

JANUARY 1978

TIMES[®]

HOROLOGICAL



CAS-KER CO.

**Genuine Parts
Prompt Service
Fair Prices!**

OMEGA GENUINE PARTS

- We stock the complete Line of Omega and Tissot parts including all movement parts, crowns, gaskets and crystals.
- Most mail orders are filled the same day received.
- All parts are genuine and priced at authorized dealer list.

PROMPT SERVICE isn't a phrase we stick into our advertising nonchalantly. We have the parts on hand and we ship pronto!

Omega parts, Rolex parts, Seiko parts are here when you need them. Bulova parts, sure, and all the popular factories' material as well. And, we still have some supposedly unobtainable parts like sleeves for old American 18, 16, 12 and 3-0 size watches.

CK-76 SLEEVE ASSORTMENT
Contains 8 Assorted
Most Popular Sleeves With Stems **\$12⁰⁰**



**SEIKO PARTS Are No Problem
When You Order From Us!**

QUARTZ BATTERY CLOCK MOVEMENT

QZ8

NEAR PURE ACCURACY

- 4,194,304 Hz Quartz Crystal Oscillator.
- Accurate to ± 1 minute a year (59° to 77°F).
- Operational Range 14°F to 122°F (-10°C to +50°C).
- Slide Switch, exact to the second setting.
- Movement Size: 80 X 60 X 27 mm.

**SECOND HAND, IF USED, ADVANCES AT
PRECISE ONE SECOND INTERVALS.**

Stock
No. M-81



**TWO YEAR
GUARANTEE**

A PRICE BREAK FROM CAS-KER CO.

You will find the QZ8 movement in new clocks retailing at \$100⁰⁰ and up. Volume production for new clocks lowers the per unit cost of manufacturing and we pass the savings to you.

1 or 2 @ \$11.95 each
3 to 9 @ \$10.50 each
10 to 24 @ \$9.75 each

PRICES INCLUDE POLISHED BRASS HANDS, ETC.

CARTON OF 25 at \$8²⁵ each

CAS-KER CO.

Drawer A
P.O. Box 2347

Cincinnati
Ohio 45201

Phone
[513] 241-7074

Executive & Editorial Offices

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

Milton C. Stevens, Executive Secretary
Harold J. Herman Editor
Patricia Borger Associate Editor
Milton Stevens Advisor
Mildred Howard Circulation Manager
Paula Hill Art Director
Bess Freppon Business Manager
Lee Rothan Circulation

Technical Editors

Henry Fried Les Smith
Orville Hagans Jerry Jaeger
William O. Smith, Jr. Jim Broughton
Jim Tigner Bob Nelson
Pat Monk Ewell Hartman
Marvin Whitney Joe Crooks

Officers

James H. Broughton President
Gene Kelton 1st V.P.
Orville R. Hagans CMW, CMC 2nd V.P.
Karl Buttner CMW Secretary
Dorothy M. Aderman Treasurer

Directors

Joe Crooks
Ewell Hartman CMW
A. Gray Lawrence
Charles H. Mann
Robert A. Nelson CMW
Marshall Richmond CMW
Alvin I. Rudnick CMW
Eric R. Samuel CMW
Leslie L. Smith CMW
William O. Smith, Jr.

Affiliate Chapter Director

Willard Blakley CMW

Research & Education Director

Gerald G. Jaeger CMW

HOROLOGICAL TIMES is published monthly and copyrighted by the American Watchmakers Institute, Harold J. Herman, Editor. Subscription, \$25.00 per year, \$4.00 per copy in the United States and \$36.00 per year, \$5.00 per copy outside the United States. Second class postage paid at Cincinnati, Ohio. Copyright 1977 by American Watchmakers Institute.



Volume II, Number 1

January 1978

Official Publication of the American Watchmakers Institute

CONTENTS

FEATURES

THE PRESIDENT'S MESSAGE
by James H. Broughton 4

INSIDE THE CLOCK SHOP
Replacing Broken Wheel Teeth by James L. Tigner 6

HEAT TREATING CARBON STEEL
by Gerald G. Jaeger 10

ADVANCED HOROLOGY FOR THE YOUNG WATCHMAKER
Wheel Cutting by William O. Smith, Jr. 14

THE SHIP'S CHRONOMETER
by Marvin Whitney 16

QUESTIONS AND ANSWERS
J.M. Badollet by Henry B. Fried 22

IN THE SPOTLIGHT
The Rasmus Sornes Clock No. 4 by Orville R. Hagans 30
Drawings of Unusual Escapements by Orville R. Hagans 32

THE ESSENCE OF CLOCK REPAIR
The 30-Hour Modern Musical Cuckoo Clock by Sean C. "Pat" Monk 38

AWI NEWS—MEET MICHAEL DANNER
by Milton C. Stevens 42

AFFILIATE CHAPTER COLUMN
by Willard Blakley 44

SCHOLASTICALLY SPEAKING
by Gerald G. Jaeger 46

EXTRAS

Book Review 36
We Salute These New Members 41
New Products 51
Bench Tip 54

Editorial

Recently, articles appeared in Phoenix and Rochester newspapers telling the sad plight of individual watchmakers from those areas. The stories ramble from repeated robberies of one watchmaker to inability to command fair prices for services. Quotes from these men advise potential tradesmen not to enter the watchmaking field. True, not all people are suited for the demanding patience and organized mind that the tradesman must have. And all do not possess the mechanical aptitude or miniaturized manipulation necessary to become successful at the bench. And some are poor businessmen.

It is too bad that unsuccessful people had been interviewed, when the AWI was available to guide those newspapers to the average tradesman. The repair industry sustains damage, as does the consumer, when supply and demand become unbalanced because new blood is not introduced in the field.

A good way to counteract this inaccurate picture is for our AWI watchmaker members to invite their local newspapers to do an article about them . . . the successful tradesmen.

ABOUT THE COVER

The January cover depicts a scene portraying the dormancy of winter.

OUR READERS WRITE

Enclosed is a check for \$25.00 for the renewal of my subscription to *Horological Times* for 1978. I am not a watchmaker, but a retired journeyman machinist with over 41 years at tool and diemaking and almost 72 years old.

This new hobby has problems similar to what I had all my life. With the help of good books and magazines these new problems melt away.

Anthony J. Bayer
Milwaukee, Wisconsin

To Jim Tigner: I have been meaning to write you for some time to tell you how much I enjoy your *Inside the Clock Shop*. It is well written and very informative. I have followed many of your suggestions and have had good success—with one notable exception—Daniel's Solution!

I mixed up about 6 quarts—put 4 quarts in my ultrasonic machine and bottled the rest. I then tried my first clock. (Moderately dirty with some rust on the steel parts.) After about a 20-minute cleaning cycle, I took the basket out for a look. To my amazement I saw that not only was the brass clean but the rust was all gone as well as the blue from the hands. I thought, "boy, this stuff is fantastic!" However, as I watched, the brass started streaking and darkening. This was easily removed by replacing the basket in the solution. I then quickly immersed the basket of parts in the water rinse. No good! No matter how fast I move between cleaner and rinse, the parts come out with dark streaks. What am I doing wrong? Also, I noticed that after a few uses, the solution turned red in color. I thought that might be an indication that it had become contaminated. However, when I checked the 2 quarts of unused solution I had put by I found that it had also turned red.

I should also mention one other thing. The derusting and blueing removing capabilities of the solution disappeared after the first use.

I would sincerely appreciate your comments on all this.

R. M. Rowe
Menlo Park, California

(From Mr. Tigner: Thank you for the kind words on my small efforts in The Shop. It's always nice to know that someone enjoys what you're trying to do.

Now, Daniel's Solution! This is an old, tried and proven formula for cleaning clocks, but trouble can result if it's used on anything but brass or steel. Aluminum, zinc, and lead are certain to cause the unsightly discolorations you spoke of.

Whether these metals were present in the clock you cleaned, or in your basket, I don't know, but one of them had to be present somewhere. Aluminum is usually used for the framing in watch cleaning baskets, and this may be where your trouble lies—if you were cleaning a small desk clock.

My own basket is a large one made for deep-frying potatoes, etc. The whole thing had been dipped in solder of some sort—mostly tin, I believe, but possibly with some lead. Anyway, the first two or three times I used it, the results were about like yours. And then everything cleared up. I theorize that if there were any lead in the coating, it was eaten up on the surface by the Daniel's Solution, leaving only tin, which doesn't react with the stuff.

Most deep-fry baskets made for the restaurant trade today are stainless steel, which is excellent. You can buy stainless steel screen from a place specializing in wire, and make your own. Bronze window screen is also okay. Nothing galvanized, however.

After the first clock or two, the solution does turn a reddish brown, mostly brown, but that is normal and doesn't affect the cleaning properties at all. However, the solution in your bottle shouldn't have turned red. I'm wondering, did the bottle have an aluminum cap? Lots of them do. Try to get a plastic cap from a drug store, or a chemical supply house. Or you can store your solution in a plastic freezer container, as described in the September session of The Shop. A gallon size costs less than a dollar. Quart sizes are even less, and are available in the supermarkets.

As you implied, speed in transferring the cleaned clock from the Daniel's Solution to the hot water rinse is the secret of preventing undesirable staining. However, some darkening of the plates isn't unusual, nor is it anything to worry about unless the movement is to go under glass. In that case a little light brushing with chalk will brighten them up with a much longer lasting finish than any chemical will provide. But so far as the running of the clock goes, a little tarnish

(Continued on page 4)

**REPLACE
YOUR OLD
WORN
CATALOG**



FREE
FROM BESTFIT®
BESTFIT BATTERIES
BESTFIT 111-111A CATALOGS

FOR OVER 50 YEARS —
YOU KNOW
YOU CAN RELY ON BESTFIT QUALITY

ASSORTMENT CONTAINS

BESTFIT® #246 (Ucar 357)
BESTFIT® #275 (Ucar 386)
BESTFIT® #281 (Ucar 392)

ALL BATTERIES ARE PRETESTED AND GUARANTEED

Bestfit®
WATCH BATTERIES

Bestfit®
WATCH BATTERIES

Bestfit®
WATCH BATTERIES

BESTFIT® 111 OR 111A CATALOG FREE!

With purchase of 30 batteries consisting of 10 each
BESTFIT #246, 275, 281 Batteries.

30 Cells at regular price \$36.00
BESTFIT Catalog (111 or 111A) 6.50

TOTAL 42.50

YOU PAY FOR BATTERIES ONLY 28.50

YOU SAVE 14.00

- ☐ ZX8-78/111- PART I \$28.50
☐ ZX8-78/111A- PART II \$28.50

**SPECIAL COMBINATION BUY BOTH and
SAVE MORE!**

With package of 60 Batteries consisting of 20 each #

60 Cells at regular prices \$72.00
BESTFIT 111-111A Catalogs 13.00

TOTAL 85.00

YOU PAY FOR BATTERIES ONLY 53.95

YOU SAVE 31.05

- ☐ ZX8-78/111-111A \$53.95

SPECIAL INTRODUCTORY OFFER

36 BATTERIES + 5 FREE
Only .78¢ a Battery

24 BATTERIES + 3 FREE
Only .80¢ a Battery

12 BATTERIES + 1 FREE
Only .83¢ a Battery

ORDER FORM

✓ CHECK TO ORDER

- | | | |
|--|---------------------------------------|---------|
| ☐ ZX8-78/111 | — 30 Batteries with 111 Catalog | \$28.50 |
| ☐ ZX8-78/111A | — 30 Batteries with 111A Catalog | \$28.50 |
| ☐ ZX8-78/111-111A | — 60 Batteries with 111-111A Catalogs | \$53.95 |
| ☐ BAT-41 | — 41 Batteries — 36 + 5 FREE | \$31.95 |
| ☐ BAT-27 | — 27 Batteries — 24 + 3 FREE | \$21.60 |
| ☐ BAT-13 | — 13 Batteries — 12 + 1 FREE | \$10.75 |

MARSHALL-SWARTCHILD

P.O. Box 726 (2040 Milwaukee Ave.), Chicago, IL 60690 312-278-2300

1512 Commerce, Dallas, TX 75201 214-741-1454

657 Mission St., San Francisco, CA 94105 415-421-2153

1425 Fourth Ave., Seattle, WA 98101 206-682-6158



The President's Message

by James H. Broughton

How many of our readers of *Horological Times* would like to read articles with titles such as: "The Watchmakers' Role in the Solid State Electronic Timepiece Explosion," or "Electronic Diagnostic Procedures on ESA 9180-81," or "The Art of Staffing"? Well, if you have been a reader of *Horological Times* since the beginning, you have already read these articles. They were in the January, February, and March 1977, issues. These articles were written by Bob Nelson, Gerald Jaeger, and Les Smith. We do have a tendency to forget.

How many of our readers remember when the first issue of *Horological Times* came out? Would you believe this is the thirteenth issue? It was exactly one year this month that the *HT* was born. A lot of words have been printed and read since that date. A lot of our readers have seen reasons to write their comments on paper and mail them to this office. Mr. Herman, who is the Editor, has shown the letters to me and he does this with pride.

Mr. Milton Stevens is another person who is proud of the success of *HT*; he should be, since the idea of the magazine was mostly his.

Now what these two fine people do not know is the amount of comments that the AWI instructors, speakers, and representatives hear when they are at various meetings. Regardless of the size of the group being addressed, the *HT* is always mentioned. I have yet to hear anyone say anything

negative about our magazine.

We who have had the pleasure of reading this magazine for the past 12 issues have witnessed the growing pains. We have seen it go from "very good," which was Volume 1 Number 1, January 1977, to "excellent," Volume 1 Number 12, December 1977. We have seen the growth in advertising. This, of course, is a very important factor with any publication. Without advertising there would be no *Horological Times*. This is a very good reason why every AWI member should patronize the advertiser, when he possibly can. Support the advertiser; he is supporting your organization.

While many people have contributed to the success of *HT*, there is one person still responsible for its professional look—seeing that the advertising is correct and sufficient for each issue, as well as making sure each member receives his or her copy on time. The person I am speaking of is our editor, Mr. Harold Herman. Happy Birthday to the *Horological Times* and Harold Herman. I am very proud to be president of the American Watchmakers Institute during this memorable occasion. Thanks, Hal, for the masterful job you have done.

The Executive Board Meeting will be held very soon. I want to remind all committee chairmen that your reports are due and should be in my hands no later than January 15, 1978. The good working relations of all committees are making my job easy this year. Keep up the good work. □

OUR READERS WRITE

(continued from page 2)

is going to develop anyway, and is actually an essential dry lubricant to the gears. Without it, brass wheels and steel pinions couldn't be successfully mated in either clocks or watches.

Generally speaking, Daniel's Solution won't remove rust any more than any other cleaning solution. Of course, it is a mild caustic, and as such will eat up rust and even steel if parts are left in it long enough—12 hours or more. I suspect the rust was pretty light that disappeared in your solution. I wouldn't advise putting blued hands in Daniels; it may remove the blue.

Hope this solves the mystery. I'd really appreciate a line letting me know how you make out.)

Just received our two copies of November 1977 *Horological Times* (one for me and one for the college), and note with chagrin that pages

5 through 12 and pages 45 through 52 are missing. Also, some pages in between 12 and 45 are duplicated. Anyway, the hole darn thing is bolixed up. If I didn't usually read it from cover to cover I wouldn't care, but I don't want to miss even a single line of this superb publication. As Walter Winchell might say, orchids to you and your staff for a thoroughly enjoyable and downright practical literary effort—up to now.

Just send me two good copies of November 1977 and I'll be happy. Keep up the good work.

George J. Schlehr, CMW
Instructor, Horology Department
Mountain View College
Dallas, Texas

(Editor's Note: Printing presses sometimes grab more than one sheet. Sorry for your bolixed magazine. Two replacements are in the mail for you.)

THE NEW SEIKO BATTERY REPLACEMENT KIT:

To provide proper power for the best-selling quality Quartz watches in the world.



It's everything you need in one compact attractive case:

1. 30 Quartz Energy Cells: A special assortment enabling you to replace the batteries for all watches in the Seiko Quartz line.
2. A Seiko Quartz Battery Information Chart: To make selecting the right battery easier and more convenient.

3. One Pair of Energy Cell Tweezers: To avoid using metal tweezer for battery replacement.

4. A Three-Cornered Battery Hatch Remover: Opens any Seiko battery hatch easily, without marring surfaces.

5. An attractive case that contains the entire kit: Everything you need to replace Seiko Quartz energy cells in a professionally designed and compactly convenient flat case that measures 4 $\frac{3}{4}$ " by 9 $\frac{1}{2}$ ".

Order the New Seiko Battery Replacement Kit, (STC-30), today from your Authorized Seiko Material Distributor. Price: \$39.50.

SEIKO



Inside the Clock Shop

with James L. Tigner

CMC

REPLACING BROKEN WHEEL TEETH

"Different ships, different long splices" is an old seafaring adage which means there's more than one way of doing the same job. To paraphrase this salty truism, we might say, "Different clock shops, different tooth replacements," or, for that matter, different ways of handling any clock repair problem.

With that as a premise, let's have a look at how teeth are replaced *Inside the Clock Shop*.

When only one tooth is missing, I like to turn up a new one from brass wire. Select the wire with a diameter approximately equal to the circular pitch of the wheel—that is, to the combined widths of a tooth and a tooth space. Chuck up the wire in the lathe, and, with a graver, face the end true. Scribe a line at a distance from the end equal to a little over half the width of the wheel web into which the new



Figure 1.

tooth will be set. From this line turn a tapered cut as in Figure 1. This is the section of the tooth that we will later dovetail into the wheel web.

Next, make a parallel cut as in Figure 2. This is the section from which the tooth proper will be formed, and its diameter should be a little greater than the tooth width, thus insuring sufficient metal for centering and shaping the new tooth. For convenience in turning, the parallel cut should be



Figure 2.

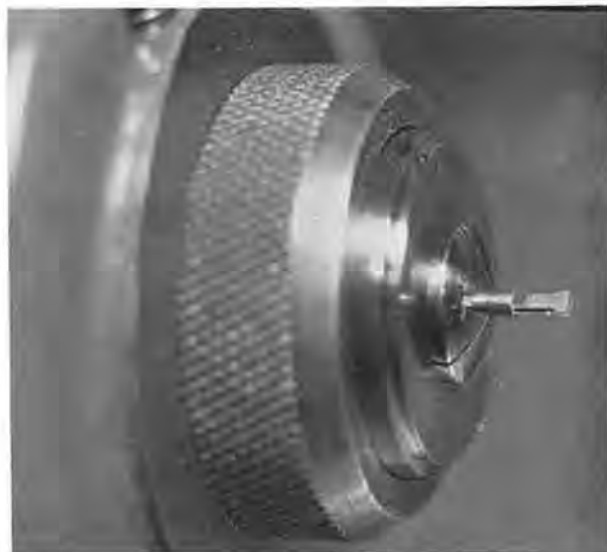


Figure 3.

at least as long as the cutting edge of your graver, which should also provide ample height for the tooth.

With the wire still in the lathe, file a flat on one side of the two cuts. Rotate the lathe 180 degrees and file another flat, as in Figure 3. The thickness between flats should be a little greater than the thickness of the wheel web, so there'll be stock enough to hammer and spread for a perfect fit in the dovetail cut we'll be making later in the wheel web. This spreading will be facilitated, incidentally, if the tapered edges of the wire are also flattened, as shown in Figure 3.

A No. 2-cut pillar file with safe edges does a fast, neat job for this sort of work, but any flat file will do the job. It's not all that fussy. Likewise, a headstock with indexing holes helps in filing the two flats parallel, although the eye can do an adequate job.

The wire can now be taken out of the lathe, but at this point the work should *not* be parted off. The tail makes too good a handle for holding the work while its dovetail outline is being scribed on the wheel web.

To do the scribing, I use a fine-pointed needle held in a pin vise. A bench pin with a V-cut makes a good supporting device for the wheel. Figure 4 shows a barrette needle file



Figure 4.

finishing up the dovetail cut after it was first roughed out with a jeweler's saw. Figure 5 pictures the finished cut.

A bench pin is really a tool of the manufacturing jeweler, but it can be used to advantage by the clockmaker in much of his fine sawing and filing. Notice that the work is supported horizontally, while the strokes of the saw and file are made vertically. The barrette needle file is an excellent tool for forming sharp, acute corners. It's a thin file, having only one cutting side (flat). Its back is safe, or uncut, and is divided into two low, beveled sides for strength. By grinding the tip, the file can be adapted for exceedingly fine and delicate work.

While a perfect fit between plug and dovetail cut isn't essential, the closer the fit the better. Figure 6 shows a

We Can Deliver!

- ★ A COMPLETE LINE OF GENUINE REPLACEMENT PARTS FOR ALL NAME BRAND AND OTHER BRAND WATCHES
- ★ A COMPLETE LINE OF JEWELERS TOOLS AND WATCHMAKERS MATERIALS AND SUPPLIES
- ★ WIDE RANGE OF CRYSTALS & WATCH BATTERIES AT COMPETITIVE PRICES
- ★ BEAUTIFUL ASSORTMENT OF RING & BRACELET BOXES & GIFT PAPERS

WRITE FOR INFORMATION PERTAINING TO YOUR PARTICULAR NEEDS

We Sell Service & Quality

C. DVORKIN & CO. 5 S. WABASH AVE.
CHICAGO, ILL. 60603
312/726-8678



Figure 5.

the house that has it all

S. LaRose, Inc.
Worldwide Distributors to Horologists

234 Commerce Place, Greensboro, N. C. 27420, U. S. A.



Figure 6.

fit tight enough to permit lifting the wheel by the pressed-in plug. Figure 7 demonstrates how the plug is lightly hammered to tighten the fit even further and to spread the metal into any possible vacant areas. The plug is hammered first on one side and then on the other, centering it to project beyond the wheel the same amount on either side.

Note again in Figure 7 how much easier the job is when you have something to hang on to. In nearly all cases,



Figure 7.

leaving a handle to a workpiece makes the handcrafting of small parts simpler.

One more word on the hammering operation. Don't overdo it! It's possible to spread the metal to such an extent that the wheel will be stretched out-of-round. The result could be excessive friction with the mating pinion, if not actual butting.

Figure 8 shows an enlarged view of the plug after hammering. The tail has been sawed off, soldering flux run around the dovetail joints on both sides, and a small piece of



Figure 8.

solder placed at the base of the plug as shown. The solder should have a low melting point (I use Tix), and no more heat should be applied than necessary to flow the solder. Any more than that will soften the tooth.

Instead of soldering, the dovetail cut in the wheel can be beveled and the plug riveted in place, thus eliminating the need for heat completely. But this requires a little more time and skill in fitting the plug, with greater risk of stretching the wheel. Better leave it to those with plenty of experience.

After soldering, the work must be scrubbed, of course, in hot, soapy water, followed by an alcohol rinse, to avoid rusting adjacent steel parts. Next, file down the height of the plug nearly to final dimensions, and its sides flush with the sides of the wheel. The easiest and best way to reduce the height of the plug to that of the rest of the teeth, is to top the wheel in the lathe. But using the graver for intermittent turning of this kind is risky. It may catch on the plug, or on one of the teeth, with disastrous results. A slide rest with a



Figure 9.

sharp cutter is the best, but a file can be used, as in Figure 9, safely and with good effect. The lathe is run in reverse, and the file held with its handle away from the operator, for the best cutting action.

Chuck up the wheel as close to the collet as possible to avoid unnecessary run-out. Even though American clock wheels are seldom staked exactly concentric with their arbors, there's no sense in making them even further out-of-round by our topping operation. Stop the operation as soon as the file begins to top the old teeth at any point.

Figure 10 shows how the wheel looks at this stage. A few file marks remain which can be taken out with 2/0 emery paper, but it's next to impossible to tell where the dovetail was.

The final step is to center and file up the new tooth. Clockmakers sometimes take impressions of the old teeth,



Figure 10.

which they transfer to the new one for a guide in filing. Or they cut out thin templates traced from the old teeth, which they then use to scribe an outline for the new tooth.

As stated in the opening paragraph of this article, "Different ships, etc." My own preference is just to use a short steel scale to measure off and scribe a center line across the top of the plug. This centers the new tooth, which is the most important consideration. Shaping the tooth is simply done by eye, using the other teeth for a pattern. I use a 6-inch scale, calibrated in 64ths, but a millimeter scale could just as well be used, and the distances estimated in 10ths of millimeters. All this, of course, must be done using a loupe.

For finely pitched wheels, multiple tooth replacements may be turned from wire in the same way we've described. But for the typical American clock, the size of the wire would require too much filing to be practical. It's better to make the plug from sheet brass.

