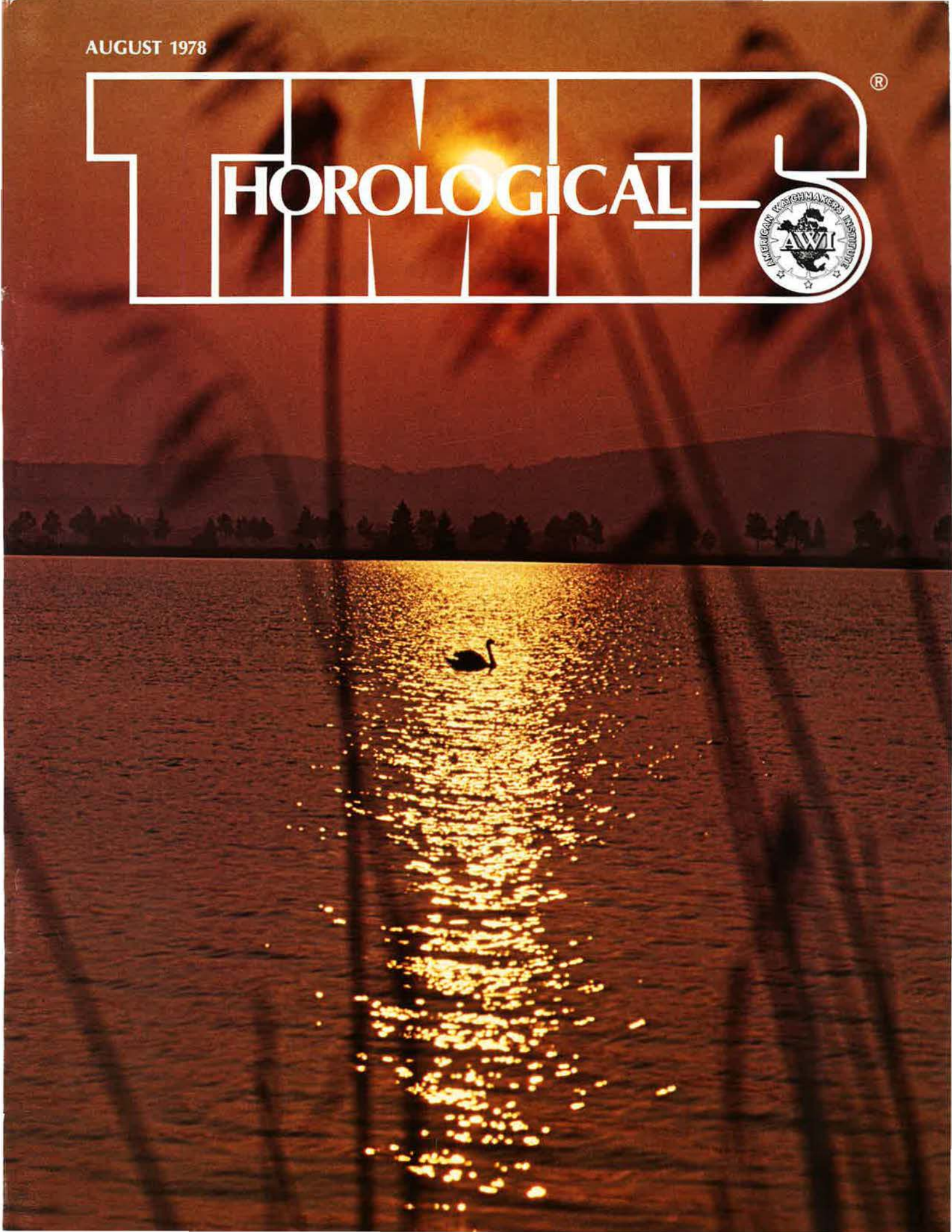
AUGUST 1978

HOROLOGICAL TIMES®



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Editorial

Electronics is to most people a magic, an unknown that they know exists. But what it is or how it works is an enigma to them. A few, though, are knowledgeable about capacitors, resistors, and transistors.

You as a watchmaker, clockmaker, or jeweler must be a journeyman in this growing area of new watches and new clocks. If you do not know, and try to bluff your way, those few customers will very quickly recognize your lack of knowledge. And word of your deficiency travels fast.

For the educational program on electronics that will put you on par with your vocation, write Micro-Electronics Course for Watchmakers, Home Study Dept., P. O. Box 11011, Cincinnati, Ohio, 45211.

OUR READERS WRITE

Avocation Becomes Vocation

I've been a member of the AWI for a few years now, and I have nothing but praise. I'm somewhat of an "outsider," having been in the electronic service and sales business for almost 17 years. About 9 years ago, I became interested in collecting and repairing clocks. I took your clock repair course by mail, which took me over 3 years in my spare time to complete. I don't think I could have made it without the help and encouragement of your very fine instructor, James Tigner. Knowing something of teaching (I've taught electronics at community college level), I consider Mr. Tigner one of the best instructors I've had the pleasure of learning from.

After completing the course, I took your certification exam, and passed. Boy, that was a great day!

So, AWI and James Tigner have changed my life. I'm now in the clock business full time. And, I might add, I'm happier in my work now.

I do enjoy your magazine especially the articles by James Tigner. The series he has started on wood works clocks is a dandy.

Thanks for all the help and encouragement you have given me.

Clifford A. Lint
Mt. Shasta, California

Attention Editor

Let me say that I enjoy your magazine. However, I feel there is much need for improvement in regard to the information given to the watchmaker therein. I find that your magazine is geared more toward the clockmaker than to the watchmaker even though your organization is supported almost exclusively by watchmakers.

In your June issue I noticed that there are four men who write about clock problems but only two men who write about watch problems. There are about 20 written pages on clock repair, and only about 3 pages written about watch problems. Seems a little topsided to me. I assume that your membership is more interested in the repair of modern watches than they are in clock repairing. In conclusion may I suggest that you increase your writings on watch repairs. May I also suggest more articles in automatics, calendars, mechanisms, and diagrams, also more on electronic watches–where to obtain parts for LEDs, LCDs, etc.

Paul Algiers
Stoneham, Massachusetts

Our modern watch repair writers have not submitted copy for some time. They are heavily taxed traveling around the country presenting bench courses on modern watch repair. I have been aware of the situation of thin copy on modern repair and have made arrangements to have two experienced writers fill this void in Horological Times. *The September issue will show a better balance between watch and clock articles–Ed.*

What am I missing?

I just have to tell you what a great magazine *Horological Times* is. I look forward to receiving each issue and after thorough study I file them for future reference. Any watchmaker who does not receive it doesn't know what he's missing. Anyone who receives one with blank pages doesn't know what he's missing either.

That is what happened to me. Pages 13, 16, 17, 20, 37, 40, 41 and 44 were all blank in the June 1978 issue. Would sure appreciate it if you could send me the missing pages.

Everett E. Sexton
Coeur D'Alene, Idaho

I appreciate your compliments regarding Horological Times *and regret the error with your copy. Enclosed please find a copy of June 1978. Although rare, printing problems do occur. I apologize to you for the inconvenience–Ed.*

About the Cover

The cover of the August issue of the Horological Times pictures a swan swimming on a lake somewhere in Europe.

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389/RW49, 10L122
392/10L125, RW27, RW47
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The President's Message

by Orville R. Hagans

At the annual Board of Directors meeting, June 23-25, 1978, the AWI completed its 18th year as the most progressive, well balanced and established national horological association America has ever had.

Today AWI is respected for its accomplishments brought about by the members and dedicated administrative personnel. Without loyal members and their sincere desire for knowledge to keep abreast of times, present and future, your AWI would not be in a position to own its own administration building, a large circulating library, including the Coleman Library, a museum for the preservation of horological objects of the past and present, traveling bench course personnel, many technical and business visual aid programs and own a publication devoted solely to technical and business aids and information.

The AWI ELM Charitable Trust, a division of AWI, is assisting financially deserving students to further their study in horology.

A very impressive part of the recent meeting, arranged by our most capable Immediate Past President, Jim Broughton, was a President's Reception for Past Presidents. All Past Presidents, except our beloved Jim Dodson, deceased, 4th President who served the years 1965-66, were present. Those present were

1st–John M. Farrel, 1960-63
2nd–Donald W. Leverenz, 1963-64
3rd–Clinton E. Aderman, 1964-65
5th–Harold J. Herman, 1967-68
6th–Gerald J. Jaeger, 1968-69
7th–Harold Calvert, 1969-70
8th–Henry B. Fried, 1970-71
9th–Ewell Hartman, 1971-73
10th–Marvin E. Whitney, 1973-75
11th–Robert A. Nelson, 1975-76

The many committees, our devoted instructors, your research personnel, the schools' group, the industry segment and the Chapter Affiliates are doing a most commendable job for you and the profession. We who endeavor to give our best feel truly rewarded by the increasing membership; after all, who are we without you of the profession and industry.

On our drafting board there are many programs being developed for AWI members. Help us all realize the plans you need. New membership is the answer and there is no better time than today for each of us to sign up a new member.

I pledge to give my best to be worthy of your trust.

Sincerely,

Orville R. Hagans
President

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THE SHIP'S CHRONOMETER

by Marvin E. Whitney
CMW CMC

Although the design and construction of the balance continued to improve, its behavior in the various temperatures and the resulting rating errors continued to be most frustrating in spite of all that was done. Even the best made and most carefully adjusted chronometers, when adjusted to produce the same rate at the two extreme temperatures, showed a different rate at the mean. The range of temperature to which the balance was adjusted varied with the idea of different makers, or the climate in which the chronometer was expected to be exposed. Most chronometer makers adjusted their chronometers for temperatures from 50° to 85° F, which covered the range of temperatures to which the instruments would be subjected aboard ship.

Some makers adjusted their instruments so that the rate would be the same for the two extremes to which the chronometer would most likely be exposed and then just accepted the inevitable, what was called the "residuary error," (later to become known as the middle temperature error). Others adjusted their instruments so as to have a close rate at the mean and one of the extremes, with the total error then being at the other extreme.

So no matter how the makers attempted to manipulate their balances this so-called residuary error remained, the cause being most perplexing and evasive.

Ferdinand Berthoud, a very eminent Swiss horologist, discovered the middle temperature error. On October 13, 1768 Berthoud determined the rate of his marine timekeeper No. 8 at various temperatures, which is shown in the table below.

Temperature, R	Daily rate, s/day	Temperature, R	Daily rate, s/day
5	–1.7	20	–1.25
10	–0.7	25	–2.50
15	0.0	32	–6.25

This shows a middle temperature error of approximately 4 seconds between 5 R and 32 R. The temperature coefficient of the system is approximately 0.17 seconds per day per degree Reaumur. (The Reaumur temperature scale equates 0 at 32° F and 80 at 212° F at sea level.)

Berthoud was not only a very skillful craftsman but he was a very competent writer. He was one of those rare individuals who did not believe in keeping his discoveries to himself and therefore published the results of his research and experiments. He theorized that the expansion and contraction of the balance wheel was one of several factors that caused the middle temperature error. Although various chronometer makers sought to obtain complete temperature compensation through the use of various auxiliary devices, Berthoud chose not to do any further work on eliminating the middle temperature error and turned his energies to other problems. Some historians feel he thought there was no solution to this problem.

In 1833, Edward J. Dent, a very fine English clock- and chronometer-maker stated that if a chronometer were regulated to keep time at the two extreme temperatures, it would gain from one to several seconds at the middle temperature between those two extremes. He devised a new balance designed to counteract this middle temperature error. See Figure 1. He and numerous other makers, Molyneux, Eiffer, Vissiere, Poole, and Kullberg, devised balances to counteract this error.

So great was the desire to find a solution to the middle temperature error that many different forms of secondary or auxiliary compensation devices were invented. Most of these consisted of some very ingenious devices generally made of two different metals which were attached to the balance wheel. In all, approximately 25 different designs were produced and many patents were applied for. Some of these contrivances accomplished their purposes very well, but the

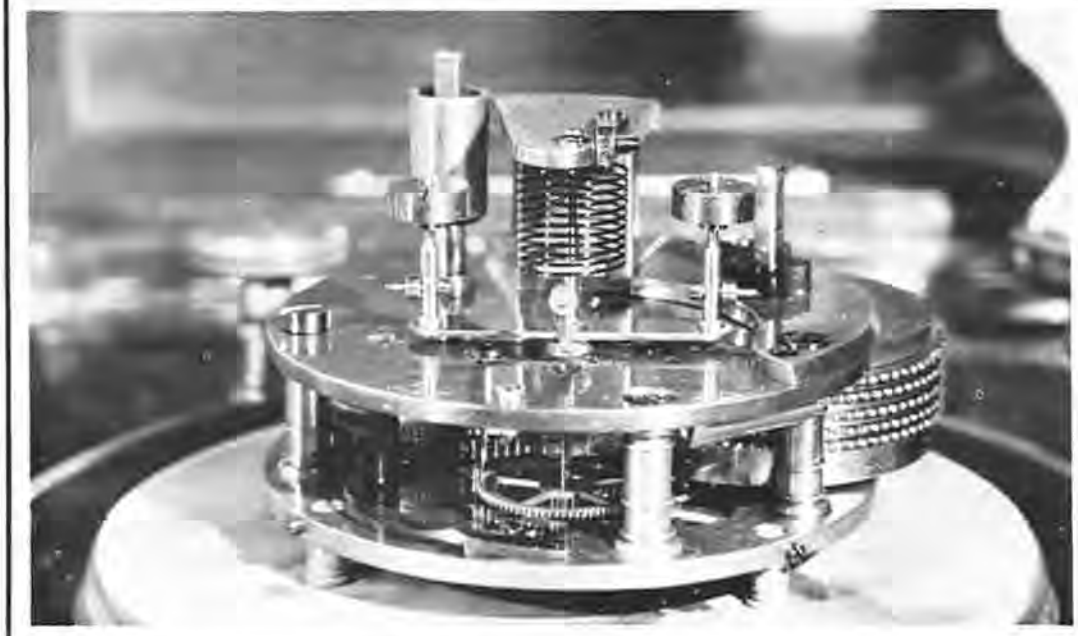

Figure 1. Dent's cross-bar balance with mounted weights.

fact that they were so complicated or contained certain inherent defects resulted in their often being unreliable. For this reason some naval authorities preferred chronometers fitted with plain balances. Until the monometallic balance wheel appeared and particularly the Hamilton, none of the designs was probably more consistent than the Kullberg auxiliary compensating balance.

The conventional bimetallic chronometer balance cut near the end making 1¼ turns can result in an error of as much as 12 seconds per day. Dr. Guillaume, the inventor of Invar, designed a balance composed of brass and nickel steel which was cut midway to the rim. This balance practically eliminated the middle temperature error and also reduced the centrifugal error to about 2 seconds per day. Many of the Ulysse Nardin chronometers are fitted with this type of balance. See Figure 2.

Before Hamilton developed its monometallic balance with the Hamilton Elinvar hairspring, other makers were experimenting with this type of balance. Paul Ditisheim designed a monometallic balance with two compensating bimetallic strips, fitted with a pair of small compensating attachments on the inside of the balance rim. The holes in the strip were elongated to allow the strips to be moved along the rim. Thus, by moving them along the rim, their acting length could be either shortened or lengthened. Ditisheim's design produced some very good rates.

Thomas Mercer, maker of English chronometers since 1859, also experimented with this type of balance. He designed and fitted some of his chronometers with a nickel steel monometallic balance with short brass compensating curbs and a nickel steel hairspring. The rim of the balance was much wider than most rims with the curbs hugging the outside of the rim in a milled out recess extending from the arm to approximately midway of the rim. Chronometers fitted with this type of balance performed very well and received an excellent rating when submitted to the National Physical Laboratory for trials. However, Mercer presently uses a brass and steel compensating balance.

The Hamilton chronometer differs in that the bimetallic balance wheel with the conventional steel or pal-

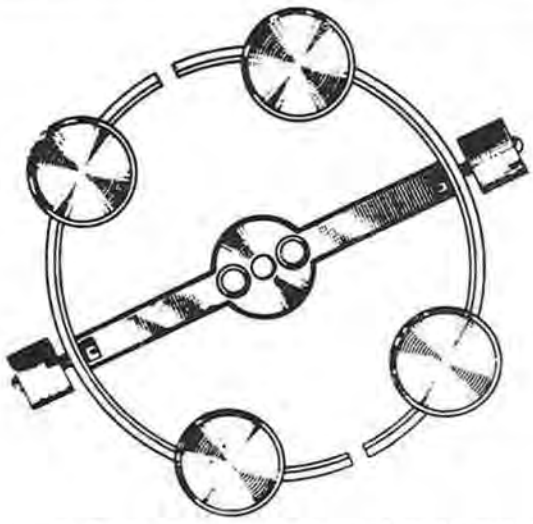

Figure 2. Guillaume's brass and nickel steel bimetallic chronometer balance.

ladium hairspring has been replaced by a monometallic balance wheel. It consists of a solid, uncut, stainless steel rim to which is silver-soldered an invar arm. To eliminate any undue stresses, the wheels were seasoned by an accelerated process of alternately heating and chilling. The rim is provided with 24 uniformly spaced tapped holes around its circumference and by employing conventional balance screws. See Figure 3. Temperature adjustments are obtained by moving these screws either toward or away from the arm of the wheel. Located at the end of the arm is a pair of large timing weights and to their right for fine regulation, a pair of very small vernier timing weights. One complete turn of this pair of vernier timing weights will alter the rate of the chronometer only 2.8 seconds per day, as compared to the 40 seconds per day for the larger weights. Hence, a special screwdriver incorporating a liquid level (see Figure 4) was made which permitted regulation to be done within 0.1 or 0.2 seconds per day.

