the 200th anniversary of the death of Rousseau and Voltaire, Scriptar, S.A., well known horological publishers of Lausanne, in cooperation with Franco Maria Ricci of Milan, have published a reissue of this famous dictionary's section on horology and jewelry making. Of the 240 pages, 152 are devoted to horology and the remainder to jewelry making.

This encyclopedic dictionary until now has been quite scarce and availa ble copies very expensive. Its large, engraved plates of all types of watch and clock movements, repeating and striking mechanisms, calendric and astronomical inclusions and horological tools were artistically and veritably executed. This resulted in many of these rare volumes being dismantled (like antique carousels for their exquisite wood carvings) and their plates sold separately for framing, making existing copies still rarer. To satisfy purchasers of this issue, the publishers have supplied each volume with a separate, loose plate for framing.

This reissue is as fine a volume as one can obtain. The paper is heavy stock, handmade. Originally published between 1751 and 1772, this volume bears the date of 1765. The foreword by the present publishers pays tribute to the celebrated eighteenth century French horologist, chronometrist and prolific author, Ferdinand Berthoud (1727-1807).

The text is the fourth of eighteen volumes, and starting dictionary-wise at "HOR"–horloge, begins with a history of the measurement of time which occupies thirteen large pages which brings the reader up to the accomplishments of leRoy, Thiout, Romilly and among others, Graham, Huygens, but mainly French horologists and horology.

The major part of this book is devoted to twenty-nine plate reproductions of the engravings of watch and clock movements, escapements, striking and repeating systems, equation devices, the astronomical sections of clocks, watch and clockmaking tools and equipment of the time, carillons, testing devices and other related items, each described or listed in the accompanying French text, also reproduced from original page editions.

There are page-sized engravings of early lantern clocks with verge striking escapement, others showing the details of the going train, side views and various different striking and time train layouts.

Quarter striking systems are shown in excellent views with the clarity one sees in the meticulous engravings of that century. Alarm and striking mechanisms of mainspring clocks with verge escapement, count wheel and stop works and striking detent mechanisms are explained in the text and illustrated on the large reproduced plates.

Thiout's quarter, pull-repeat system is also depicted assembled and also as viewed taken apart, in exploded views. Also, Julien leRoy's thermometric pendulum is included, as well as the cardrature showing the equation kidney-piece, rack mechanism and dial, as is Dautheau's differential equation cardrature.

Other equation systems illustrated and explained are those by Berthoud, Rivaz, Amerauld and (Jean) Bon. Details of watch ebauches, train and fusee layouts, train wheel and pinion counts, regulation, barrel and spring details are illustrated. Another plate illustrates the details and construction of a fusee chain, its assembly and pictures of watch movement dust covers and movement potences. There are side and top views of these movements, fusee worm take-ups, cannon pinion and traction systems, fusee wheel construction and the French system of verge escapement depthing.

Watch striking systems and details with equation of time arrangements make another plate subject. Only a few escapements are shown but the cylinder, Bethune and Thiout's escapements are pictured.

Quarter striking, repeating watch mechanisms are on some plates in large page-sized flat views as well as having separate pieces pictured. There is textual reference for every one of the many hundreds of items illustrated.

Graham's knife-edge suspension and the early double spring suspension with lead screw take-up regulation are depicted with views of contemporary horological tools. Hand turns, pivot lathes, ferrules, face plates, special gravers, files, saws, mills countersinks, broaches, calipers, dividers, balance tools, beam compasses, gimbals, depthing tools, clamps, pliers of all types, and screw-plates are among those catalogued.

A few pages show full size views of wheel cutting engines in complete detail. Also there are mainspring winders which appear as though they might have been pictured in a modern catalogue. Uprighting tools and fusee cutting engines are also included. One page illustrates some wheel tooth and pinion forms after designs by Sully and some wheel cutting engines he used. These are shown both assembled and separately with their components. Two similar devices by Hulot show the sophistication of later designs.

A carillon or belled and hammer music mechanism used in clockwork is shown with its tripping and locking arrangement, and occupies one full plate. Another illustrates a delicate pyrometer to measure the variations in pendulum lengths. Early rounding-up machines which used planing saws and other methods are covered in a few additional plates. Others show devices for pivot

adjustment and polishing and escapement fitting.