Figure 11 shows a piece of sheet brass hammered into place for a 2-tooth replacement. Notice the handy tail still on the plug! Having on hand an assortment of sheet brass in various gauges reduces filing to a minimum and is a great time saver. For those who find it difficult to locate items of this sort, remember that metal stock of all kinds can be bought in

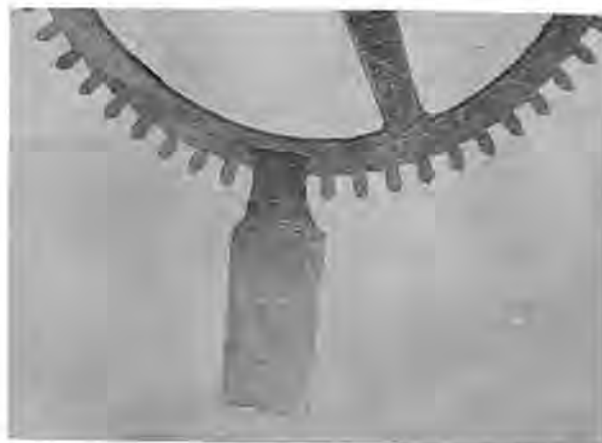


Figure 11.

small quantities from Campbells, whose address was noted in the August column.

In the turned-wire method, we first made the plug and then scribed its outline on the wheel for the dovetail cut. In the sheet brass method I find it easier first to saw and file the dovetail cut in the wheel, and then to trace its outline on the sheet brass. But maybe that's just the way I am. "Different ships."

Next month *The Shop* opens with a session on barrel tooth replacement. And maybe a little more. □

WMJDA ANNUAL CONVENTION

The annual meeting of the Watch Material and Jewelry Distributors Association will be held March 29 through April 1 at the Boca Raton Hotel and Club, Boca Raton, Florida.

The agenda includes a report on the micro fiche program by Mark Borel and a panel discussion on "Management Control of Small Businesses," covering product liability, fire insurance, business interruption insurance, key man insurance, and credit insurance. A question and answer period will follow a report on "Finance Management." Art Bush of United Tool and Material, Denver, will deliver a lecture on "Perpetuation of Business."

Arrangements are now being made with IBM for display and operation of low cost in-house computers.

Officers for 1978 are Morris Beresh—President, M. Beresh, Inc., Oak Park, Michigan; John Cassedy—1st Vice President, Cas-Ker Co., Cincinnati, Ohio; Bernard Nest—2nd Vice President, The Nest Co., St. Louis, Missouri; Karl Esslinger—3rd Vice President, Esslinger and Co., St. Paul, Minnesota; and Harvey Berkey—Treasurer, Berkey Bros., Oklahoma City, Oklahoma.

the house that has it all

S. LaRose, Inc.
Worldwide Distributors to Horologists

234 Commerce Place, Greensboro, N. C. 27420, U. S. A.



HEAT TREATING CARBON STEEL

by Gerald G. Jaeger
CMW

In this brief article I discuss some of the basic principles in the heat treating of carbon steel. We should keep in mind that I am not attempting to put forth a scientific paper nor trying to introduce new methods and procedures which require the latest in scientific equipment. I deal with heat treat in a manner which applies to the bench watch- and clockmaker, using the facilities he has now or those that can be readily secured at a nominal cost. Hopefully, along the way we may point out some new methods which will work for you.

Heat treatment of steel falls into three categories:

(1) annealing, wherein we bring the steel to its softest state; (2) hardening, wherein we bring the steel to its hardest practical state; and (3) tempering, wherein we soften hardened steel by degrees in order to instill toughness and elasticity and reduce brittleness. Each step contains certain do's and don'ts. We will discuss them in their proper order.

Annealing

Annealing could best be described as a heating-and-slow cooling process of treating steel. The cooling is usually done very slowly. We anneal steel for many reasons, e.g., to remove strains after forging, to soften for grinding or shaping, or to produce a definite structure within the steel. In our application we are most concerned with removing the hardness and brittleness from the steel which it has attained by being worked. This is referred to as work hardening. This comes about through hammering, shaping, bending, etc., in the fabrication of a given part. There are many methods to slow cool steel, but in most cases (for our application), air cooling will suffice. Other methods which could be mentioned are not needed to attain the result needed for our use.

In annealing, the critical point on cooling is considerably lower than the critical point on heating. The best result is obtained when we cool the steel from the critical hardening temperature (cherry red) very slowly until it has passed through the lower critical cooling temperature. This lower critical cooling temperature will be attained when the metal reaches a black color. It can be cooled fairly fast from the black color because the change back to a soft structure will already have been made. Whatever method of slowest possible cooling your heating equipment will enable you to employ will be the best method for you to use. If an open flame is used, gradual removal from the heat source is best.

If you have a semi-enclosed gas furnace, gradual reduction of the heat source is best. The slowest possible method of cooling from the critical high temperature to the critical low temperature will be the most effective in the annealing stage of heat treatment.

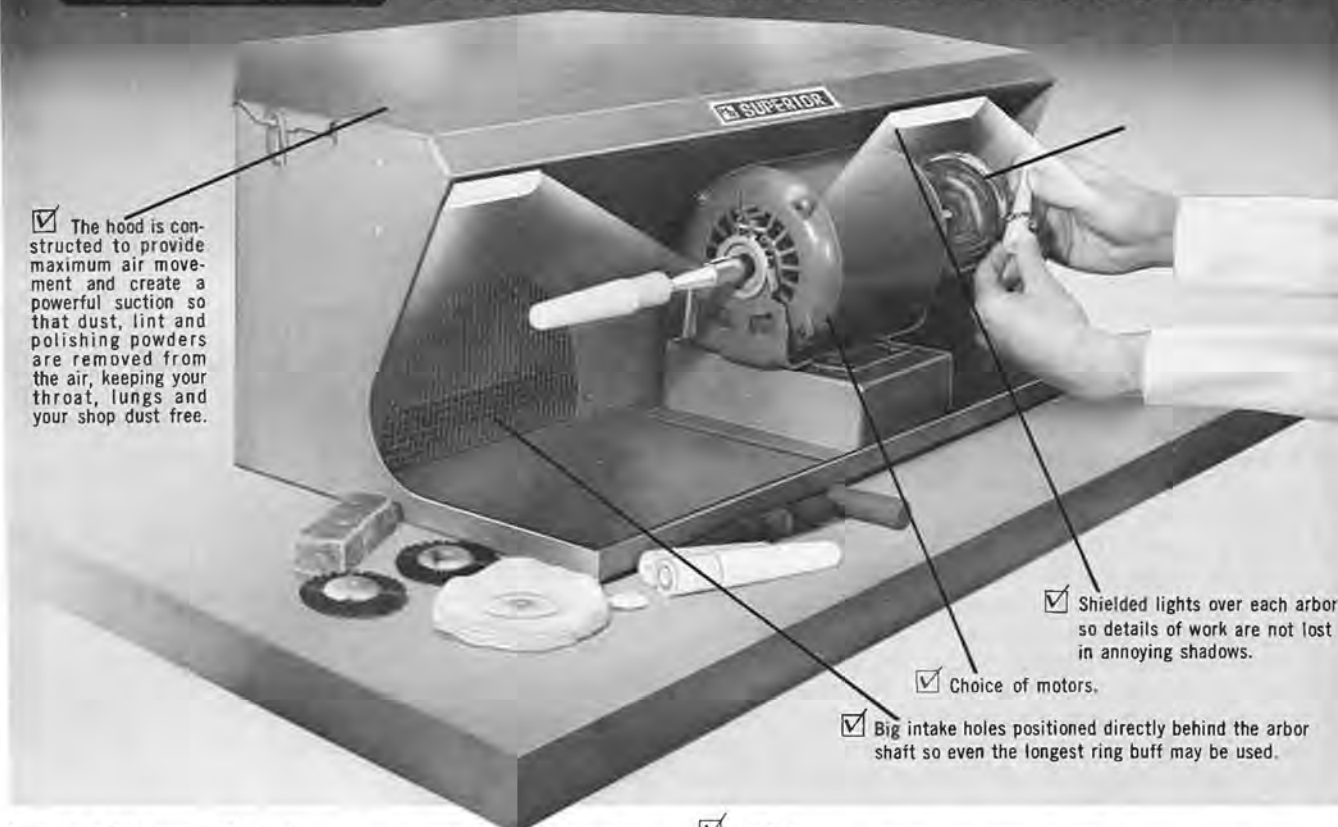
Hardening

Hardening can be best described as a heating-and-fast cooling process of treating steel. The hardening process is probably the area wherein we make the most errors. We often unknowingly do not achieve the sought after result. In heating the steel prior to the quench we must reach the critical temperature. When the process is done in normal atmosphere with a gas flame, the critical temperature is about 1400 degrees F when the metal will assume a color we call "cherry red." Keep in mind there are many ways to accomplish heat treat but throughout this article we will deal with the methods available to most of us in our own shops. We must also keep in mind that visual color perception to one is not the same as to another. This necessitates much experimentation on our part so we can relate to the critical color as we see it in both hardening and tempering. We will deal with this later.

The ultimate usage will determine the steel we are working, but in general, the same rules apply as to hardening. The most common error is overheating of the steel in the heating process prior to quenching. In the heating of the steel we want to affect changes in the atomic structure of the metal. We want to get a fine, smooth, compact appearing structure visible to the eye under magnification. Steel quickly cooled from white heat (over the critical temperature) will have a coarse crystalline structure. Steel quickly cooled from a cherry red color will have the fine, smooth structure we require. Steel cooled quickly from a dull red will not have experienced the molecular change we are looking for and will be coarse and soft. After every hardening procedure, we must always check the steel by stroking it with a file. If the file passes over the metal easily and does not remove any metal we can assume it has reached suitable hardness. This too is an area where experimentation will help us develop this feel. A good experiment is to select a piece of approximately 5 mm diameter soft drill rod and saw a cut about 1 mm deep at 1/2-in. graduations from the end, making four cuts, as shown in Figure 1. Heat the drill rod to attain the desired color as

First... ☒ check the features on this

HR SUPERIOR® Polisher and Dust Collector



☒ The hood is constructed to provide maximum air movement and create a powerful suction so that dust, lint and polishing powders are removed from the air, keeping your throat, lungs and your shop dust free.

☒ Shielded lights over each arbor so details of work are not lost in annoying shadows.

☒ Choice of motors.

☒ Big intake holes positioned directly behind the arbor shaft so even the longest ring buff may be used.

Here is a big, powerful unit which comfortably takes buffs up to 6" diameter. Has big intake holes positioned behind the arbor shafts so that even the longest ring buffs can be used.

The hood is designed to provide maximum air movement and create a powerful suction so that dust, lint, polishing powders, etc., are quickly removed from the air, keeping your shop clean.

Another feature is the positioning of the filter ahead of the blowers, so that dust does not clog them, thereby eliminating repairs and decreased suction. The filter can be easily reached for removal and replacement by removing the top hatch.

Hood has a convenience outlet for the polishing motor, and shielded lights so that the finest details are not lost in shadows.

☒ Switch turns on motor, fan and lights.

☒ Double axial fan blowers.

☒ Easily replaceable fiberglass filter



Inside View of Dust Collector

- Double axial fan blowers provide strong air current.
- Easily replaceable fiberglass filter is placed ahead of blowers, protecting them from dust and dirt. Top is removed by snapping open latches—no screws to remove.
- 2 lights, one over each arbor.
- 115V AC
- Convenience outlet for polishing motor.

- Constructed of 16 gauge (.062") sheet metal and painted in a hammer-tone finish. Measures 32" wide, 10" high and 21" deep. Mounted on rubber feet to prevent slipping.
- Switch operates blowers, polishing motor and lights.
- Motor pan measures 9" deep, 32" wide, 8" high.

and now ☒ check the low price—\$199.50 No. 31-765—Complete with 1/3 h.p. motor, ship. wgt. 66 lbs.

Available from your jewelers supply house.

Ask for Bulletin No. 50-135 on our complete line of Polishers and Dust Collectors from \$49.50 up.



HAMMEL, RIGLANDER AND CO., INC.

P.O. Box 222 • New York, New York 10014

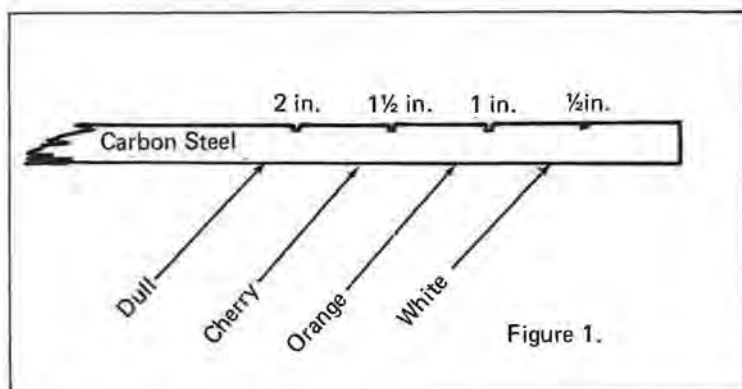


Figure 1.

indicated in Figure 1. Quickly quench the drill rod in room temperature water. This is another area where many errors are made. The heated steel must be immediately quenched. A time period of over a second from the flame to the quench will sufficiently change the temperature of the metal so as not to get the desired result. When properly heated and quenched, the steel is ready for our experimentation. Stroke the drill rod at the $\frac{1}{2}$ in. graduation, the 1 in. graduation, and again at each graduation down to about a $2\frac{1}{2}$ in. graduation. This test should indicate the steel to be full hard from the $\frac{1}{2}$ in. graduation down to the 1 in. graduation. The 2 in. graduation which was heated to a dull red may be partially hardened and will file with difficulty. The area around $2\frac{1}{2}$ in. should file easily.

Now to prove out your hardness tests, place the piece of drill rod in a vice, grasping it up to the $\frac{1}{2}$ in. cut and apply pressure so as to break it at this saw point. It should break easily without bending. The grain should be coarse and crystalline (Figure 2). Next break the dull rod off at the 1 in. saw cut. This should be somewhat finer but still have a crystalline



Figure 2.

texture. The break at the $1\frac{1}{2}$ in. graduation should be smooth of surface and very finely grained (Figure 3). You should also note this break was much harder to make, as at this point the metal should have been less brittle and the molecules of the iron would have greater resistance to separation. Up to this point, your drill rod should have remained straight and should not have exhibited any bending. The break at the dull red cut should bend before breaking. At this point the drill rod did not reach the full hard point. If we attempt to break the drill rod at a point of about $2\frac{1}{2}$ in. we will find it soft and it will take repeated bending to effect a break. This experiment should help to determine proper color to achieve proper hardness and also point out the danger of overheating and underheating. Overheating will achieve hardness but will



Figure 3.

render the steel useless for our needs. Underheating will not effect the structural change needed in the metal nor will the metal harden upon quenching from an underheated state which will also render the steel useless for our need.

Figure 2 shows a piece of carbon steel drill rod which was heated to a white hot. It is sufficiently hard, extremely brittle, and exhibits the crystalline structure which is not acceptable for our use. Figure 3 shows a piece of carbon steel drill rod which was heated to a cherry red (critical temperature) and exhibits a fine, compact grain.

Next month's article will deal with proper cooling (quenching) of the metal from the critical temperature. We will discuss the effects and possible results of improper quenching. Tempering of the hardened steel will also be covered.

□

SEIKO TIMES NATIONAL HORSE SHOW WITH NEW HIGHLY SOPHISTICATED WIRELESS ELECTRONIC TIMING SYSTEM First Time Used in U.S.

A new highly sophisticated wireless electronic timing system—accurate to 1/100th of a second—developed by Seiko Time Corporation timed this year's annual National Horse Show, in New York City, November 1.

This wireless timing system used at New York's Madison Square Garden includes pairs of photo-electric beam transmitting and receiving units at the start and finish lines, which automatically activated when a competing horse broke the light beam. At the judges' station, a master electronic printing timer—started and stopped by the photo-electric cells—automatically timed and printed out digitally the elapsed time of the event to 1/100th of a second.

Times were flashed simultaneously onto two large spectator clocks at each end of the arena. The times were shown digitally in minutes, seconds and tenths of a second enabling spectators to know times immediately.

Mr. H. Moriya, Seiko's president, noted that the supreme accuracy of Seiko's systems have proven extremely valuable in such international sports speed events as sprints, relays, ski slalom, swimming, and racing—and that this extra-accuracy is what was desired by the horse show officials when planning for the show in New York.

□

TAKE STOCK...ORDER YOUR ACCUTRON®, BULOVA®, CARAVELLE® HOUSE-OF-REPAIRS BENCH SYSTEMS NOW...

For the first time we've added two new Stem and Post Systems to go along with our other value packed Crown, Crystal and Gasket Systems.

NEW! STEM & POST SYSTEMS...

Master Stems and Posts (Male & Female) System No. 800-BC-57 for Bulova, Caravelle Watches. Consists of 57 Stems and Posts in all the required lengths. New "Master Listing Booklet" included which eliminates all guesswork by showing you the designated Stems and Posts for the designated case numbers. The correct crowns for the selected case numbers are also listed. **\$46.00**

FREE! Each Stem and Post System comes with...

FREE! New "Master Listing Booklet"

FREE! Case Parts Catalog

FREE! Imprinted Stock Control Envelopes

FREE! Attractive Storage Cabinets

FREE! One Set of Case Back Wrenches

Master Stems and Posts (Male & Female), Crowns System No. 5800BC-57/48.

For watchmakers who want more, we have the same system as the above but have added 48 White and Yellow Water-Resistant Crowns along with 57 Stems and Posts. **\$74.00**

*CRYSTAL SYSTEMS...

Crystal System No. 200-A-32 for Accutron Watches. Total of 32 most used Accutron Crystals. **\$55.75**

Crystal Stem No. 200-A-63 for Accutron Watches. Most complete Accutron Crystal System. Includes 63 most often used Crystals. **\$89.95**

Crystal System No. 200-B-35 for Bulova Watches. Contains 35 most used Bulova Crystals. **\$57.70**

Crystal System No. 200-C-30 for Caravelle Watches. Total of 30 of most used Crystals. **\$35.00**

Master Crystal System No. 200 for Accutron, Bulova, Caravelle Watches. Consists of 72 of the most widely used A-B-C Crystals. **\$100.00**

Ladies A-B-C Fancy, Faceted Snap Crystal System No. 200 A-B-C-72. Contains 72 of the most often used ladies A-B-C Crystals. Includes Fancy, Faceted, and Snap Crystals for Accutron, Bulova and Caravelle fancy cases. **\$86.40**

***FREE!** With the purchase of any A-B-C Crystal, Crown, or Gasket Bench System.

FREE! Storage cabinet with Imprinted stock control envelopes.

FREE! Bulova Case Parts Catalog.

FREE! ABC Supplement to Interchangeable Parts Catalog.



*CROWN SYSTEMS...

Crown System No. 500-A-36 for Accutron Watches. Includes 36 of the most used crowns for servicing series 2180-2210-2300. **\$48.90**

Crown System No. 500-B-42 for Bulova Watches. Contains 42 of the most used Dust-Resistant, Water-Resistant, Double O-Ring Crowns. **\$48.00**

Crown System No. 500-C-30 for Caravelle Watches. Total 30 most used Dust-Resistant, Water-Resistant, Regular, Double O-Ring Crowns. **\$26.95**

Master Crown System No. 500 for Accutron, Bulova, Caravelle Watches. Consists of 78 of the most used Water-Resistant, Dust-Resistant, Double O-Ring Crowns. **\$75.00**

*GASKET SYSTEMS...

Gasket System No. 300-A-48 for Accutron Watches. 48 of the most often used Accutron gaskets. **\$34.95**

Gasket System No. 300-B-63 for Bulova Watches. Contains 63 of the most used Bulova Gaskets including O-Ring and Rubber types. **\$29.95**

Gasket System No. 300-C-63 for Caravelle Watches. Total of 63 Caravelle gaskets. O-Ring and Rubber types included. **\$28.95**

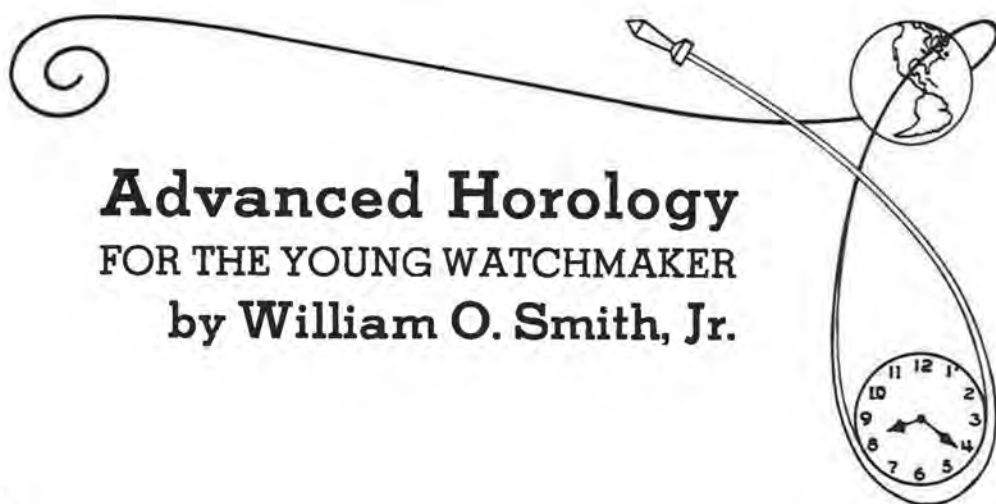
Master Gasket System No. 300 for Accutron, Bulova, Caravelle Watches. A total of 150 of the most used A-B-C gaskets. *At a cost of less than .43 cents per gasket.* **\$65.00**

Order from your Authorized A-B-C Material Distributor

Bulova Watch Company

MATERIAL SALES DIVISION

62-10 Woodside Avenue, Woodside, N.Y., 11377



Advanced Horology

FOR THE YOUNG WATCHMAKER

by William O. Smith, Jr.

WHEEL CUTTING

Much gear cutting is done today on the watchmaker's or clockmaker's lathe. The lathe is fitted with a dividing head, a slide rest, and a milling attachment. The dividing head has been selected to be the main topic of this article.

The purpose of the dividing head is to move the gear blank that is being machined the proper number of divisions in accordance with the number of teeth to be cut.

A typical dividing head incorporates an index plate, such as shown in Figure 84. The plate is affixed to the lathe spindle (see Figure 85) by virtue of set screws located in the index plate hub (hub not shown). By adjusting the position

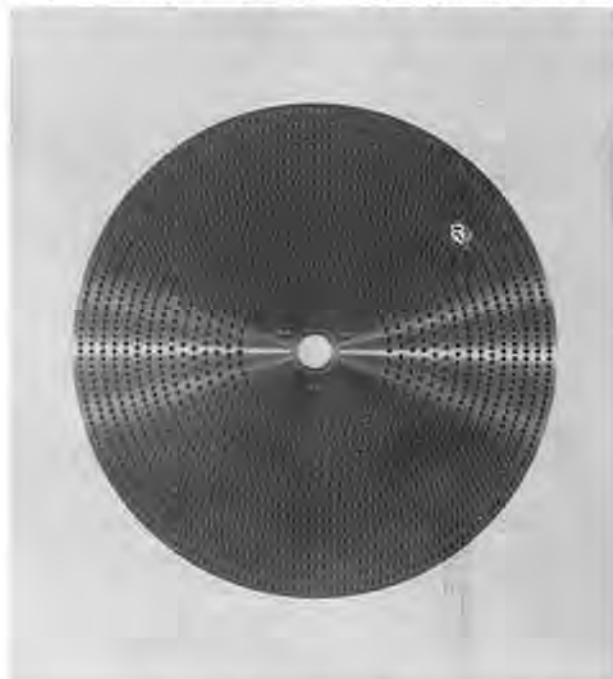


Figure 84. Index Plate
(Courtesy of Parkland College)

of the index pin arm "A," the index pin "B" may be aligned with any of the circles of holes in the index plate. The index plate shown is made by Bergeon. The number of holes in each circle is listed below:

204, 192, 180, 168, 156, 150, 144, 132, 100, 80, 76, 70, 58, 54, and 46.



Figure 85.

Little needs to be said about how the index plate is used in wheel cutting. It is, however, worth mentioning that greater accuracy in indexing is accomplished by using the circle of holes located farthest from the center of the plate.

For example, assume that a 50-tooth gear is to be cut. The 150-hole circle and the 100-hole circle are evenly divisible by 50. Thus, either circle of holes may be employed, but the better choice would be to use the 150-hole circle. The only difference in indexing on the 150-hole circle, instead of the 100-hole circle, is that each movement of the index plate will result in a movement of three holes instead of two holes.

$$(150 \div 50 = 3)$$

$$(100 \div 50 = 2)$$

When the index plate is affixed to the lathe spindle, as shown, the wheel blank into which the teeth are cut is fitted to the head stock and the gear cutter is fitted to the milling attachment. This is reversed, however, when the index plate is affixed to the milling attachment, such as shown in Figure 86. (The particular milling attachment shown is made by Boley.)