In most chronometer balance wheels used heretofore, temperature compensation adjustments were provided by split bimetallic rims, bimetallic affixes or other complex devices. Adjustments were difficult to achieve and also the effects of centrifugal force impaired the performance of the timepiece.

Prior to World War II, Hamilton had introduced in its watches a hairspring made of Elinvar and when combined with a solid (uncut) monometallic balance wheel, produced rates which varied only slightly with temperature. When the war became imminent in 1940, plans were made for the United States to build history's greatest navy, and out of this program sprang history's greatest demand for ship's chronometers. So in the very early part of 1941, Commander T.O. Brandon, Material Officer at the US Naval Observatory, took a Nardin chronometer and visited each of the American watch factories, requesting them to build a chronometer. All said no, except Hamilton and William O. Bennett, engineer and

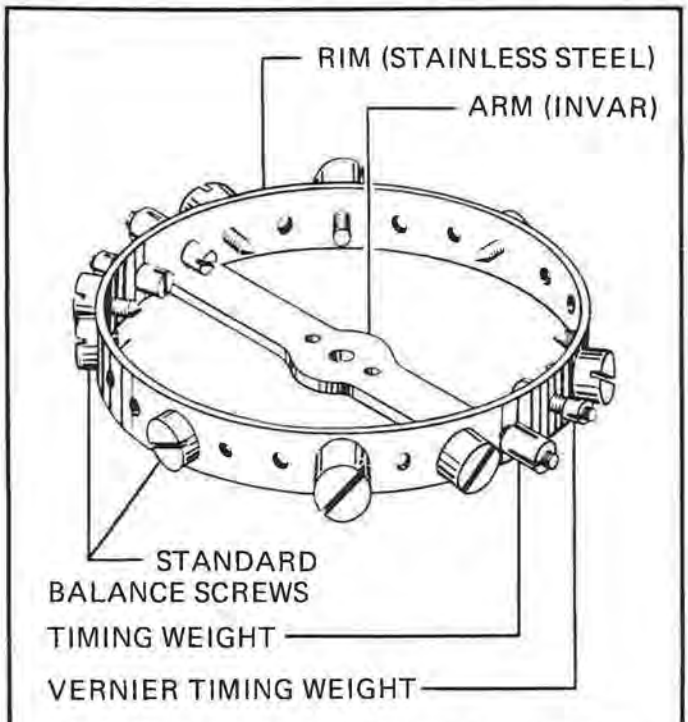

Figure 3. Hamilton's chronometer balance wheel.


Figure 4. Liquid level screwdriver slotted to fit timing weights.

designer of Hamilton's monometallic watch balance wheel, later to become project engineer for chronometers, who qualified their acceptance, "No, if they had to make it with a bimetallic balance."

The Navy's specification No. 18C7c, February 2, 1931 for Chronometers, Ships' stated, "The chronometer shall have the ordinary compensated balance, with detent escapement and without auxiliary correctors, and shall beat half seconds. The hairspring shall be of steel or palladium." It was evident that the Navy's specifications for chronometers had lagged behind technological developments in the horological field. The Navy made no changes in its specifications between April 1919 and February 1931, although many improvements had been made in its construction. Common sense prevailed and portions of the specifications were waived.

The Hamilton Watch Company accepted the challenge and, with the excellent cooperation of the US Naval Observatory's chronometer shop, designed and mass-produced chronometers which broke all previous performance records. Not just once or twice, but thousands of times.

Most balances being cut also had a decided centrifugal force error but with the solid wheel, this error was practically eliminated. Also with the bimetallic balance, adjusters were always concerned about how to overcome the isochronal error of a split balance, for as the amplitude of oscillation increases, the mass tends to move outward, inducing an isochronal error. For this reason, the motion of such balances was seldom made to exceed more than one turn. With a solid balance wheel it was possible to employ a motion of 1 3/8 to 1 1/2 turns. Since the Hamilton uncut balance was free from centrifugal effects, by reducing its weight it was possible to increase its diameter without sacrificing the moment of inertia. For comparison, the Hamilton balance wheel weighs 5.1 grams while the Nardin weighs 10.2 grams.

Another difference in a chronometer and most other timepieces is that it is not fitted with a regulator. It has long been known among adjusters that a timepiece fully adjusted should be "free sprung." For a timepiece fitted with a regulator, the moment the regulator is moved, the acting length of the hairspring is changed and consequently, the isochronal

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adjustment is altered. Thus, without a regulator this force is eliminated as a cause, although there are other forces that affect the isochronal adjustment.

The helical or cylindrical hairspring used in chronometers was invented by John Arnold, who achieved great success as an English chronometer maker. Although helical springs were used before Arnold's time (Harrison used them in his earliest timekeepers), they were used in tension rather than torsion.

Arnold, as his predecessors, used a flat steel spiral hairspring in his earlier marine timepieces. But he was not satisfied with their performances and reasoned that if a hairspring could be designed whereby the coils of the hairspring remained concentric with the axis of the balance staff as it wound and unwound, the timing oscillations of the timpiece would be greatly enhanced. During his experiments and deliberations, the thought occurred to him that a helical type spring would do just that. So in 1775, Arnold applied for a patent on the helical hairspring entitled *A New Pendulum Spring for Timekeepers and the Method of Compensating the Effect of Heat and Cold of the Same.*

The first helical hairsprings Arnold used on his ship chronometers were made from flat strip steel much wider than the type used by later makers. This was understandable for Arnold used a larger and heavier balance in his chronometers.

In 1779 Arnold experimented with gold helical springs made from an alloy of 1/8 to 1/4 parts copper to gold. By using goid he hoped to solve the problems of rust which resulted from handling or when the instrument was sent to sea. Although gold was tried with some degree of success, Arnold returned to the steel spring in 1774.

Shortly after applying for his helical spring patent, he observed that the upper and lower coils, because they were fixed, did not expand and contract as freely as the middle coils. Again, this brilliant horologist in experimenting with different designed curves discovered that by incurving the upper and lower coils, he could greatly improve and equalize the expansion and contraction of all coils; in other words, he applied terminal curves. He applied for a patent on his terminal curves in 1782.

Although there still remained a lot to be learned regarding the cause and effect of terminal curves on isochronism, Arnold's patent and hypothesis sufficed to cause others to explore the subject further.

Besides being the inventor of the helical hairspring and terminal curves, Arnold was also responsible for improving the spring detent escapement which was invented in principle by Le Roy and was one of the first to construct and use balance wheels from two different metals.

The cylindrical hairspring has either 11, 12, or 13 coils and is made from either steel, palladium or elinvar. The diameter of the coils is about one half the diameter of the balance wheel, or 1/2 inch in a standard or 56-hour chronometer, and slightly under 5/8 inch in height.

In the steel hairspring it was found that no two springs, although made from the same steel stock and to the exact same dimensions, may show a rating error as much as 5 to 7 seconds per minute. One of the most baffling peculiarities of chronometers for the early chronometer makers was that every new chronometer had a gaining rate during the first two or three years of service. For that reason, it was customary for springers to age them before submitting them for timing trials. Many theories were advanced to account for this peculiarity, but for years there was no satisfactory explanation.

Rust and magnetism had long been known as two of the worst enemies of the steel hairspring and thus, most detrimental to the timekeeping quality of any timepiece. In any attempt to overcome rust, E.J. Dent, after tempering, electrogilted his steel hairsprings. But after a period of time he found that the gilding flaked off, which affected the strength of the spring and in turn, decreaseed the resiliency of the hairspring.

In 1803, palladium was discovered by Wallaston. Palladium is obtained in working up platinum. It is a very hard, brittle, stainless, nonmagnetic white metal, belonging to the platinum family.

Although palladium was known to be rust resistant and not affected by magnetism, it went unnoticed for years before being used for hairsprings. About 1880, C.A. Paillard became the first to make palladium hairsprings for chronometers. He also found that they did not accelerate as much as steel hairsprings and that the middle temperature error was reduced considerably. Palladium had its drawbacks too, for it was heavier and softer than steel, and hence, more susceptible to distortions. Until elinvar was discovered, palladium was used in most high grade chronometers. Although elinvar was generally accepted as having no equal, one eminent chronometer firm, Mercer Brothers of England, did not defect to elinvar. Even today this firm uses a special palladium alloy for its hairsprings, which like all other parts of its chronometers, are made in its own factory. The elastic properties of this alloy at various temperatures are such that, when used with a bimetallic compensating balance, the middle temperature error is nonexistent and thus Mercer is able to rate its instruments so the average daily error is not more than 0.50 seconds or one part in 172,800 in temperatures between 40° F and 95° F. See Figure 5.

Figure 5. Nardin's palladium hairspring before incurving inner and outer terminal curve.

The position of the hairspring terminals and their influence on the rate of a chronometer in the long and short arcs was still a great concern of many makers and particularly,

(Continued on page 44)

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SEIKO

escapement module barrel arbor pendulum balance staff quartz crystal verge chimes main wheel ratio hairspring potence push button crystal capacitor crown diode stepping motor fuzee mainspring transistor frequency lathe condenser staking tool capacitor trimmer suspension spring light emitting diode detached lever repeater liquid crystal loupe tweezers attraction friction buff amplitude poise endshake resistor analogue stop works gear lubrication calendar torque

Questions and Answers

by Henry B. Fried

CMW CMC FBHI

YOUTHFUL ASPIRATIONS

Q. I have been interested in watch repairing for 4 years. I started when I was 7 and I am still working at the age of 11. You saw me at the seminar in Asheville, North Carolina in June. I enjoyed your seminar very much. It was my first convention. You have seen my dad at all the conventions. If you have any helpful advice for becoming a good watch repairman, I would appreciate it very much if you would send it to me. My daddy is a CMW and that's what I hope to be.

Tom Baker, Jr.
Roxboro, North Carolina

A. I feel flattered and honored that you would write to me and I will try to answer you as best as I can. I remember you at the seminar and even jested about you. I am pleased that you enjoyed my seminar and attending these and making notes, *you will have a record of listening to and seeing some of the country's best horologists (myself excluded, of course) and this will be some of the most cherished memories you will have later on in life. You will be able to recall at first hand what these well known people said and what they actually looked like to you. I myself have such memories of watchmakers who I remember lecturing and talking. Today, one reads about them in books and in articles and these same people are quoted in awe and respect. When someone asks certain questions, I proudly report that the answer I am giving was in turn given to me by Ferdinand Haschka, Rochas Salomon, Abe Ashendorf, Thomas Lugrin, Jacques LeRoy, Fred Bergleitner and Dr. Arthur Rawlings, Major Chamberlain, John Bowman, and many others who were model makers for various American watch factories and designers of movements.*

My father, too, was a fine watchmaker and so was his father. After his death, I as a young boy worked for very fine watchmakers who showed me so much. However, one in particular made my eyes open like a boy at Christmas time when a real pile of toys and goodies was put before him. What did he do to create this amazement? He showed me a book called Britten's Watch and Clockmakers Encyclopedia and Guide. *When I glanced through those pages, I felt that here were all the trade secrets revealed between the covers of one book. It actually never occurred to me that there were books on watch and clockmaking! Then I looked at the binding covers and edge of the book and saw something that I saw on all library books, put there by the librarian with white ink. I asked my boss, "Did this come out of the library?" "Yes," he replied, "and there are many more there on the same subject." Except for required reading for my night high school studies, these then became the books I would read over and over again until I could almost always quote the page and the part of a page where certain answers could be found. When the other young apprentices around the Maiden Lane area of downtown New York would get together, I found myself always being asked about this or that, as they would ask me rather than read for themselves. They would then quote me to their bosses. When these bosses would see me at a material house while on an errand or in the cafeteria for lunch, they would ask me where I got this idea or that, and would I like to work for them. Thus I could have had the pick of masters for whom to work.*

So much for the ideas and facts of watchmaking, which are all yours to be read and committed to memory. However we can't wave a book over a bent hairspring or a broken pivot and expect it to become unbent or repaired. The answer to this last statement is in this little story about a young boy with a violin case under his arms who asked an old lady while in New York City, "Please tell me how does one get to Carnegie Hall?" The little old lady replied, "Practice, my boy, practice, practice."

I had one boss who took a liking to me, but the way he made me work, you'd never think it. However, I knew what he was doing and although he seemed harsh, I knew that he wanted me to be very skilled with my hands as well as being able to quote horological facts off the top of my head. He would give me homework to do that had nothing to do with finishing a repair. He would actually take a setting lever from a fine Meyland or Patek watch movement and break it and throw the pieces away so that I could not recover them. He would instruct me to bring one back fitted to the movement over the weekend, after he had shown me how it should be made, knowing a part couldn't be bought for that movement. I would do that after my weekend homework (I also ran cross-crountry for my night school) and then worked on the part, sometimes making three or four before one would work the way I knew he wanted it to work and look. Sometimes I would make a fine combination setting piece with spring and it looked just beautiful. However, when I put it in the watch and pulled out the stem, it would break in two, as I didn't temper it properly. I also learned to control my temper and

Tick Tock Talk

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just start all over again. He gave me the weird assignment in making parts or discovering some fault that he purposely put into the watch, all as assignments at home and I did them all, knowing that although he was an oddball to his customers and to other watchmakers, he was doing it for my own good.

I am relating this to you so that you will realize that skill in anything, whether it be playing the piano, drawing pictures, running, hitting a golf ball, making watch parts or straightening hairsprings requires practice, practice, practice. Arthur Rubinstein, the famous pianist, has said that when he failed to practice for one day, he knew the difference. If he didn't practice for two days, the music critics knew the difference, and when he didn't practice for three days, his audience knew the difference. When I received an unusual watch or clock that needed some skilled work on it, such as repivoting a very thin watch wheel, setting a jewel, old style, into a very fine watch or trueing the hairspring on a very small or fine chronometer, I would first practice on another old watch, especially if I had not done that work in some time. A surgeon performing a type of operation he hasn't done recently will often perform and practice first on some unliving being. Above all, never become discouraged if you fail to do the job correctly or adequately the first time. If it were so easy, shoeshine boys would do watch repairs. The more dedication required to master a skill, the rarer it is, and like all commodities, that skill becomes valuable and more valuable the rarer it is. Skill of any type is acquired only through dedicated repetition, again whether it is kicking a soccer ball, getting one into a basket, playing a guitar, or turning a staff on the lathe; you are not too young either.

In England, the very small links in a fusee chain were made by boys in orphanages who were even younger than you. In fact, the story of Daniel JeanRichard (yes, it's a double name spelled just that way) who when he was just fourteen saw an English watch for the first time. He was determined to make one just like it. After six long months of study and practice, he did produce one. At twenty he was listed as a Master, which meant quite a lot more than that term does today. There is a statue of him in Switzerland.

To conclude, read everything you can about horology, practice the things your well known father suggests to you, and set only the highest goals for yourself. Who knows, some day, you may be a famous horologist. Save this letter, too, for who knows, some day I too will be famous horologist. Feel free to write. Already you are off to a good start.

Eli Terry

Q. While doing some family research, I discovered one Eli Terry who was a clockmaker, born in 1772 in Connecticut.

I would really appreciate any information you can send me about his clocks–availability, present value, quantity make, etc.

Elain Terry Alton
Fort Campbell, Kentucky

A. To answer your request regarding history on Eli Terry, the clockmaker, quantity of clocks made, availability and present value would take reams of paper.

Suggest that you visit your local library, or a large city library in your area, and ask about the following books: Book of American Clocks, *by Brooks Palmer;* Two Hundred Years of American Clocks and Watches, *by Chris Bailey.*

These two books contain considerable information about Eli Terry, types of clocks made and good photograghs of some of his clocks.

Total number of clocks produced by Terry is not known. Some of his clocks are collector's items and some are still available, but not at one particular source.

Value can be determined only on a specific clock, or clocks, by a qualified appraiser.

Eli Terry was born on April 13, 1772 and died February 24, 1852.

(Answer provided by Orville R. Hagans, Curator, AWI Museum.)

400 Day Regulation

Q. In my shop I have a 400-day clock which I cannot regulate. The clock, made by Gustave Becker, is similar to plate No. 1207A in *The Horolovar 400 Day Clock Repair Guide,* by Charles Terwilliger. I have cleaned and oiled the movement and tried to replace the suspension spring. The original suspension spring is 0.005 inches thick and rotates the pendulum 30 times per minute with the pendulum adjustment full slow. The specified 0.004 suspension spring runs 17 times per minute. I tried a 0.0032 spring which tends to flutter. I tried shaving the 0.004 spring with fine abrasive paper, but this was little if any help.

The escapement seems to be in good order as described in the book.

I would greatly appreciate any suggestions you might have or are able to make about the trouble.

Jon Winarski
Clinton Township, Michigan

A. There is something about your questions which does not ring just right. All Gustave Becker 400 day clocks, according to Charles Terwilliger, beat eight times a minute. For a torsion balance of that weight to oscillate 30 times a minute is very difficult to imagine; the arc would have to be very short and rather rapid. Even 17 times a minute is much too fast to imagine for such a balance. Check this again. I called Charles Terwilliger who said the same thing. As for thinning a spring and it flutters, again, refer to the book which should suggest that you raise the pallet crutch closer to the point of suspension to eliminate fluttering.

Count the actual swings of the torsion balance; make certain that you aren't obtaining a fluttering escape wheel.

Clock Cleaning Procedure

Q. (For James L. Tigner). I am just recently started in clock repair and am using your articles as a guide. I have been doing very well.

I have been cleaning my clocks in L&R Ultrasonic solutions, same as for watches.