The last eighty pages are devoted to the making of watch cases, the tools used, findings and even winding keys. There is even a fine engraving, reproduced here showing a contemporary shop where these were made. A few plates illustrate watch case designs, ornamental sword hilts, broaches, "necessaire de couture," rings, shears, letter seals, snuffboxes, covers and other jewelry items.

The text in this, like previous sections, describes in short the various jeweler's files, rolling mills, hammers, anvils, engraving pads, taps, dies, drills and bows, wire dies, shears, lamps, furnaces, and saws. Goldsmith tongs, brushes and accessories describe all the illustrations. The lapidist's shop is another subject illustrated and other illustrations catalogue over fifty different gemstone shapes. For the stone setter, there are pages of ornamental designs popular for that era.

An engraving of the gemstone setter's shop with semicircular, form-fitting benches and attached aprons and ridged table tops shows that present shops do not differ much. The various tools, dapping dies, planishers, shears, balls, ships, awls, pump drills, sieves, pestles, light globes peculiar to those times which used to diffuse natural light, oil lamps, bellows, riffles and tongs with a myriad of files are viewed in these closing pages and plates.

The text as mentioned earlier is eighteenth-century French, and those who do not speak or read this language will hope that with this book, with its lavish production, could have included in pamphlet form an English translation of the text to American and English buyers. However, this most famous of all encyclopedic dictionaries deserved its reputation. This present reprint should aid in extending its status as pictorially and its cataloguing text is an excellent record of the technology of its times. This too shows that for hand skills, not too much in the way of equipment has changed through 200 years. Those who are avid students of old clocks and watches and interested in authentic restoration or identifying old tools, mechanisms and systems should find this edition a worthy reference.

NEWS IN THE TRADE

(continued from page 47.)

BULOVA ELECTS VICE PRESIDENT–FINANCE

The board of directors of the Bulova Watch Company, Inc., has elected Seymour H. Lesser to the post of vice president–finance.

"Mr. Lesser will be responsible to me for the Company's financial affairs," Sol E. Flick, chief executive officer and vice chairman of the board, commented. "For the past five years, Mr. Lesser has served as chief financial and administrative officer and treasurer of Allied Artists Pictures Corporation. Prior to this, he headed his own financial consulting firm and served for nearly ten years with MGM, Inc., where he was a corporate financial officer and then president and chief financial officer for their Recording and Music Publishing Division," Flick said. "His reputation for professional excellence and his many proven talents will have direct application to Bulova."

Mr. Lesser is vice chairman of the Management Planning Committee of the Financial Executives Institute, New York Chapter, and is widely known in the New York financial community. He is a member of the American Institute and New York Society of Certified Public Accountants and is affiliated with the National Association of Certified Public Accountants.

Mr. Lesser earned his Bachelor of Business Administration at Pace University in 1951 and resides in Manhattan with his wife and two children.

SWISS-MADE IN HONG KONG

Swiss manufactured watch components will soon be assembled in Hong Kong. Ebauches Electroniques SA (EEM)—an Ebauches subsidiary—and Stelux Manufacturing Co. Ltd. of Hong Kong have concluded a joint venture agreement for the production of quartz LCD modules in Hong Kong.

Using technological support from EEM, Modutek Ltd., an existing watch module manufacturer, will expand its activities to assemble high quality multi-function and Betalite modules using Swiss manufactured parts produced by EEM at their plant at Marin, near Neuchatel.

Asked why the agreement had been negotiated at a time when Swiss watch factories were not working at full capacity, a spokesman said that Swiss labor costs and the strength of the Swiss franc were such that it was not possible to produce this module economically in Switzerland.

Stelux is an international watch manufacturing and trade group with major interests in property development and banking. The company holds 26.8% of Bulova shares. Ebauches SA, EEM's parent company, is part of Switzerland's largest watch manufacturing group, ASUAG.

(Reprinted from the British Retail Jeweller.)

RJA OFFERS ANALYSIS OF WAGE & PRICE STANDARDS

Retail Jewelers of America, Inc. (RJA) is offering to jewelers a special simplified analysis of the voluntary wage and price standards issued by the Council on Wage and Price Stability.