Another more elaborate dividing head is shown in Figures 87 and 88. The index plate is fitted with sector arms "D" and "E." These arms may be separated to span any num-



Figure 86. Milling Attachment Fitted with Index Plate
(Courtesy of Parkland College)

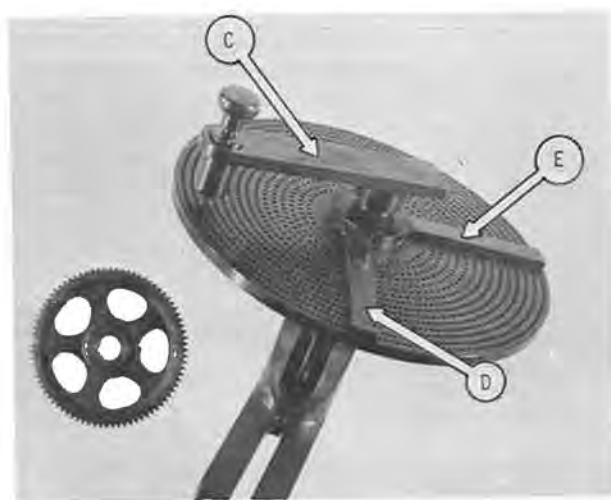


Figure 87. Dividing Head
(Courtesy of Parkland College)



I. WIDESS & SONS

607 S. HILL ST. - SUITE 820
LOS ANGELES, CALIF. 90014
(213) 626-1471

Diamonds

EMERALDS - SAPPHIRES - RUBIES

Memo to rated jewelers.

U.S. HEADQUARTERS FOR ALL SCHATZ PARTS

ALSO FOR KUNDO ELECTRONIC

GREENHILL CLOCK SERVICE

7760 FAY AVENUE
LA JOLLA, CALIFORNIA 92037



Figure 88. Dividing Head Mounted on Watchmaker's Lathe
(Courtesy of Parkland College)

ber of holes. The arms may be locked together by virtue of a set screw. The two arms, locked together, may then be moved around the index plate as a single unit. This arrangement truly provides for easy, carefree indexing.

The crank of the dividing head is affixed to a worm (see side view of dividing head, Figure 89). The worm is meshed with an 80-tooth worm gear. The worm gear is affixed to the lathe spindle (lathe spindle not shown). When the crank

(Continued on page 48)

the house that has it all

S. LaRose, Inc.
Worldwide Distributors to Horologists

234 Commerce Place, Greensboro, N. C. 27420, U. S. A.



THE SHIP'S CHRONOMETER © 1978

by Marvin E. Whitney
CMW CMC

In the horological world, when one sees or hears the word "chronometer" it creates interest and curiosity. Whether it is because horologists are familiar with the story of the "Finding of Longitude" or the success of John Harrison's Number Four chronometer, or as J. Eric Haswell stated, "It would scarcely be possible to find any instrument of greater beauty and refinement than the modern box chronometer," is difficult to assess. To me, a ship's chronometer is an exquisite timepiece and because it demands the highest degree of skill and craftsmanship, makes it undoubtedly the pride of the horological world.

Repairing a ship's chronometer is not difficult but should be undertaken only by a well qualified and experienced watch- or clockmaker. The detent escapement is touchy and cannot stand indifferent workmanship or rough handling. The usual precautions taken in watch and clock work are also applicable in the handling and repairing of a ship's chronometer. Spare parts are most difficult to come by, and, in most instances, are nonexistent; so as in the repairs of many timepieces and particularly the restoration of antique watches and clocks, the watch- or clockmaker must be able and capable of handling many types of repairs.

For nearly two hundred years ship chronometers were made abroad by individuals or small groups of European craftsmen, who designed, fabricated and assembled all the component parts, timed and adjusted them. Each chronometer became an empiricism largely as the result of long, tedious hours at the bench and the application of trade secrets which were jealously guarded. The first chronometer makers were English and French, which is understandable: England and France being the leading naval powers in the 18th century. Later, when the Swiss watchmaking industry became established, Swiss watchmakers made chronometers, and with their expertise and fine workmanship the chronometers they produced were truly gems of the Swiss Watch Industry.

Before World War II no chronometers made entirely of domestic materials were manufactured in the United States. A few firms, William Bond & Sons of Boston, Massachusetts,

John Bliss & Co., and T.S. and J.D. Negus, both of New York City, assembled chronometers from imported parts, while other firms imported complete instruments which they marketed. At the outbreak of World War II, very few chronometers were even being assembled in the United States. By the time of the attack on Pearl Harbor, Switzerland had virtually ceased supplying the United States with chronometers because the Axis Powers would not permit such exports to countries other than themselves. British chronometer makers likewise were unable to supply the United States because of the unprecedented demands of the British Navy. The U.S. Navy, therefore, turned to the domestic watch manufacturers of the United States to produce a chronometer. The Hamilton Watch Company and the Elgin Watch Company accepted the challenge. These two companies were obligated to design a chronometer and make all the necessary tools and dies before they could get into production.

Only Hamilton was able to produce a chronometer that met Navy specifications. Hamilton engineers undertook



Figure 1. Hamilton Ship's Chronometer.

to produce chronometers by mass production, something never done before. Two years later on February 27, 1942, Hamilton delivered its first chronometer to the U.S. Naval Observatory, Washington, D.C. Shortly thereafter, Hamilton was producing more chronometers in a month (Figure 1) than had been manufactured in a year in all the world before the war. When Mr. C. Jowsey, a representative of the Hydrographic Supplies Establishment of the British Admiralty, visited the Naval Observatory in 1945, he stated that the largest English chronometer manufacturer, Mercer Brothers, had reached a peak production of twelve chronometers per week.

During the month of October 1944, 546 chronometers (the largest one-month quantity) were delivered to the Naval Observatory by Hamilton. Hamilton produced 8,902 chronometers for the Navy and approximately another 1,500 for the Maritime Commission and Army.

The Hamilton ship's chronometer was a remarkably accurate instrument, performing beyond all expectations. The Navy's tolerance for the average daily rate was 1.55 sec per day. But the majority of the Hamiltons delivered and tested rated well under a half a second per day.

The basic design of the Hamilton chronometer was very similar to that of the Nardin (Swiss) chronometer, imported before World War II by the Longines-Wittnauer Watch Company (See Figure 2). The traditional chronometer was one



Figure 2. Nardin Swiss Ship's Chronometer.

with a conventional bi-metallic balance wheel, detent escapement, and a hairspring of either steel or palladium. The hairspring was helicoidal fitted with Phillip's terminal curves which permitted the expansion and contraction of the hairspring to be perfectly concentric with the center of the balance.

At first glance, the Hamilton ship's chronometer was conventional in appearance. Some of the changes that Hamilton made were for the benefit of mass production, while others were deemed necessary for the sake of excellence. Of the latter, the most outstanding innovation was found in the hairspring and balance assembly. The Hamilton chronometer differed from all other models in that the bi-metallic balance wheel and steel hairspring were replaced by a monometallic balance wheel and Elinvar hairspring. The use of the Elinvar hairspring and monometallic balance wheel gave the much sought after automatic compensation that had eluded chronometer makers for years. From the time of Earnshaw almost to the middle of the 20th century, the middle temperature error was a curse to the fine timing of watches and chronometers.

In the Hamilton balance, the arm is made of invar, which has negligible thermal expansion. The rim is of stainless steel, having a relatively large expansion. The theory of the adjustable compensation feature, is, of course, that by grouping the balance screws closely about the ends of the arm, the chronometer can be made to rate faster at 90 degrees F than at 55 degrees F. By grouping the screws about the portion of the rim at right angles to the arms, the chronometer can be made to rate slower at 90 degrees F than at 55 degrees. Hairsprings were chosen which would cause the error to fall within the range of adjustment of the balance wheel. Since the temperature adjustments were built into the chronometer by the use of the proper hairspring and balance wheel combinations, the rate always remained constant.

Elgin in designing their chronometer chose to use the split type of balance wheel which gave them considerable trouble. The timers were just unable to bring it to time and within the tolerances allowed by Navy specifications. Elgin, however, did come up with an innovative idea, the introduction of a detachable escapement assembly, which permitted the repairman to remove the complete unit (escape wheel, detent and balance wheel) from the top plate by just removing two bridge screws.

There was one other domestic manufacturer, Roth Brothers Chronometer Company, New York City, which had no previous watch manufacturing experience in the United States, but, nevertheless, undertook to produce chronometers, not for the Navy but for the War Shipping Administration. The Roth chronometer was a copy of the English Mercer chronometer and although several were produced, difficulties in obtaining certain parts and timing tolerances did not allow them to get into production before VJ-day. (Figures 3 and 3A.)

the house that has it all

S. (LaRose, Inc.)
Worldwide Distributors to Horologists

234 Commerce Place, Greensboro, N. C. 27420, U. S. A.

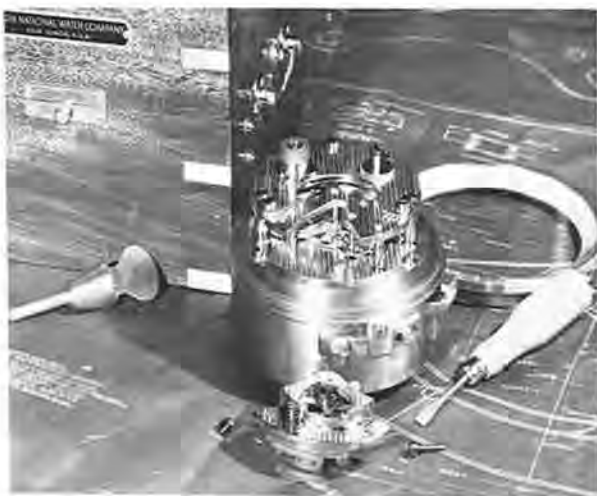


Figure 3. Elgin Ship's Chronometer.

Presently, despite the introduction of the quartz crystal movements, chronometers with a spring detent are still being manufactured. Thomas Mercer, Eywood Road, St. Albans, Herts, England, maker of chronometers since 1858,

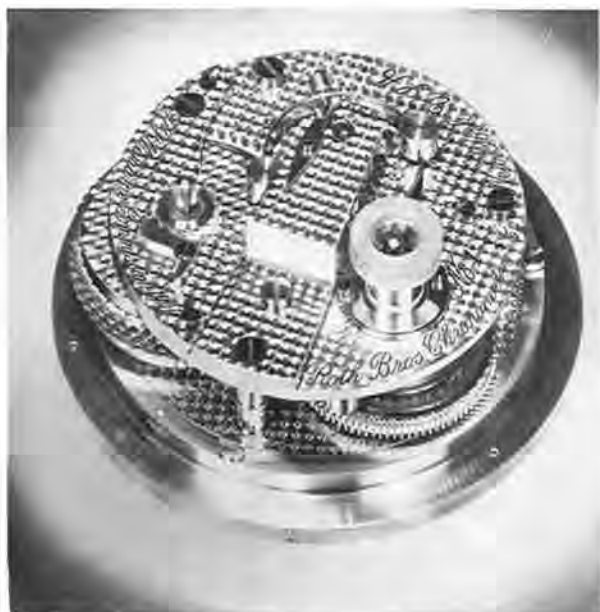


Figure 3A. Roth Brothers Ship's Chronometer.

still has a steady demand for the familiar box marine chronometer and also continues to repair all other makes. See Figure 4.

The history behind the design and construction of the ship's chronometer and the incentives offered to produce such an instrument are intriguing. The search for a method of determining longitude at sea was varied and the development of an instrument that would keep accurate time during a long voyage seemed to most men beyond the realm of possibility. The lunar distance method using the data and instruments available early in the 18th century were far from satisfactory. Many ships and lives were lost because of inaccurately determined longitudes. During the Age of Discovery, Spain and Holland posted rewards for solutions to the



Figure 4. Mercer Ship's Chronometer.

problem, but to no avail. When 2,000 men were lost as a squadron of British men-of-war ran aground on a foggy night in 1707, officers of the Royal Naval and Merchant Marine petitioned Parliament to do something. As a result, the Board of Longitude was established in 1714, and was empowered to reward the person who could solve the problem of determining longitude at sea. A voyage to the West Indies and back was stipulated as the test.

John Harrison, the son of a carpenter, born in 1693 at Foulby, near Wakefield, Yorkshire, England, has become known as the father of the "ship's chronometer." Harrison was apprenticed to his father's trade and at an early age showed remarkable mechanical aptitude. Before he was 20, he had constructed two longcase clocks. Being a carpenter, he used methods and materials which were most familiar to him. Hence, his first clocks were made of wood, including the wheels and their spindles (arbors).

Henceforth, John, with his brother James, developed a maintaining device to keep clocks running while they were being wound, the gridiron pendulum and the grasshopper escapement which did not require oiling. By 1726, the Harrisons produced two clocks so accurately constructed that one of them, according to the Harrisons, did not vary more than a second a month.

In 1714, the English Parliament offered an award of 20,000 pounds for a portable timepiece that would be seaworthy and accurate enough to determine longitude within 30 miles at sea (2 seconds per day). Although Harrison lived near the port of Kingston, he contended that he was unaware of such an award. However, when he heard of the award, he was inspired, as were many other well known English clock-makers, to make a "portable" clock for use at sea.

Realizing that this timepiece would have to be constructed of metal, that he was not familiar with metal fabrica-

tion and that he would have to do most of the work during his leisure time because of his carpenter's job, he would need additional funds. The Board of Longitude was empowered to advance grants to those persons whose inventions appeared to have a reasonable chance of success. But the Board was not the most accessible institution. Nevertheless, he took his plans, which incorporated all of the refinements included in his regulator clocks and was able to obtain an interview with Dr. Halley, one of the Commissioners. Dr. Halley, an astronomer, was also working on the problem of longitude, and thus, was reluctant to advise Harrison on the feasibility of his idea. But Dr. Halley suggested that he contact George Graham, the famous clockmaker who designed the Deadbeat Escapement. Harrison was reluctant to reveal his plans to another clockmaker, but with Halley's assurance that Graham was a man of high integrity, Harrison went to see him, because of the dire need for money to pursue his idea. Graham



Figure 5. Harrison's No. 1 Chronometer.

also assured that he and Dr. Halley would sponsor him before the Board of Longitude and he (Graham) would lend him money to finance its construction.

Returning to his home in Burrow-on-Humber, Harrison began to work on his marine clock and after four years

of patient work and many timing trials conducted on a barge on the River Humber he was satisfied that it was ready to be submitted to the Board of Longitude for test. Harrison's first marine timepiece was quite large, measuring approximately 2 ft square and 1½ ft high, weighing more than 70 lbs. Two balance wheels rotating in opposite directions were used, powered by two clock springs both acting through a common fusee, controlled by his grasshopper escapement showing seconds, minutes, hours, and days.

Harrison No. 1 Chronometer was placed on the *Centurion* which sailed from Spithead, England on May 19, 1736 and arrived in Lisbon on the 26th of May. Captain Proctor of the *Centurion* became ill and died shortly after reaching Lisbon. So Harrison and his clock were transferred to the *Oxford* for the return trip home. Although Harrison was well satisfied with the results and received a certificate from the ship's master, the Board rejected it, stating that it did not meet the requirements. (See Figure 5.)

This did not deter Harrison nor cause him to lose faith in his timepiece. Again, he approached the Board re-



Figure 6. Harrison's Ship's Chronometer No. 4—Dial View.

the house that has it all

S. LaRose, Inc.
Worldwide Distributors to Horologists

234 Commerce Place, Greensboro, N. C. 27420, U. S. A.

questing that they advance him 500 pounds so he might construct a new timepiece. Although the Board was impressed with Harrison's perseverance and ingenuity and agreed to advance him the 500 pounds, they imposed additional conditions which were not to Harrison's liking. Nevertheless, he accepted them.

Between the years of 1735 and 1761, he submitted four marine clocks before having one accepted. In November 1761, his son William, and Number 4 (Figures 6 and 6A) were placed on the sailing vessel, *The Deptford*, bound for the West Indies. Upon returning home after five months at sea, Harrison's chronometer varied only one minute and 53 seconds,



Figure 6A. Harrison's Ship's Chronometer No. 4—Movement View.

less than a half a degree of longitude, well within the requirements set forth by the Board of Longitude. Although his timepiece met all the conditions for winning the much coveted prize of 20,000 pounds, the Board delayed making the award, declaring that even though the results were astounding, they may have been arrived at through a combination of errors.

Still Harrison had faith in his ability and timepiece, but each time he requested additional funds to continue his work, the Board continued to make additional demands. By now, Harrison was nearing 80 and his sight was failing. Finally, the Board's hypocritical attitude got the best of Harrison, and he appealed directly to King George III. The Harrisons were granted an audience with the King. After hearing John Harrison's story, he said, "By God, Harrison, I'll see you righted!" Thus, after some 40 frustrating years dealing with an insensitive Board, John Harrison was awarded the prize by the English Parliament.

Between 1767 and 1770, Harrison and his son, William, constructed No. 5 Chronometer, which was tested in the King's observatory (Kew) and was found to have a total error of only 4½ seconds in 10 weeks.

Harrison's Nos. 1, 2, 3, and 4 Chronometers are all running and on display in the National Maritime Museum of England, a fitting memorial to a man who became known as Mr. Longitude. He died in London in 1776 at the age of 83.

During 1963, the United States Naval Observatory, Washington, D.C., was accorded the rare privilege by the British Admiralty of displaying John Harrison's timekeeper No. 4, the forerunner of the modern marine chronometer which will be dealt with in succeeding articles. □

SWISS WATCHES—STRENGTHENING OF AFTER SALES SERVICE IN THE UNITED STATES

In order to strengthen the after-sales service for watches of Swiss origin on the American market, "The Swiss Watch Technical Center, Inc." (SWTC), has recently opened a new industrial building in Lititz, Pennsylvania.

This center, established in 1970 for servicing and reconditioning mechanical and especially electronic watches and movements of Swiss origin sold in the United States, is



financed by Ebauches SA, Neuchâtel, Switzerland. The center is at the disposal of importers and wholesalers who represent the Swiss watch manufacturers on the U.S. market. Its output has increased from 4,000 units in 1970 to nearly 60,000 in 1977. The premises and the very modern equipment, which have just been inaugurated in Lititz, make it possible to absorb without difficulties a steadily growing demand. Under the management of J.P. Savary, President, and W.E. Giroud,



Vice President and Technical Director, the center now has 38 employees. It is an important element in promoting Swiss watches in the United States.

Also at this time, a branch of the SWTC is being opened in Long Beach, California. Its goal is to provide the West Coast with even a more prompt repair service than in the past. These two facilities comprise the first stage in the creation of a network of centers to service the entire United States.

The inauguration of the SWTC in Lititz took place in the presence of a large audience, including local and regional authorities, Mr. Suter, Swiss Consul General in New York, Mr. Balmer and Mr. Sommer, respectively President of the General Management and commercial manager of Ebauches SA, Mr. Pasteur representing the Federation of Swiss Watch Manufacturers and Mr. Gordon, Attorney and Chairman of the Board of WOSIC and SWTC. □

REPLACE
YOUR OLD
WORN
CATALOG

FREE
FROM
BESTFIT®

BESTFIT BATTERIES BESTFIT 111-111A CATALOGS

FOR OVER 50 YEARS —
YOU KNOW
YOU CAN RELY ON BESTFIT QUALITY



ALL BATTERIES ARE PRETESTED AND GUARANTEED
ASSORTMENT CONTAINS

BESTFIT® #246 (Ucar 357)
BESTFIT® #275 (Ucar 386)
BESTFIT® #281 (Ucar 392)

BESTFIT® 111 OR 111A CATALOG FREE!

With purchase of 30 batteries consisting of 10 each
BESTFIT #246, 275, 281 Batteries.*

30 Cells at regular price \$36.00
BESTFIT Catalog (111 or 111A) 6.50

TOTAL 42.50

YOU PAY FOR BATTERIES ONLY 28.50

YOU SAVE 14.00

☐ ZX8-78/111- PART I \$28.50

☐ ZX8-78/111A- PART II \$28.50

SPECIAL COMBINATION BUY BOTH and SAVE MORE!

With package of 60 Batteries consisting of 20 each #

60 Cells at regular prices \$72.00
BESTFIT 111-111A Catalogs 13.00

TOTAL 85.00

YOU PAY FOR BATTERIES ONLY 53.95

YOU SAVE 31.05

☐ ZX8-78/111-111A \$53.95

SPECIAL INTRODUCTORY OFFER

36 BATTERIES + 5 FREE
Only .78¢ a Battery

24 BATTERIES + 3 FREE
Only .80¢ a Battery

12 BATTERIES + 1 FREE
Only .83¢ a Battery

ORDER FORM

✓ CHECK TO ORDER

☐ ZX8-78/111	— 30 Batteries with 111 Catalog	\$28.50
☐ ZX8-78/111A	— 30 Batteries with 111A Catalog	\$28.50
☐ ZX8-78/111-111A	— 60 Batteries with 111-111A Catalogs	\$53.95
☐ BAT-41	— 41 Batteries — 36 + 5 FREE	\$31.95
☐ BAT-27	— 27 Batteries — 24 + 3 FREE	\$21.60
☐ BAT-13	— 13 Batteries — 12 + 1 FREE	\$10.75

B. JADOW and Sons, inc.

53 West 23rd Street New York, N.Y. 10010

— Sold Through Wholesalers Only —



Questions and Answers

by Henry B. Fried

CMW

CMC

FBHI

J.M. BADOLLET

Q. Enclosed you will find a picture of a collage made of watch parts. You may be familiar with this type of arrangement. This mounting belongs to a very good friend of our President, and



of the same name of Paris who operated as early as 1712 in Paris at the Quai Pelletier in 1748. In 1800 the family business moved to Rue de Sentier. A branch existed there in 1872. In the meanwhile the company had branches in England. In 1873-75, the firm was the first to win first prize of the Observatory awards with a prize of 400 francs. This is quite notable since this was the first occasion of the institution of the awards from the Geneva Observatory.

The J.M. Badollet & Co. of London started there in 1844 until 1851. They were succeeded in 1881 by Huguenin, Son and Hall. Records also indicate that a Paul Badollet operated in New York as early as 1798.

Obviously the collage is made up of the centerpiece movement. Upon examination, this calibre closely resembles the early Agassiz calibres, later incorporating the latter's special snail-regulator graduation. It is quite possible that this movement or one like it was the winner of the Geneva trials in 1873-74-75. The collage is composed of successive stamping from the ebauche and of finished and unfinished parts, escapements, etc. It makes up a presentation of an attractive and proud production by the company with the monogram composed of pallet and pallet bridge stampings.

As to putting a value on something like this, it is difficult since its value depends chiefly on estimating just what someone will pay for this melange, attractive as it may be.

he would like to know the value, if any, and the selling possibility.

I would appreciate your views on this matter, and I thank you in advance for your help.

Gerard Progin
 Portescap U.S.
 New York, New York

A. I have the photo of the J.M. Badollet collage before me and I think that it would be a good idea to learn what I have uncovered about the maker.

The Badollet family were prolific makers of fine watches from the late 18th century up until the first two decades of the twentieth century.

The J.M. Badollet & Co. who made the watch and the parts which make up the attractive collage was probably that of Jacques Marc Badollet. He was a descendent of the Badollet

Continental Third Wheel

Q. I am in need of a third wheel for an 18-S watch made by the Continental Watch Co. I have no sample. AWI suggested that I ask you where I might obtain one or where I might have one made.

I have tried BMS Material in New York and all the local suppliers, such as G & G Miracle House, Swartchild, Jewelmont, all without success.

Orrin O. Bergey
 Mount Horeb, Wisconsin

A. The Continental Watch Company was a name used by the A.C. Becken Company around the turn of the century for their Swiss imitation American 18 sized movements. These appeared under many names such as the Marvin Watch Com-

134 Reasons to buy from BOREL

In BOREL's seven handy locations there are 134 dedicated employees anxious to serve you. Experienced employees that only a company in business 57 years could have assembled.

But, you get more than people when you deal with Borel. You get special Products. Products that are exclusively BOREL ... of a quality and selection not matched elsewhere.

That's a Fact! **No one can touch famous BOREL Specialties:**



All are available in a wide array of assortments, in handsome cabinets with detailed charts. And refills are always available, beautifully packaged for maximum convenience. Write for samples. See for yourself the quality and selection that have made BOREL famous.

If BOREL carried only these specialties, it would be a great place with which to do business. But, specialties are only the beginning. We stock the complete range of watch material, findings, tools and supplies. We carry a large stock of watch batteries, too, and sell them in such quantities that you can depend on them being factory fresh. (At prices that are among the lowest!)

As times change, **we try hard to anticipate your needs!**



The Borel Quartz Timer is a good example. Every jeweler who replaces watch batteries will find this unit of great value. Regulate each watch that comes in for new batteries. The Borel Quartz Timer is priced so low you can't afford not to own this Customer Drawing Card. It's great for building profitable traffic.

Now, more than ever — BOREL wants to be your material house! Why not write for details of BOREL specialties, today? We'll send you samples, too! The rest will come naturally.