Today I accepted a Herschede chime clock 50 years old , valued at $1600. I proceeded to do my normal cleaning in the L&R ultrasonic cleaning solution. Up to that point I

was okay. I put the movement in a dryer. Result: all lightly coated green. Some spots are clear.

What do you recommend to put it in now to get rid of the corrosion. I have been cleaning clocks and repairing them for five years and this has never happened before.

D. Myers
Superior, Wisconsin

A. Glad The Shop *has been of help to you. It was nice of you to tell me so, and I appreciate it.*

Now to your problem. As I understand it, you cleaned your clock in L&R Ultrasonic Cleaning Solution, and then before putting it in the dryer, you forgot to rinse it. That would certainly turn the clock green.

What I would do is run the clock through the same cleaning solution again, letting the clock soak for at least half an hour before scrubbing. Warming the solution first will help. Of course, if you're using an ultrasonic tank, all that will be taken care of automatically.

Afterwards, put the clock through a couple of L&R No. 3 rinses. Dry, and you'll probably be okay.

If not, I'm afraid there's nothig left but to pull the clock all the way down and hand scrub each part with brass polish. I like Brasso best. Follow with two rinses in L&R No. 3, dry and you'll have a beautifully cleaned clock.

There's nothing peculiar about the Herschede model you spoke of, so I'm going on the assumption that the trouble was caused by overlooking the rinse. But if you did use a rinse, there's no point to recleaning the clock in the same solution. Start right in with the Brasso.

(Answer by James L. Tigner.)

Vacuum Tester

Q. A waterproof tester gauge indicates 0 to 760 MMQS. How does this measurement translate into depth measurement or conventional measurements currently in use?

H. Wasserman
Louisville, Kentucky

A. MMQS as far as I can make out is the height of a column of mercury in a gauge which will show the degree of pressure (or vacuum. 760 mm would total 29 inches of mercury, 29.9 in.) or a normal atmosphere. If this atmosphere were removed completely, you'd have a perfect vacuum and thus equal to an equivalance of 32.8 feet. Most often these are used on gauges in waterproof testers that employ the vacuum principle rather than one using a pressure test.

For more study of these devices and waterproof in general, read The Principles and Practices of Waterproofing Watches *by Fried, available on loan from the AWI library to paid-up members.*

□

Defeat is only for those who accept it.

SMITHSONIAN INSTITUTION HAS RARE CLOCK, RELIC OF EARLY SAN FRANCISCO

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

A Wenzel Air Clock, one of the very few operating clocks in the vast collection of the Smithsonian Institution in Washington, D.C., and one which escaped destruction in the 1906 great earthquake and fire in San Francisco, was repaired and rebuilt at Hagans Clock Manor.

Perhaps before describing the unusual and now rare clock, a word or two about the inventor is probably in order.

Herman Julius Wenzel was a better than six-foot, 20-year-old youngster when he became a fugitive from military conscription in his native Germany. Evading the recruiting summons, he made his way first to England, and then to the United States, landing at New York. Immediately he took steps to become a naturalized citizen and remained in the city a year or so, following his trade of watch- and clockmaker, learning as an apprentice to the celebrated Adolph Lange.

But the youth was restless. Gold was still a major topic in America and in the early 1850's Mr. Wenzel made his way westward to make his fortune. He went to San Francisco and then to the Hawaiian Islands where he spent some four years. In 1860 his name appears for the first time in the San Francisco directories. Later editions of the directory indicate that he moved his location several times, and that he had one brief partnership. After that, this cosmopolitan watch- and clockmaker carried on with the aid of his son, who continued the profitable business after his father's death at the age of 54 in 1884.

Dr. W. Barclay Stephens, writing in the October 1947 Bulletin of the National Association of Watch and Clock Collectors, stated that the business prospered until the earthquake and fire of 1906, when the entire city was practically laid waste. "The catastrophe," said Dr. Stephens, "brought to a practical end the career of the air clock. Where the fire had not destroyed, the earthquake had frequently broken the glass jars and/or the pipelines running through the walls. These breaks and other damage together with the absence of parts made the repair and care of the remaining clocks so burdensome that they were gradually abandoned . . . . The advent of the more practical, more easily installed, and more carefree electrically controlled clock was another factor" in the demise of this clock.

Although more suited to public buildings, such as schools, hotels, and large business houses than to private homes, a few of these clocks were found in the large old residences in San Francisco and the Bay area. Some were in use in Sacramento, and even as far east as Boise, Idaho, in the early days. Through publicity attendant upon bringing the Smithsonian model to Colorado, another of these air clocks was discovered in nearby Greeley, Colorado in the courthouse, and which the Clock Manor was also asked to repair.

Workmanship on the clock bespeaks the skill, the ingenuity, the patience, and the perseverance of the inventor. Mr. Wenzel regarded this clock as his masterpiece. He had made some fine chiming clocks, and a novelty for his shop window which his son called a "fly back." The numerals were placed horizontally across the window and then the marker, having traversed from 1 to 12, would "fly back" to the starting point. This was comparatively simple to the conglomeration of glass jars, lead weights, and pipes, gears, dead beat escapement and a seconds pendulum, but no dial or hands, nor any provision for these, which made up the master clock or control for subsidiary clocks which could be placed as the owner desired, at any distance from the master unit.

Workmanship on this masterpiece is of the very highest quality throughout. Parts are beautifully finished and well executed, a result attributed in part to Mr. Wenzel's early Lange training, and, in no small measure, to the inventive genius and ambition of the artisan himself. During restoration missing parts were replaced by making new ones, and clock technicians carefully tried to follow the original thought and style of construction.

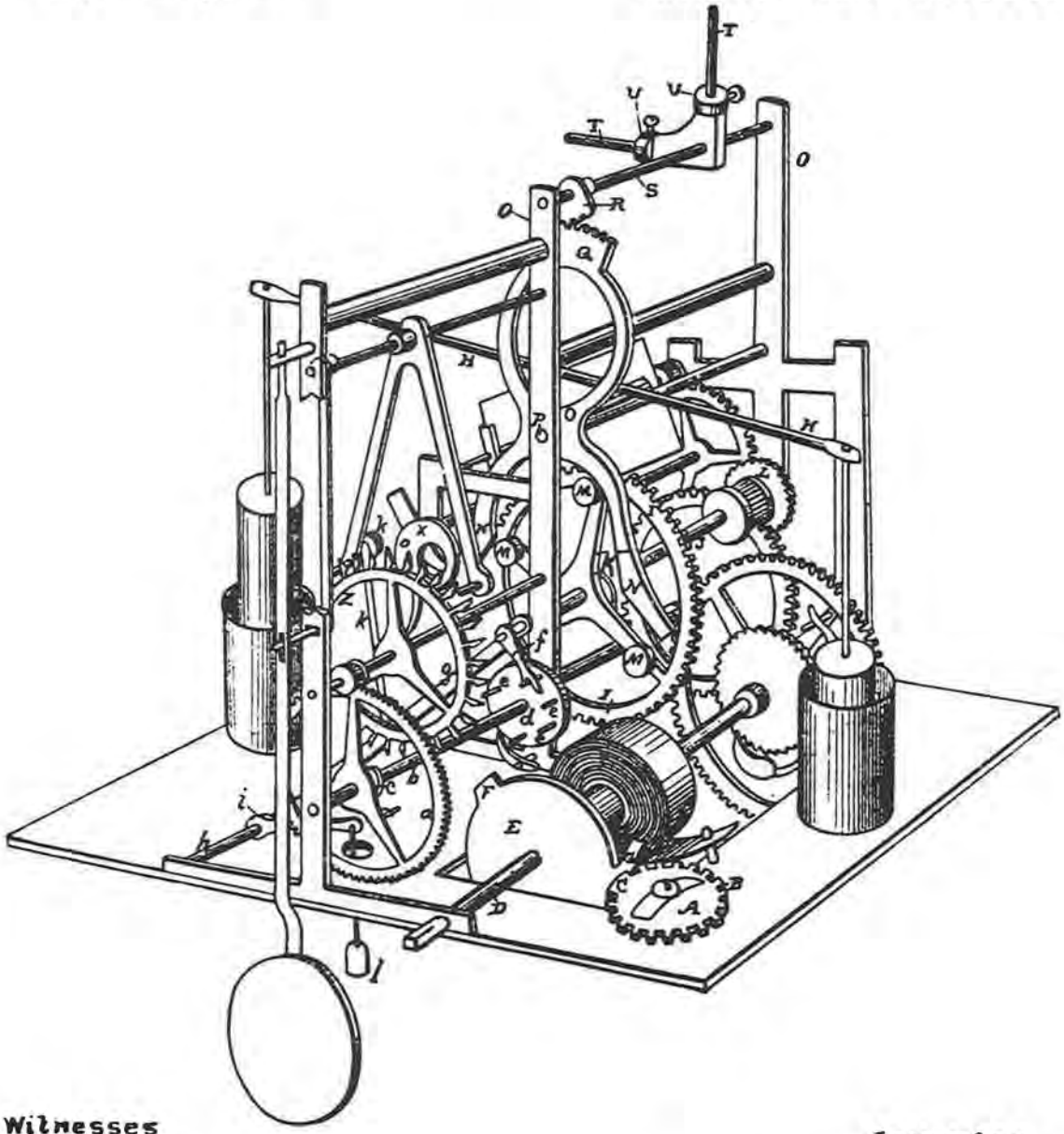
First letters of patent were issued to him in 1873; these were for "improvement in transmitting time-movements to distant dials," and were followed in 1877 by a second patent showing the slave mechanism. Separate letters of patent on "apparatus for transmitting chronometric motion" were issued to him on March 17, 1874, and June 8, 1880. (See Figures 1 and 2.)

This apparatus for transmitting chronometric motion is a device whereby several timepieces are actuated by means

H. J. WENZEL. 2 Sheets—Sheet 1.

Apparatus for Transmitting Chronometric Motion.

No. 228,577. Patented June 8, 1880.



Witnesses

Frank A. Brooks

J. St. Nourse

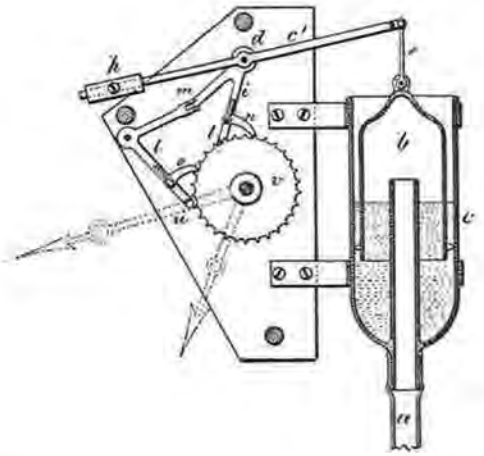
Inventor

Hermann J. Wenzel

Figure 1.

H. J. WENZEL.
Transmitting Time Movement to Distant Dials.
No. 196,404. Patented Oct. 23, 1877.

[SLAVE MECHANISM]



Witnesses
Chas. F. Smith
Geo. T. Pinckney

Inventor
Hermann J. Wenzel
by Lemuel W. Serrell
atty

Figure 2.

of air conveyed through tubes from a central motor or timepiece, as in Figure 1, a perspective view.

A is a horizontal disk which is secured to the framework by a central pin about which it turns. This disk has its periphery cut into equidistant spaced teeth or notches *B* except at one side, where a broad tooth or stop *C* extends over one of the spaces.

The winding shaft *D*, carrying the spring or weight barrel and the main driving wheel, has secured to it a disk, *E*, which revolves with the shaft *D* at right angles with the notched disk *A* and with its edge close to it. A spur or projection, *F* upon the edge of this disk *E* passes between the teeth *B* as the disk revolves, but will rest upon the broad tooth *C* and stop the shaft whenever that tooth is brought into line with its rotation.

Upon the edge of disk *D* is formed a projecting strip *G*, which is so bent as to stand at any angle with the edge of the disk. When the disk is turned around this screw flange passes through the space between two of the teeth *B* at each revolution and turns disk *A* forward one tooth. The action of winding will thus turn this disk forward at each revolution of the winding shaft until the broad tooth *C* is brought opposite disk *E* when the pin *F* will strike it and thus arrest the shaft. As the spring or weight unwinds, the spiral flange passing between the teeth at each revolution will reverse the movement of disk *A* until the clock has run down, when the disk will have made an entire revolution backward and is ready for the operation of winding again.

In the mechanism actuating the oscillating arm *H* and balancing arm, the wheel *I* turns freely on shaft *J* and is connected with it by a maintaining power spring, *K*, and ratchet and pawl, *L*, so that it will be kept in motion while the clock is being wound up.

Upon the arms of the wheel are friction rollers *M* which when the wheel revolves, will impart an oscillating motion to the arms *NN* of the frame *A*, which turns upon pivot *P*. The oscillating arm *H* is secured to this frame and is actuated by it. The pneumatic cylinders are supported from the ends of this arm and are operated by it, as shown.

At the top of the frame *O* is the segment rack *Q*, which engages with a pinion or segment *R* upon the shaft *S*. Secured to this shaft are two arms *TT* which project from it at right angles with each other and carry regulating weights *U*. This arrangement enables the clockmaker to connect any unequal number of distant dials with the two cylinders, as each arm counterbalances one cylinder. If their action is unequal it may be regulated by setting the weights *U* further out or in.

It was Mr. Wenzel's considered opinion that when a large number of clocks was to be operated that a very heavy weight or power would be necessary to drive the machinery. In the clock under discussion each weight was of lead and weighed 40 pounds. Also knowing that the delicacy and accuracy of the escapement are seriously diminished when subjected to excessive power, Mr. Wenzel improved his apparatus by separating the escapement from the other part of the clock and provided it with a light independent driving power which is actuated and kept in motion by means of the heavier machinery acting upon it at stated intervals.

Wheel *I* engages the pinion *V* upon the shaft *W*. Upon the shaft *W* is a cam *X* and one or more arms *yy*, which are driven by it.

Escapement wheel *Z* is driven by a wheel *a*, turning freely upon shaft *b* and connected with it by a maintaining spring, *c*, and the pawl and ratchet wheel *d*, so that its motion will be continued during the intermission of the power. The wheel *d* has a number of pins *e*, projecting from one side as indicated, and a click or pawl, *f*, engages with these pins successively, so as to drive the wheel, and by it the escapement wheel. This pawl or click is actuated by a lever-arm, *g*, to which it is connected. This arm is secured to a shaft *h*, and besides this arm, two other arms, *l* and *k*, also project from it.

Arm *i* has a weight, *I*, suspended from or secured to its end, and this weight, acting through the arm upon shaft *h*, arm *g*, and pawl *f*, serves to drive the wheel *d* and the escapement. Arm *k* has a friction roller upon it and when cam *X* is revolved it strikes this roller and forces the arm *k* back. This withdraws the pawl *f* and sets it upon a new pin, *e*, at the same time raising lever *i*, with its weight *I* for a new action. A stud *m* projects from arm *g* at a point where it will catch the end of the arm *y* or *y'* when arm *g* is drawn back by the action of the cam.

In the action which follows, pinion shaft *W* is revolved by the action of the main clock movement through the

wheel *I*. As it rotates it carries arm *y* and *y'* and cam *X* which acts to lift arm *g*, carrying pawl *f* and the latter will be raised far enough to catch the next pin in wheel *d*. Arm *y* will be stopped by stud *m* and held until arm *g* has moved far enough to allow arm *y* to escape from the stud.

One arm *y* might suffice, according to Mr. Wenzel's description of his invention in his Letters Patent No. 228,577, to interrupt the movements and make them periodic, but he found that when the air cylinders were lifted at once from the cup containing the liquid the aciton of the air and of capillary attraction between the cylinder and the liquid caused a considerable commotion as the cylinder left the liquid and this might cause the liquid to splash over into the air-conveying tube. For this reason, he added the second arm *y'*, the distance between *y* and *y'* being such that when the first one escaped from the stud *m* the movement to the second one allowed the oscillating arm *H* to lift the cylinder a bit so as to nearly or entirely clear the liquid. When the second arm escaped the movement of the cylinder was completed without any splash or commotion in the liquid.

The frame *O* was especially constructed, through the use of its oscillating arms *NN* and the friction rollers on wheel *I*, to produce more frequent oscillation of the bar *H* and the cylinders, with less movements of the machinery. The double adjustable compensator *TT* allowed the connection of an unequal number of clocks while still maintaining equal pressure upon the apparatus.

(Continued on page 44)

Essence of Clock Repair©

by Sean C. "Pat" Monk
CMW

PART XXXV

ITHACA CALENDAR CLOCK

The Ithaca No. 2 Regulator, shown in Figure 1 with dials removed, incorporates a calendar mechanism showing the day, date and month. The clock is described in the Ithaca reference as being a "Hanging 8 Day Weight, Bank Clock." Our clock dial is marked H.B. Horton's, April 18, 1865 and August 28, 1866.

However, the first calendar clock was invented in Ithaca, New York. The inventor was J.H. Hawes who took out the first patent on this type of clock in 1853. Improvements were made by others, making the clock automatic in operation and, in some instances, self-adjustable for February 29 of leap year. The clocks became commonly known as bank clocks simply because it was to banks, hotels, and business establishments that they were generally distributed. Eventually the Ithaca Calendar Clock Company sold their patent to the Seth Thomas Clock Company who also went into the calendar clock business. About the time of the disposal of the Ithaca patent to Seth Thomas, another Ithaca clock genius produced a greatly improved perpetual calendar clock. His name was H.B. Horton and his first patent was established in 1865.

Figure 1.