"The simple fact is that all retail businesses, regardless of size, are covered by these voluntary wage and price standards," comments RJA Chairman Michael D. Roman. "The purpose of our analysis is to highlight the key provisions of the program which affect our industry and to simplify jewelers' compliance."

The Analysis includes questions and answers designed to clarify some of the complexities of the guidelines. Jewelers interested in obtaining a copy of RJA's Analysis of Wage & Price Standards should write to Jim Adams, Director of Member Services, RJA, 1271 Avenue of the Americas, New York, NY 10020. RJA members' cost is $1.00 (to cover postage and handling). Nonmembers' cost is $3.00. Please send check with order.

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Tradesman

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Superior Tweezer Resharpening $2.00 each, including return first class postage. Minimum of three tweezers. Advance payment required. Harvey C. Watkins, CMW, PO Box 1738, 1204 West Cason Street, Plant City, FL 33566.

Wanted To Buy

Gemology equipment, jeweler's and watchmaker's tools, benches, related equipment. Call or write, give details and prices. Braunschweiger Bros., 37 South St., Morristown, N.J. 07960. (201) 538-2189.

Wanted: American, foreign high grade pocket watches or movements. Will buy individually or quantity. Describe condition and price. Dick Ziebell, P.O. Box 427, Ipswich, Mass. 01938, 617-356-5756.

IMMEDIATE CASH for precious metal scrap. Highest prices for bench sweeps, buttons and sprues, watch and optical scrap, etc. Request Refining Purchase Schedule. Dept. A4, SWEST, INC., 10803 Composite Drive, Dallas, Texas 75220.

KWM Bushing tool with basic accessories. Jack Tencza, 12309 Ambleside Dr., Potomac, MD. 20854. 301-340-8465.

Help Wanted

EXPERIENCED WATCHMAKER. Located in central Ohio. Guild store since 1929. Forty hour week, salary open. Send resume to Carl Laubscher, Laubscher's Jewelry, 16 South Main Street, Mansfield, Ohio 44902.

WATCHMAKER WANTED: In beautiful Southern California. Trade and Retail Shop. Mostly 18 to 22 size movements. Production Quality Watchmaker only. Send Resume and Salary requirements. Tom Green, GT Jewelers, 22478 Barton Road, Grand Terrace, CA 92324 (714) 783-0829.

Watchmakers. We have 2 positions open for fast and experienced watchmakers. Our trade shop in Cleveland is paying up to $21,800 per year with many fringe benefits. Contact Mr. J. Pollak at Pollak Watch Service, Inc., 2132 E. 9th St., Cleveland, Ohio 44115 or call 1-216-241-4413.

HOROLOGIST: ENGINEERS-TECHNICIANS —Need persons trained as a horologist to work in product engineering center designing small mechanisms for America's largest manufacturer of battery movements and auto clocks. Ability to invent or innovate essential. Reply in confidence to Harold Anderson, General Time Corporation, P.O. Box 338, Davidson, N.C. 28036.

Wanted Hand engraver capable of engraving fancy monograms, coats of arms, facsimiles, etc. State salary desired, enclose picture of work if possible. Reply to Dukor, 245 Dale Drive, Silver Spring, MD 20910.

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., 13 Greentree Rd., Trenton, N.J. 08619 (609) 586-5088.

For Sale

Wall clock, English. Carved mahogany, eight day twin fusee, chain striking movement. Dulen Lee, 3521 Tanbark Way, Beale AFB, CA. 95903. (916) 788-0341.

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Clockmakers' Buying Guide. New 80-page Second Edition lists over 1000 spare parts and repair services available from over 400 suppliers. $5 postpaid. 30-day satisfaction or refund. Box 171-T, Bronxville, NY 10708.

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NOTICE TO ALL AWI MEMBERS

On pages 6 & 7 of the AWI Library Index, the name of William O. Smith, Jr. was inadvertently omitted from the listing of authors for the series of books which make up the Esembl-O-Graf Library. On page 1 of the Index, "Jr." was omitted from Mr. Smith's name in the listing of A Research Report on the Micro-Precision and Horological Educational Research Project – 1967-68.