BOREL wants to be your supply house!

Borel Group, 1110 Grand Ave., Kansas City, MO. 64106

DISTRIBUTION CENTERS

CLEVELAND • KANSAS CITY • LOS ANGELES • MIAMI • NEW YORK • OAKLAND • PITTSBURGH

BB-Stella

FITTING GLASS WATCH CRYSTALS YOURSELF

*Increases profits . . .
delivery . . .
customer satisfaction!*

Thanks to a new concept in glass watch crystal design TAPERED SIDES you can reduce an oversized crystal by .2mm with the least amount of effort. "BB Glass Crystal Kits for Retailers" include crystals and all the tools required to do taper-fitting yourself.

Now you can meet the growing demand for the high luster and professionalism of glass watch crystals. Use the kit for taper-fitting crystals to LCD, quartz analogue and conventional watches.



Kit #100	BB-Perfit glass crystals (48)	\$48.00
	Vernier gauge (with dial)	10.00
	Glass crystal cement	1.25
	Emery cloth applicator	3.50
		\$62.75

Special introductory price **\$57.50**

Kit #200	BB-Perfit glass crystals (96)	\$96.00
	Vernier gauge (with dial)	10.00
	Glass crystal cement	1.25
	Emery cloth applicator	3.50
		\$110.75

Special introductory price **\$100.00**

Each kit includes an up to date catalogue, instructions for usage and the most popular crystals to assure quick inventory turnover.

**STAY AHEAD OF THE INCREASING DEMAND
FOR GLASS WATCH CRYSTALS**

ORDER TODAY FROM YOUR MATERIAL WATCH WHOLESALER



CRYSTAL COMPANY
653 11TH AVENUE
NEW YORK, NEW YORK 10036

pany (who really made these in Switzerland) and many fake American-sounding names. Many such movements still abound and I have a few in my collection of "fake" American watches under various different American sounding names. Even should you obtain such a movement to cannibalize it for your third wheel, it would have to be fitted and adjusted by a very good watchmaker, since most of these did not fit like the real American watch parts do.

For your wheel, you might try: R.T.S. Company, giving them the information I have supplied. Their address is: Suite 207, 424 S. Broadway, Los Angeles, CA 90013; or W.E. Benjamin Co., 387 Washington St., Boston, MA 02108; or H.R. Stodder, 213 S. Franklin St., Holbrook, MA 02343.

Give them the same information. Listing these names does not constitute a recommendation and we assume no responsibility of any kind resulting from this.

Hampden Railway

Q. A friend, who is a brand-new member of our NAWCC, asked me to learn whatever we could about an item in his collection. He has, just within the past five months of membership, narrowed his interest to watches and/or cases made in Ohio. Presently, he is trying to collect, and learn about, Hampden watches and Dueber cases.

He has a Hampden watch that, to me, is most unusual. Now I don't pretend to have seen, or heard about, *all* Hampdens; nevertheless, in my eight years of reading and listening and looking, I've run across quite a few. But I haven't encountered the 18s 21j "North American Railway."

My friend drew a sketch of this watch as seen with the backplate removed, and accompanied it with a verbal description. I am attaching his description: 18 size, HC, double



sunk dial marked Hampden Watch Co. in script. Plates same as illustration on page 21, watch 1, of Ehrhardt's American Pocket Watch etc. book—which is marked Dueber Watch Co. The shape seems unique in the Hampden line as no others of this plate arrangement are illustrated. The finish is equal to the Special Railway and I don't believe it to be other than Hampden manufacture. We would be very grateful for information that you may provide us.

An addressed, stamped, envelope is enclosed for your convenience in reply.

Dewey Blair
Cincinnati, Ohio

A. The "North American Railway" is a model of the Hampden

1978 AWI EUROPEAN HOROLOGICAL TOUR

April 19 — May 7, 1978

Conducted By
HENRY B. FRIED

SWITZERLAND!	Basle Fair - Watchmaking Industry
GERMANY!	Black Forest - Watch and Clock Museums - Jewelry Factory
AUSTRIA!	Watch and Clocks - Music - Good Living
HUNGARY!	Horological and Art Museums - Lake Balaton
DENMARK!	World's Most Complicated Clock - Tivoli Gardens

All inclusive tour price from New York \$1668.



Space is limited! For detailed tour brochure and for further information contact:

KUONI TRAVEL, INC.

11 EAST 44 STREET, NEW YORK, N. Y. 10017
Telephone: (212) 687-7190.

Watch Company. I have notes in my own records of having seen this inscription on Hampden watches of higher jewel content. The movement plates are of the same pattern as you point out in Ehrhardt's book, although he pictures another in his first edition, page 31.

A similar watch and movement are pictured in the booklet, The Dueber-Hampden Story by J.W. Gibbs, page 37. Here the movement is 23 jewels, its name was "Special Railway" (\$35.00). It is beautifully damaskeened and is almost exactly like your sketch.

Chelsea Material

Q. This is to thank you for your letter from August 7.

I was a little amused at your suggestion that I should ask the local watch- or clockmaker where I should obtain the needed parts for the Chelsea Mantel Clock, since I am the licensed clock repair shop in my area! I tried your idea about using the pallet jewels from a broken platform escapement, after playing around with the depth of the jewels in relation to the escape wheel—it is now operating very well!

I had written to Rudolf Flume before writing to you; however this firm has a bug on their back side against Americans owning clock shops in Germany. Bergeon and Hugh Buchser S.A. Switzerland as well as Kaden & Wolberg of Frankfurt, Germany have now heard of my problem and are willing to help one and all. Your letter mentions the firm of Witschi—would you have any idea where in Germany they would be located?

I am also the proud owner of two of your books, *The Electric Watch Repair Manual* and *Bench Practices for Watch and Clockmakers*. I thank you for the information therein, which has been a great aid to my shop.

John K. Spurrell
Kaiserlautern, Germany

A. It was good to learn that my suggestion bore fruit! Chelsea has this reticence but I think they may relax in regard to selling parts. Incidentally, I bought a few master clocks with Waltham eight-day movements providing an electrical impulse each minute. When I opened two others to look at the move-

the house that has it all

S. LaRose, Inc.
Worldwide Distributors to Horologists

234 Commerce Place, Greensboro, N. C. 27420, U. S. A.

ments, inside were spanking new Chelsea, gold-plated movements (antioxidation for War use) with platform escapements. Since they only provided an impulse each sixty seconds, the center posts and wheels were merely part of the going train and not extended nor have they dial trains, ... but beautiful nonetheless.

It was interesting to read of the reluctance of the big ones in Germany to supply you. Witschi, F.Fils is in La Chaux de Fonds (not, as I inadvertently put them, in Germany). Witschi's address is: rue Croix Federal S. They are a large house.

Incidentally, our fourth AWI tour to Europe will be mostly in Germany.

Welch Clock

Q. I recently received a Welch clock for repair. It was missing both verge and pendulum rod. With parts I had in the shop, I



set the clock up as you see it in the enclosed photographs. It will not stay in beat and eventually stops.

I would appreciate any information you can supply



about this movement. A photograph or sketch of the original verge would be particularly helpful.

I have found little information about it locally.

Peter Romano
Huntington, New York

A. If your clock will not stay in beat, it is not because of the parts you have fitted. Most often and almost certainly, it is because your escape wheel is not round or else the escape wheel bearing hole is very much worn.

Place your escape wheel in a caliper or the lathe and observe its teeth; see whether they are the same length, whether they are bent (a frequent cause for a clock going out of beat for part of a minute, then sounding fine and then when the bad teeth (bent, unequal, worn, or short) come into play again, the symptom is again one out of beat.

The Welch model you have has what we would call a divided lift escapement. That is, the tips of the teeth are not pointed as in most such clocks but have an incline and take over part of the lift, sharing it with the small incline surface of the "verge" pallets. The verge you've fitted should do. See the October issue of Horological Times, "fitting the verge" by James Tigner.

Waterbury

Q. Your column is most interesting. I wonder if you would help me find some information on a pocket watch that a customer brought in for repair.

It is a 6 size open face, gold filled case, with the name Addison on the dial and the movement. It is a full 3/4 plate, with the balance also attached and it has a star wheel (or I believe, duplex) escapement. On the pillar plate are listed the patent numbers, six of them, starting February 3, '74 through March 31, '86.

I cannot find anything on this company in any of my books, and would appreciate any history of the company that you could supply.

Donald Braekevelt
Fraser, Michigan

A. The Addison was a model of the Waterbury Watch Company of Connecticut. The New England Watch Company was a successor to this company, later selling out to the Ingersoll Company. Today that company is Timex. The Waterbury-New England companies used the duplex escapement for most of their models and many, many were made.

The history of the American watch companies does list this company and much has been written about it. These are interesting escapements and there are still many of this company's watches ticking away.

Balance Pivot Sizes

Q. I have a question that has puzzled me for some time. Why is it that the older model American pocket watch movements utilized more than one diameter of balance staff pivots? (In a given model.)

For example, looking at my copy of the Waltham 1948 material catalog, page 22, I see that in the case of their

18 size Model 1883 movement, balance pivots range from .10 to .15 mm!

Why didn't they predetermine the optimum diameter when designing the movement, and stick to it, as is done today with the modern movements? That certainly would have reduced the inventory requirements for staffs and balance hole jewels for us now, as well as for them back in yesteryear!

It always seems that every time I have to replace the staff or balance hole jewel in one of these oldies, I have every size there is except the one needed for the job in hand! Not to mention the extra time required to carefully measure everything to be certain of using the correct size replacement!

I hope you know the answer to this question, as it's been bugging me for some time.

Willard W. Halsted
Omaha, Nebraska

A. The reason for the variety of pivot thicknesses on American watches of older vintage was that for the lower jeweled movements, the thicker pivots were used. Firstly, for practical reasons, the cheaper watches were bought mostly by the common laborer or worker who gave his watch much more abuse than the professional person or wearer of a fine, highly jeweled watch. Secondly, to produce a balance staff pivot of thin measurements was more difficult since the final polish and finish were done by hand on a type of Jacot pivot polisher and runner while the thicker pivots could merely be finished more coarse and without the delicacy and finesse of a separate, skilled operator or operation. The technology at the time, while ahead of the rest of the world, had not yet reached modern standards to produce and provide uniformity with ease and economic standards.

Roller Jewel Feeler Gauge

Q. I am a student at Houston Technical College of Watchmaking.

In your book *The Watch Repairer's Manual*, on replacing roller jewels you mention a set of feeler gauges to determine the width of the jewel pin. Can you tell me where I can purchase these gauges, as I have been unable to find a supply house that stocks them.

J. E. Brack
Houston, Texas

A. I have inquired of the two importers of tools (B. Jadow and Hammel Riglander). At this time none carries this gauge, although both are aware of it. They claim that since the call for these is rather sparse, when their stock recently ran out, they did not reorder.

When the last edition of my Manual was revised just a few years ago, these tools were still available. However, one

Do You Know WATCH/JEWELRY REPAIR AND STONE SETTING

Tuition: \$30.00 per month
Fully Accredited — Individual Instruction
28 Years of Service to Industry

KILGORE COLLEGE

1100 Broadway, Kilgore, Tex. 75662 — Ph. 214-984-8531

of the people at Jadow whom I called just now promises to let me know should these be again in stock.

Dueber Hampden

Q. Will you please identify the 18 size movement pictured in the accompanying photos. The balance staff is broken.

Robert C. Markley
Willo St., Pennsylvania

A. The photographs reveal a Dueber-Hampden 18 size, open faced, lever set movement. I believe staffs for these can be had



from Manfred Trauring, 87 Nassau Street, New York, New York 10038.

The original name on the plate with the Wilmington address is almost certainly the jeweler. A search through the city's old directories should prove this. □

the house that has it all

S. LaRose, Inc.
Worldwide Distributors to Horologists

234 Commerce Place, Greensboro, N. C. 27420, U. S. A.

CAS—KER CO.

P.O. Box 2347
Cincinnati, Ohio 45201
Ohio (513) 241-7073
National 1-800-543-0408

ESSLINGER & CO.

333 Sibley
P. O. Box 43561
St. Paul, Minnesota 55164
Call Toll Free 800-328-9366
In Minn. call collect 612-224-3348

EWING BROS.

P.O. Box 445
Tucker, Georgia 30084
Georgia: 1-800-282-9220
Other States: 1-800-241-9081

VALU
CRAFT

What is Valu Craft? ... Valu Craft is an organization of independent suppliers

Tempo 355

Parts Cleaning Machine



Watch cleaning for the space age. Trouble-free as a satellite.
Four solution jars — 1. clean 2. rinse 3. rinse and lubricate
4. lubricate ... in one automatic operation

... plus in-line drying chamber.

Solid state programmable basket
motor speeds for all positions.

Solid state electronic
timers for all five positions
adjustable even drying cycle.

Built-in additional auxiliary
drier for simultaneous
drying and cleaning.

Mechanical lift, no
leakage. Simple control
panel. **New solid state
ultrasonic generator
and transducer.**

Beautiful! Best
yet: Two-year
warranty.

COMPLETE . . . \$1,395.00

IMMEDIATE DELIVERY:

ADVERTISED ITEMS AVAILABLE

CAS—KER CO.

P.O. Box 2347
Cincinnati, Ohio 45201

ESSLINGER & CO.

P. O. Box 43561
St. Paul, Minnesota 55164

EWING BROS.

P.O. Box 445
Tucker, Georgia 30084

VALU
CRAFT

PLUS FROM
U-
T.M.
FT

LANGERT BROS.

1620 W. Camelback Road
P.O. Box 27487
Phoenix, Arizona 85061
Arizona: 1-800-352-0398
Other States: 1-800-528-0331

MAYER BROS.

P.O. Box 750, Seattle, Wash. 98111
Wash.: 800-552-7415
Other States: 800-426-0800
P.O. Box 3423, Portland, Ore. 97208
Ore.: 800-452-1331
Other States: 800-547-1257

THE NEST COMPANY

915 Olive Street
St. Louis, Missouri 63101
Wats Lines
Mo.: 800-293-7741
National
800-325-7090

the jewelry industry, organized to offer you the best values at the lowest possible cost

L&R Micromat With 5:1 Electronic Lens,



NOW PRICED UNDER A THOUSAND DOLLARS.

The L&R Micromat with 5:1 Electronic Lens is the only timing machine of its kind priced under \$1,000.00. Fully transistorized to facilitate instant operation with the flick of a switch, built to handle all types of watches.

Special \$995.00 price maintained.

IN STOCK AT ALL **VALU CRAFT** DISTRIBUTORS

PLUS FROM
LU-
T.M.
FT

LANGERT BROS.

P.O. Box 27487
Phoenix, Arizona 85061

MAYER BROS.

P. O. Box 750 Seattle, Wash. 98111	P. O. Box 3423 Portland, Ore. 97208
---------------------------------------	--

THE NEST COMPANY

915 Olive Street
St. Louis, Missouri 63101



In the Spotlight by Orville R. Hagans

CMW

CMC

FBHI

FROM THE ORVILLE R. HAGANS
MANUSCRIPT AND PHOTO LIBRARY



THE RASMUS SORNES CLOCK NO. 4

FROM THE OUTSTANDING COLLECTION OF
SETH ATWOOD IN THE TIME MUSEUM
ROCKFORD, ILLINOIS

Historians and horologists will undoubtedly debate whether this clock or the Jens Olsen clock in Copenhagen is the most complicated clock ever constructed.

Rasmus Sornes was born near Stavanger, Norway, in 1893, and spent all of his spare time for 35 years building four clocks. The first clock was finished in 1937. In 1958, he retired as a radio technician to spend full time planning and building his masterpiece, Clock No. 4.

It is thrilling and incredible to think of the life of this modest man who, in a little village in Norway, taught himself astronomy—made most of his own tools—and built for mankind one of the most precise and beautiful mechanisms ever made. Rasmus Sornes died in January 1967 before he could build a suitable cabinet for his silver and gold-plated mechanical universe.

Mr. Sornes decided that this clock, which is considerably larger than his earlier three clocks, should be of a very solid construction and also be as simplified in its construction as possible. It was driven as a pendulum clock, its weights being automatically rewound by electricity, and supplied with a 24-hour working reserve, if the electric current should be cut off.

The clock dials are mainly located on the front side. The largest and most important of the drives, controlling the orbit of the sun and moon, is placed at the top together with seven auxiliary drives. Four of these drives are used to control and reproduce the eccentricity of the moon's orbit, and the three others are for the sun's apparent position, the lines of aphelion and perihelion and the connecting lines between the nodes of the moon.

The clock is also equipped with a day counter that shows the so-called "Julian Number," which is, so-to-speak, the calendar of the astronomers. The days are simply numbered consecutively starting with January 1, 4713 B.C.

The purpose of the auxiliary trains is to achieve the greatest simulation of the actual orbit of the sun and moon as possible, and to show solar and lunar eclipses with accuracy.

In the famous Strasbourg clock, this is achieved by using very big toothed wheels. In this clock, the length of the year is fixed to 365.242222 days using toothed wheels up to 269 teeth. In Mr. Sornes' clock the length of the year is 365.242278 and the largest toothed wheel has 139 teeth. The correct length of the year is 365.24229879. This positive deviation in Clock No. 4 will, after 1000 years of undisturbed running give as a result that the hand showing the sun time will be 1/10 of a degree incorrect. This, however, will not be easy to observe! The works that show the movements of the stars have a deviation that is less than 1/10 of a second per year. The Jens Olsen clock has a negative time deviation in very nearly the same proportion.

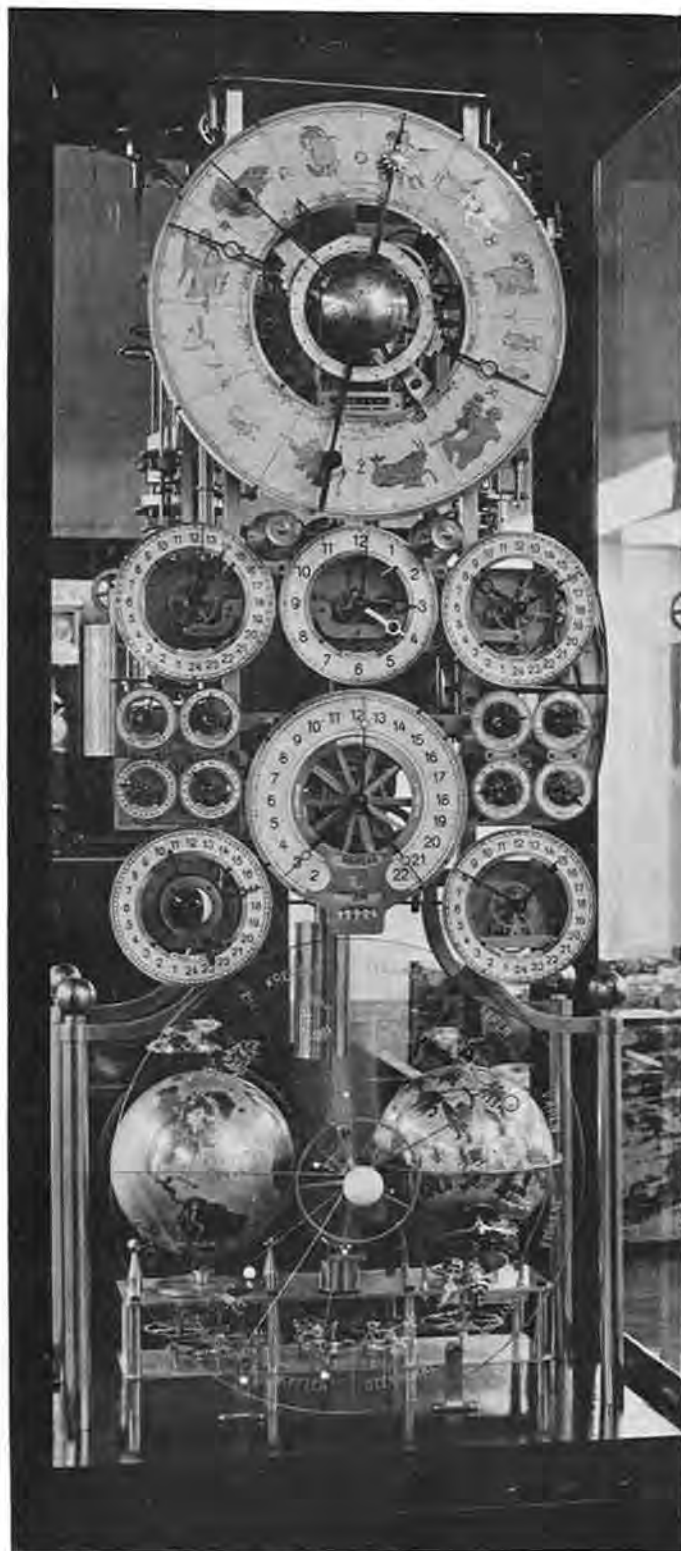
The calendar works take into consideration the uneven number of days in the months, naturally also the leap years, and even the 400 leap year period adjustment. Leap year is omitted in those centenary years that are not divisible by 400. This is one of three clocks ever constructed to incorporate a truly perpetual Gregorian calendar.

The front of the calendar drive has a dial plate with three hands, showing the sunrise, when the sun is in south, and the sundown for 60 degrees northern latitude.

The clock is also equipped with an old Nordic "Julian calendar stick," the so-called "Primstav," with its old symbols for ecclesiastical events and graduated for each day and with the names of the months. These symbols are etched in black glass and filled with white lacquer on a dial on the right side.

The earth globe and the star globe are located in the lower part of the astronomical clock, both having double movements. The earth globe runs its daily 24 hour rotation period, and the inclination of the axis revolves round the sun once a year, in order to make it possible to observe the sunrise and sundown all over the globe, thereby giving also the seasons of the year. The star globe rotates according to sidereal time. A horizontal ring indicates the horizon. Stars that are over this ring will appear if it is dark. To visualize this, the star globe is illuminated from the inside, and holes are made for the most prominent stars.

About 23 degrees from the pole star (Stella Polaris), there is another point, "the pole of the ecliptic." This celestial sphere makes a revolution in approximately 26,000 years (the precession period). To the earthbound observer, the celestial equator appears to rotate slowly westward (50.2 sec



EVEREADY Watch Batteries
FROM
A.G. BARTHOLOMEW, INC.

PRICES

ITEM	COST	ITEM	COST
201	\$1.38	354	\$0.96
301	0.75	355	1.19
303	0.88	357	0.96
309	0.80	384	0.96
313	0.92	386	0.96
323	0.96	387	1.10
325	0.80	392	0.96
343	0.96	393	0.96

PLUS **10% DISCOUNT** OFF INVOICE.....

ALL ORDERS RECEIVED BY MAIL OR PHONE BY 11:00 A.M.
ARE SHIPPED BY UNITED PARCEL SERVICE OR U.S. MAIL
AT 4:00 P.M. THE SAME DAY

- POSTAGE PAID ORDER FORMS
- FREE DISPLAYS
- NO SHIPPING CHARGE
- FREE TECHNICAL DETAILS
- NO MINIMUM ORDERS
- BONUS PROGRAMS

SEND YOUR NEXT WATCH BATTERY ORDER TO.....

A.G. BARTHOLOMEW, INC.

BOX 467
PAINESVILLE, OHIO 44077
PHONE (216) 951-8383

of an arc) and this cycle of rotation consumes 26,000 years.

In front of these globes in the vertical plane is the representation of our solar system. The glass disc shows the zodiacal symbols with their Norwegian names. The sun in the center is illuminated from inside. The earth has its moving moon, and one finds all the planets including the outermost planet, Pluto, having an orbit lasting about 248 years. This is the only clock made showing Pluto's orbit.

The planetary deviations are on the order of plus or minus 1/10,000.

The drives are made of brass (MS 58), which is electro gold plated. The discs are silver-plated and varnished with a clear lacquer to prevent oxidation. The symbols on the discs and globes are of gold on a silver backing.

The calculations and mechanism to achieve these results must be accorded some considerable reverence. □

← Rasmus Sornes Clock No. 4

Make Us Your **HEADQUARTERS** for **WATCH BATTERIES**

EVEREADY - DURACELL - RAY-O-VAC - HAMILTON - ACCUTRON - CARAVELLE - SEIKO - LONGINES - GRUEN - WITNAUER

We Also Give Same Day Service on All Jewelers Tools and Watchmakers Materials and Supplies.