Our clock, established on the dial as one of H.B. Horton's, is therefore a calendar of early date. Its 8-day movement, mounted above the calendar mechanism, is not equipped with a striking train, but does have two separately wound great wheels for running the clock. The latter are cord operated, the power being maintained by a pair of iron weights. The latter are arranged to run in wooden channels, vertically, at the left and right sides of the clock cabinet. A steel anchor (pallet) motivates a brass crutch, the latter transmitting its motion to a long pendulum rod which traverses the front part of the clock and may be seen in Figure 1, the bob being visible in the small window at the base of the cabinet.

The two weights supply a good constant power to the mechanism and, as they are arranged to fall evenly, the clock is not easily disturbed from its balanced in-beat operating position. This even drop of the weights is arranged through the two great wheels which are arranged to mesh

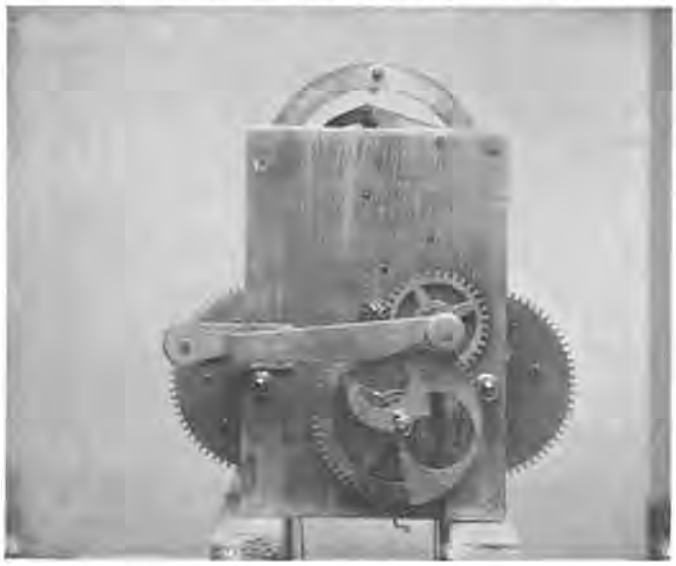


Figure 2.

opposite one another, with an intermediate wheel pinion. The intermediate wheel, in turn, meshes directly with the pinion on the center wheel. The latter rotates the hands in the usual manner. It might be mentioned at this time that all the pinions of the clock are of the lantern type. Therefore, it will be seen that the actual time mechanism is uncomplicated. There is, however, one unusual feature installed for a very special purpose. If one looks at Figure 2, it will be observed that the center arbor protrudes through the back plate and carries a small brass pinion. The latter is wedged tight against the center arbor which has a split end cut for the purpose. This small pinion drives an intermediate wheel, shown to the right of it in Figure 2. This wheel rotates the large wheel shown beneath it. This large wheel carries a large helix, or cam, which is firmly attached to it. The purpose of this helix is to lift a rod every 24 hours, the rod itself being connected to the two rods which operate the calendar mechanism. Through this lifting and subsequent dropping of the rod, the calendar mechanism is allowed to operate instantaneously at midnight. Figure 3 shows the calendar mechanism which is mounted on a separate iron frame below the separately housed time mech-

Figure 3.

anisms. The calendar operating rods are clearly shown, extending to the top of Figure 3, where the hook-up rod to the time mechanism can be seen. Figure 3 shows the hook-up rods lying at an angle, being disconnected. They would in usage hang more vertically and evenly.

When the helix, or cam, on the time mechanism lifts, lifting and instantly dropping the calendar operating rods, the day rod (left rod in Figure 3) lifts a small finger or detent at the side of the day roller. The finger then moves forward and strikes the toe of a brass lever pivoted on an iron pillar to the right rear of the day roller. On its return stroke, it kicks the brass finger again to clear it from the notches on a plate attached to the inside face of the roller. It then drops into a notch in the brass roller plate. This action rotates the day drum one day.

At the same time that this is happening, the right operating rod in Figure 3 is also lifted and lifts a brass lever as shown in center rear of the figure. This turns the date hand on the dial, by way of the steel arbor which can be seen protruding in the center of Figure 3.

Attached to the connecting wheel in the center of Figure 3 and on the steel arbor in the center, is another helix, or cam. It is in front of the toothed connecting wheel, and with a steel hook-shaped lever (see Figure 4) resting on its

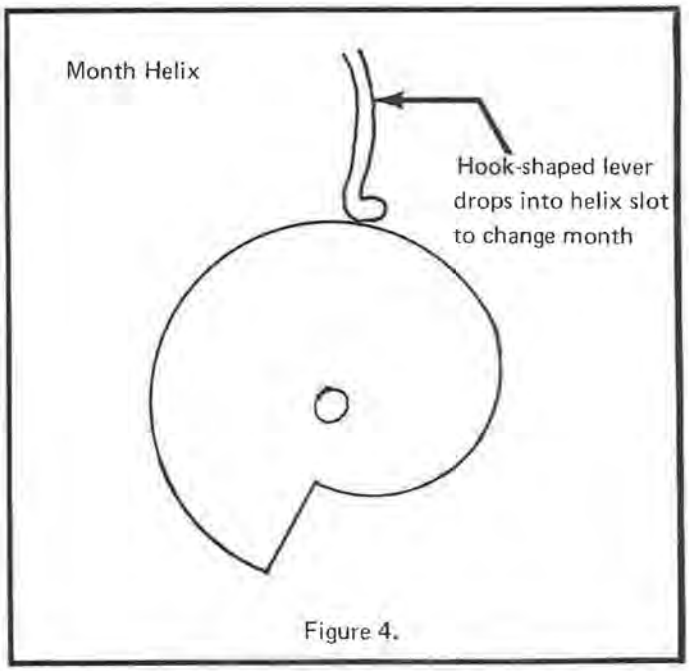


Figure 4.

periphery. At the end of 31 days this lever is arranged to fall, under gravity, into a slot in the brass helix. This action trips another finger (detent), similar to one on the day side. The action of this finger is very similar to that on the day side in that it moves the toe of a brass lever pivoted on a steel pillar to the right rear of the steel mounting frame. This rotates the month roller once every 31 days.

Our clock does not have a four-year wheel (provision for leap year) attached to it and we may assume that this has been removed, as Horton's patents of this date do specify the inclusion of a four-year wheel.

One very important practical tip: *no oil should be used on the calendar mechanism.* □

SCHOLASTICALLY SPEAKING

by Deane L. Jenne
Chairman, Research and Education Council

As your newly elected chairman of the Research and Education Council, I want to take this opportunity to commend our past chairman, Gerald Jaeger, for the excellent job he has done the past two years for REC. With his vast knowledge and experience, I'm sure he will continue to contribute a lot to REC.

Mr. Joe Perkins of Wayne Community College, Goldsboro, North Carolina, retires as Secretary and Director of REC. Joe has also contributed a great deal to REC during the past two years as Secretary and I believe he will continue to do so in the future. Gerald and Joe are being replaced as Director by two very capable instructors, Mr. Joseph Rugole of George Brown College, Toronto, Canada and Mr. Gerry Hough of Parkland College, Champaign, Illinois. Mr. Rugole was elected to serve as Vice Chairman and Leon Martin as Secretary. I know we can expect a lot of work from both of them.

The 1978 Research and Education Council meeting and workshop held at Diamond Oaks Campus, Cincinnati, Ohio was excellent. We thank Mr. Louis A. Zanoni, President of Zantech Inc. for the fine workshop he conducted on the repair of digital watches. We thank Mr. Francois Girardet of WOSIC California, and Mr. Jacques Reymond of WOSIC New York for the updating of the new calibres introduced this past year.

Jim Thorpe, student at Wayne Community College, Goldsboro, North Carolina, won for his school the major piece of watchmaking equipment that Portescap US is awarding each year to the school in the name of the student earning the highest score on his AWI Certified test. This year's equipment is a 2-quart Portescap Ultrasonic Cleaning Tank. Congratulations, Jim!

As your chairman, I ask you at this time to work with me and our committee chairmen by answering all communications promptly in order that we may be able to accomplish much in the short period of time we have. I know you all have lots of work and not enough time; just remember we are all in the same shape, so please try.

The Research and Education Council is an arm of AWI dedicated to help its member schools, AWI, and AWI members. We cannot and will not try to tell you what you have to do, but we all are ready and willing to help you in any way possible; you only have to ask. Just remember we are not supermen, just dedicated watchmaking instructors ready to do what we can to help.

We will do the same this year as has been done in the past: all instructors who attended the REC meeting this year will receive a copy of the minutes. All others who wish to have a copy will receive one by request. □

Officers of REC, L to R: Chairman, Gerald Jaeger, Wisconsin; Vice Chairman Deane Jenne, Tennessee; Secretary Joe Perkins, North Carolina.

Meeting of the REC.

Entire group of instructors including Mr. Reymond and Mr. Girardet of WOSIC pictured at Diamond Oaks campus.

Swearing in of new officers, L to R: Leon Martin, secretary, South Carolina; Joseph Rugole, Vice Chairman, Ontario; Dean Jenne, Chairman, Tennessee; by Gerald Jaeger, as Joe Perkins observes.

(More photos on page 30.)

Inside the Clock Shop

with James L. Tigner

CMC

REPAIRING WOODEN MOVEMENT CLOCKS

Part 4—Conclusion

While it's long been a common practice among clockmakers to replace broken wheel teeth in wooden movement clocks, it's generally been considered impractical, if not impossible, to replace broken leaves in wooden pinions. The reasoning is that in a pinion the necessary space is lacking for inserting a plug at sufficient depth for adequate strength.

I haven't found this to be so. Basically, the same two methods we reviewed last month for replacing wooden wheel teeth can be used for replacing wooden pinion leaves. Those who missed last month's session may want to turn back to it now for additional details, but briefly the two methods are: (1) a fast, modern, mechanically sound method using quick setting epoxy poured into teeth-forming molds of non-hardening modeling clay. John Guerin, a skilled restorer of antique clocks from Poughquag, New York, who has been successfully practicing this innovative technique for three years, showed me how it is done, and now offers it to all who are interested. And (2) a more traditional way, using hardwood inserts.

Let's take a look at the epoxy method, as applied to broken pinion leaves. Figure 1 shows the modeling clay

Figure 1.

pressed around several undamaged pinion leaves. In Figure 2 we see the clay cut away with a knife flush with the pinion leaves, revealing the leaf impressions we are seeking.

So far, our procedure has been identical with that followed last month in replacing wheel teeth, but now a small

Figure 2.

difficulty arises, not encountered in repairing wheel teeth. Again in Figure 2, note that, in a pinion, the clay covers more than fifty percent of the gear, which means that, before it can be removed, the mold must be opened somewhat, as in Figure 3.

Now when the mold is relocated over the area of missing leaves, as in Figure 4, it must be pushed together again, which, despite our best efforts, usually results in some deformation of the mold. This must be corrected by eye, using

Figure 3.

a straight wire and knife blade for modeling tools. The leaf spaces tend to close in, and in reopening and reshaping them, Mr. Guerin advises that it's better to make them too large than too small. You can always file the hardened epoxy down to size, but building it up is not as easy.

Before filling the reshaped mold with epoxy, be sure the clay is pressed snugly against the back side of the pinion and the arbor. Cleaning up a leak after the epoxy has set can be an exasperating, time consuming job.

I use a wire to fill the pinion mold, picking up the epoxy as I would oil with a wire oiler. The same wire can be used for tamping the epoxy fully down in the cavity and for displacing air bubbles.

Usually in about an hour the epoxy will be sufficiently set to permit removal of the mold. It's a good idea to wait no longer than necessary, since, if a leak did occur in spite of our efforts to prevent it, the epoxy will still be soft enough to cut with a razor blade and be peeled off the overflow area, which is easier than filing.

And speaking of filing, before any is done to shape the pinion leaves (if necessary), wait until the next day, when the epoxy will have fully hardened. Otherwise your file will load up with gummy epoxy, which will be time consuming to clean. Always finish with a fine file (No. 6), leaving the pinion leaves smooth, so as not to abrade the old wood of the mating wheel teeth.

Returning to Figure 4, notice that a rough slot has been cut where the old pinion leaves had broken off. As in

Figure 4.

wheel tooth replacement, Mr. Guerin says this slot is unnecessary except in cases where oil has impaired the bonding surface. Just run the epoxy right over the broken stump of the old pinion leaves.

In Figure 5 we see an example where epoxy leaves have been molded in this way, over the broken stumps of the old leaves. Despite the fact that the leaves are a little too thin (a consequence of my failure to heed Mr. Guerin's advice about better too thick than too thin), they are remarkably strong, seemingly just as strong as the original wooden leaves.

And now for the second method, using hardwood inserts, there's no question that it takes longer. But, as in wheel tooth replacements, it does a first-rate job, retains the wooden character of the clock, and in my view warrants a

higher repair charge. It's been my method for twenty-five years, and that may account for a personal prejudice in its favor.

To make this method economically feasible a good set of burs is essential for cutting a clean, straight-sided recess in the pinion to receive the plug, as shown in Figure 6. A set I've found useful, not only for this job but for a wide range of clock repair work, is a stone setting assortment of twenty-four burs that comes in a plastic case. Both the Vigor Bestfit catalog and the La Rose jewelers catalog (not the clock movement one) list it under Catalog No. 30008. Dental supply houses carry tiny burs in various shapes that are excellent for squaring up corners, boring small holes, etc.

I find a flexible shaft machine both handier and faster for burring work, but a lathe will serve for most jobs. The work is hand-held, and care must be exercised to prevent the bur from grabbing and over-cutting.

Figure 5.

I cut the recess to a depth of about one-third the root diameter of the pinion, or to where the pivot begins to show. When the right depth has been reached, and all is straight and square, I saw and file the plug to fit the recess. The shape should be so oriented that the grain will run radial to the pinion's center to insure maximum strength in the leaves.

Saw and file the insert to length first, and then do the sides. I find the best way to do the final stages of filing is to rub the workpiece on the file. Try to get the best fit you can, but of even greater importance, is for the plug to have no rocking motion when placed in the recess. The easiest way to achieve this is to bur off the high spots in the recess. Check to see whether the flanks of the plug are too close to the adjacent pinion leaves for safe use of a high speed bur in shaping the new leaves. It's easier and less risky to bur the flanks down now, with the plug out of its recess, than later when the plug is glued in place.

Where the wheel is pinned and glued to the pinion, as in Figure 6, it's obvious that no leaves can be cut without

Figure 6.

first removing the wheel. So drill or bur small holes on either side of the two pins, which can then be pulled with a pair of pliers. The wheel can now be either lifted or driven off, depending on whether the glue is still holding. Figure 7 shows wheel and pinion separated.

The plug can now be glued in place. I use a quick setting epoxy that attains maximum strength in about an hour. When fully set, the pinion is mounted between a chuck in

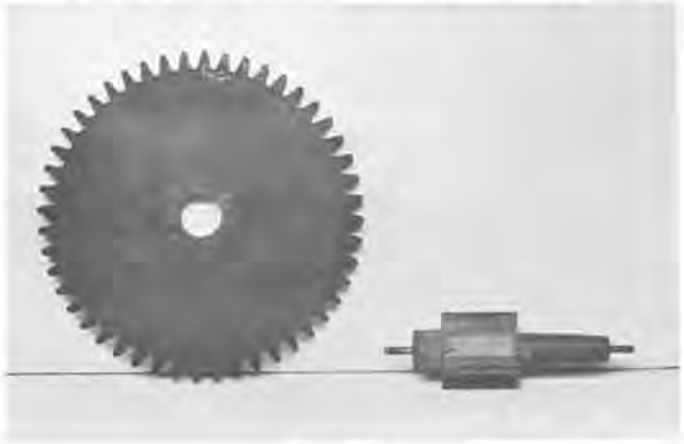


Figure 7.

the headstock and a female center in the tailstock, and the new plug turned to size and the ends faced. Use a slide rest, if you have one, but a graver can do the job if care is used not to catch one of the pinion leaves.

As described in the January 1978 session of *The Shop*, a scale is used to lay out the spacing for the new leaves, and center lines are drawn the full length of the plug with a pencil. On the two ends of the plug, profiles of the new leaves are sketched to match the old.

The next step is to rough out the leaves with burs, careful not to overcut and spoil the work. Finishing, of course, is done with files. Even though wheel cutting equipment may be available, I find this method faster than setting up for

only one or two pinion leaves. With trade specialists, who are already set up, it's a different story.

The wheel can now be reglued and pinned to the pinion. In cases of this kind, the strength of each pinion leaf is, of course, reinforced by having one of the ends glued to the wheel.

However, pinions are just as frequently free standing at the long end of an arbor. In such instances, I like to give a little extra bonding strength to the plug by extending it along

Figure 8.

the arbor just a bit beyond the length of the pinion, as shown in Figure 8. An end view of the finished pinion can be seen in Figure 9.

American wooden movement clocks were manufactured with either laurel or apple wood pinions. Neither of these woods is readily available today, and for that reason I use maple. In appearance it's about the same as the original woods, but in resistance to splitting it's superior. Here is a

(Continued on page 45)

AS 1700 AUTOMATIC DRIVING GEAR

by Leslie L. Smith CMW

Many years after a particular movement has been discontinued by the manufacturer, the watchmaker finds he is still called on to service and repair it. Sometimes it's a simple part replacement and in other instances replacement is impossible, so the watchmaker must improvise. The repair I cover in this article deals with such a situation. The AS 1700 (basic model) was marketed in great quantities and although it is a discontinued model, we will be seeing it for some time to come. For the most part it is a good movement; however, after several years' use the final driving gear pivot post begins to wear, allowing the wheel to shift, causing misalignment, and undue strain on the self-wind unit.