Please make the appropriate corrections in your 1979 Library Index.

Dates To

April

1-5—Annual British Exhibition of Fine Jewelry & Sterling Silver, Goldsmiths' Hall, London.

7-8—South Carolina Watchmakers Association; Eighth Annual Convention; City Center; Columbia, South Carolina

7-10—American Gem Society Conclave, Shoreham Hotel, Washington, D.C.

8-11—Spring Gift & Decorative Accessories Market, Atlanta Merchandise Mart, Atlanta, Georgia.

18-26—Hanover Fair, Hanover, West Germany.

21-May 1—European Watch, Clock and Jewellery Fair, Basle, Switzerland.

22—Spring Technical Seminar, Iowa Retail Jewelers & Watch-Makers Association, Des Moines Hilton, Des Moines, Iowa.

22-24—Traverse City Gift & Souvenir Show, Skateworld Convention Center, Traverse City, Michigan.

22-25—Israel Jewellery & Giftware Fair, Hilton Hotel, Tel Aviv, Israel.

27-29—South Carolina Retail Jewelers Association Annual Convention, St. John's Inn, Myrtle Beach, South Carolina.

28—Spring Meeting & Dinner Dance of the Arizona Jewelers Association, La Posada, Scottsdale, Arizona.

28-29—Michigan Watchmakers' Guild; Twenty-Fifth Annual Convention & Workshop; Doherty Hotel; Clare, Michigan

28-29—Watchmakers Association of Ohio, Inc.; Quarterly Board Meeting; Marriott Inn; Cleveland, Ohio

May

3-4—St. Louis Spring Craft Market, Alfred J. Cervantes Convention Center, St. Louis, Missouri.

6—AWI-Watchmakers Association of Ohio, Bench Course; Introduction to Solid State Watch Repairs; Bob Nelson, Instructor; Holiday Inn, Perrysburg, Ohio.

Remember

7—Horological Society of New York; Lou Zanoni, guest speaker; New York, New York.

18-20—Louisiana Retail Jewelers Association Annual Convention, Holiday Inn North, Lafayette, Louisiana.

19-20—Arizona Watchmakers State Convention; Francisco Grande Resort; Casa Grande, Arizona.

19-20—Horological Association of Virginia, Annual Convention.

27-June 1—American Jewelry Distributors Association Annual Convention, Cerromar Beach Hotel, Puerto Rico.

June

8-9—North Carolina Watchmakers Association Convention; Hyatt House; Winston-Salem, North Carolina

11-14—American Watchmakers Institute; Research Education Council; Annual Meeting; Cincinnati, Ohio.

15—American Watchmakers Institute; Affiliate Chapter Annual Meeting; Cincinnati, Ohio.

16-17—American Watchmakers Institute; Annual Board of Directors Meeting; Cincinnati, Ohio.

18-24—Southeastern Jewelers Conference, Kuaui & Honolulu, Hawaii.

30-July 6—Christmas Gift, Jewelry & Housewares Show, Dallas Market Hall, Dallas, Texas.

July

27-29—Watchmakers Association of Ohio, Inc.; Thirty-third Annual Convention; Marriott Inn; Columbus, Ohio

AWI Bench Courses

LEGEND

Symbol	Course	Usual Instructor
A	Reading Meters	J. Jaeger
C	Citizen	J. Broughton
D	Seiko	L. Smith
E	Intro. Solid State	R. Nelson
F	Bulova SMQ	H. Opp
G	ESA	W. Biederman

DATE	COURSE	LOCATION
April 1, 1979	E	Omaha, NE
April 1, 1979	D	Dallas, TX
April 8, 1979	G	South Carolina
April 22, 1979	D	Baltimore, MD
April 22, 1979	C	Minneapolis, MN
April 22, 1979	G	Iowa
April 27, 1979	C	Wassau, WI
April 29, 1979	D	Clare, MI
April 29, 1979	E	Quincy, IL
May 6, 1979	E	Perryburg, OH
May 6, 1979	D	Portland, OR
May 6, 1979	F	St. Louis, OR
May 6, 1979	C	Boston, MA
May 6, 1979	G	Denver, CO
May 20, 1979	D	Okmulgee, OK
May 20, 1979	F	Kansas City , KS
June 10, 1979	D	Sewickly, PA

Additional programs will be scheduled as requests are received and new programs are developed.