Order From

B. RUSH APPLE CO.

Phone (813) 870-3180

3855 W. Kennedy Boulevard - Tampa, Florida 33609

DRAWINGS OF UNUSUAL ESCAPEMENTS

from Photo Library of

Orville R. Hagans, CMW, CMC, FBHI

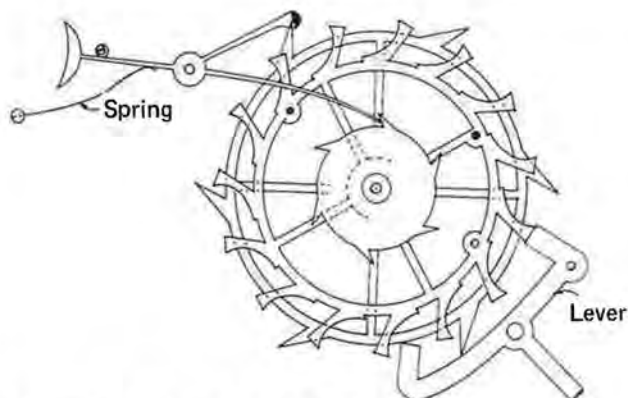
These drawings of unusual escapements were measured and drawn by the late Oscar T. Lang of Minneapolis, Minnesota, from clocks and watches he possessed.

Mr. Lang had over 70 different watch escapements and over 40 different clock escapements. For years he constantly sent me copies of his drawings; some have been published, some have not.

We are presenting them at this time to help those interested in the unusual to recognize and perhaps aid in your repair and restoration.

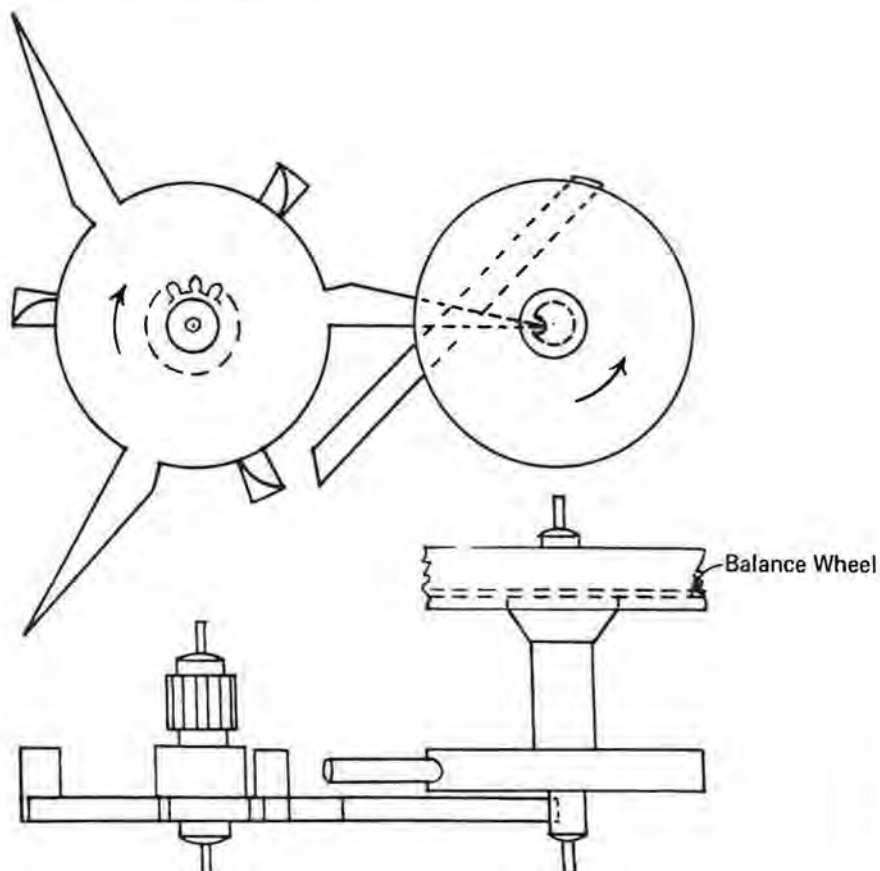
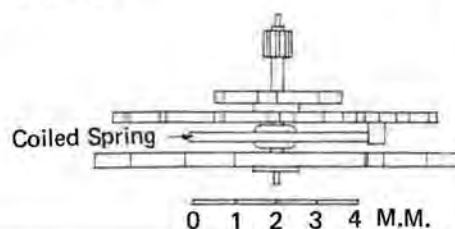
No technical data except those appearing in the drawings are given. No one book contains the many different escapements.

Today as in the future we may expect to encounter numerous versions, so it is well to retain such material in your reference files.

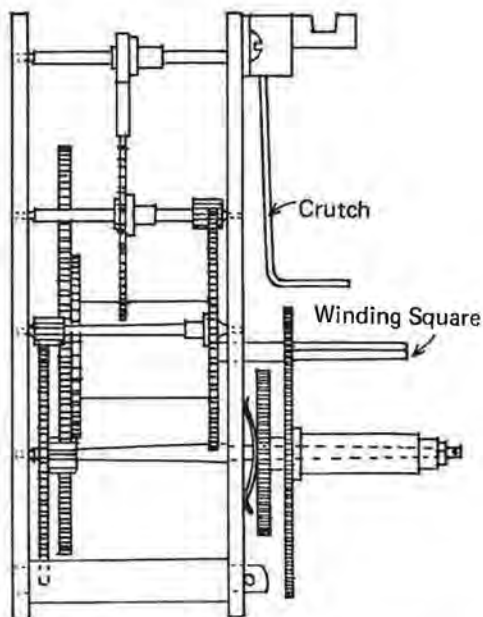


CONSTANT FORCE ESCAPEMENT

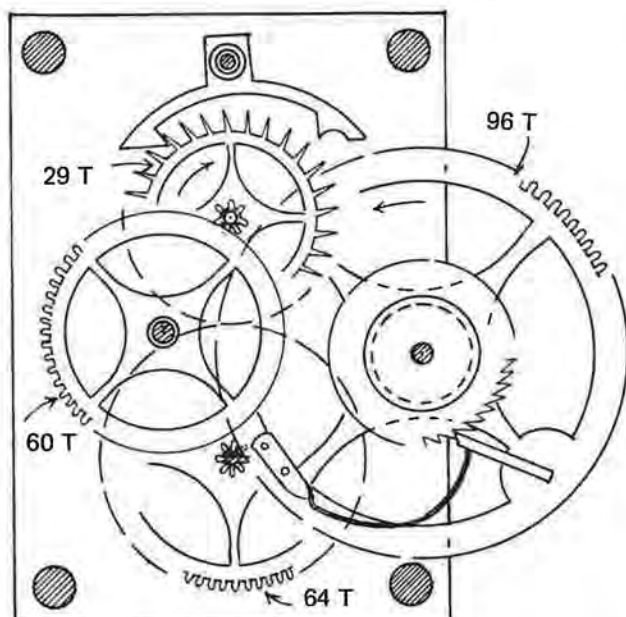
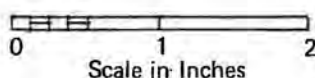
in Watch by
A. Lange & Sohne
Glashutte B/Dresden



CHAS. E. JACOT'S
STAR DUPLEX
Patented July 20, 1852
No. 290
Watch Escapement
45 M.M. Dial



Side



Elevation of Train (Front Plate Removed)

E. HOWARD & CO. BANJO CLOCK
Weight Driven

DON'T TURN AWAY ORIENT WATCHES FOR REPAIR. WE CAN SUPPLY MOST PARTS FOR ORIENT.

HELP US TO PROCESS YOUR ORDER CORRECTLY THE
FIRST TIME BY INCLUDING ALL OF THE FOLLOWING
INFORMATION:

- A — MOVEMENT CALIBER NUMBER.
- B — ALL NUMBERS FROM BACK OF CASE.
- C — COLOR OF CASE.



KILB & COMPANY

623 N. SECOND ST.

P.O. DRAWER 8-A

MILWAUKEE, WI 53201



KIENZLE *associated with
time since 1822*

Battery Operated (1.5v) CLOCK MOVEMENTS



Quartz Movements (4,1943 Megahertz)

- Standard 12 Hour
- 24 Hour
- Day Date
- Pendulum
(8, 10, 12, 14, 18, 21")

All clock movements, self-starting, with or without sweep, 17.5mm or 22mm (.689" or .866") center shaft. Complete with fittings.



Electronic Movements (5 Hz—36,000 per/hr)

- Standard 12 Hour
- 24 Hour
- Bell (1 strike per/Hr)
- Pendulum
(8, 10, 12, 14, 18, 21")

Kienzle manufactures and services a complete line of Movements, Automobile Clocks, Timers, Wall and Desk Clocks and Watches.

Immediate delivery. Call or write for details.

KIENZLE TIME CORP., INC.

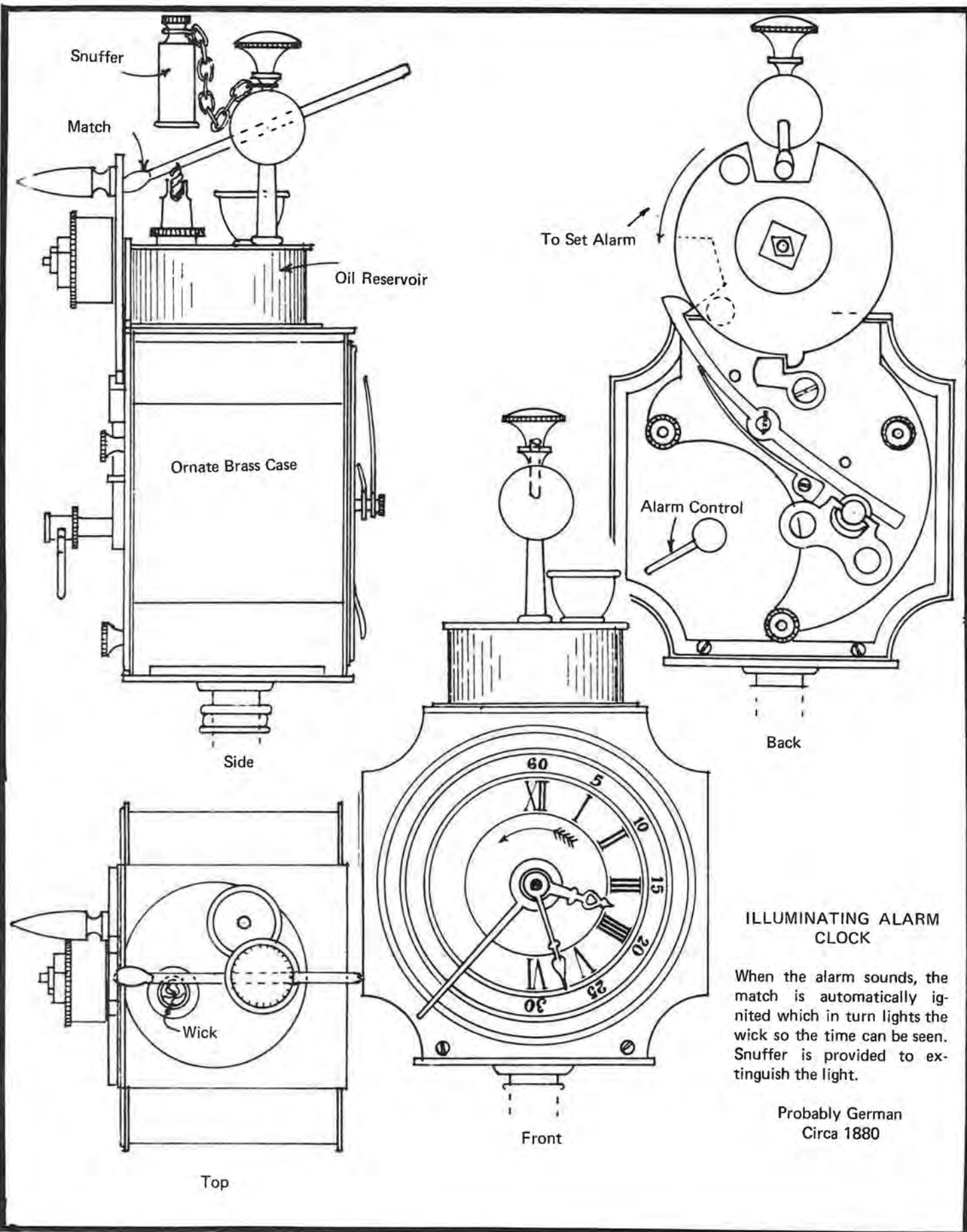
3334 Commercial Ave., Northbrook, Ill. 60062

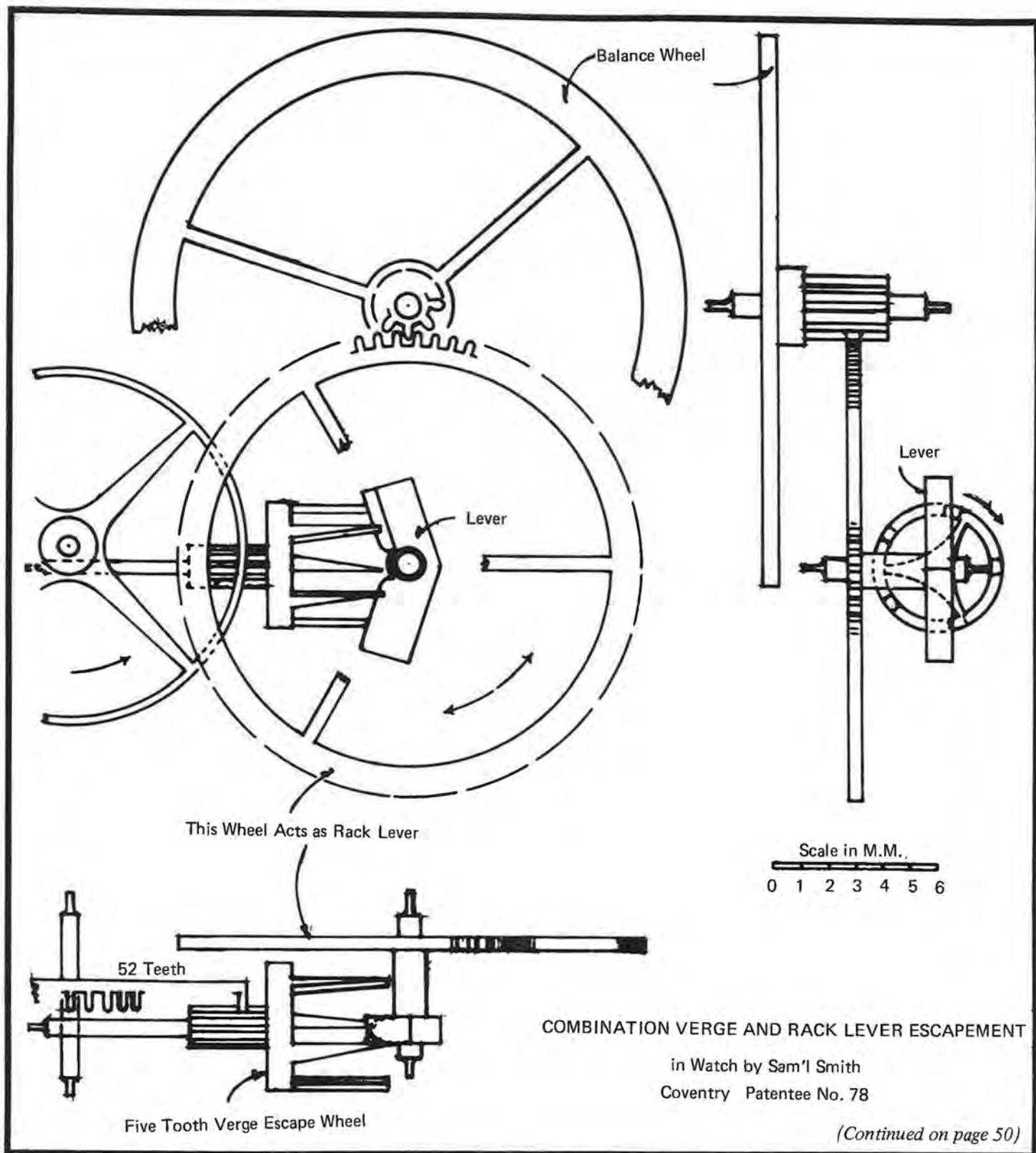
Phones: 312/564-1707 Telex: 72-4461

the house that has it all



234 Commerce Place, Greensboro, N. C. 27420, U. S. A.





the house that has it all

S. LaRose, Inc.
Worldwide Distributors to Horologists

234 Commerce Place, Greensboro, N. C. 27420, U. S. A.

#876 PENDULUM

\$11.50 In Quantity



A battery powered movement you can rely on — top quality by a West German manufacturer specializing in unique clock movements. Pendulum adjustment actually controls the accuracy. Fully solid state engineered **without contacts**. Warranted one full year. Pendulum shaft & bob have a brushed brass finish. Available in three lengths — 5 3/4" - 10" - 12".

1 or 2 @ 13.95 Each
3 to 9 @ 12.95 Each
10 to 14 @ 11.95 Each
Carton 25 @ 11.50 Each

#836 INSERT

\$8.95 In Quantity



At Long Last! The answer for the clock installation and replacement markets... A battery powered insert movement that is ready to install quickly & economically. Complete with polished brass finish bezel, attractive dial and hands. Functions for more than a year on a single 'c' cell. All this at a remarkably low price. A truly reliable movement with millions in service world wide — Accuracy to seven seconds per day and warranted one full year.

1 or 2 @ 11.95 Each
3 to 9 @ 10.95 Each
10 to 24 @ 10.00 Each
Carton 25 @ 8.95 Each

#400 QUARTZ

\$7.95 In Quantity



2 5/16 x 2 7/8 x 1 1/16

Extreme accuracy (one minute per year) is now available at moderate cost for customers that demand precise time keeping. This quality movement has an especially balanced condensator instead of the customary adjustable trimmer used in some Quartz Movements. Other quality features such as high Quartz oscillation of 4.1943 MHz with an extremely low aging rate, guarantees reliable time keeping as well as accuracy. The small dimensions are ideal for all jobs. Fully warranted for one year.

1 or 2 @ 11.95 Each
3 to 9 @ 9.95 Each
10 to 24 @ 9.50 Each
Carton 25 @ 7.95 Each

#300 TRANSISTOR

\$5.85 In Quantity



Housed in a dust free capsule, this reliable movement represents your best value today in a transistor clock movement - Runs for over a year on a single 'c' cell and accurate to within 10 seconds per day. The low price combined with trouble free service, make this our best seller year after year. Comes completed with polished brass hands and fully guaranteed for one year.

1 or 2 @ 7.75 Each
3 to 9 @ 7.25 Each
10 to 24 @ 6.95 Each
Carton 25 @ 5.85 Each

Delivery From Stock - Prices Include Hands - Use Coupon Below

ESSLINGER & CO. 333 SIBLEY ST., P.O. BOX 43561
ST. PAUL, MN 55164

Please Send Movements as Listed Plus \$1.00 For Delivery

____ #876 Battery Pendulum Movements @ _____
____ #836 Battery Insert Movements @ _____
____ #400 Quartz Battery Movements @ _____
____ #300 Transistor Clock Movements @ _____
____ Check Here For Free Illustrated Booklet _____

NAME _____

ADDRESS _____

CITY _____ STATE _____ ZIP _____

BOOK REVIEW

Practical Benchwork for Horologists, by Louis and Samuel Levin. (Revised eighth edition.) Culver City, California: Louis Levin & Son, Inc., 381 pages, 475 illustrations. \$30.

Louis Levin was a master watchmaker in the truest, traditional sense of the old school. Samuel, his son, was trained by the elder in the same tradition, with engineering and drafting experience added. Together in the early 1930's they started the magazine, *Horology*, with some of the world's most famous authorities as writers. The publication also featured articles by the Levins themselves; Samuel illustrated these with superb line drawings and photographs.

The Levins later sold the publication to the competing *American Horologist*, concentrating their energies in producing the finest tools and equipment for the watchmaker.

In 1938 the Levins published the first edition of this book. It was the first serious book on watch repairing in many years. It was reprinted eight times with slight changes but was out of print for almost twenty years. Now, it has been printed in a veritable facsimile edition. Although the book has not changed in appearance, it still is one of the very best books for the advanced watchmaker.

Stress is laid upon modern machine equipment and, of course, that which is designed by the Levins. Motor drives, idler pulleys, countershafts, lathes, collets, attachments, and accessories of all types are shown and their use by the repairer is explained, with the late Samuel's unusually fine illustrations aiding the text. Methods of solving problems are discussed in detail. The various drawings and photographs of the proper set-ups are unusually good and useful. Staff making, pivot polishing, and tool making are included.

A section on charts of drill sizes, screw thread gauges, pendant taps, screw taps and crown taps, tap drills for Elgin and Waltham screws and various tables of gears for screw cutting to slide rests with both metric and inches make this book unusual, as this is a feature not found in any other textbook.

Discussions on wheel cutting, pinion cutting, making of cutters, and important other details make this an excellent reference. Also covered are the use of fraizing or topping machine, filing fixtures, jigs and how to make them. "Repair problems" is another chapter which covers dials, hands, chronographs, setting mechanisms, which include the hard-to-find instruction for the negative, American, sleeve, winding and setting systems. Also found in this section are instructions for the use of the pivot polisher, internal grinder or transverse grinder, its use in decorating winding wheels and plates, mainspring and barrel repairs, jewel setting, screwhead polishing and hairspring work.

Watch cleaning machines do not include ultrasonics since the book's last revision took place before the advent of this newer method. Likewise, the instruction on watch timers has not been brought up to date in this new printing, as it shows timing machines now long out of production and use. This shortcoming is compensated for by the book's pages on the dismantling, cleaning, and assembling of repeating watches. An important chapter on adjusting includes the eight Gribi hairspring charts which show 200 different over-coil shapes. A long chapter on the manufacture of jewels from the raw boule occupies 33 pages.

U.S. Bureau of Standards for testing pocket watches has been discontinued for many years but these pages do list the standards for which requests still are made. Swiss standards for testing pocket and wrist watches are contemporary with the last revised edition of this book in the 1950's. This is followed by a short chapter on mechanical drawing which should be of help to those who plan watch and clock design or the cutting of accurate wheels and pinions.

The lever escapement is nicely analyzed by large, fine construction drawings.

For the serious horologist who wishes to perform the highest quality work and do watch wheel and pinion cutting and parts making, this book should be a required reference.

Reviewed by Henry B. Fried

NEWS RELEASE

Philippine Center for International Trade and Exhibition is inviting American manufacturers of watches, clocks, and jewelry to participate in "Time Exposition '78"—an international clock, watch, and jewelry show, which will be held in Manila, Philippines on March 8–22, 1978. Information concerning participation may be obtained by writing directly to Mr. Jose V. Yulo, Jr., Deputy Executive Director, Philippine Center for International Trade and Exhibition, CCP Complex, Roxas Boulevard, Manila, Philippines. □

Paris Texas Junior College

"One of the largest, oldest and best equipped Watchmaking, Stone Setting and Jewelry Repair Schools in America"

- State Supported - Non-profit Institution
- Low tuition rate - \$35.00 per month (With no out-of-state tuition)
- G.I. Approved
- Journeyman instruction
- Quarterly employment dials
- Year round training
- Modern Facilities
- Married Student Housing Available
- State and Federal approval for handicapped
- Financial Aid Available to Eligible Students

Write for more information

COURSES OFFERED INCLUDE:

Watchmaking, Jewelry Repair and Stone Setting is certificate courses which can lead to an Associate Degree from Paris Texas Junior College and/or to a Bachelor's degree at several participating Universities

PARIS TEXAS JUNIOR COLLEGE

Department of Horology - Jewelry Technology

PARIS, TEXAS 75460

small things come in good packages



\$49.95
SB-101

One glance will tell you exactly what you have in stock with this assortment of round, faceted synthetic birthstones. No more diamond papers; instant access to stones.

The kit comes in a leatherette case containing 72 plastic bottles and a chart identifying the contents of each. Each bottle holds up to 200 stones.

Sixty bottles are filled with 3 stones of each month in only the most useful and popular sizes: 2, 2½, 3, 3½, and 4 mm. Twelve bottles are left empty for other use.



THE GOULD COMPANY

(214) 233-7725

13750 Neutron Road
Dallas, Texas 75240

Call toll free: (800) 492-4104 - Texas

(800) 527-4722 - Arkansas, Kansas, Louisiana, Mississippi, Missouri, Oklahoma

BURGLARY—UNIVERSITY OF OXFORD HISTORY OF SCIENCE MUSEUM

On the evening of Friday, October 7, 1977, the above Museum in Oxford City (England) was forcibly entered. A unique collection of antique pocket watches was stolen from the "Beeson Room." The collection comprises 87 watches of exceptionally fine quality by some of the world's finest makers. The total value is in excess of 100,000 pounds. Full details and photographs of the stolen watches are shown in the University of Oxford Museum of History and Science Catalog.

A substantial reward is offered subject to the usual conditions. If you obtain any information regarding these watches, please contact the Incident Room at Oxford Police Station, telephone Oxford 49881, Ext. 273-274, or any Police Station.

David Holdsworth, Chief Constable

the house that has it all



234 Commerce Place, Greensboro, N. C. 27420, U. S. A.



Essence of Clock Repair

by Sean C. "Pat" Monk

CMW

THE 30-HOUR MODERN MUSICAL CUCKOO CLOCK

Part XXVIII (b)



In Part a of this subject, which appeared in the December issue of *Horological Times*, we described the clock's general construction and the dismantling procedure. Now we shall describe the strike (cuckoo) sequence and the music (chime) box operation and adjustment.