A close inspection should be made on every movement brought in for repair. Detection is easy because the screw holding the wheel will no longer be centered. Figure 1 shows the wheel before wear has taken place, while Figure 2 shows a shift in the wheel and the screw is no longer centered. After removing the screw, it is easy to see the seriously worn post

Figure 1.

Figure 2.

Figure 3.

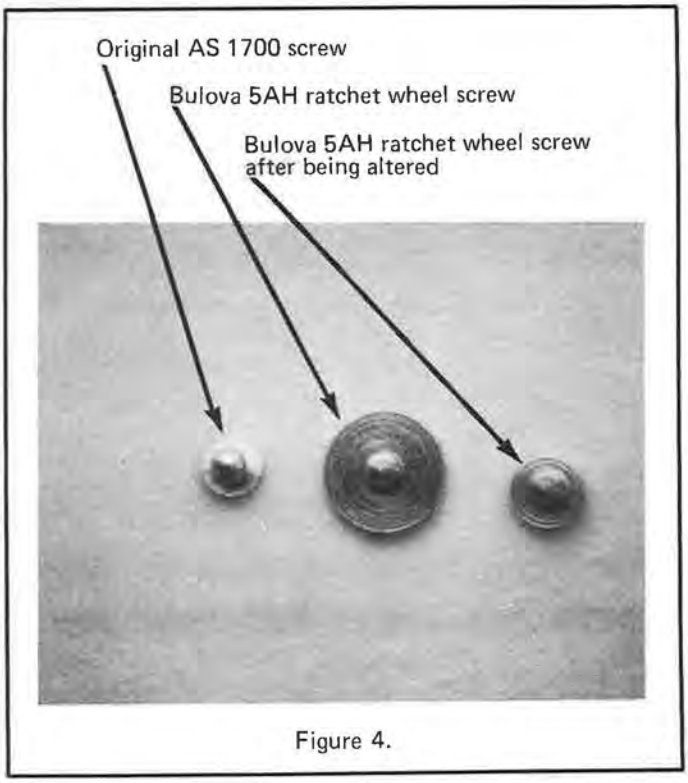


Figure 4.

and how much the wheel is out of alignment, Figure 3. Obviously something must be done if the watch is to wind properly.

The post is milled out of the main plate and because the plate is very thin at this point, removing the old post and replacing it could not be done satisfactorily, so there has to be an alternative method of making the repair.

The easiest and most practical way to correct this situation is to use a screw with the same thread size (0.49 mm) as the original one but one with a larger head diameter, so the head can be cut to fit the wheel exactly, allowing approximately 0.02 mm side clearance for proper freedom. A screw very suitable for this purpose is the 5 AH Bulova ratchet wheel screw. The threads are a little too long and will have to be shortened slightly, but it works very well. Put it in the lathe and carefully cut it down to fit the wheel. The head has to be considerably larger than the original one. The diameter of the original screw head is 0.85 mm while the new screw head, when turned to proper diameter, is 0.97 mm. Figure 4, from left to right, shows the original screw, the 5 AH ratchet wheel screw, and new screw after turned to correct diameter. The larger head holds the wheel in its original position and acts as the bearing rather than the post.

The screw should be thinned so as not to extend above the wheel and should be polished to reduce friction. Also, the thread length must be shortened or it will protrude and interfere with the calendar mechanism. It should be lubed with a light grease rather than oil because there is now a steel on steel friction that must be considered. Figure 5 shows the completed repair.

Figure 5.

Personal experience with this method of repair has been most satisfactory. I've seen no noticeable wear after the repair has been made and worn for several years before returning for service. In the event there is wear, it's easy to change the wheel or screw. □

REC PHOTOS

(Continued from page 23)

Louis Zanoni, President of Zantech Inc., makes a point during his Solid State Repair seminar.

Instructors listen attentively to Louis Zanoni.

Jacques-Maurice Reymond and Francois R. Giradet of WOSIC present a slide presentation to the instructors.

□

AWI technical bulletins AWI hot line AWI bench courses AWI horological times AWI museum AWI employment service AWI films and slides AWI ad assistance AWI library AWI home study AWI certification AWI federal liason AWI scholarships AWI awards

AWI NEWS

By Milton C. Stevens

June 19 through June 25 saw AWI activities reach a level never before experienced. It really began June 18th when 30 instructors who teach watch repair checked into the Imperial House West Motel in Cincinnati, Ohio. They were there to attend a four-day in-service workshop for instructors at the Diamond Oaks Campus. These in-service workshops have become an annual event of the Research and Education Council of AWI. Featured at the workshops were Louis Zanoni, President of Zantech, Inc. and Jacques Reymond and Francois Giradet from the Watchmakers of Switzerland Information Service.

Mr. Zanoni proved that repair of solid state watches has come of age, and there is no reason why any watchmaker with proper training cannot convert his skills to repairing these kinds of timepieces. With the use of Valtech and Zantech equipment, the instructors learned to diagnose malfunctions in a variety of solid state watches. They then made the actual repairs required. Before the program was over, each instructor was routinely changing quartz crystals, trimmers and making repairs to the circuitry.

I had the privilege of sitting in on most of Mr. Zanoni's sessions and became firmly convinced that the time for watchmakers to move into solid state repairs is here. AWI's "Introduction to Solid State Repairs" as presented by Robert Nelson, complemented by the various other "brand name" AWI solid state bench courses, combined with a program such as Zantech's, should enable the watchmaker to become firmly established in solid state watch repairs at a relatively modest investment.

The Swiss portion of the workshop featured the latest developments in microtechnology. The REC instructors learned first hand of the amazing advances the Swiss have made in this field in just a short period of time. The presentation included a summary of the new movements which have been developed during the past year.

In the business meeting of REC, the instructors selected Deane Jenne, instructor at State Area Vocational-Technical School, Nashville, Tennessee, to succeed Gerald Jaeger, instructor of Milwaukee Area Technical College, Milwaukee, Wisconsin, as Research and Education Council Chairman.

On June 23, when REC activities were coming to a close, many of the instructors packed their bags and headed across the Ohio River to the Americana Hotel at the Greater Cincinnati Airport. Here they joined delegates who were arriving for the AWI Affiliate Chapter meeting.

The Affiliate Chapter delegates, chaired by Willard Blakely, began deliberations at 9 a.m., June 24. There were representatives from all sections of the United States and Canada. When the dust had settled, the delegates had selected Willard Blakley and Bob Bishop to serve as Affiliate Chapter Director and Vice Chairman for another year. They had presented reports on their individual association's activities, and expressed the concerns of their individual members. The chapter delegates concluded their work by making the following recommendations to the AWI Board. All but the first were accepted by the AWI Board.

1. Recommendation that Article 10, Section 7, of the Constitution be modified by deleting the last phrase which reads, "and is not associated with any commercial enterprise doing business with members of the Institute."

2. AWI to investigate reasons for high price of some material and reasons for use of multiple part units that must be replaced as a whole at great expense.

Comment: It was the feeling of the delegates that the cost of some parts is pricing the job out of the market.

3. AWI send to National Sheriffs Association magazine information on our case mark program so that they will promote this program all across the country.

4. That the annual report by the Executive Secretary and Administrative Director be included in the Affiliate Chap-

ter packet or a copy be given to the Affiliate Chapter Chairman, or the Executive Secretary or Administrative Director be present at Affiliate Chapter to save discussion time on matters which AWI has already taken action.

AWI President, Jim Broughton, gaveled the Annual Board of Directors' meeting to order at 9 a.m., June 25. Michael P. Danner, Administrative Director, presented the annual report as prepared by Mr. Danner and your Executive Secretary. Following Mr. Danner's presentation, the report of the Finance Committee was given. This report revealed that during the year 1977-78 we managed to finish in the black with income exceeding expenses by $3,910.66. A proposed budget predicated on a members' dues structure of $30 per year was approved. The $5 annual dues increase became necessary due to rising costs.

The AWI Board continued with annual reports from the various committees, and acted upon each recommendation of these committees. As a result, the entire AWI program for 1978-79 was formulated.

Aside from the stresses of long meeting deliberations, the weekend had its more relaxing moments. On Friday evening, June 24, more than 60 persons traveled to AWI Central to see the AWI Museum. Everyone was impressed with the advances of the museum, and the work of our Curators, Orville and Josephine Hagans. Saturday evening, June 25, the Watchmakers Association of Ohio honored their own, Jim Broughton, with a delightful poolside cookout. Everyone welcomed this event; our thanks to WAO for making it possible. After the cookout many delegates enjoyed the AWI Tour slides as presented by Henry Fried. Also presented were several of AWI's newer slide programs by Wes Door, Robert Bishop and Marion Blakely.

The meetings concluded with the installation of the newly elected Board members. These directors, along with the ten incumbents, selected the following officers:

Orville R. Hagans, President
Leslie Smith, 1st Vice President
Joe Crooks, 2nd Vice President
Marvin E. Whitney, Treasurer
Karl Buttner, Secretary

We look forward to working with the new Executive Board and Board of Directors. With their guidance and cooperation, AWI can expect another year of progress. We will give more details of AWI's 1978-79 program as it unfolds during the year. □

Members wishing a copy of the Annual Report and Financial Statement may obtain a copy by sending a self-addressed LETTER SIZE envelope to AWI Reports, Box 11011, Cincinnati, Ohio 45211. Please affix $.28 postage for first class mail.

1978 AWI MEETING

Installation of Orville Hagans as AWI President. Robert Phillip chairs the ceremony.

Robert Phillip installing Leslie L. Smith as first vice president; Joe Crooks, second vice president; Karl Buttner, secretary; Marvin Whitney, treasurer.

Helen and immediate past president Jim Broughton.

American Watchmakers Institute past presidents seated L to R: John Farrel, Don Leverenz, Henry Fried, Clint Aderman. Standing: Jim Broughton, Harold Calvert, Marv Whitney, Jerry Jaeger, Bob Nelson, Ewell Hartman, and Hal Herman.

Onlookers at the past presidents reception.

ELM Trust meeting (L to R): Jo Hagans, Hal Herman and Henry Fried.

ELM Trust meeting (L to R): Milt Stevens, Jim Broughton, Bob Bruckhart and Orville Hagans.

Mrs. Kelton, Curator Hagans, and Gene Kelton.

AWI Central museum area.

AWI annual board meeting in progress.

President Broughton presiding over meeting.

(More photos on page 54.)

AFFILIATE CHAPTER COLUMN

by Willard Blakley CMW

The Affiliate Chapter meeting is history for the year 1978. We will not meet again until the latter part of June 1979. This will give all delegates a full year to think of any new ideas and recommendations for that meeting. While the meeting and its content are still fresh in the minds of the delegates who were at the meeting, I would like to ask them to make some notes and forward them to me. If anyone has any suggestions or criticism, let's work on it for the next meeting. Only by input can we improve our meetings. We had a very fine meeting this year with all delegates making remarks about problems or ideas which they presented at the meeting. The representation was very good. We had delegates from 36 Chapters in attendance and just prior to the meeting we received word from Georgia that they would like to become an Affiliate Chapter. I would like to commend the delegates who were at the meeting. They had a long hard weekend, but the hard work paid off, since the AWI Board of Directors approved all of the recommendations from the Affiliate Chapters with the exception of one.

You who were delegates at the meeting, I hope you will not take your associations for granted, but give them a report on the activities at the meeting. Some of you were sent at great expense to your various groups and I would wish that you report back to them either through your newsletter, or by an oral report at a future meeting. Some of your members will not have the opportunity to attend one of these meetings. So, only by sharing in your experience through a report from you will they be able to take part in the meetings.

I think those of you who have been delegates in the past have been able to see the benefit of the reports being sent in early and receiving them back in a packet form prior to the meeting. There were many favorable comments heard in regards to this procedure. Everyone seemed to like the opportunity to read the reports and recommendations from other chapters prior to the meeting. We do hope to have a more complete cooperation in this effort in the coming year. I also would like to thank the delegates for the vote of confidence expressed at the meeting for reelecting me as the Affiliate Chapter Director. Also on behalf of my Vice Chairman Robert Bishop, who was reelected unanimously, I thank all of you sincerely. With a vote of confidence such as this, it presents even more of a challenge to do more for the Affiliate Chapters. If I can be of assistance to anyone during the coming year please let me know.

The meeting recessed Saturday evening for everyone to enjoy a poolside cookout through the courtesy of the Watchmakers Association of Ohio. The food was supplied by Mr. and Mrs. Bob Allis, Mr. and Mrs. Al Finch, and Mr. and Mrs. Al gruenig. We were also treated to some entertainment by guitarist Don Ragan. There was a cake for the outgoing president of AWI, Jim Broughton. The cookout provided a welcome change of pace along with the opportunity to visit with old friends and meet new.

At the Affiliate Chapter meeting this year we all experienced a first–all delegates brought a flag either from their organization, their Affiliate Chapter banner, or state flag. The response to this was really gratifying as we had twelve flags to display around the meeting room. Through the generosity of the delegates and friends who were at the meeting Friday we will also have a special flag to display next year–our own Affiliate Chapter banner! Those who were at the meeting were able to see a scale model of this banner. The order has been placed for this and we will proudly display it at next year's meeting. A request was made for donations from the delegates to cover the cost of this and they responded generously.

Those of you who were delegates to this 1978 meeting, please encourage your association to name a tentative delegate for the 1979 Affiliate Chapter meeting soon. By so doing we can keep in touch with that person concerning business we may have during the coming year. It is very important that we know to whom to direct information, Also, associations that

did not send a delegate to the meeting, why not start making plans now for someone to represent your organization at the meeting in 1979? You are part of the Affiliate Chapters and this meeting is a good way you can be heard by all other chapters. Our meetings have been well attended in the past, but I think we can do better. I would like for the coming 1979 Chapter meeting for us to shoot for 100% representation of the Affiliate Chapters.

We wish to congratulate the new AWI Directors, and the new President, Orville R. Hagans. Mr Hagans has led, advised, and directed us for many years and now he will serve as our President.

Again let me thank all delegates for their support and for the display of confidence in my ability to serve as Affiliate Chapter Director. I will do my best to live up to your expectations. I will be in touch with all delegates in the near future. If I can be of any help in any way please do not hesitate to contact me.

Robert Phillip, right, swears in Willard Blakley as Affiliate Chapter Chairman.

Jack Schecter of Seiko Time Corporation.

Tony Riggio, President Cincinnati Watchmakers Guild, discusses Seiko 5-year guarranteed batteries.

Affiliate Chapter meeting in progress.

Chairman Willard Blakley, right, and Vice Chairman Robert Bishop.

NEW JERSEY

Horner Williams, past president of the NJ Retail Jewelers Association, showed watchmakers there is more to a successful repair business than knowing how to service watches when he appeared at the June meeting of the Watchmakers Association of New Jersey.

Mr Williams, himself a watchmaker, gave a wealth of tips on handling customers with effective sales techniques. His own sales expertise is attested to by a busy retail store in Red Bank which has won the Bulova Window Display contest and the Speidel Sweepstakes Award.

Taking in repairs is a skill which pays dividends to the watchmaker who learns to use it, according to Mr. Williams. Every action, from greeting the customer to delivering the completed repair, should be used to build sales, more sales and repeat sales, he said.

Mr. Williams demonstrated proven techniques for examining jobs, presenting diagnoses and answering objections. He also showed how to itemize benefits and regulate service so the customer feels his needs are met. Tips for generating tie-in sales and ways to add on additional services, pointed the way to bonus profits from routine business.

Guest speaker at the September 12 meeting of WANJ will be Jack Schecter of Seiko Time Corporation. Schecter, manager of Seiko Technical Services, will give an illustrated talk on "The Digital Explosion." He will trace the development of timekeeping devices up through the electronic circuitry of digitals and give ideas of what the future holds for repairmen as the liquid crystal quartz takes over in the industry. Plenty of time will be allowed for questions afterward.

The WANJ bench course on Seiko quartz is set for September 24 at Howard Johnsons in Clark. Registrations can be sent to Joseph L. Cerullo, 43 Hillcrest Avenue, Cranford, New Jersey 07016. Jersey members and AWI members will be given preference, after that it is on a first-come basis.

A panel of industry representatives will be coming to the WANJ dinner meeting on October 9 for a discussion of current trends. This will be at the Ramada Inn in Rochelle Park. Also coming up is the dinner dance, November 11, at which life members will be honored.

MASSACHUSETTS

At the June 13 meeting of the Massachusetts Watchmakers Association, two programs were presented. John DiMuccio of Providence, Rhode Island showed slides of the February watch seminar and the tour of the E. Howard Watch Company. Also, Mr. Sandforth A. Roth, President of the Admisnic Corporation, and Mr. Jeffrey Tung, who developed the Time-A-Chron II Quartz Watch Timer, were featured guests. New members of the Association include Vincent Costa, Philip Whitney, Ned Sullivan, Eldon Barrows, and David Cate. At the May 7 bench course, Instructor Gerald Jaeger presented a course on the ESA 942711 Quartz Digital and the ESA940.11 to the 45 who attended the seminar.

CALIFORNIA

Warren Rogers, watchmaker, jeweler, diamond setter, goldsmith, engraver, and long time member of the Horological Association of California shared his knowledge with 160 HAC members at the June 13 meeting in Los Angeles. A basic concept of HAC is the exchange of information to improve the livelihood of the watchmaker. Warren achieved this goal—each person in the audience definitely profited from the advice he gave.