If your group or association is sponsoring an event you would like to have printed in the Calendar in the HOROLOGICAL TIMES, please send all pertinent information (event, date, place, sponsor) to: Calendar, Horological Times, P.O. Box 11011, Cincinnati, Ohio 45211 at least eight weeks in advance of the event.

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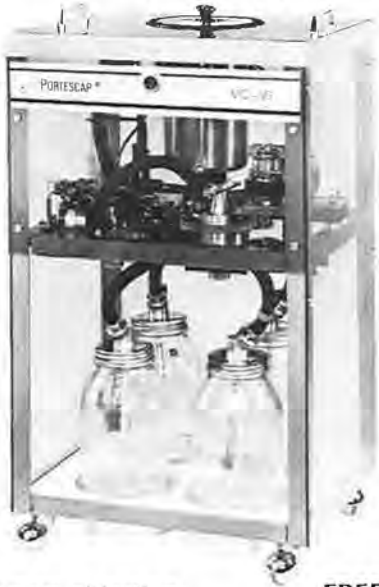
DID YOU HEAR WHAT HAPPENED WHEN WATCHMAKERS PRESSED THIS BUTTON LAST YEAR?

Portescap VC-10: A Fully Automatic Watch Cleaning Mini-Factory!

Hundreds of Watchmakers cleaned up with it last year.



Just one year after we introduced our unique VC-10, hundreds of jewelers are cleaning up on watch cleaning as they never did before! It's easy to understand why. There's never been a Watch Cleaner like the VC-10 before. It's a fully automatic Watch Cleaner that saves you time ... saves you labor ... and makes you more money than old-fashioned cleaners.

The VC-10 can handle up to 20 assembled watch movements at one time. It can also accept travel alarm clocks, pocket watches and other clock movements. After you push the starter button, the complete cleaning, rinsing and drying cycle takes just 30 minutes till the VC-10 automatically turns itself off. *From start to stop, you never touch the movements.* The cleaning solutions automatically move through their cycles, in a perfectly calibrated pre-programmed system that requires no effort on your part, yet produces absolute cleaning.

MULTI-FREQUENCY INFRASONICS COUPLED WITH VACUUM ASSURES ABSOLUTE CLEANING!

In order to attain *absolute cleaning* (the removal of all contaminants from a movement) our engineers have discovered after years of testing that it is necessary to employ multi-frequency cleaning action. The VC-10 has been designed with a cleaning frequency ranging from 5 to 20,000 cycles per second. Our research has shown that to thoroughly clean any given movement it is necessary to employ *low frequencies* for soft contaminants, *high frequencies* for brittle contaminants, and *medium frequencies* for general cleaning. During cleaning, the watch movements in the cleaning chamber are under partial vacuum. The individual cleaning and rinsing liquids also operate under partial vacuum. Cleaning and rinsing solutions can be used twenty to thirty times over.

FIVE STAGE AUTOMATIC CLEANING!

After the button is pushed, automatic programming takes over. The unit goes through a five stage automatic cleaning cycle: one wash, three rinses and one high-speed drying stage. At the conclusion, it shuts itself off.

USE WITH ALL WATCH LUBRICANTS!

The VC-10 has been engineered to work with all of the latest watch lubricants!

A LOT OF PROFIT IN A LITTLE SPACE!

The VC-10 is only 29½" high; 17" wide; 14" deep and easily wheels around on its heavy-duty chrome casters. Complete system, all accessories included. The VC-10 is fully assembled.

BUILT TO LAST!

Everything about the VC-10, from its steel framing and transparent Plexiglas (you can see everything at work!) to the special Viton hoses that are resistant to almost all standard commercially available anhydrous (waterless) cleaning and rinsing solutions are made of the highest quality materials under the most exacting standards.

FREE IN-STORE DEMONSTRATION!

Your Portescap Vibrograf Machine salesman will be happy to give you a complete demonstration in your store at no obligation. Easy payment terms and trade-in allowances are available. Call or write us now for free literature.

Portescap U. S. VIBROGRAF® MACHINE DIVISION

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