Each hour and half hour, the cuckoo (strike) flint is lifted. This lever is the large black lever at the top of Figure 1, uppermost on the front plate. The hour rack is then permitted to drop. Remember that during this striking (cuckoo) pro-



Figure 1.

cedure, the strike main wheel is in tension by means of the weight applied to it. This is the right hand weight when viewed from the front. As soon as the rack drops, the strike train is freed. In Figure 2, the second strike wheel is clearly shown on the left center of the exploded clock frame. This wheel is normally meshed by its pinion, with the strike main wheel. (The latter has been removed for convenience of photography). This second wheel, however, is fitted with a small brass cam on the outer side of the front plate. When the strike train is freed, this cam turns and allows a steel plate (fitted at the back of the second strike wheel pinion) to push against another steel lever (a) in Figure 3. This lever is itself fitted with a strong polished steel cylindrical pin. This pin can be clearly seen in the photo, left, dead center between the two plates. Next,



Figure 2.

this steel pin pushes against another lever, immediately to the left of lever (a) and closer to the inside of the front plate. This may sound somewhat confusing, but it is really a very simple operation; certainly much easier to follow by looking at the movement than in trying to describe it in words. So, bear with me and follow what happens next, because this is certainly the very essence of the push that opens the cuckoo door.

The steel pin, pushing against the lever, just described, rocks it free and allows the pin to free itself from a

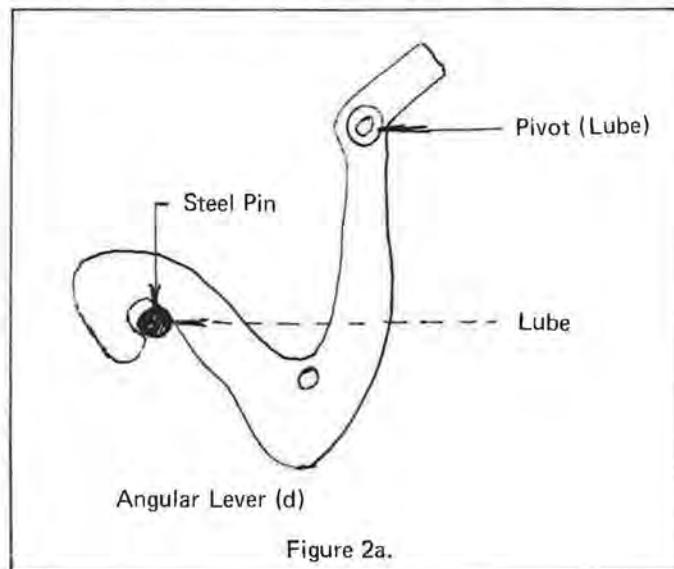


Figure 2a.

curved portion of the lower end of the cuckoo actuating arm. The actuating arm is shown as (b) and the curved portion of the arm as (c) in Figure 3. The actuating arm, carrying the cuckoo bird at its uppermost, is tensioned against the front

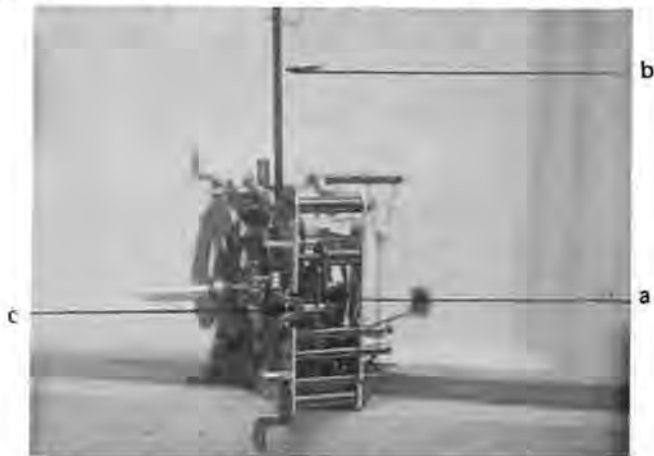


Figure 3.

plate by a small brass helical spring and is now freed of its restraint. This permits the cuckoo to push open the door.

The next sequence is determined by the large, angular lever which we have marked as (d) in Figure 2. This lever now drops onto the same steel pin (mentioned in the two preceding paragraphs) and by virtue of a claw at its extreme left end, prevents the cuckoo from returning inside its door, until the culmination of the strike (cuckoo) sequence. After completion of the strike sequence, an arrest pin moves on the strike (cuckoo) flint into a slot on the small brass cam (previously mentioned in paragraph 2), mounted on the front plate arbor of the second strike wheel. Our rough sketch of this cam shows the arrest pin in the locked position. This shuts off the strike (cuckoo) sequence.

Finally, after striking (cuckooing) has been executed, the lever (a) with the cylindrical steel pin attached to it, comes forward to allow the cuckoo door to close.

In maintenance of the clock, after repairing and cleaning, it is most necessary to lubricate both the pivot of the lever (d) and also the claw portion of the same lever. When one fails to do this, oftentimes the cuckoo (strike) will not be released. It is one of the main malfunctions of the clock, wherein the bird fails to come out from, or return inside, its door. Our rough sketch shows this lever, approximately, and the two lube points in question.

Music (Chime) Box Operation and Adjustment

Our Figure 4 shows the box in the "arrest" position. Its main-wheel, driven by its appropriate weight, is the one on the left as one looks at the clock. One might be inclined to refer to

Quality Service Price

Jewelers Saw Blades

(Sold in Gross Lots Only)

	SWISS	HERCULES
2/0	5.95/gross	9.40/gross
0	5.95/gross	9.40/gross
1	5.95/gross	9.40/gross

SEND \$1.00 FOR ALL NEW 120 page CATALOG

G & G'S MIRACLE HOUSE

YOUR COMPLETE WATCHMAKERS' & JEWELERS' SUPPLY HOUSE
5621 W. Hemlock St. Box 23234
Milwaukee, Wis. 53223



Parkland College

Champaign, Illinois

COURSES OFFERED IN:

- Watch Repair
- Clock Repair
- Clock Making
- Jewelry Engraving
- Jewelry Repair
- Diamond Setting
- Photo-Chemical Milling

For more information, write:

William O. Smith Jr., Director of Horology
Parkland College
2400 West Bradley
Champaign, Illinois 61820



Figure 4.

the house that has it all



234 Commerce Place, Greensboro, N. C. 27420, U. S. A.

it as the third weight, after the going (running) and strike (cuckoo) weight. Someone more knowledgeable in strict nomenclature may chide us for using such terminology, but our main concern here is to impart bench knowledge through readable and comprehensible descriptions.

Therefore, let us proceed by simply saying that the music mechanism goes into operation at the "warning" for the cuckoo. In Figure 5 of the previous article, the angular lever shown and its accompanying wire extension are described as the two devices which allow the box to play until released and prevent the music box fan from turning until the strike (cuckoo) is finished. However, in many musical cuckoos, of more recent and cheaper vintage, the angular steel lever has been replaced by a common steel wire. We shall refer then, for simplicity, to a pair of levers, or wires, relating to the purpose.

Normally, the angular arm (or upper wire) rests over the arm (e) in Figure 4. The angular arm (or wire) holds the music box drum in tension. Remember, the tension of the latter is supplied by its weight, which operates, chainwise, over its respective main wheel. The music box, therefore, can hardly be effectively tested unless the weight is hung. There are those who are inclined to forget this, comparing it (one supposes) with the key wound type of music box. When, at the appropriate time in the clock sequence, the angular arm (or upper wire) is pushed down, a toe (f) on the lower end of its extension frees the music box and playing commences. It should be mentioned at this point that the arm (e) is slotted about halfway down (where it is attached to the plate) to prevent its lower toe from jamming on the music drum.

However, the music box will not play until the lower wire (shown in Figure 5 on right) is raised at the end of the



Figure 5.

strike (cuckoo) sequence. Until this happens, it is locked against the music box fan (g), Figure 4.

When the strike (cuckoo) sequence is completed, both wires (levers), working in conjunction with the strike mechanism, are again raised, allowing the music to play.

When the arm (e) moves up after the strike sequence, the music drum keeps turning under its weight tension and the toe on the lower end of the arm (e) drops into a hole provided in the music box drum. The drum, however, will continue to

rotate, pulling the arm (e) down until a plastic piece (h) hits the fan. The music will then cease.

Maintenance of the Music Box

There are two points here: (1) lube the fan with a graphite pencil, and (2) the plastic piece (h) must be checked for deterioration. It should be solid, not buckled, and of correct length. If not, the fan will not be arrested and the music box will continue to play.

Finally, my thanks to my head clockmaker, Jack Dawson, not only for preparing the clock for photography, but for his knowledge and dedicated help with practical information. □

STRENGTHENING THE SWISS PRODUCTION OF WATCH CRYSTALS

Ebauches SA, of Neuchâtel, the world's largest producer of watch components, has just decided to strengthen its competitiveness with regard to quartz resonators for the watch industry and in the future for industrial purposes, thus laying the foundations for crystal production on a worldwide scale.

For this purpose, an agreement for long-term technical cooperation has just been reached between Ebauches SA and Statek Corp., Orange, California. This agreement provides for a transfer of licenses and "know-how" between the two companies. In addition, it guarantees close cooperation in technical matters such as second sourcing each other in watch and general electronic crystal design.

Statek Corporation is today America's leading producer of quartz crystals for the watch industry. Founded in 1970, this company now employs 300 people and has a highly advanced technology, derived from the integrated circuit business. Also an outline agreement has been drawn up between Ebauches SA and SSIH regarding the coordination of the Swiss quartz resonator production.

The oscillations of the quartz resonators, which are sustained by an electronic circuit, supply the display system of the electronic watch with the signals required for ensuring its regular operation. The manufacture of these resonators is now based upon a rapidly evolving technology which will cut down production costs within a very short time. In order to be in a better position to tackle the problems and to share more effectively the risks inherent in the launching of a rapidly evolving industrial production, Ebauches SA has deemed it necessary to give top priority to the quartz crystal problem. Ebauches SA will place all its efforts into competitive domestic quartz resonator production initially designed specifically for the watch industry and subsequently for other electronic applications. □

Reversing your treatment of the man
you have wronged is better than asking
his forgiveness.



WE SALUTE THESE NEW MEMBERS!

AGUIAR, Guillermo—Chicago, IL
 BAKER, Barry J.—Louisville, KY
 BAKER, Don—Cincinnati, OH
 BALES, Lee F.—Quincy, IL
 BEVENS, Earl E.—Independence, MO
 BLAY, Dennis E.—Fresno, CA
 BOWER, Ronald Page—Lansdale, PA
 BREYFOGLE, A. Bruce—Tucson, AZ
 BROWN, Roy G.—Nashville, TN
 CAMPBELL, Ralph D.—Issaquah, WA
 CARPENTER, Cathy—Atmore, AL
 CHAMBERS, Eleanor—Pritchard, AL
 CHO, Young C.—Silver Spring, MD
 CONNER, Ben F., Jr.—Houston, TX
 CONWAY, Joseph—West Newton, MA
 COOPERMAN, A.J.—Temple Terrace, FL
 COX, Charles Q.—Terre Haute, IN
 COX, Oscar R., Jr.—Great Falls, MT
 CHEPLE, Frank E.—Edmonton, Alberta
 DRUCKER, Stanley—Plainview, NY
 DUCATT, Daniel L.—Defiance, OH
 DYKE, William D.—Columbus, OH
 EARLEY, Gary—Fairhope, AL
 FULLER, T. Crawford—Laurel, MS
 GAENGER, Daniel—East Williston, NY
 GAY, Grady A.—St. Louis, MO
 GORDIER, Dean G.—Rochester, NY
 GRANDINALI, Louis—Nanuet, NY
 GURNEY, Harlan L.—Lompoc, CA
 HESTER, James L.—So. Ozone Pk, NY
 HOLSTAD, Wallace A.—Yakima, WA
 ISBELL, Anthony—Chelsea, AL
 LEWIS, Thomas R.—Overland, MO
 LUCK, Allen J.—Greenbrier, TN
 MICKLE, E.R.—Midland, TX
 MURRAY, Frank—Miami, FL
 MYERS, Robert T.—Severn, MD
 NEAL, Charles W.—Seattle, WA
 NOONAN, James E.—Denver, CO
 PAK, Jung Kun—Seoul, Korea
 PAVEL, William T.—Fort Worth, TX
 PETERS, Albert E.—Broomall, PA
 PRZYBYLA, Eugene R.—Webster, NY
 RICE, Gail—Nashville, TN
 RIGSBY, Kenneth D.—Morrison, TN
 RIMLER, Maxwell R.—East Meadow, NY
 ROBERSON, Thomas C.—Cantonment, FL
 ROPER, Bruce E.—Montgomery, AL
 RUNCIMAN, John—Seattle, WA
 RUTHERFORD, Hank—Denver, CO

AMERICA'S MOST COMPLETE SUPPLY OF GENUINE
OMEGA CASE MATERIAL

International Watchmakers

POST OFFICE BOX 91909
LOS ANGELES, CALIF. 90009

DRESS
WATERPROOF
ALARM



CHRONOGRAPH
DIVING
ELECTRONIC

WE'VE DONE IT AGAIN!

Thanks to your tremendous response to our Omega case material, we have now expanded to include a complete line of Omega movement material at great savings.

Regular Stems	3/1.10	Case Clamps	.50
Split Stems	3/1.90	Screws	5/1.50
Staffs	3/1.90	Mainsprings	2.20
Detents	.95	Winding Pinions	1.20
Clutches	1.20	Setting Bridges	1.30

Complete Selection of Omega Electronic Material All Parts Guaranteed Genuine

Movement Material • Case Material • Tools •
Technical Information • Free Postage

California Residents Please Add 6% Sales Tax

SAGVOLD, Dennis—West Fargo, ND
 SALOFF, Robert—Woodbury, NJ
 SCHUMACHER, Eugene Dennis—Spokane, WA
 SIMMONS, Allan D.—Pueblo, CO
 STAFFORD, Oliver—Derby, KS
 STEWART, Arthur—Birmingham, MI
 STEWART, David—Charlotte, NC
 STOE, Billy L.—Atlanta, GA
 SULLIVAN, Harold L.—Jacksonville, FL
 TAYLOR, Charles R.—Laurel, MS
 TAYLOR, Gerald K. III—Goldsboro, NC
 TOMASZESKI, Michael J.—Belmar, NJ
 TRACEY, C. A.—Toronto, Ontario
 TURMAN, Jack—E. Cajon, CA
 WALTERS, W. L.—Louisville, KY
 WATSON, Homer H.—Mt. View, CA
 WEAVER, Andy H.—W. Farmington, OH
 WELLER, Terry Ray—Auburn, CA
 WHITE, Gerald L.—Little Rock, AR
 WOLF, Kenneth—Colorado Springs, CO
 WORLEY, Orville—Pensacola, FL
 VARNER, J. Brian—Denver, CO
 VARTY, Marvin—Haliburton, Ontario
 VINT, William A.—Pasadena, TX
 YI, Chol Che—Seoul, Korea

the house that has it all

S. LaRose, Inc.
Worldwide Distributors to Horologists

234 Commerce Place, Greensboro, N. C. 27420, U. S. A.



AWI NEWS

By Milton C. Stevens

EXECUTIVE SECRETARY

Michael P. (Mike) Danner has joined the staff at AWI Central as the Administrative Director. His responsibilities will include the everyday business routine of the office, and business management. Holding a degree in business from the University of Cincinnati, Mike has a background in finance; he recently resigned his position as manager of a savings and loan branch office to accept his present job with AWI.

The growth of the American Watchmakers Institute in recent years has made the hiring of a full-time administrator necessary. In the early days of AWI, when its activities and services were at a minimum, I was able to manage the affairs of the Institute on a part-time basis. At that time we had less than 3,000 members. Now with membership more than doubled and services greatly expanded, I have found it impossible to continue to manage the office on a part-time basis and continue my duties as a full-time math and science teacher in the public school system.

For the next year or two, Mike and I will work closely together so that he will gain the background and experience necessary to continue the growth pattern that has been set for AWI. Mr. Danner is not a trained watchmaker, but he is studying watch repair so he will fully understand the total concept of AWI work. During the transition period, I will continue to guide major projects of the Institute, while

Mike will handle the routine business of the office. This should insure the AWI membership of prompt handling of their requests—something they have a right to expect.

We have just completed our second billing of members for 1978 dues. The response to the first billing was much appreciated. The cost of time and money required to make repeated billings to members for their annual dues unnecessarily limits the effectiveness and resources of the Institute. If you are on a first of the year billing basis, and haven't sent your annual dues, please do so now.

An inventory of our technical library has just been completed. We now list more than 3,000 individual technical items in our technical file. The entire list of forty pages is being printed and will be sent to all AWI members. By referring to the list, members will know if a needed technical bulletin is on file for their use. If your needs are not listed, ask anyhow. We constantly receive new bulletins from manufacturers around the world. We will also leave no stone unturned to find the technical information you need. Henry Fried and his technical committee work tirelessly to help you with individual problems for which technical information is not published.

If you are in a hurry, remember to use the AWI Hotline: (513) 661 INFO. This reaches our 24-hour recording service. All calls during the low rate hours cost little and will be processed during the next business day. Some of you have reported difficulty in reaching the Hotline. This is because when you dial INFO, you dial the number 0 (zero), rather than the letter O. You usually reach a little old lady whose patience is by now growing rather thin. If it's confusing, dial (513) 661-4636.

When there is time, it is better to write your technical requests. This way you can give more details and better identification. Often a photo or sketch will help us help you. Many members have found that they can place their watch or parts on a photocopier with good results. The photocopy in most cases gives us the much needed information for identification.

Never send watches or parts through the mail. Remember, a letter-size self-addressed, stamped envelope will speed the answer to you, especially if it becomes necessary to turn to one of our volunteer technical experts for an answer to a problem. It isn't fair for you to expect them to try to decipher poorly written addresses or pay for postage and envelopes. We know you'll remember your SASE the next time you write. □



Michael P. Danner

13 COUNTRIES REPRESENTED IN BASLE

A record number of exhibitors expected at the 1978 European Watch, Clock and Jewellery Fair

From April 15 to 24, 1978, over a thousand manufacturers (410 watch manufacturers, 133 clock manufacturers, 547 jewelry manufacturers, and 241 representatives of the allied industries) will be vying to do business with you at the sixth European Watch, Clock and Jewellery Fair in Basle. It's a unique show, one that has never been more comprehensive and varied. These figures are only provisional, too, as the organizing authorities try to cope with demand for booths far in excess of the available floorspace.

The Fair owes its success to the deserved interest it enjoys throughout the trade. This vast and vitally important source of new ideas offers unrivaled scope for comparing prices and styles as well as for finding that long-sought special item. So a visit to Basle is often the start of promising new



Symbol of the 1978 Basle Fair and European Watch, Clock and Jewellery Fair.

business and, more than ever, retail jewelers can be divided into two groups: those who've been to Basle. . . and the others.

The European Watch, Clock and Jewellery Fair differs from all other trade shows in three fundamental ways: size (over 60,000 sq. m), product diversity, and organization.

Smooth and faultless organization, by the way, is the price to pay for the two others. No less than 14 information booths are planned for 1978. Practically every country represented at the Fair will have its own information system. This national approach is explained by the fact that not even a specialist can be expected to know all there is to know about the Fair whereas every national industry can easily provide information on its own exhibitors.

Studies have shown that trade fair visitors devote nearly 50% of their time simply to finding their way around and establishing contacts. With the information facilities available at the Basle Fair, this time can be cut practically by half, leaving more time for actual business negotiations.

Still, a careful visit demands careful planning. And careful planning requires complete information—something the European Watch, Clock and Jewellery Fair has prepared for you. If you haven't already received it, just send a postcard to: European Watch, Clock and Jewellery Fair, P.O. Box 4021 Basle, Switzerland. You'll receive it by return post. □

"THE BEST MAINSPRING LUBRICANT IS KEYSTONE'S"

stated by the late Jesse E. Coleman

LIGHT, MEDIUM, OR HEAVY VISCOSITY

(Medium most popular)

8 oz. - \$4.00 EACH

CLOCK PIVOT OIL

after years of testing we can claim this oil to have the very best of lubricating qualities

2 oz. - \$4.00 EACH

ANY THREE OF ABOVE - \$10.00 POSTPAID

KEYSTONE SALES, LTD. 7250 TELLER ST. ARVADA, COLORADO 80003



**DO
IT
NOW!**

GET YOUR COPY of the ALL NEW

CLOCK & TOOL CATALOG 178

250 Pages Full of The Items
You're Looking For:

- Movements & Accessories
- Clock Parts
- Tools & Supplies

Available Through
Your Material Supply House

or send \$3.50 to:

P. MEREMINSKY
15 Maiden Lane
New York, NY 10038



the house that has it all

S. LaRose, Inc.
Worldwide Distributors to Horologists

234 Commerce Place, Greensboro, N. C. 27420, U. S. A.



AFFILIATE CHAPTER COLUMN

by Willard Blakley CMW

Attention all affiliate chapter representatives: mail news of upcoming events of your group to Horological Times, P.O. Box 11011, Cincinnati, Ohio 45211.

AWI deserves a special thank you for the excellent workshops it offers. The AWI instructors are willing to give their time so that we may learn more about new watches on the market. Here in Cincinnati we just had a workshop on "Introduction to Solid State Watches." Watchmakers from three states attended, with a full morning and afternoon session. Bob Nelson instructed the workshop, doing his usual excellent job. Each participant worked on an LED watch, which became his to take home.

Several AWI workshops are now available. They really keep us up to date on the new Quartz, step motor, LCD, LED, and lever escapement watches. If we do not attend these workshops, we may find ourselves being forced to turn away customers who bring these watches in for repair. Not only do we take money out of our pockets, but we are also sending our customers to someone else to get the work done. We must learn all we can now about these new watches—then it won't be so difficult to learn about the more advanced Quartz LED and LCDs. These solid state watches are a whole new phase for the watchmaker.

The small fee which AWI charges for these workshops goes toward making slides, paying travel expenses for instructors, and mailings connected with workshops. AWI does not make a profit on these programs.

A new workshop is called a double header, with AWI instructor Les Smith teaching one of these. The morning class is on the ladies Seiko 4300 quartz with the gents Seiko 0903 quartz covered in the afternoon.

If you are an Area Representative for AWI, I urge you to take advantage of the marvelous opportunities now available to your organization. If you are a member of AWI, encourage your Representative to bring these workshops to you. AWI is working for you all the time. The board has re-invested your money in tapes and slides for your Affiliate Chapters. If you don't take advantage of these workshops then perhaps a slide program for your regular meeting would be more suited to your needs. There are also films available from the film library. Please return promptly so that we may all get the most possible good from them.

These are only a few reasons why I feel it is important to be an AWI member. Anyone who is a watchmaker and not a member of AWI is cheating himself. Tell your

friends about the benefits of belonging to AWI. I really don't know how watchmakers are managing today without the information that AWI has to offer. Nowhere else is there so much available to you in the field of watch repair.

I'm still waiting for items of interest on your chapter's doings. I need these articles typed and double-spaced. Let's start sharing successful ideas with other chapters. Maybe your ideas and/or programs are just what another chapter needs to build a fire under some of its members and add spark to its meetings. □

CALIFORNIA

The Horological Association of California recently enjoyed a night with Omega. The Norman M. Morris Corporation sponsored the November 10th meeting which attracted 209 members, several driving as far as 180 miles one way. Robert Ressler, the Norman M. Morris Representative in Southern California, was the featured speaker.

Following opening remarks by HAC President Jay Foreman, which included a demonstration of two items he had just restored (a mechanical talking clock and a hand crank organ, both circa 1900), Mr. Ressler was introduced.

Mr. Ressler's presentation focused on two main thoughts: don't be afraid of the future, and don't sell yourself short. "The most important people Omega has to care for are the watchmakers." "If the watchmaker is not there to take care of our products, our customers will lose confidence." A year or two ago there was much fear among the watchmaking profession because of the advent of the solid state digital watch. Watchmakers were concerned over their livelihood. These fears have begun to disappear as the many newcomers in the watch industry have disappeared, leaving the traditional watch companies that make watchmakers' watches. "Don't fear the future," says Mr. Ressler. "Remember, today was yesterday's future."

The second point, "don't sell yourself short," was brought out by Mr. Ressler and substantiated by an outstanding, beautiful film. Mr. Ressler reminded the watchmakers that they really do have "roots." "Roots that go back hundreds of years." "Roots to be proud of." "You, the watchmaker, give people their precious time."