How can a watchmaker achieve success and respect? Warren answered this question in five parts. (1) Customer image. "Is your bench piled high with parts, spring bars, 40 disassembled watches, or is it like an operating room?" Keep your bench clean. Dress well. Involve yourself in community and industry activities. Display achievement certificates. (2)

Pricing. "Do not sell your skills at a point that is not profitable to you." (3) Salesmanship. "Get off the defensive . . . get some courage." You should not feel guilty charging a fair price. (4) Shop operation. You must be efficient in your shop operation to make money in watchmaking. Hire an apprentice or high school student to polish crystals, clean cases, install spring bars. Leave your time for the skills that give you the privilege to be called a watchmaker. (5) Delivery. "Do not just toss the envelope at the customer and say that will be $18.75." Take time to explain your guarantee, the operation of the watch, its limitations.

A theme that rang loud and clear throughout Warren's presentation was "to be a professional, you must think like a professional."

PENNSYLVANIA

The Watchmakers' Association of Pennsylvania, Inc. is now composed of two guilds. The Pittsburgh area members of the Watchmakers' Association of Pennsylvania formed their own guild at the May 9, 1978 meeting. It is known as the Allegheny Watchmakers Guild and will be an affiliate chapter of the State association. The officers of the new guild are Ralph Henning, President; Albert Rodibaugh, Vice President; Walter Guenther, Secretary; Bill Wasson, Treasurer.

At the June 13 meeting the guild members were guests of the Kirk Dial Company, touring their dial refinishing facilities.

The annual summer picnic date is August 13 at the beautiful country estate of Mr. and Mrs. Gene Eckstein.

OHIO

The Watchmakers Association of Ohio presented a seminar on Sunday, May 21 at the Imperial House Motel in Findlay. The watch movement covered was the Bulova Quartz Stepping Motor Model 242. The instructor was Mr. Cal Sustachek, of Racine, Wisconsin, who will very shortly be working for the Bulova Watch Company in an educational capacity. There were 41 men and 1 lady in attendance. All received their certificate on this movement.

A group of WAO members working on the Bulova 242 quartz movement at the seminar in Findlay, Ohio.

Robert Allis and Al Gruenig of WAO, host chapter, making preparations for the cook-out at the recent AWI annual meeting.

Mr. Howard Opp from Chillicothe, Ohio, a board member of WAO and an instructor for AWI, will be handling the seminars on the Bulova 242 when Cal Sustachek leaves.

James Broughton is presented a cake by the WAO. L to R: Dorothy Aderman, Robert Phillip, James Broughton.

Milton Stevens, AWI, receives Dick Lang Award from Albert Finch, President of WAO, for Roger Evans CMW. This award was presented to Mr. Evans for scoring the highest mark on the AWI Certified Master Watchmaker's exam.

L to R: Cal Sustachek, AWI, of Racine, Wisconsin, handing over the instructor's pointer and the Bulova 242 quartz instructor duties to Howard Opp, WAO member and AWI instructor.

Howard has been assisting Cal in reconditioning these movements, so he is in a good position to impart a great deal of knowledge when this seminar is presented again.

INDIANA

The first watch and jewelry repair show of the Watchmakers of Indiana will open at 12 noon on Saturday, September 16 in Stouffer's Ballroom in Indianapolis. Bench courses and seminars are scheduled for both Saturday and Sunday.

WAI has been working with Ivy Tech Schools (State of Indiana's Vocational Technical Schools) to establish watch and jewelry repair schools in Indiana. A curriculum committee was established which included WAI Education Chairman, Addison Harris, Rick Webber, Harold Calvert—whose input is vital to be sure curriculum is structured to prepare students to pass the State's Watch and Clock Licensing Examinations, Normagene Murray, Ivy Tech Dean of Indianapolis Campus, Warren Haas, and Meredith Carter, President of the Ivy Tech Indianapolis facility.

It was agreed that two areas of educational assistance from the Ivy Tech Schools would be required. One area would be the training for entry into the watchmaking field and jewelry industry of new people and the other would be in the area of continuing education for licensed watch and clock repair people.

A target date for the beginning courses is set for September 1978. While the full accreditation of the Associate

Degree program will not be in effect at this time, plans are being made for watch, clock and jewelry courses that can be applied to the Associate Degree program when and if the State's Education Commission grants approval.

NORTH CAROLINA

The North Carolina Watchmakers Association held its 1978 convention on June 2-4 in Asheville. Featured speakers were Henry Frystak, Henry Fried, and Jean Pierre Savary.

OKLAHOMA

The Board of Directors held a workshop in May under Mr. A.J. Vanderpool. Charles Thayer was named editor of the monthly newsletter.

ONTARIO

Recent meetings of the Ontario Watchmakers Association featured two slide tape shows. The first was on Jewelry Designing and Manufacturing for the Watchmaker. The second was on Production Repairs. Both were prepared by Wes Door and are available from AWI. The OWA held its annual picnic on June 18 at the Museum of Time.

VIRGINIA

At the June 13 meeting of the Potomac Guild, Marvin Whitney gave a talk on the history of the marine chronometer. An ethics committee was also formed at this meeting.

The Tri-City Triangle Guild met on June 20. The program was a slide/tape show on Dial Refinishing.

The Tidewater Horological and Jewelers Guild met on May 30, 1978 at Clayton's Restaurant, with HAV president Chuck Nesmith present. Ray Riley, past president, and Charles Cohn, immediate past president, also attended. Four members from the Peninsula Guild were in attendance: George W. Pittman, Robert Barclay, Gus Ramsey, and E.A. Charlton. Mr. Cohn gave a report on the HAV convention which was held May 13-14, 1978 in Alexandria, hosted by the Potomac Guild. Membership in the Tidewater Guild was 85 this past year.

NEW YORK

New administrators for the New York State Watchmakers Association include David W. Gutchess, Executive Secretary, and Evelyn Gutchess, Recording Secretary. The board of directors met on May 7 and planned for the courses, speakers, and entertainment for the upcoming season. They also met with Paul Wadsworth, chairman for the convention to be held September 16-17. The board decided to form the following committees: education, technical, research, and seminar; social; by-laws; new guild; convention; nomination; library and museum; editorial. Members are asked to participate in the work of these committees.

On May 28, the Rochester Guild sponsored a bench course taught by Gerald Jaeger.

The Horological Society of New York met on June 5. The program featured a showing of clock slides by Henry Loeser, a swap session, and an intermembership discussion. This was the last meeting until September. □

LAW ENFORCEMENT INQUIRY

Information is requested regarding a Gerard Perregaux men's wrist watch, case markings:

J121983
K937
4154Z
V240-1
W3/127
D13859

Contact Massachusetts State Police, 460 Dalton Ave., Pittsfield, MA 01201, Attention: Robert G. Scott, Trooper.

NEW PRODUCTS

NEW BRIGHTLY LIGHTED VERTICAL JEWELRY SHOWCASE

Jacoby-Bender Inc., one of the country's leading manufacturers of men's and women's fashion jewelry is now offering a new and unique jewelry merchandising display. The new "Light & Motion" store fixture is unlike any other store display available today. The unit measures only 20½ inches square and is 5½ feet tall and takes less than 2 square feet of floor space. 9 clear plexiglass shelves holding 8 packaged bracelets per shelf (72 total), rotate silently under two concealed 15 inch overhead lights plus two vertical 24 inch fluorescent lights. Jewelry is brilliantly lighted and floats within the display with no corner obstructions. Rear door is framed in steel with full length hinge and 3-way lock and key.

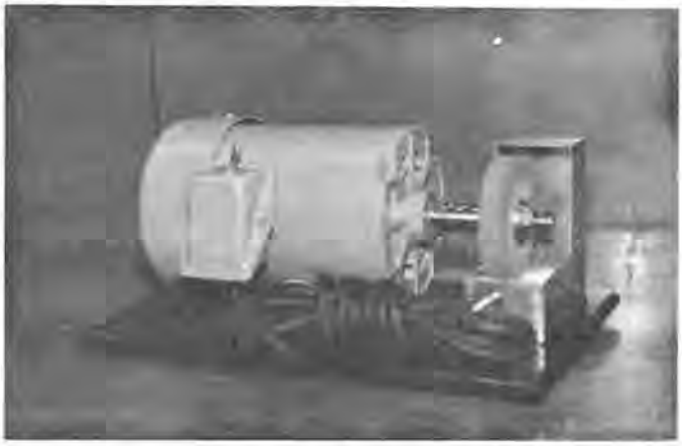
Jacoby-Bender offers free personalization of each display with the jeweler's store name in gold letters across the top panel. The display comes with a set of four interchangeable seasonal signs that feature the store as headquarters for Christmas gifts, Valentine gifts, graduation gifts, and Mother's Day and Father's day gifts.

The new "Light & Motion" display from J-B is available for immediate delivery with a choice of two display assortments. The ID-171 men's and women's Ident Bracelet Assortment includes 71 men's and 42 women's right connection idents (35 yellow-78 white) plus 35 men's and 23 women's RC-II idents (35 yellow-21 white) at a cost of $995.00 and a suggested retail of $2,996.00.

The ID-172 Embracelette, Right Connection & RC-II Ident Assortment features 24 women's engraveable embracelettes (15 yellow-9 white), 67 men's and 32 women's right connection idents (32 yellow-27 white) and 35 men's and 14 women's RC-II idents (31 yellow-18 white). Jeweler's cost $995.00, suggested retail $2,004.00.

GLASS CRYSTAL GRINDER

Tools that enable the watchmaker to fit glass watch crystals are readily available today. Basic is the Vernier gauge to obtain correct measurements of the bezel. Reference to catalogs available from watch material suppliers illustrating replacement glass watch crystals at actual size will enable him to order the correct crystal.



If the crystal does not snap-fit, use of any emery cloth applicator will enable him to take the crystal down 0.2 mm. If more is needed, the glass crystal grinder can be used. Note: the sponge must be thoroughly wet, and bevelling

should be done lightly on the side of the wheel. More information is available from American Perfit Crystal Corporation, 653 Eleventh Avenue, New York, New York 10030.

SWEST INTRODUCES NEEDLE FILES FOR WAX

Swest, Inc. announces it has now added a kit of 6 wax files to its line. These coarse-toothed needle files come in the 6 most popular shapes: Entering, Half Round, Round, Square, Triangular and Equalling. The addition of these files is a result of popular demand by wax designers for needle files similar to those used for finishing jewelry. Even the coarsest metal file is too fine for wax working, so these specially designed tools are a great aid to the jewelry designer when making the wax pattern. For complete information request free wax file brochure from Swest, Inc., 10803 Composite Drive, Dallas, Texas, 431 Isom Road, San Antonio, Texas or 1725 Victory Boulevard, Glendale, California.

NEW WATCH BATTERY REPLACEMENT GUIDE

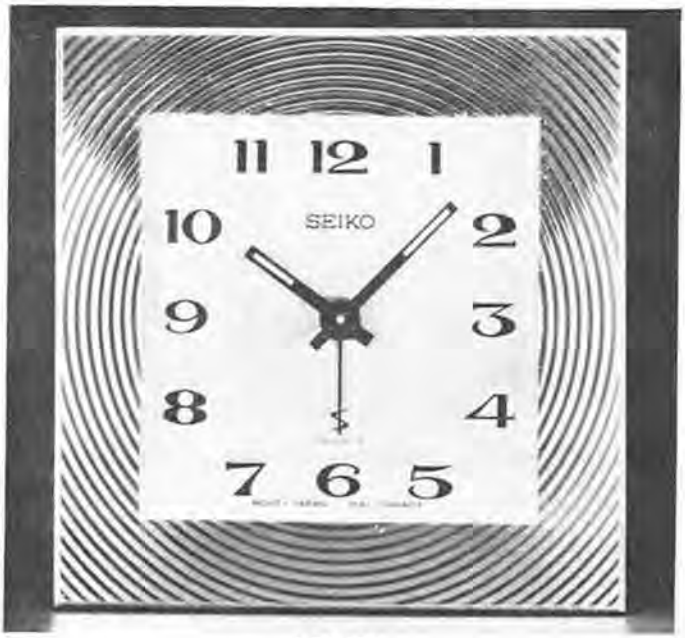
Mr. Robert McClancy, Vice President and General Manager of the Vibrograf Machine Division of Portescap US, (Sole Distributor of VARTAchron replacement watch batteries on the North American continent) has announced the introduction of a new VARTAchron watch battery replacement guide. This handy new guide contains information on the complete VARTAchron watch battery line, which includes 28 different battery types for electric and electronic watches including LED, LCD, low and high drain. Free copies are available directly from Portescap US Vibrograf Machine Division, 6 Ohio Drive, Lake Success, New York 11040.

RAILROAD QUARTZ

The easy-to-read white enamel dial, with red sweep second hand, silhouette minute and hour hands, black and red Arabic numerals reading from 1 to 12 and 13 to 24, respectively, is the distinctive feature of this stainless-steel water-resistant railroad-approved Bulova Accutron quartz day-and-date wristwatch. The new style also features a scratch-resistant and distortion-free Dura-Crystal and the Accuset mini-computer control system (that sets the second hand exactly, at the press of a button), tritium indicators and a black corfam lizard-grain strap. In-use accuracy is to within a minute a year, and continuous operation for at least 12 months is assured by a single replaceable aspirin-sized power cell. Suggested retail price: $160. Additional information is available from: National Sales Manager, Bulova Watch Company, Inc., Bulova Park, Flushing, N.Y. 11370.

SEIKO TO INTRODUCE AT ATLANTA AND CHICAGO GIFTS SHOWS 25 NEW HIGH QUALITY DESIGNER QUARTZ CLOCKS WITH ALARMS

Seiko Time Corporation recently announced that it will introduce 25 new high quality designer quartz clocks with alarms at the Atlanta Gift Show (July 23-27) and the Chi-



LQ0480

cago Gift Show (July 30-August 4). The new clocks, ranging in retail price from $85 to $145, expand Seiko's wide line of decorator-styled clocks to 46 models.

Elegantly styled with colorful dials to enhance any room, they are perfect accessories for desks, end tables or shelves—and provide beautiful new dimensions for both contemporary and traditional home furnishings.

Model LQ0600 has a square brass case with a brown and beige enamel front. It retails for $110. In the identical shape and at the same price is model LQ0610, with black and turquoise enamel front.

Two complementing colors, forming an abstract design, highlight the dials of models LQ0630 and LQ0640. Model LQ0630 has a rectangular shaped brass case, with a combination green and turqoise abstract dial. Model LQ0640 has a combination of black and red dial. Both timepieces retail at $90. The same brilliant colorations have been fashioned onto the brass cases of new models LQ0700 and LQ0710. Model LQ0700 has a black and red enamel front with gilt dial. Model LQ0710 has green and turquoise enamel front with gilt dial. Both clocks retail at $120.

Unusual modernistic "oval-oblong" shapes are standout features of four others of the new clocks. Each has an oval case, with round dial. Model QP001G, at $85, has a brushed gilt case with a white dial; model QP002G has a textured gilt case and gilt dial, at $90; model QP003K offers a matte black case with matte black dial, at $95, and, model QP004S has a brushed silver-tone case with silver-tone dial, at $95. Both models QP003K and QP004S, also have the addition of studs in the gilt ring which surrounds the dial.

Another quartet of models, equally as contemporary, have square cases rounded at the corners. They include model QP005G, with brushed gilt case and white dial, and Roman numerals, at $85; model QP006G, with textured gilt case and brushed gilt dial at $90; model QP007K, with matte black

QP007K

QZ583G

case and dial, at $95; and model QP008S, with brushed silver-tone case and silver-tone dial, at $95. Both models QP007K and QP008S also have the addition of studs in the gilt ring which surrounds the dial.

Circular brass cases and dials with enamel set the high fashion tones of models LQ0590 at $100, with black and turquoise enamel rings surrounding its gilt dial, and markers and dots at the four quadrants; model LQ0560, at $100, with black and red enamel rings surrounding its gilt dial; also with Roman numerals and gilt dial is model LQ0570, at $100, with blue and green enamel rings; and LQ0580 at $100 with brown and beige enamel rings.

Geometrically-shaped decorative cases emphasize model QP012G, featuring a square gilt case and round black dial, with Roman numerals. Each of the corners on the front has black corner trim with gilt screw heads. It retails for $110. Another similar model, QP013G, also at $110, offers a square striped gilt case, with round gilt dial. A third like selection, model QP014S, features a square case, with round black dial. Each of the four corners on the front has gilt screw heads. In addition, the case has a design forming tiny squares in a graph-like effect. Its price is $110.

Two additional new models with square cases highlight dials with Roman numerals are models LQ0670 and LQ0680. Style LQ0670 has a brass and mahogany case and gilt dial with Roman numerals at $125. Model LQ0680 has a mahogany case and a white dial surround with a brass frame at $125.

Two bold clocks, offering round white dials, with minute markers and Roman numerals are models LQ0650 and LQ0660. Model LQ0650 has a square mahogany case at $120, while LQ0660 offers a rectangular shaped mahogany case, trimmed at top and bottom with brass, at $145.

The 25 new clocks being introduced are all available for immediate delivery to gift and specialty stores through Seiko's nationwide network of distributors. Seiko's current clock line also includes quartz wall clocks, retailing from $75 to $150. Eight new wall clocks were introduced in March.

SHIP'S CHRONOMETER

(Continued from page 10)

Ferdinand Berthoud. They were all attempting to find an answer to the question, "On what does the isochronism of an oscillating system depend?".

Some were of the opinion there was just one method for isochronizing a hairspring, while others theorized that many different forces affected isochronism. Berthoud was one of the latter, for he surmised that friction, the escapement, temperature compensation, and the hairspring affected the isochronal adjustment of marine timepieces. He carried out numerous experiments on the above and a great portion of his voluminous writings described these experiments and the results that he obtained. Berthoud made over 70 chronometers and in his writing he gives a most detailed account of their construction. He was particularly interested in the stability of rate, always looking for causes of any irregularities of rate and attempted to reduce or eliminate them in his next timepiece.