The film entitled "Time in Sculpture" presenting the creation of the Audemars Piguet skeleton watch showed

"roots" to value. According to the film, a great sculptor once said of his masterpiece: "I just removed the excess marble and this is what remained." That is just what the craftsmen do that create the most beautiful of watches, the Audemars Piguet skeleton watch. Behind these timepieces are half a lifetime of apprenticeship and a full year's labor to complete a watch to perfection. The sawing, filing, and engraving of the movement were shown in detail.

A second film of the evening, entitled "Measure for Measure," showed the overall Omega concept of watch creation: research and development, production, testing and checking, marketing; and behind all this, teamwork. The tone of the film was one of encouragement for the future—Omega's sights are indeed set for the future.

The evening concluded with door prizes, including two Omega watches, compliments of Robert Ressler and two cut crystal Omega ashtrays, three Omega knives, and one Omega eye loupe, compliments of the Norman M. Morris Corporation.

MASSACHUSETTS

At the November 15 meeting, a program was presented on security. Since the watchmaking and jewelry businesses seem to be the prime target of the various types of thieves, this topic was most appropriate. The program was set up by Sentry Electronic Systems, Inc. Mr. Joseph Sacco, Security Consultant, and others of his organization provided a full schedule of information, including all of the usual appurtenances and special installation equipment to assure members a thorough and informative session. After the program there was a question and answer period.

The Annual Report was recently released for the Massachusetts Watchmakers Association. Programs included: New Hermes Engraving Company, Mr. John Yaffee; Bulova Accutron Bench Course; Twentieth Anniversary Convention of the Massachusetts Watchmakers Association; Digital Watch Repair Program; How diamonds are mined and set, Miss Hersey; representative from the Attorney General's Office who talked on consumers' rights; Timex Program; and Clock Repair Program. The President and Vice President attended the AWI Convention in Cincinnati, Ohio. Outstanding Service Awards were given to Mr. Joseph Sullivan and Mr. Millard Cole. A going-out-of-office presentation was given to the new Past President, Giacomo Cappabianca. Officers Ladies Night at the Chateau DeVille in Randolph and a field trip to the Van-Dell factory completed the year's activities. Eight new members were admitted during the year.

VIRGINIA

The 1978 convention chairman, Marvin E. Whitney, has made arrangements with Holiday Inn—Olde Town in the Olde Town section of Alexandria, Virginia. The convention will be held on

Support the
AWI - ELM TRUST
Scholarship Program
by
Sending your old
watch batteries
to the
**AMERICAN
WATCHMAKERS
INSTITUTE**

May 13 and 14, 1978. More details will be announced later.

A State Board Meeting was held on Sunday, November 20 in Charlottesville, Virginia.

The Tri-City Triangle Guild held its monthly meeting on November 15, featuring a program on the ladies ESA-9200. On December 15, the Guild held its Christmas party at the Swift Creek Mill Playhouse, with Mr. and Mrs. Lawrence Edwards planning the occasion. The members saw the play, "Damn Yankee," at this party.

The Potomac Guild held their monthly meeting which featured a presentation by Bob Dahmer on clocks and watches.

PENNSYLVANIA

An AWI solid state bench course is tentatively scheduled for February. At the January meeting, Al Rodibaugh, former instructor at WPHI and well known watchmaker and jeweler, will demonstrate a new lubricant he has developed. It has

(Continued on page 48)

the house that has it all

S. LaRose, Inc.
Worldwide Distributors to Horologists

234 Commerce Place, Greensboro, N. C. 27420, U. S. A.



SCHOLASTICALLY SPEAKING

by Gerald G. Jaeger CMW

Chairman, Research and Education Council

Time does fly and the time is here again when we must start tying the loose ends of the 1977 REC meeting and put into effect the many proposals and suggestions.

Portescap U.S. is contributing a major piece of equipment each year to REC. It was decided by resolution that this piece of equipment be awarded to the member school in the name of the student who makes the highest score on the "Certified Watchmaker" exam of AWI. The period of time for the award will be from May 1 to April 30 of each year. It is now time to inform our students of this award and encourage them to work toward this goal.

Membership in the Research and Education Council of AWI will be \$50.00 for the 1978 membership year. It is each instructor's obligation to inform administration of this. Do not run the risk of losing AWI benefits for your students by failing to renew your REC membership.

Many preliminary contacts have been made to firms and individuals regarding programming for the 1978 REC annual meeting. The results of these contacts will be reported to the Executive Board of REC. Their decision regarding the final program will be reported at the earliest possible date. If any instructors are aware of any new programs, please let me know immediately so we can consider them. Keep in mind that we are interested in presentations which are transferable to the classroom.

AWI and REC have contacted companies to secure materials and supplies for use in the classroom. We have scarcely scratched the surface of the potential in this area, but hopefully we will show improved progress this year.

Above all it is most important that each of our member schools is represented at REC this year. I suggest that those who were not in attendance secure a copy of the agenda from the last year. A presentation to your administrators of a copy of the agenda with the minutes of the meeting should go a long way in enabling you to attend. If you do not have a copy of last year's agenda, write either AWI Central or me, and I will see they are made available. We have not met our goal if the fruits of these REC meetings do not reach the classroom and horology students.

Tempus fugit!

□

GEM CITY COLLEGE EXPANSION

The Horology Department at Gem City College has been enlarged. Alterations were completed during the summer break. The room has been expanded from its former size to an area large enough to accommodate one hundred more students. There are also new facilities for casting and a new tool room. The Horology School now occupies the entire south section of the building from east to west.

The expansion is just a part of the entire program of college expansion. New facilities have been opened in the building to the east on State Street. These include five new business classrooms, a library, student lounge area, restrooms, and a faculty lounge.

An open house was held to celebrate the opening of the new addition. At this time there was the unveiling of a mural that covers the lobby wall. Painted by artist Leroy Schwan, it depicts the growth of the industry and technical education in Quincy. To assist in the ceremony were Miss Illinois, Miss Adams County, and Miss Quincy. State Representative Mary Lou Kent was the speaker. A phone call from the Secretary of the Department of Health, Education, and Welfare and a telegram from the Governor of Illinois were received among the messages of congratulations regarding the growth and progress of Gem City College over the past few years.

Gem City College—School of Horology—is now the largest school of horology in the world. It will soon be listed in the Guinness Book of World Records.

DEAD SOLUTIONS

If you want to kill your watch cleaning and rinsing solutions before their time, run an antique pocket watch through your cleaning machine. It is best to save that oldie until all modern watches have passed through, and run the antique through just before your scheduled solution change.

□

SWEST ANNOUNCES TOLL FREE WATS LINE FOR ORDERING

Swest, Inc., a leading supplier of tools, supplies and equipment for jewelers and watchmakers, has announced the installation of a nationwide WATS line for phone ordering from its Dallas office.

"We know this will be well received by our customers," said Earl R. Weaver, president of Swest, "since we have customers in every state, and since we can halve the time that orders are in the mail."

The new WATS number, 1-800-527-3058, is for all states in the continental U.S. except Texas; Texas customers use the existing toll-free number 1-800-492-6872.

Mr. Weaver pointed out that the WATS line is connected to the order department and was for that purpose only. All other business would be conducted over the regular phone number 1-214-350-4011.

"The reduction in time for orders that heretofore have been mailed to us will greatly facilitate the processing of orders," said Mr. Weaver, "and we will consequently be able to render speedier service to all our customers."

For more information, contact Swest Inc., 10803 Composite Drive, Dallas, Texas; 431 Isom Road, San Antonio, Texas; 1725 Victory Boulevard, Glendale, California. □

RJA'S 1978 SPRING BANQUET

"Jeweler's Night in the Sky" describes the special setting of RJA's 1978 Banquet on Tuesday, February 7, 1978.

Timing the Banquet to take place the last night of RJA's 1978 Spring International Jewelry Trade Fair & Conference, the association has taken over the Hemisphere Club which is located high atop the Time & Life Building, Rockefeller Center, 51st Street and Avenue of the Americas, two short blocks from the RJA Spring Show.

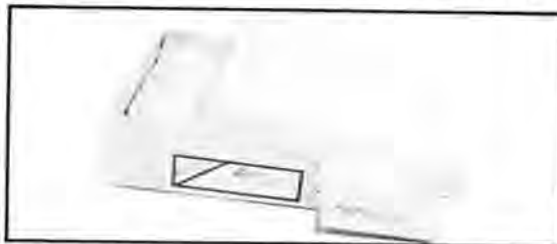
A breathtaking view of New York City will be the backdrop for the gala. A cocktail party, which is included in the price of admission, will be followed by a sumptuous dinner and an evening of dancing.

RJA's Banquets have long been the social highlights of RJA's shows, giving jewelers a chance to relax and exchange ideas in a "non-business" atmosphere.

Since space will be limited for "Jewelers Night in the Sky," jewelers are advised to make their reservations early. Tickets are \$30.00 each, which includes the cocktail party, dinner, and dancing. Checks should be sent with ticket requests to Retail Jewelers of America, Inc., Time & Life Building, Rockefeller Center, 1271 Avenue of the Americas, New York, New York 10020. □

THE *Swest* SYSTEM OF WATCH HANDS

MORE USEABILITY - LESS INVENTORY



Swest has finally solved the age-old watchmaker's problem of having too many watch hands but never the correct one. Swest now offers four modern styles that will fit approximately 90% of all watches and are not stocked in pairs, which means more coverage with less inventory. Purchase in individual containers of three or in assortments.

120 Hands assorted sizes & styles. Yellow or white	\$34.95
297 Hands assorted sizes & styles Yellow, white & sweep hands	\$74.95
39 Hands Alpha style assorted sizes Black	\$10.95
Package of three (minimum)	\$.75 to 1.80
Dozen Individual hands	\$2.50 to 6.00

Swest SINCE 1923 **INC.** DEPT HT
FORMERLY SOUTHWEST SMELTING & REFINING
10803 COMPOSITE DR. DALLAS, TEXAS 75220 PH (214) 350-4011
431 ISOM RD. SAN ANTONIO, TEXAS 78216 PH (512) 349-4118
1725 VICTORY BLVD. GLENDALE, CA 91201 PH (213) 248-8385

REQUEST
FREE BROCHURE

LEARN watchmaking and jewelry

CAREER SKILLS Choose courses in: Watchmaking, Engraving, Jewelry-Diamond Setting, and Jewelry Store Management. New Classes begin every Monday throughout the year. Placement service for graduates.

GEM CITY COLLEGE
SCHOOL
OF HOROLOGY
Quincy, Illinois 62301

WRITE FOR
FREE BULLETIN

KANSAS CITY SCHOOL
OF WATCHMAKING
4528 Main St.
Kansas City, Mo. 64111

Don't scold, boast, parade, or bellyache,
but live, love, laugh, and do things
worthwhile.

the house that has it all

S. LaRose, Inc.
Worldwide Distributors to Horologists

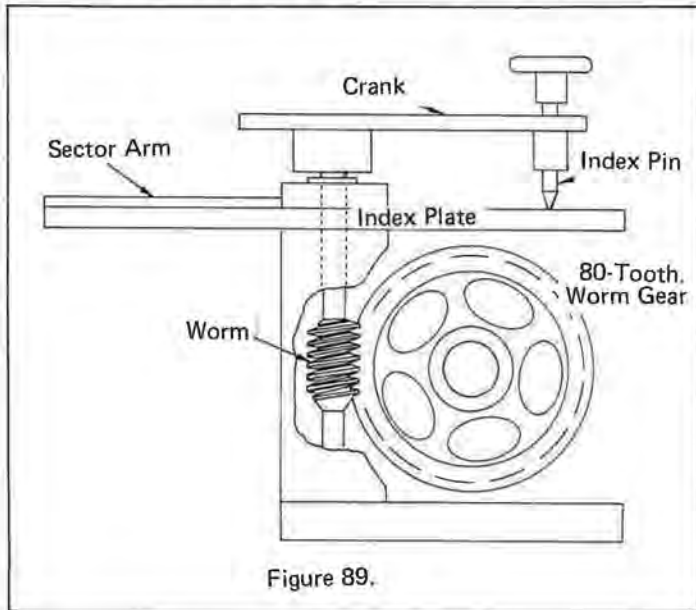
234 Commerce Place, Greensboro, N. C. 27420, U. S. A.

ADVANCED HOROLOGY

(continued from page 15)

is turned, the worm causes the 80-tooth worm gear and the lathe spindle to turn. The index plate itself is stationary.

In fitting the dividing head to the lathe, its base is positioned and bolted to the bed of the lathe so that the worm meshes deeply into the worm gear. It is important that there is no backlash in the teeth. The ratio between the worm and the 80-tooth worm gear is one to eighty (1 to 80). This means that



the crank must turn 80 revolutions to one revolution of the worm gear. Or to put it another way, one revolution of the crank will move the worm gear one tooth (i.e., $1/80$ of a revolution).

For wheel cutting, to determine the number of turns of the crank needed to produce a given number of divisions, proceed as follows:

Divide the number of teeth on the worm gear by the number of teeth to be cut on the wheel blank.

For example, if a gear of 30 teeth is to be machined and the worm gear, as illustrated, has 80 teeth, then:

$$80 \div 30 = 2 \frac{2}{3} \text{ revolutions of the crank}$$

Thus, after each pass of the cutter into the wheel blank, the crank must be turned $2 \frac{2}{3}$ revolutions to produce a 30-tooth wheel. To turn the crank exactly $2 \frac{2}{3}$ revolutions, one must determine which circle of holes to select in the index plate. To do this, it is necessary to find a circle of holes whose number is evenly divisible by the denominator (3) of the fraction $2/3$. The outer circle of 204 holes will serve well since 204 is evenly divisible by three. Next, the number of holes over which the index pin must be moved to turn the crank exactly $2/3$ of a revolution should be calculated. This is done by multiplying the fraction $2/3$ by 204 holes.

$$204 \text{ holes} \times \frac{2}{3} = 136 \text{ holes}$$

Thus, 2 revolutions of the crank, plus 136 holes on

the 204-hole circle, will move the crank exactly $2 \frac{2}{3}$ revolutions, as needed. The sector arms are then set to span 136 divisions on the 204-hole circle.

To give some idea of the accuracy such a dividing head offers, assume that the 204-hole circle is used in the cutting of a watch wheel that has a circumference of 25.4 mm (1 inch). Under these conditions, if in turning the crank of the dividing head a mistake is made and the index pin is placed off position by one hole, then the error produced in machining would be only .00155 mm. If the same mistake was made on the 180-hole circle, then the error in indexing would be only .00176 mm. Thus, the accuracy derived from such a dividing head is indeed outstanding.

The complete dividing head shown sells for about \$400 and is manufactured by W.W.S. Graham, Box 288, Savoy, Illinois 61874.

The Bergeon index plate and the Boley milling attachment with index may be purchased through the watch material supply house.

All questions and comments should be addressed to William O. Smith, Jr., Horological Times, P.O. Box 11011, Cincinnati, Ohio 45211. □

AFFILIATE CHAPTER COLUMN

(continued from page 45)

been proposed to amend the By-Laws to have the beginning of the fiscal year and election of members of the Board of Directors at the regular meeting on the second Tuesday of June. There are several advantages to this. The new officers will have the summer period to plan their program for the coming season, and more time will be available to provide a proper election.

OKLAHOMA

The meeting of the Green Country Watchmaker's Guild on November 8 was a follow-up of October's meeting on the correct way to solder the digital units together.

The Guild meets on the second Tuesday of each month. Students at Okmulgee Tech are also invited to attend these meetings.

INDIANA

Mr. William P. Nichols, owner of Reis-Nichols Company and Indiana Jewelers Supply Company, has generously offered to help the Watchmakers Association of Indiana both financially and with his ideas and efforts. The WAI Executive Committee met with him in two lengthy sessions and listened to his proposals and voted unanimously to accept, if the proposed programs can be properly executed. Most of his proposals will be outlined as follows: make the organization grow; help with finances; education programs suggested to be offered on a guild or area basis or presented in Indianapolis; technical bulletins and information; and public relations for the promotion of watchmaking. Mr. Nichols also made it clear that he is not wanting to monopolize this program and asked the Executive Committee to invite any other suppliers of Indiana Watchmakers to present and fund any programs they can or will, and in the end all will benefit.

After holding the office of Secretary since October 1968 and the office of Executive Secretary since January 1972, Marshall F. Richmond has tendered his resignation effective January 1, 1978. The reason given was that after nine years of this tremendous responsibility he was tired and felt that under this condition it would be better to have a change to enable this organization to expand its services.

The Executive Committee met and accepted the resignation of Mr. Richmond and started plans for the future by agreeing to use the services offered by Association Members Services Limited, an Association management service that is headed by Normagene Murray and manages several trade and professional organizations. Marshall Richmond agreed to retain the title of Secretary-Treasurer for one year to be of assistance in the transition and to pass on the connections and influence built in the last nine years that really belong to the WAI. Association Members Services will provide all the services, such as arranging programs, seminars, workshops, and manage the conventions, as well as editing and publishing the Hoosier Watchmaker and convention program books, plus collecting dues and other monies and paying bills.

The following committee appointments were made: Educational Director—Addison Harris, Insurance Coordinator—Bernard Cabiness, Directors of Guilds—Paul Rehling and Robert Lohrmann, Legislative Committee—Harold Calvert, William Lewis and Leonard LeBeau, Awards Director—Robert Wood, Convention Committee—Marshall Richmond, Harold Calvert, William Lewis, and James Johnson.

The WAI will sponsor a class in clock repair in Indianapolis one night a week starting in January 1978, to be conducted by a Master Clockmaker with 35 years experience.

The Wabash Valley guild held their meeting recently in Terre Haute. This was a dinner meeting, with Mr. Lou Corey presenting a retail sales tips seminar.

The North Indiana guild met recently, with Mr. Joseph Dellorto as guest speaker. Mr. Dellorto spoke on "Savings and Investing earnings." Present also for this meeting was WAI President Floyd A. Tuttle. At another meeting, Mr. Earl Furness gave a short talk on his new job at Herschedes, manufacturers of grandfather clocks.

The St. Joseph Valley guild met in South Bend for their regular meeting. The program was a demonstration of the newest cleaning machine available by Dexter Elliott of Portescap.

The Madison guild met in North Vernon on November 3. Election of officers was held, with the following results: First Vice President—Kenny Patrick; Program Director—Ray Gregory; Secretary-Treasurer—Marshall Richmond. In the absence of the new President—Lloyd Hull—Vice President Patrick presided at the balance of the meeting. The retiring President Robert Lows of Lawrenceburg was commended for the work done in the past year.

OHIO



Mr. Robert Nelson

The Watchmakers Association of Ohio will present a seminar on the new caliber Swiss Quartz on January 15, 1978, at the Holiday Inn, Middletown. The seminar will be given by Mr. Gerald Jaeger of Sheboygan, Wisconsin. Mr. Jaeger is a Past President of the AWI and serves AWI presently as Research and Education Director.



Mr. Addison Harris

A Solid State Bench Course was recently presented in Cincinnati to members of the Cincinnati Watchmakers Guild. Mr. Addison Harris assisted Mr. Robert Nelson of AWI.

ARIZONA

The November meeting of the Arizona Watchmakers Guild was held on Tuesday, the 15th. An interesting program planned by Ken Peck was held, along with doorprizes, refreshments, money raffle, and good fellowship.

NEW JERSEY

Featured at the November meeting was Mr. Jean-Pierre Savary of the Watchmakers of Switzerland Information Service. Mr. Savary has served in an executive capacity at WOSIC for

the house that has it all

S. LaRose, Inc.
Worldwide Distributors to Horologists

234 Commerce Place, Greensboro, N. C. 27420, U. S. A.

many years and is well known in watchmaking circles, both here and in Europe. He covered the latest products of Ebauches SA; his program was titled "Electronic Time, Switzerland's Trump Cards."

A quartz stepping motor analog watch bench course was held on November 13 in Clark. Tony Montefusco is collecting old watch batteries for AWI; all members are asked to take old batteries of him.

New officers for 1978 include President, Walter Riegler; Vice President, Alex Kast; Treasurer, Joseph Barbieri; and Secretary, Joseph Cerullo.

ILLINOIS

On November 17, the Central Illinois Watchmakers met in Urbana. William O. Smith, Jr. continued the talk on trouble-shooting which he began at the September meeting. Three reports were given: Max Hoover on the AWI Convention; Don Bilyeu on the CIWA Convention; and Bill Hart on the CIWA nominating committee's recommendations for board members in 1978.

NEW YORK

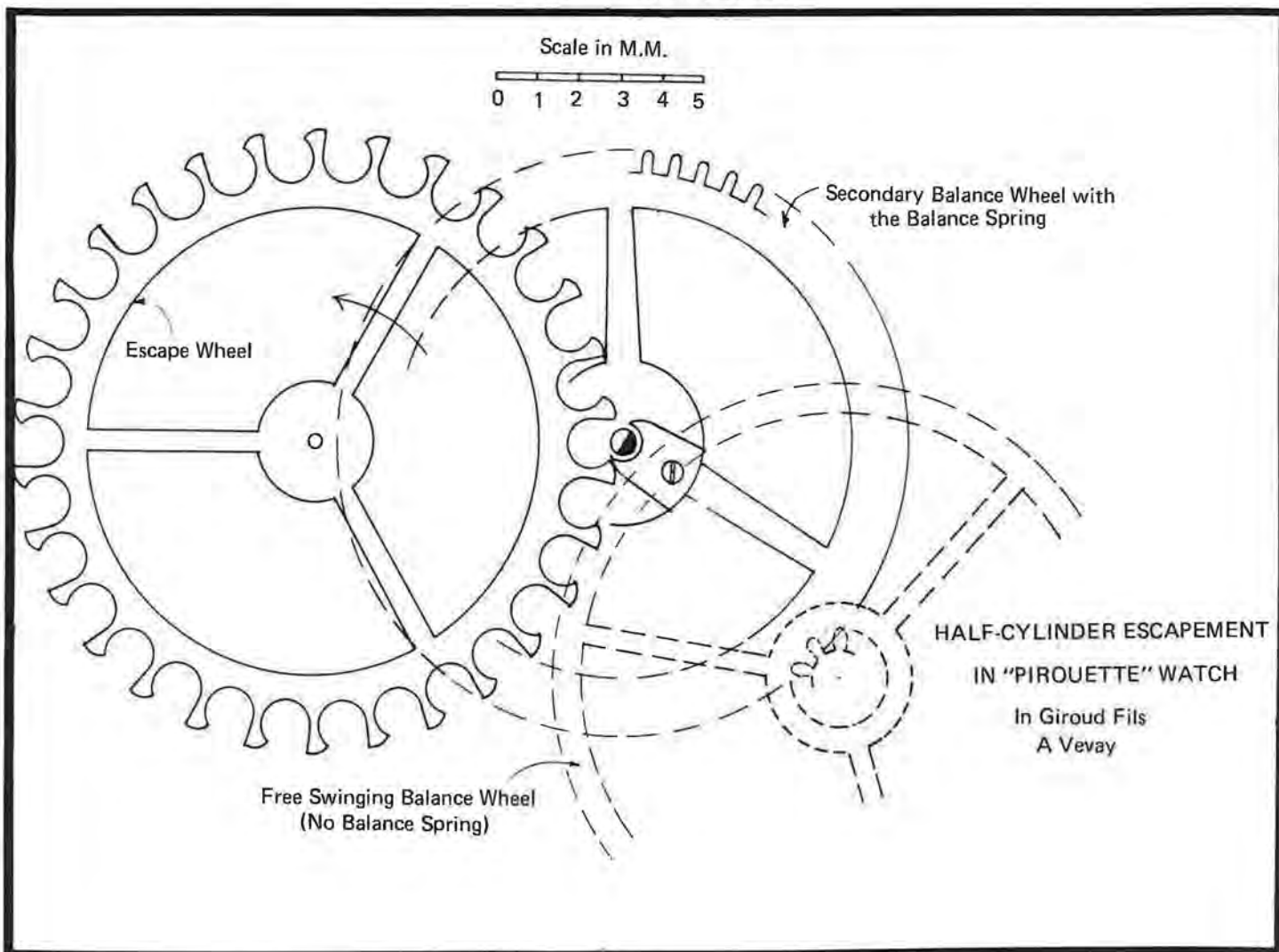
At a recent meeting, the Horological Society of New York heard a presentation by Henry B. Fried, featuring a lecture with slides from his enormous travelogue. This meeting was the last in the Hotel Piccadilly; as of January, meetings will be held in the Hotel Americana. The Banquet Committee has finalized the plans for the 1978 Banquet. It will be held at "Antun's" in Queens Village. The Guest of Honor at this Dinner-Dance will be present Executive Secretary, Alvin Rudnick.

At the graduation exercises of the George Westinghouse Vocational High School held at the New York Hilton, Irving Albert, President of the HSNY, presented the "David Protas Memorial Award" to Ludlow Brown, honor student in watch repairing. Among the dignitaries present were Mr. Norman Shapiro, Principal; Honorable Fred Richmond, 14th Congressional District; and Honorable Percy Sutton, Manhattan Boro President. Ludlow Brown will also receive a one-year free membership in HSNY.