However, it was not until 1861, when Phillips, a very able mathematician, published his classic, *Le spiral reglant,* in which he laid down rules for the formation of curves which would cause the hairspring to expand and contract concentrically, thus eliminating any lateral pressure on the pivots so the center of gravity of the spring would coincide with the axis of the balance staff. Therefore, a theory was set forth explaining how terminal curve affected isochronism.

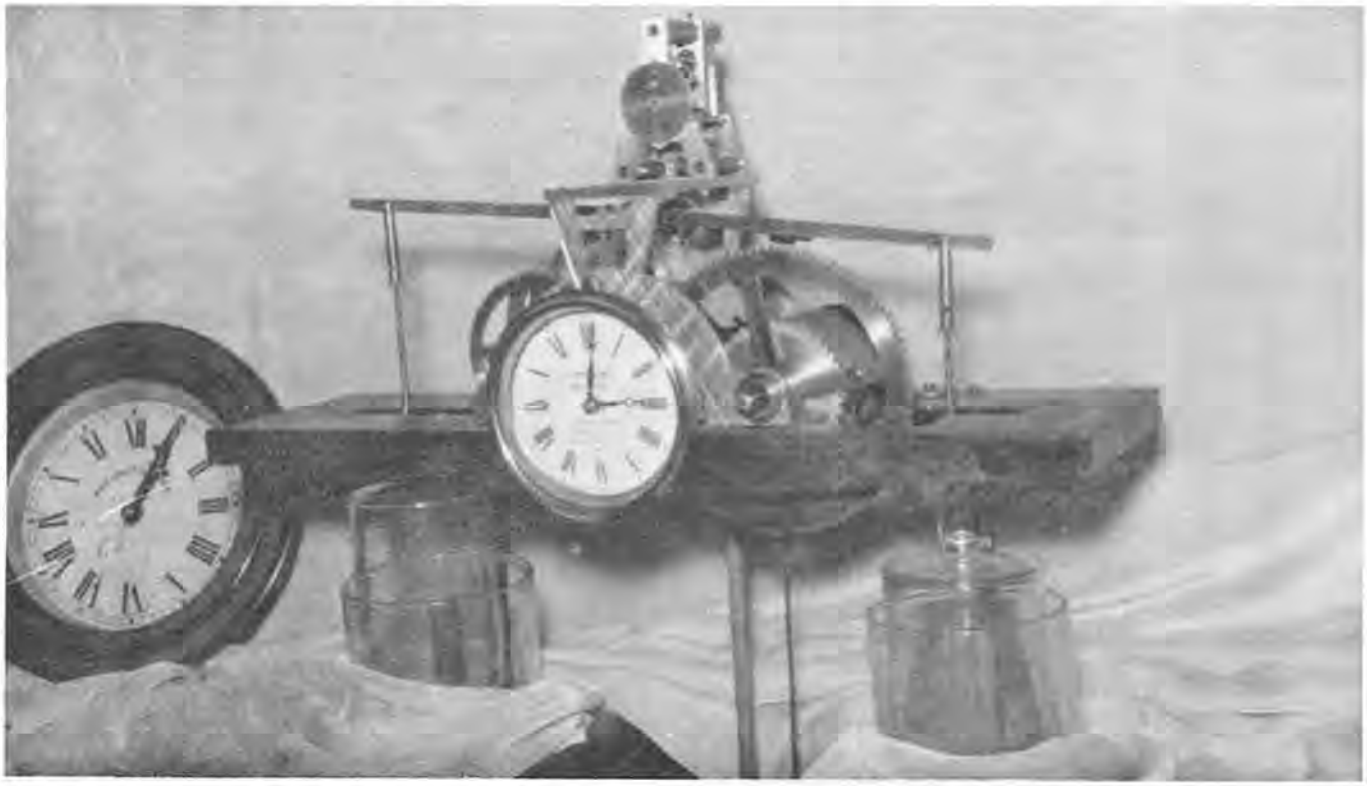
It is a well known fact that Jules Grossman and his pupil, L. Lossier, did much in interpreting Phillips' theories so they would be understandable by the practical man. So the outer terminals of the helical spring follow Lossier's development of Grossman's theory for flat springs, for the theoretical factors are just the same for helical springs as for flat springs, in order that isochronal conditions many prevail. The upper and lower terminal may begin at any place on the circumference of the spring without interfering with any timekeeping qualities, but for the sake of symmetrical appearance, they generally begin at points equidistant from the line of centers.

Next month, the functional description will be continued. □

IN THE SPOTLIGHT

(Continued from page 19)

Figure 3.



Slave Mechanism

As mentioned before, no provision was made for dial or hands on the master clock; these appurtenances were reserved for the secondary clocks, which through the connecting pipes received air impulses at one minute intervals and recorded these impulses by their hands. However, the master clock restored for the Smithsonian Institution was fitted with both hands and a dial, as shown in Figure 3.

The time controlling apparatus which produced these impulses at the same intervals, i.e., one minute, was a dead beat escapement and a seconds pendulum. The escape wheel is driven by a wheel which fits loosely over the front end of the arbor, but is attached thereto by a flat spiral spring which

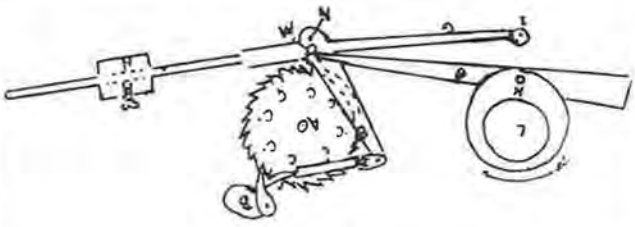


Figure 4.

serves dual purposes; driving the wheel and as a maintaining spring at each one minute rewind. See Figure 2. At the outer end of the arbor of this driving wheel is a ratchet wheel with eight equally spaced steel pins projecting forward from the surface of the wheel. Above the wheel is a weighted pawl which engages the ratchet teeth and prevents the wheel from turning counterclockwise. See Figure 4, detail of ratchet wheel.

The Secondary Clocks

Like the master clock, the secondary clocks have jars of glycerine and bell jars, but in miniature and instead of sending the air impulses they receive one and are actuated thereby. The bell jar is lifted by the compressed air and as it lifts it pushes the lever upon which it is suspended.

Suitable pawls attached to the arbor of this lever engage the teeth of a ratchet wheel of 30 teeth, and at each impulse turns the ratchet wheel clockwise one tooth. The arbor of this wheel carries the minute hand and since the wheel has 30 teeth, the minute hand advances two minutes at each impulse. □

INSIDE THE CLOCK SHOP

Figure 9.

summation of the various woods originally used in these old clocks: oak for the plates, cherry for the wheels, and laurel or apple for the pinions, arbors, posts, and studs. Albert Constantine and Son, Inc., 2050 Eastchester Road, Bronx, New York 10461, is a good source for small amounts of hardwood, no matter what the kind, which was mentioned before in Part 1 of this series.

Normally, the pivots on wooden movement clocks show relatively little wear. All they generally need is a dressing up with 4/0 emery paper held between the thumb and fore finger of one hand, while the arbor is spun back and forth with the thumb and fingers of the other hand. This method was described in detail in the article on Pivot Restoration, May 1977.

Occasionally, however, grit will lodge in the walls of the wooden pivot hole and cut halfway through the iron pivot. In such cases, pull out the damaged pivot with a pair of pliers, reverse it, apply a little epoxy, and drive it back into the arbor.

The pivot will now undoubtedly be found bent, since the holes in the arbors are nearly always drilled at an angle. A good way to staighten the pivot, when the epoxy has dried, is to chuck it in the lathe, which is then slowly turned by hand. Watch the extended end of the arbor ride up and down against the T-rest, which has been moved into position as a reference point. Each time the arbor reaches a high point, press down on it until it runs true.

If the pivot extends from a simple arbor, having neither a pinion nor a wheel at its end to strengthen it, there is risk of splitting the arbor when using this method. To avoid any possibility of such damage, I always grip the arbor firmly with a pair of smooth-jawed pliers held close to the chuck, before pressing down on the other end.

Bent pivots are quite common in wooden movements and each one should be checked for truth. The hole in a new bushing can be fitted with what may seem to be ample freedom, but if the pivot is not straight, it will bind at the slightest swelling when the weather turns hot and humid.

As a conclusion to our series on wooden movement clocks, a final word on oiling. Only places where metal works

against metal should be lubricated in any way. This includes the escape wheel teeth and verge, the upper escape wheel pivot and brass bridge, the crutch loop, and all contact points between striking levers and pins. That is all. No more than the smallest amount of oil should be placed on the upper escape wheel pivot, or it will spread to the wood shoulder of the arbor where it will create a viscous drag that may prematurely stop the clock. To reduce this drag, in the event oil should reach the shoulder, I find it a good idea to chamfer the shoulder to about one-half its original diameter.

Next month, back to brass clocks. Let's see what we can do with the prestigious Graham dead beat escapement. □

NEW MEMBERS

AGOSTINE, Thomas M.–Sioux City, IA
ALDERTON, Malcolm–Westport, N. Zealand
ANDREWS, Jean–Hollywood, FL
AUNGST, David C.–Hampstead, NC
BACHMANN, Mike–Boise, ID
BECHTOL, Bruce M.–Quincy, IL
BERGER, Steven–Buffalo Grove, IL
BHINDI, Dilip H.–Montreal, Quebec
BLAKLEY, Marian–Moscow, OH
BOCCHICCHIO, Mario–Pittsburgh, PA
BOMAN, Benny L.–Wichita, KS
BOWEN, Jeffrey K.–Zionsville, IN
BOYD, Luke M., Sr.–W. Bridgewater, MA
BRINES, Johnnie–Concord, NC
BURKEY, Wayne M.–Lincoln, NE
BURNETT, L.E.–Toone, TN
BUSBY, James E.–Wilmington, NC
CAMERON, David–Malden, MA
CARD, Gary N.–Warren, MI
CHERRY, Thomas E.–Denison, TX
CHRISTENSEN, Joyce–Chatham, IL
COLE, Curtis W.–Grand Rapids, MI
COLLISON, T.A.–El Cajon, CA
COOPER, Herb–Syosset, NY
CUMMINGS, Donald A.–Fort Gaines, GA
CUTRIGHT, William–Albuquerque, NM
CYSEWSKI, Joseph J.–Winona, MN
DALTON, Alvin O.–Madison, AL
DENNISON, James M.–Weston, WV
DePRISCO, Henry–Dania, FL
DOAN, Roy S.–Libertyville, IL
DURHAM, Charles H.–Mobile AL
EIRICK, Henry–Bertrand, NE
ELDER, Kenneth T.–Mililani Town, HI
EVANS, John L.–Pittsburgh, PA
FINKE, Randy–Crawfordsville, IA
GARRITY, Richard W.–Dorchester, MA
GOLDFARB, Robert W.–Clearwater, FL
GOODWIN, Philip D.–East Lebanon, ME
GRADY, Michael P.–St. Louis, MO
HADDOCK, K.H.–Jacksonville, FL
HARFMANN, Robert–East Syracuse, NY
HARKRADER, Robert H.–Salisbury, NC
HARPER, Roy–Cullman, AL
HART, John–Irvine, CA
HATCHER, F.R.–Los Angeles, CA
HELKER, Fred H.–Platteville, WI
HELM, Floyd–San Diego, CA
HILLIER, Lowell–Westland, MI
HIXSON, Thomas C.–Hixson, TN
HOLLINGSWORTH, James Y.–W. Helena, AR
HONEYCUTT, Dean L.–Forest Park, GA
HORNE, William D.–Stedman, NC
INGRAM, A.E.–Wilmington, MA
INGRAM, E. Dean–Clarksville, AR
JOHNSON, Monark, Jr.–Cuyahoga Falls, OH
JOHNSON, William T.–Sulphur Springs, TX
JONES, Durwood B.–Iola, KS
KEECH, Randy–Memphis, TN
KELSO, Charles A.–Audubon, PA
KLEIN, Henri–San Diego, CA
KRAFT, Robert J.–Hartville, OH
KRAUSE, Frederick R.–Baltimore, MD
KUZKIN, Martin–Brunswick, OH
KWIATKOWSKI, Paul T.–Park Forest South, IL
LaCAVA, Thomas M.–Gahanna, OH
LAMBERT, Edward–Miami, FL
LANSING, W.A.–Arlington, TX
LIVESAY, Henry–Tampa, FL
LOCKE, William J.–Kingston, NY
McFALL, Joseph L.–Lithia Springs, GA
McGREW, David D.–Camas, WA
McPHERSON, Carol–Kensington, MD
McQUIGGAN, Edward, Jr.–Rockland, MA
McKINNEY, Robert–Martinez, CA
MOORE, Charles R.–Rockingham, NC
MORGAN, Harvey H.–Wellington, KS
MURPHEY, F.A.–Clay Center, KS
MYERS, J. Gordon–Plano, TX
NAVARRETTE, Pedro P.–Belen, NM
NELSON, J.W., Jr.–Falkville, AL
OSBORN, Joel G.–Wasilla, AK
PITTS, Howard R.–Central, SC
PLEWES, John B.–Carp, Ontario
PLUMMER, E.G.–Oxnard, CA
POLLOCK, Ken–Aldergrove, British Columbia
POSTEN, William–Berkeley Springs, WV
RESER, Clinton J.–Burlington, KS
REYNOLDS, Eugene–Noblesville, IN
RHODES, Bruce T.–Daytona Beach, FL
ROSE, Bruce R.–Franklin, VA
ROWE, Michael–Smithtown, NY
ROYAL, Marvin R.–Keokuk, IA
ROYER, Lew–St. Cloud, MN
SAMS, Charles E.–La Grange, MO
SANG JIN, Hahn–Falls Church, VA
SAURBAUGH, Carl–Providence, RI
SCHADE, Alan F.–Essex, MA
SCHETTLER, Ernest W.–Georgetown, DE
SEITZ, Floyd S.–Scituate, MA
SERPENTINI, Richard J.–Middletown, NY
SERVINSKY, Larry–Cresson, PA
SHOPNICK, Larry D.–Allston, MA
SIMES, Kenneth–South Salem, NY
SMITH, Donald–Moundsville, WV
SMITH, S. Dale–Bradford, PA
SOEMANN, George W.–No. Tonawanda, NY
SOWELL, Crawford S.–Sandusky, OH
STAMMER, Nelson F.–Bowie, MD
STEWART, Aaron C.–Safety Harbor, FL
STEWART, George E.–Dunnellon, FL
SYKORA, James J.–Independence, OH
TENCZA, James A.–Middletown, CT
TEWKSBURY, Otis–New Port Richey, FL
THOMAS, Moyne W.–Grandview, MO
THOMPSON, Edgar C.–Shelby, NC
TIPS, David–Dallas, TX
TROUT, Rev. David C.–Cincinnati, OH
TUPPER, David W.–New Fairfield, CT
UNDERWOOD, Dennis K.–Kalamazoo, MI
UNDERWOOD, Harry L., Jr.–Weston, WV
UYESUGI, Mas–Santa Ana, CA
WEATHERLY, Max D.–Raleigh, NC
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BENCH TIP

with Joe Crooks

Mr. W.H. "Bill" Reid, 2017 Ashland Avenue, Charlotte, is an 83-year young watchmaker/clockmaker who retired at 65, 75, and 80. He plans to retire again at 90, 100, etc.

I talk him out of "retirement" a few months each year to live with me and overhaul the clocks that I'm always behind in for repairs. He is the best craftsman I've ever seen operating a clock bushing tool, with perfect alignment of the pivot holes every time!

Bill gave me this month's *Bench Tip*, along with a little bit of wisdom in his dry wit way of getting it across. The following is Bill's own words:

It's been said you can't teach an old dog new tricks. This isn't true. I try to teach my girl friend something new each day and if you young pups would keep your ears pricked up so you can listen, you could learn a few new things also.

It seems most all those bench tips you write about are "invented" to save time repairing watches, but it looks like you could use a new way for cleaning expansion watch bands.

I saw you clean a dirty twist-o-flex band in the ultrasonic tank, brush it, rinse under hot water and repeat the procedure three times before it stopped oozing a black gooey mess on the towel when you dried it.

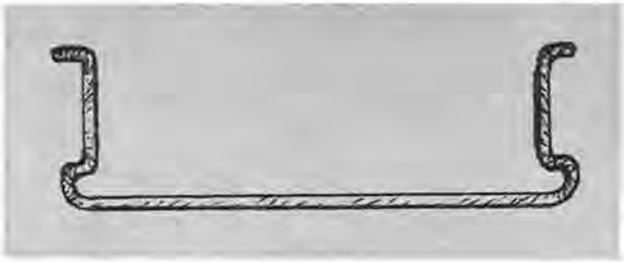

Figure 1. Diagram of a twist-o-flex coat hanger stretcher to be used with the case attached while cleaning extra long bands.

The way to cope with this problem is to have the watchband fully expanded while cleaning in an ultrasonic tank or a steam cleaner. This opens up all the moving parts so the black goo can be attacked and will wash out ten times quicker and cleaner because it is not trapped in the band.

To make "stretchies" nothing works better than coat hangers. (Coat hangers to a man are equivalent to bobby pins for a woman.)

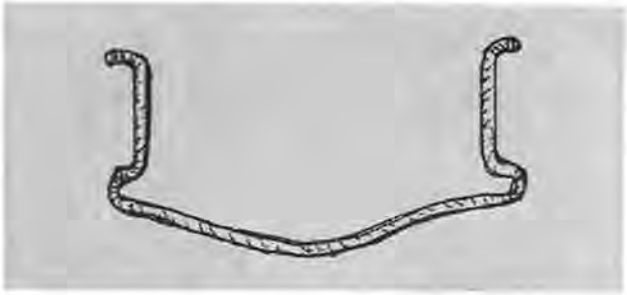

Figure 2. The stretcher can be adjusted for shorter bands.

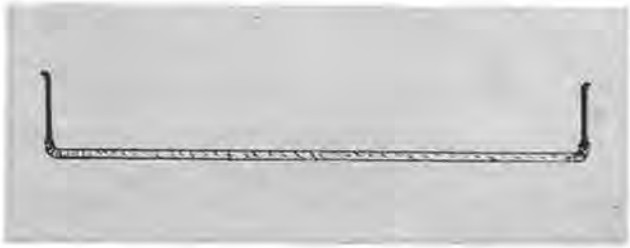

Figure 3. To clean expansion watch bands that are not attached to the case, the stretchers must be turned or filed down in the lathe to a spring bar diameter and then shaped slightly differently.

Knowing Bill as I do, this was the end of the conversation. He refuses to become involved in a discussion and I would have to make expanders and try them out myself.

It works beautifully and the watchbands are clean as new in very little time.

Send your tips, name, and address to "Jingle" Joe Crooks, 265 N. Main Street, Mooresville, North Carolina 28115. We will publish them along with your name. □

NEWS IN THE TRADE

ERNEST BOREL-MIDO: A New Venture in the US

Mr. Kurt A. Diggelmann, Managing Director of the Mido Watch Company in Bienne, Switzerland, announces the appointment of Borel Watch Company, 1008 Walnut Street, Kansas City, MO as their new exclusive distributor for the US.

Such a move was made to strengthen the Mido position on the US market and to improve its relations with all its dealers. Mido, subsidiary of General Watch Co. Ltd, belongs to ASUAG, the largest Swiss watch industrial group.

At the same time, Franz K. Winklhofer, President of Borel Watch Company, advises that Ernest Borel Switzerland has been purchased by Aubry Freres SA in Le Noirmont, Switzerland. Presided over by Mr. Marcel Aubry, this firm is one of the largest producers of Swiss watches.

Borel Watch Company in Kansas City, now fully owned by its officers and celebrating this year its 20th anniversary, considers this move an important step that will allow it to prepare a stronger merchandising program than ever before.

Mr. Winklhofer also welcomes the selction of Borel Watch Company as the new Mido distributor for the US He calls it a great challenge and a marvelous opportunity that two fine lines such as Ernest Borel and Mido should be merchandised together. Utmost care will be taken in the selection of the watches to be presented in each line so that they will complement each other and truly be an asset to all Mido and Ernest Borel dealers, old and new.

Franz Winklhofer and Marcel Muller, President and Vice President of Borel Watch Company, Kansas City, MO, since 1958 distributor of Ernest Borel Watches and now the new national distribution center for Mido Watches in Bienne, Switzerland.

WHITE HOUSE NEWS PHOTOGRAPHERS HONORED BY HAMILTON

Hamilton Watch Company again honored the outstanding White House news photographers of the year at their association's annual ball and recognition ceremonies held in Washington, D.C., recently. This is the fifteenth consecutive year Hamilton has participated in the event.

Frank Johnston, Still Photographer of the Year, was honored with an engraved Hamilton quartz watch. Paul Fine, Reel Photographer of the Year, received the same

For the fifteenth consecutive year, Hamilton Watch Company has honored the outstanding member of the White House News Photographers Association with Hamilton watches and clocks. Left to right: Frank Johnston, Still Photographer of the Year; Bob Cirace, 1977-78 association President; J. Paul Zanowski, Hamilton's Exectutive Vice President; and Paul Fine, Reel Photographer of the Year.

award. Bob Cirace, 1977-1978 President of the association was presented with a Hamilton quartz clock for outstanding service.

J. Paul Zanowski, Hamilton's Executive Vice President and Director of Marketing, made the presentations.

A complete line of mechanical, digital and quartz watches and fine wood case clocks is manufactured by the Lancaster, Pennsylvania, firm. Hamilton is a wholly owned subsidiary of Societé Suisse Pour L'Industrie Horlogère (S. S.I.H.), Switzerland.

SWEST APPOINTS GUENTHER BAERJE MANAGER OF NEW CALIFORNIA WATCHMAKERS' SUPPLY DEPARTMENT

Swest, Inc., a leading supply house for jewelers and watchmakers, announces the opening of a watchmakers' supply department in its Glendale, California office, and the appointment of Mr. Guenther Baerje as manager of this department.

Mr. Baerje is well known to many western watchmakers, having served them through two other supply houses for the past 11 years. Born in Hagen, Germany, Mr. Baerje came to the U.S. in 1964 and to Los Angeles in 1967. He resides in North Hollywood, California with his wife, Lourdes, and their three young sons.

Mr. Guenther Baerje, Manager of New Watch Material Department in Swest, Inc. California office.

Although Swest opened its Glendale branch in 1973, it did not stock watchmakers' supplies there as it did in its Dallas and San Antonio offices. Now the Swest Glendale office can boast a complete line of merchandise for the jeweler and watchmaker.

For further information contact Swest, Inc., 10803 Composite Drive, Dallas, Texas 75220 (phone 214-350-4011), 431 Isom Road, San Antonio, Texas 78216 (phone 512-249-4118), or 1725 Victory Blvd., Glendale, California 91201 (phone 213-246-8385).

SWISS TIMING TO TIME THE 1980 WINTER OLYMPIC GAMES

The XIIIth Winter Olympic Games, which will be staged in Lake Placid, NY from February 13th to 24th, 1980, will be timed by Swiss Timing.

The company has just successfully completed negotiations with the Winter Olympics' Organizing Committee with a contract signed in Zurich on June 19, 1978.

According to the terms of the contract, Swiss Timing's three operational partners, Longines, Omega and Heuer, will be responsible for timing all sports where timing is essential and for which the highest precision is needed, in this case downhill and crosscountry skiing, bobsleigh, luge, biathlon and speed skating.

Swiss Timing was established on July 3, 1972, by the Federation of Swiss Watch Manufacturers together with Omega and Longines for the timing operations at major international sports meets like the Olympic Games. The company's objectives have plainly been fulfilled since it has so far

The signing of the contract for the timekeeping of the 1980 Olympic Winter Games at Lake Placid: from the left to the right, Messrs. Theo Girard and Thomas Keller, respectively Vice-President and President of Swiss Timing; Ronald M. MacKenzie, President of the Organizing Committee; and Manfred Laumann, Vice President of Swiss Timing.

bid on and won the timing contract for some thirty major international competitions, including the 1976 Olympics in Montreal and Innsbruck, and its services have already been retained for the 1980 Olympic Games in Moscow.

KIT ASSEMBLY

Sol Friedman (left), manager of Bulova Material Sales, sets up assembly line in Woodside, New York where new Bulova

Jewelers Battery Kits are assembled prior to shipment to jewelers.

SEIKO'S NEW YORK SERVICE CENTER, MATERIALS AND TECHNICAL SERVICES DIVISION RELOCATED TO NEW AND EXPANDED FACILITIES

Seiko Time Corporation has relocated its New York Service Center and its national Materials/Technical Services Division, to new and significantly expanded facilities at 555 West 57th Street (14th Floor), New York, New York. The announcement was made by Milton Putterman, vice president of service operations.

The move to the larger 25,000-square foot quarters represents a major stride in Seiko's continuing program to provide the most efficient high-quality after-sales maintenance and repair services available to the retail jewelry trade. The new facilities have been designed to meet the present requirements of jewelers, and to be further expanded for future needs, when required.

OKLAHOMA STATE TECH

Terri Brunson, an Oklahoma State Tech watch and microinstrument repair student from Fayetteville, Arkansas, and Gray Lawrence, supervisor of Tech's watch repair program,

admire a variety of electronic and conventional watch movements recently donated to Tech by the Research and Education Council of AWI. Each year AWI donates several watch movements and hairsprings for instructional purposes to Tech's 20-month watch repair program of study. The electronic, digital LED and LCD movements will be used in students' final trimester of training, advanced watch repair.

GOULD AND SWEST TO COSPONSOR TIMEX REPAIR SYMPOSIUM

The fourth annual symposium designed to show watchmakers/jewelers the profits to be made by offering a Timex Movement Replacement/Repair Service was held on Sunday, July 30, 1978 in San Antonio, Texas.

The Gould Company and Swest, Inc. cosponsored the affair, which was a four-hour program beginning at 1:00 p.m.

"This is the fourth year we have offered this program," said Ken Weil of the Gould Company. "Factory representa-

tives will be on hand to show short films on movement replacement and to answer any questions. Market research has shown that there is a great deal of profitable Timex repair business to be had, and this does not even take into consideration the accompanying benefit of increased traffic," he continued.

Earl Weaver of Swest, Inc. stated that "For most jewelers this program offers a large untapped source of revenue for small investment in money and does not require the attention of an experienced watchmaker. Watchmaker apprentices or after-school young people can easily handle the exchange of movements."

This symposium will be in two sessions; the first will be an introductory session and the second will be advanced, with a break between. Six crown and stem assortments will be given away as door prizes.

All of those interested watchmaker/jewelers are invited to attend the program. There is no registration charge, but it is requested that those planning to attend make reservations ahead of time so that adequate space will be provided.

For more information or for reservations please write to Timex Repair Symposium c/o Swest, Inc. 10803 Composite Drive, Dallas, TX 75220 or the Gould Co., 13750 Neutron Rd., Dallas, TX 75240.

Book Review

by Henry B. Fried

How to Make an English Style Bracket Clock, by John E. Tyler. 88 pages, hard covers, 119 figures. San Diego, Brant Wright Associates, 1978. $25.75.

The number of collectors who search for fine clocks is increasing greatly. This in turn creates a shortage of such items for many. To satisfy some, fine reproductions have been commercially made. However, the high prices charged puts these above the budgetary limits of many.

The appearance of these fine but commercial replicas, however, has generated unusual interest and desire to make one's own clock, say many ambitious collectors. Thus there are many such amateurs who have never repaired a clock but who are now taking group instruction. For those in areas where group instruction is unavailable, good textbooks are prime requisites and this new book is one of them.

John Tyler of California is one who for more than 25 years has traveled the obstacle strewn path of the amateur and is thus fully aware of what the unschooled learner has to know. Mr. Tyler is a research physicist at the University of California at San Diego.

The English bracket clock is the subject of this "how-to-make" book. Mr. Tyler has prepared detailed drawings and photographs, recording visually each construction detail and successive step. Even special tools which he made to ease his task and ensure error-free parts making are illustrated in detail. Especially useful for this clock and future projects is a micrometer attachment to the depthing tool which assures success in pitching the depthing of wheels and pinions. The construction of the recoil escapement, so suited for short pendulum clocks, is detailed, as is the making of all the striking mechanism's parts.

The making of the rack and snail of the striking section is uniquely detailed in an original approach. Even the dial is handmade and Mr. Tyler shows how the chapter ring, figures, minute markings, the backing of the dial or face plate are easily made and finished. Decorating the winding holes and other areas is also explained and illustrated.

How to cut the wheels, pinions, fusee, wheel spoking or crossings and how to make the anchor, pendulum and pendulum bob (as well as every other part of this 18th-century style movement) are covered fully.

Since the clock is a completely made individual product, the making of the clock case or cabinet, as he puts it, is explained with photographs, drawings and dimensions.

A short separate section on the theoretically correct design of a fusee includes various formulas and mathematical equations, a contribution of Dr. R.W. Preisendorfer, a fellow clockmaker and research mathematician at the University at La Jolla.

While inches to millimeters conversion tables are provided, this reviewer, who also did the preface, wishes more details were provided. Also, details on the making of the hands are not provided other than their thickness, hole sizes and material composition (brass). However, Mr. Tyler's clock, which he completed while writing the book, won the silver medal at the 1977 convention of the National Association of Watch and Clock Collectors, competing with many other outstanding entries. Thus, the book serves as instruction in all phases of clockmaking, set up, adjustment, equipment use, dial making, and cabinetry. The added factor of having been run serially in the British *Horological Journal* has allowed its contents to be refined through editorial and reader comments. □

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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.

ESEMBL–O–GRAF LIBRARY in 28 volumes, Pittsburgh, 1955. Chronograph repairing is made easy by Step-by-Step procedure. Each small step of removing and replacing each part and making adjustments is clearly illustrated. No concentrated study is necessary. $200.00. (Hamilton 500 Manual free while they last). Write EOG, PO Box 11011, Cincinnati, Ohio 45211.

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Clockmaker Wanted. The House of Lancaster, an Indianapolis furniture store, is opening a new clock shop–Keystone Clocks. We are in search of a registered clockmaker to own the clock repair department. There is no risk involved, just opportunity. Call Art Richardson 317-844-6118.

WANTED TO BUY

Hamilton chronometers model 21 and 22 complete, boxes, hardware and movement parts. Need broken or basket cases. Raymond Rice, P.O. Box 31481, Aurora, Colorado 80041.

Chuck holding tail stock for a Moseley Lathe. Carl Goettsche, 554 So. 26 St., Apt. 117. Phone 402-341-0569. Omaha, Nebraska 68105.

Clock and watch books, clock & watch mfgrs. catalogs, wholesale jewelers' catalogs, books about violins or violin makers, wholesale music catalogs, and other related paper material. Roy Ehrhardt, P.O. Box 9808, Kansas City, MO 64134.

SITUATIONS WANTED

Graduated in watch course from Jaeil Watch and Jewels Skills Institute in Korea. Have worked as repairman on various watches and clocks. Will send, upon request, complete information including graduation documents, work performance records, and resume. Contact Kwon Uk-Kon, 1020, Dunsan-dong, Dong-gu, Daegu, Kyungsang Bukdo, KOREA.

Austrian Watch and Clockmaker, age 36, very dedicated. Good electronic knowledge, chronograph and repeater expert. Three years school of watchmaking in Austria, 18 years world experience, looking for top position as manager-partner, or later taking over of shop. Present position, owner of small watch- clock repair shop. Prefer to live California or Florida. Please contact: H. Reitbauer Calle 2K5 Villa Universitaria, Humacao, Puerto Rico 00661.

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.

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AWI MEETING

(Continued from page 34)

Mr. and Mrs. John Farrel look on as Jean Pierre Savary examines the history of AWI.

Orville Hagans reporting on Building Fund.

Retiring board members Gray Lawrence, Eric Samuel, Charles Barnes, James Broughton, and Gene Kelton.

Newly elected board members Henry Fried, Gerald Jaeger, Sean Monk, Donald Leverenz, and Marvin Whitney take oath of office.

Robert Nelson presenting award to past president James Broughton.

Executive Secretary Milton Stevens (right) presenting award to Director Ewell Hartman.

First Lady Jo Hagans and President Orville Hagans.

DATES TO REMEMBER

AUGUST

5-6—NMRJA Convention; Hilton Inn; Santa Fe, New Mexico

5-6—MINK Jewelry and Silverware Show; Hilton Plaza Inn; Kansas City, Missouri

6-9—Memphis Gift and Jewelry Show; Cook Convention Center; Memphis, Tennessee

9-11—Pacific States Fair; Ft Mason Facilities; Pier 2; San Francisco, California

12-21—20th Annual Pacific Jewelry Show; Century Plaza Hotel; Los Angeles, California

13-15—Third Orlando Gift and Decorative Accessories Show; Convention Center/Sheraton Towers Hotel; Orlando, Florida

13-16—Minneapolis Gift and Jewelry Show; Radisson Hotel and Radisson Center; Minneapolis, Minnesota

15-16—JC-K Inventory Management Workshop; Airport Sheraton; Los Angeles, California

17-18—JC-K Financial Management Workshop; Airport Sheraton; Los Angeles, California

20-23—Seattle Gift Show; Seattle Center and 6100 Building; Seattle, Washington

21-22—JC-K Financial Management Workshop; Fisherman's Wharf Sheraton; San Francisco, California

23-24—JC-K Sales Management and Motivation Workshop; Fisherman's Wharf Sheraton; San Francisco, California

27—Green Country Watchmakers Guild (Tulsa, Oklahoma); family picnic and auction

SEPTEMBER

3-6—Miami Merchandise Mart Show; Miami, Florida

3-7—International Watch and Jewellery Trade Fair; Wembley Conference Centre; London, England

3-8—Dallas Fall Gift, Jewelry and Housewares Show; Dallas Market Center; Dallas, Texas

9-10—Iowa Retail Jewelers Association; 1978 Fall Convention; Eddie Webster's; Dallas, Texas

10-13—Miami Beach Gift and Jewelry Show; Convention Hall; Miami Beach, Florida

12—Massachusetts Watchmakers Association; regular meeting

12—Watchmakers' Association of New Jersey; regular meeting; Howard Johnson's; Clark, New Jersey

16-17—New York State Watchmakers' Convention; Rowntowner Motor Inn; Rochester, New York

16-17—Watchmakers Association of Indiana Annual State Meeting and Convnetion; Watch and Jewelry Repair Show; Stouffers Inn; Indianapolis, Indiana

24—Watchmakers' Association of New Jersey; Quartz Watch Seminar and Bench Course; Howard Johnson's; Exit 135, Garden State Parkway; New Jersey

OCTOBER

9—Watchmakers' Association of New Jersey; dinner meeting; Ramada Inn; Rochelle Park, New Jersey

23-29—Third Annual Illinois Watchmakers Convention, Decatur, Illinois

NOVEMBER

11—Watchmakers' Association of New Jersey; dinner dance.

19—Watchmakers' Association of New Jersey; Swiss Quartz Analog Bench Course

21—Massachusetts Watchmakers Association; regular meeting

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