□

UNUSUAL ESCAPEMENTS

(continued from page 35)



□

NEW PRODUCTS

NEW "HR SUPERIOR" PRODUCTS MAKE HARD SOLDERING EASIER

Jewelers' Supply Houses throughout the country can now supply craftsmen with two radically different soldering aids that have never been available before. Both are formulated to make hard soldering faster, easier, and less aggravating.

One of them, called JEL-FLUX, takes advantage of modern gel technology to eliminate "blind joint" soldering. Because it's a gel, this new flux is transparent like a liquid, and



stays put like a paste flux. It goes on faster and more evenly, thus leaving less oxides and residues, and allowing faster pickling. There are no toxic fumes released while soldering with JEL-FLUX. The 2 ounce jar retails for \$2.85.

JEL-FLUX works well with any pickling solution, but its companion product, PRE-PO-PICKLE is recommended by the makers. As the name implies, "PRE-PO" precleans before soldering, and post-pickles afterward to remove oxides and fire scale.

PRE-PO-PICKLE has several advantages over conventional dry granular pickling compounds. It can be used at room temperature; warming to a maximum of 140 only accelerates its action. It quickly removes oxides from gold, silver,

copper, bronze, brass, and German silver. When first mixed, PRE-PO solution is pink; when the solution is exhausted or contaminated, it turns amber. The large size jar, making a gallon of solution, retails for \$3.00.

PORTESCAP ANNOUNCES DIGITAL QUARTZ ANALYZER FOR PUSH-BUTTON TESTING OF ANY WATCH FROM QUARTZ CRYSTAL TO MECHANICAL

In announcing Portescap's new Vibrograf M-80 Digital Quartz Analyzer, Robert McClancy, vice president/general manager of the Vibrograf Machine Division, referred to it as the "ultimate timer for testing the accuracy of watches today." McClancy went on to say, "the technology of the M-80 is so advanced that it is pushing the outer limits of the state-of-the-art in testing quartz watches."

A simple instrument to operate, the M-80 employs a unique "microphone holder" on which the watch is positioned. Then by a push of a button for the type of movement to be



checked for accuracy—quartz base movements employing digital LED or LCD displays, with analog stepper motor or tuning fork, plus all tuning fork and conventional balance wheel watches—and the digital displays the plus or minus rate in seconds per day.

The heart of the M-80 is a crystal standard that oscillates over 8 million times per second, offering accuracy many times greater than that of the most sophisticated quartz watches being made today.

McClancy also noted that "the versatility of the M-80 makes it an excellent investment. It is capable of testing all known frequencies of watches." The M-80 can measure errors as small as 1/100th (0.01) of a second per day on a quartz watch.

The unique "microphone holder" eliminates the need for special probes and attachments. A capacitive coupler picks up the radio signals of quartz crystals; an inductive coupler monitors the magnetic field produced in analog and

the house that has it all



234 Commerce Place, Greensboro, N. C. 27420, U. S. A.

tuning fork watches, an acoustic crystal picks up conventional balance wheel movements.

The integrated solid state circuitry of the M-80 is housed in a compact all-metal cabinet that measures 9½ in. wide x 4 in. high, and 8½ in. deep. There is a built-in tilt stand for viewing ease.

The Vibrograf M-80 comes with a two-year guarantee.

PORTESCAP U.S. INTRODUCES NEW DEMAGNETIZER

Mr. Robert McClancy, vice president/general manager of the Vibrograf Machine Division, announced a new compact and powerful demagnetizer for rapid complete demagnetization



of watches, movements, loose parts, and tools. It measures 4¾ in. wide x 2½ in. high x 5½ in. deep and has a treated aluminum (anti-static) work surface.

SEIKO INTRODUCES NEW MEN'S DIGITAL QUARTZ LC ALARM CHRONOGRAPH

Seiko Time Corporation recently announced introduction of a new men's LC digital quartz Alarm Chronograph.



The new timepiece, model FB004M, in yellow top/ stainless steel back case dial frame, features a "time mode" displaying continuous readout in hours, minutes, seconds and day of week.

At the push of a button—month, day and date are displayed. The calendar automatically adjusts for 28-30-31-day months (except February of leap years).

The electronic stopwatch "chronograph mode" gives readout in hours, minutes, seconds with 1/10th second readout for initial

20 minute period—for timing of complete races, individual laps and first-and-second place finishers simultaneously. In its "alarm mode," the alarm can be set to any hour and

minute desired. It will "beep" for one minute continuously at the set time. This new timepiece, which retails at \$295, is available for immediate delivery.

With this new addition, Seiko now offers three men's LC Digital Quartz Alarm Chronographs, ranging in retail price from \$250 to \$295, all available through Seiko's network of distributors.

SEIKO INTRODUCES NEW MEN'S SLIM DIGITAL QUARTZ MODELS IN \$150-\$195 RANGE

Two stunning new men's LC Digital quartz slim models priced at \$150 and \$195 have been added to Seiko's rapidly growing high quality LC Digital Quartz line.



These exceptionally accurate and highly styled models feature continuous readout in hours, minutes, and seconds—and with AM/PM indicator.

The "command" system features an instant display of month and date at the push of a button, and automatic adjustment for proper number of days in each month (except February of leap years).

Other features include built in illumination system, "Hardlex" mar-resist crystal and adjustable bracelet.

Model DN007M, in stainless steel, with black dial frame, retails at \$150; while model DN008M in yellow top/ stainless steel back case and black dial frame will sell for \$195. These new models, added to Seiko's "DN" Quartz Series, total this grouping to eight men's models, retailing from \$135 to \$225, all available through Seiko's nationwide network of distributors.

NEW FROM GEM INSTRUMENTS CORPORATION

A new fully-illustrated Instrument Brochure which gives specific information about the performance of over 100 professional jeweler's instruments including the new Mini-Lab



and Wax-Worker is now available from GEM Instruments Corporation, wholly-owned subsidiary of GIA.

Significant developments in natural and manufactured gemstones over the past few years have made the use of instruments increasingly important in gem identification, grading and appraising. Such instruments as the Gemolite Mark V, DiamondLite and Proportion Scope are unsurpassed for making professional presentations of diamonds and colored stones.

The new Mini-Lab, a completely self-contained gem laboratory, gives jewelers all the instruments needed for identification and examination of most gemstones. It is ideal for buying trips. Jewelers who often do gem identification away from their stores will appreciate the convenience of being able to take along all of these instruments in the compact kit.

The new Wax-Worker is outstanding for both simple and detailed jewelry wax carving and modeling. It features nine different screw-in tips. Jewelers can select tip temperatures up to 500 degrees F by simply setting a dial. The exclusive stay-cool hand piece and contoured grip permit holding the instrument close to the tip for precise control. The Wax-Worker can be used with all kinds of waxes regardless of melting point.

Many of the instruments described in the new brochure were developed in the research and lab facilities of GIA and are available exclusively from GEM Instruments Corporation.

For your copy of the new Instrument Brochure, write GEM Instruments Corporation, 1660 Stewart Street, P.O. Box 2147, Santa Monica, CA 90406.

NEWEST PULSAR® DIGITAL WRIST WATCH HAS SOPHISTICATED SYSTEM TO DISPLAY PULSE RATE

The new Pulse/Time Computer monitors the constantly changing pulse beat and displays the pulse rate in bright



red digits at a touch of a finger. The extremely sensitive system measures the pulse by detecting the slight changes in blood flowing through the capillaries of the finger. The new solid 14 kt gold Pulsar digital Pulse/Time Computer is priced at \$2,500.

NEW CATALOG FROM HAMMEL, RIGLANDER & COMPANY

A new catalog for clock repair men has just been published by Hammel, Riglander & Co., Inc. and will soon be distributed to the trade through supply houses, selling clock parts.

The 36-page two-color catalog is arranged in sections to follow the procedure used to repair and restore clocks. Not only are the parts shown for many American, French, Cuckoo



and 400-Day clocks, but the necessary tools, supplies and equipment used in repairs are illustrated and described as well.

Since there are many watch repairmen and others taking in clock repairs for the first time, the catalog also features sections on methods of cleaning, oiling, rebushing and the use of clockspring winders.

The catalog number is 877 and should be ordered through supply houses. If for any reason it cannot be obtained, send \$50 direct to Hammel, Riglander & Co., Inc., P.O. Box 222, New York, New York 10014.



the house that has it all

S. LaRose, Inc.
Worldwide Distributors to Horologists

234 Commerce Place, Greensboro, N. C. 27420, U. S. A.

BENCH TIP

ADJUSTABLE DEPTH PUSHER FOR SPRING LOADED DETENTS

Last year while Technical Director for the North Carolina Watchmakers Association and serving on the AWI Bench Tip Committee, Claude Miller, 2409 Union Road, Gastonia, North Carolina, sent me a Bench Tip with this apologetic letter:

"Dear 'Jingle Joe,'

"If you can use this as a bench tip—fine. If you can't, blame our State Secretary Walter Hanson; he made me send it to you.

"It's a pusher for spring loaded detents, that is adjustable so you don't tangle a group of instant set levers or jam the detent, by pushing too far.

"The sketch shows how a watchmaker can make this tools, from junk he has lying around, in only a few minutes.

Best regards,
Claude Miller"

Claude is an excellent watchmaker and devoted member of the North Carolina Piedmont Crescent Watchmakers Guild, NCWA and AWI.

Here he gives us the best tip of the year for a new tool to cope with the changing technology in construction of the modern mechanical watch and he didn't think it was worth mentioning, because it was so simple to make.

By my scale, I think he merits ten of Marvin Whitney's "Atta Boy" Certificates and, believe me, they are hard to earn!

One watchmaker said, when he learned about the adjustable depth pusher, "I'm going to make one of those tools. I've been using a thumb tack sticking out the end of a thimble but it's too dangerous. Some smart alec in the store keeps turning the thumb tack around on me."

The point I'm trying to make is this: you may have a bench tip that will save your fellow watchmaker lots of time and trouble, but don't think it worth letting us know about it. If it's new or an improvement on an old tip, send it in, with your name and address and AWI will publish it.

Please print or type your tips and make a picture or diagram, if needed, to explain them. Don't worry about detail, we will do that when they are printed. But send them in! The address is: "Jingle Joe," 265 North Main Street, Mooresville, North Carolina 28115.

In the lathe, saw off a crown post from an old crown. Tint outside of post with soft solder and screw it halfway down the threads of an AS1194 stem and tighten another old crown on the stem. Saw end off one inch spring bar, in the lathe. Put a little flux on the soldered part and push the stem assembly into the spring bar until the pilot extends out the small and as far as it can. Heat center of the spring bar until the solder melts. Rough up the end of the crown with some

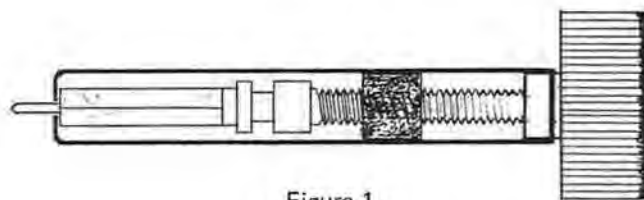


Figure 1.

course emery paper so it won't slip and you have a depth adjustable detent pusher. (See Figure 1).

If you want more length add a stem extender and substitute a longer length of brass bushing tube for the spring bar body, leaving one end at the smaller diameter to fix the stem pilot.

It's quite easy to modify a tip after someone else thought of it. Figure 2 shows the depth and adjustable detent

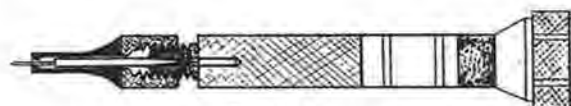


Figure 2.

pusher I made after Claude planted the idea. Very handy also for setting digital watches, pushing out spring bars in removable links and changing spring bar adjustments on the buckle, for most of the new solid type watch bands that are now being manufactured.

To make the plunger, cut a 1 mm staff wire 30 mm length. Draw temper on one end and turn a .50 mm diameter pilot 6 mm long with a blunt point. Harden and draw temper to medium straw.

In the lathe saw off a screwdriver 50 mm long including the head. (My depther was made from 3 mm Bergeon screwdriver which was rarely used.) Remove head, chuck this end in lathe, *carefully true*. Drill a hole 10 mm deep with a No. 61 twist drill (.99 mm) for a press fit with the plunger.

Turn this end to 2.82 mm diameter, 8 mm length. Thread with 4 x 48 die and split threads down the middle with a 4/0 saw blade (to spread for friction fit when depther is screwed on). Press in plunger and proceed to make the depther from part of screwdriver that was cut off.

Saw off a 20 mm length section and *very carefully true* in the lathe with knurled end out. Drill 19 mm deep with No. 61 twist drill (1.1 mm) for the plunger shaft body. Then drill and thread with 4 x 48 tap. Turn depther around in the lathe, chuck up 6 mm deep and again *very carefully true* before drilling pilot hole with No. 76 twist drill (.505 mm). Turn end 1.80 mm diameter, 8 mm length and tap up to chuck.

This makes a tool 70 mm long (2 3/4 inches). To customize a comfortable length to fit your hand, stick index finger straight out, parallel to the bench while the middle finger and the thumb are pressed together, resting on the bench. Measure from bench top to bottom of index finger for total length of depthing tool. Only the measurements for the top half need be changed to modify length of tool for your need. □

Classified

Regulations and Rates

Ads are payable in advance \$.30 per word, \$.40 per word in bold type. Ads are not commissionable or discountable. The publisher reserves the right to edit all copy. Price lists of services will not be accepted. Confidential ads are \$4.00 additional for postage and handling. The first of the month is issue date. Copy must be received 30 days in advance.

HOROLOGICAL TIMES; P. O. Box 11011; Cincinnati, Ohio 45211; (513) 661-3838

THE TRADESMAN

Trade work, quality watch repair, Bulova VC-10 cleaning machine, Vibrograph timing, Certified Accutron Technician, Charles R. Bunkelmann, 1410 Sunset Ridge Dr., West Bend, Wisconsin 53095. Phone (414) 338-3770.

Wheels, pinions, barrels or whatever, repaired or made new. Repivot arbors. On all watch parts, inquire first. Ken-Way Inc., 311 Chestnut St., Addison, Illinois 60101.

Clock repair material and tools. Manufacture of clock springs, dials, escape wheels, verge kits, weights, all types of brass and steel stock and custom made parts. Catalog postpaid \$1.00. Tani Engineering, Box 338, Atwater, Ohio 44201.

Pearl and Bead Restraining. All types. Fast service. Jean A. Gruenig, P.O. Box 12007, Columbus, Ohio 43212.

FOR SALE

New! Kale-Katch-All Replacement sink trap for watchmakers & jewelers. Lexan see-thru material stronger than brass. Instant-remove bowl/filter \$13.95 Postpaid. Maurice Lareau, 1408 Robin Ct., Longwood, FL 32750.

Horological clock and watch books, repair, identification and pricing guides. Illustrated catalogue \$.35, refundable. American Reprints Co. 28, 111 West Dent, Ironton, MO 63650.

For Sale—Timing Machines, Watchmaster Timers Vibrograph Timers. Factory Rebuilt. All machines guaranteed. Terms available. Also available Ultrasonic Watch Cleaning Machines. Write Watchmaster sales representative Robert Swensgard, 6826 Wetheridge Dr., Cincinnati, OH 45230. Or phone (513) 231-3919. Territory: Ohio and Michigan.

Unimat 3, Maximat, Emcomat, Sherline Lathes. Precision tools, English or Metric. Aluminum, brass, steel, all shapes. Small screws, taps, drills, saws, collets. 78 Page Catalog \$1.00. Campbell Tools, 1424 Barclay Road, Springfield, Ohio 45505.

HELP WANTED

EXPERT WATCHMAKER WANTED. We are seeking a highly trained competent technician to work on the world's foremost watches, such as Patek Philippe. Must do all types of repairs, including adjusting and regulation, adjustment of escapement, making and polishing parts, refinishing cases; some electronics and "complicated" watch experience needed. 35 hours per week. Salary \$250 to \$285 depending on experience and expertise. Please send resume to: The Henri Stern Watch Agency, Inc., 10 Rockefeller Plaza, New York, NY 10020, (212) 581-0870.

WANTED TO BUY

Escape wheel—pinion, pallet fork complete 16S Elgin, B.W. Raymond model no. 28203444 Grade 472; 21 jewel. Paul Taylor, 10101 Oak Hollow Circle, Austin, Texas 78758.

Used Omega movements needed. Cash for any quantity, any condition. International Watchmakers, P.O. Box 91909, Los Angeles, CA 90009.

Hamilton models 21 and 22 chronometers, movements, boxes, gimbals, parts, damaged or basket cases. State condition and price. R.P. Rice, Box 31481, Denver, Colorado 80041.

23 Jewel Pocket Watches wanted for my collection. Send movement serial number, description, and price. Roy Ehrhardt, P.O. Box 9808, Kansas City, MO 64134.

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

SITUATIONS WANTED

This column is free to AWI members. You may use this column every fourth month at no cost. HOROLOGICAL TIMES will also keep your ad confidential, and mail all inquiries directly to you.

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.

the house that has it all

S. LaRose, Inc.
Worldwide Distributors to Horologists

234 Commerce Place, Greensboro, N. C. 27420, U. S. A.

Calender

JANUARY

- 15—Watchmakers Association of Ohio; New Caliber Swiss Quartz Seminar; Middletown, Ohio.
- 17—Massachusetts Watchmakers Association; regular meeting; Cambridge, Massachusetts.
- 28-29—Watchmakers Association of Ohio; regular meeting; Marriott Inn; Columbus, Ohio.

FEBRUARY

- 5-8—Retail Jewelers of America; 1978 Spring International Jewelry Trade Fair and Conference; Americana and New York Hilton Hotels; New York, New York.
- 9-16—Retail Jewelers of America and The Jewelry Institute; Management Seminars; Guadeloupe.
- 19-24—Dallas Market Center; Spring Gift, Jewelry, and Housewares Show; Trade Mart and World Trade Center; Dallas, Texas.
- 25—Horological Society of New York Banquet; Antun's; New York, New York.
- 25-26—Minnesota Retail Jewelers Association/Minnesota Watchmakers Association; Annual Convention and Trade Show; Radisson South; Bloomington, Minnesota.

MARCH

- 11-12—Wisconsin Jewelers Association; Mid-America Jewelry Trade Show; Olympia Princess; Oconomowoc, Wisconsin.
- 12—Watchmakers Association of Ohio Seminar; Diamond Appraisal and Colored Stones; Mansfield, Ohio.
- 12-14—Manufacturing Jewelers and Silversmiths of America; Convention and Suppliers Exposition; Expo/New York; New York Hilton; New York, New York.
- 21—Massachusetts Watchmakers Association; regular meeting; Cambridge, Massachusetts.
- 29-31—Manufacturing Jewelers and Silversmiths of America; Convention and Suppliers Exposition; Expo/West; Century Plaza Hotel; Los Angeles, California.

APRIL

- 14-16—Wisconsin Licensed Watchmakers Association; Annual Convention; Holiday Inn; Fon du Lac, Wisconsin.
- 15-16—Michigan Watchmakers' Guild; Annual Convention; Doherty Motor Hotel; Clare, Michigan.
- 15-24—European Watch, Clock, and Jewellery Fair; Basel, Switzerland.

ADVERTISERS INDEX

AMERICAN WATCHMAKERS INSTITUTE	45
B. RUSH APPLE	31
BB CRYSTAL CO.	24
A.G. BARTHOLOMEW	31
BOREL	23
BULOVA WATCH CO.	13
CAS-KER CO	Inside Front Cover, 28, 29
C. DVORKIN AND CO.	7
ESSLINGER AND CO.	28, 29, 36
EWING BROS.	28, 29
G & G'S MIRACLE HOUSE	39
GEM CITY COLLEGE	47
GOULD CO.	37
GREENHILLS CLOCK SERVICE	15
HAMMEL RIGLANDER & CO.	11
HER MIL INC.	Outside Back Cover
INTERNATIONAL WATCHMAKERS	41
B. JADOW SONS, INC.	21
KANSAS CITY SCHOOL OF WATCHMAKING. . . .	47
KEYSTONE SALES	43
KIENZLE TIME CORP.	33
KILB & CO.	33
KILGORE COLLEGE	27
KUONI TRAVEL, INC.	25
LANGERT BROS.	28, 29
S. LA ROSE	7, 9, 15, 17, 19, 25, 27, 33, 35
.	37, 39, 41, 43, 45, 47, 49, 51, 53, 55
MARSHALL-SWARTCHILD	3
MAYER BROS.	28, 29
P. MEREMINSKY	43
THE NEST CO.	28, 29
PARIS TEXAS JUNIOR COLLEGE	37
PARKLAND COLLEGE	39
PORTESCAP	Inside Back Cover
SEIKO	5
SWEST INC.	47
E & J SWIGART CO.	Outside Back Cover
VALU-CRAFT	28, 29
I. WIDESS & SONS.	15

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



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

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

MULTI-FREQUENCY INFRASONICS COUPLED WITH VACUUM ASSURES ABSOLUTE CLEANING!

In order to attain *absolute cleaning* (the removal of all contaminants from a movement) our engineers have discovered after years of testing that it is necessary to employ multi-frequency cleaning action. The VC-10 has been designed with a cleaning frequency ranging from 5 to 20,000 cycles per second. Our research has shown that to thoroughly clean any given movement it is necessary to employ *low frequencies* for soft contaminants, *high frequencies* for brittle contaminants, and *medium frequencies* for general cleaning. During cleaning, the watch

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

*Hundreds of Watchmakers
cleaned up with it last year.*



movements in the cleaning chamber are under partial vacuum. The individual cleaning and rinsing liquids also operate under partial vacuum. Cleaning and rinsing solutions can be used twenty to thirty times over.

FIVE STAGE AUTOMATIC CLEANING!

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

USE WITH ALL WATCH LUBRICANTS!

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

A LOT OF PROFIT IN A LITTLE SPACE!

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

BUILT TO LAST!

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

FREE IN-STORE DEMONSTRATION!

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

**Portescap U. S. VIBROGRAF®
MACHINE DIVISION**

6 Ohio Drive, Lake Success, N.Y. 11040 (516) 437-8700

incabloc®

HER-MIL INC.
PRESENTS

the original **one step**®

Single phase watch lubricant.

- HER-MIL'S ONE STEP offers the improvements in lubrication you have been looking for!
- A stable emulsion which cannot separate, thus insuring an even distribution of lubrication throughout the watch.
- ONE STEP treatment in the final rinse eliminates undesirable imbalance in the lubricant due to "carry over" from the inhibitor solution.
- Non-Plastic formula eliminates the curing process requiring extreme heat thus eliminating the risk of damage to delicate watch parts.
- The ultimate degree in wetting or detergency power. Eliminates "globs" of polymeric residue.



**2 OUNCES
TO BE MIXED
WITH ONE
QUART RINSE
\$6.95**

**8 OUNCES
TO BE MIXED
WITH ONE
GALLON RINSE
\$24.95**

Available through
leading material
distributors

For your nearest
dealer, write:
**HER-MIL, INC.
P. O. Box 11288
Cincinnati, Ohio
45211**

Second Class
Postage
PAID
Cincinnati, Ohio
45211

AMERICAN WATCHMAKERS INSTITUTE
P.O. Box 11011
Cincinnati, Ohio 45211
Send Form 3579

Now in its 99th year, the E. & J. Swigart Company has, since its founding in 1879, been one of the largest of pure material houses in the continental United States, offering full lines of Swiss and American watch materials and batteries, including genuine materials from such factories as Seiko, Citizens, Bulova, Girard Perregaux, Omega, Longines, Wyler, Zodiac, Rolex, Hamilton, Elgin and other popular brands.

We also carry full lines of tools and supplies for the jeweler and watchmaker, as well as regular and jewelry findings, clock materials, watch glass, bands and straps, optical goods, packaging supplies, tags, job envelopes, and bags, imprinted on our own presses.

The majority of our sixty-six employees have been with us for periods of twenty years or more, giving us an expertise which is unique in a complex and highly technical business. We invite you to try our stocks and service.

Catalogue and Ordering Material Available on Request

THE E. & J. SWIGART COMPANY

34 West 6th Street
Cincinnati, Ohio 45202
(513) 721-1427

QUEEN CITY SEMINARS

Now in its fifth year, and with attendees over the 600 mark, we are currently sponsoring in a separate location at 34 West 6th Street in Cincinnati, five day seminars in jewelry making and repair. Equipment used is the most modern available. Seminars are as follows:

1. A primary five day class in ring sizing, assembling heads and shanks, prong rebuilding, stone setting, plating, and related functions. Classes are limited to six to permit personalized instruction. Findings used are 14K die struck.
2. Five days of advanced jewelry work for those who have attended the primary seminar.
3. Five day seminars in casting rings, pins and pendants by the lost wax process. Wax modeling, carving and design.

WRITE FOR BROCHURE

The E. & J. Swigart Co.