

FIREARMS ENGRAVERS GUILD OF AMERICA

HOW-TO HANDBOOK



SECOND EDITION

Revised August 2006

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Firearms Engravers Guild of America
www.fega.com

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1 INTRODUCTION

The following pages are compiled from information freely given by members of the Firearms Engravers Guild of America. While it does not represent our cumulative knowledge of the art of engraving, it does represent the first steps in revealing some of our special "secrets" to our fellows-in-art.

We have taken our lead from members who are respected in our ranks. We understand there is no real danger in opening our minds to those who want to know how we work. It should be recognized that when others understand the difficult steps we take, and the time-consuming processes involved in engraving work, we would be further respected for our knowledge and perseverance in creating a finished piece.

To the beginning engraver: This represents an unknown number of hours spent trying to find the best way to achieve a satisfactory method of approaching special problems in firearms engraving. You may read several solutions to a single problem, and while each may work, each represents a solution arrived at after some effort to solve that problem. Occasionally a solution may seem more difficult than the original problem. It probably is not, but it should remind you to approach these special areas with caution. If you find a better way, please let us know!!

A special thanks to Steve Frickey, Bob Strosin, Marty Rabeno and Andrew Biggs for doing a splendid job of re-editing and re-typing. To those who contributed to this information: "Thanks, everyone." Your shared knowledge is a real gift and is what the Guild is all about. When everyone helps, everyone learns. We have a storehouse of knowledge in our combined experience; please continue to send your suggestions.

R. Pedersen

1.1 FEGA CODE OF ETHICS

AS A MEMBER OF THE FIREARMS ENGRAVERS GUILD OF AMERICA:

1. I will make a sincere effort to improve my skills and achieve a high standard of quality in my work.
2. I will use fairness, honesty, and integrity in dealing with the public, clients, and colleagues.
3. I will honor all local, state, and Federal laws pertaining to engraving and the pursuit thereof.
4. I will uphold the by-laws of our Guild and support those who are looking after the success and welfare of the Guild and its members.
5. I will support the Guild in its efforts to inform and educate all of those interested in the engravers art.
6. I will uphold and defend this code and will conduct myself, at all times in a manner that will bring credibility, honor, and pride to the Guild and its members.
7. I understand that the Guild will not tolerate unethical practices and will review any complaints from the public, clients, and/or colleagues and that any wanton violation of good ethics can bring expulsion from the Guild. But a member in question will be reviewed in a fair and impartial manner, with a concerted effort to obtain proof before action is taken. Without proof, the member in question will be placed under observation until a determination can be made.
8. I understand that acceptance of this code is a requirement for membership.

1.2 MEMBERSHIP IN THE FIREARMS ENGRAVERS GUILD OF AMERICA

Any individual may enroll as a Regular member or Associate member.

Regular membership is for all individuals who are engaged in the craft of engraving or actively learning the craft. Regular members are entitled to all rights and privileges of membership except those specifically restricted to FEGA Certified Professional members. (The special privileges granted to FEGA Certified Professional members are the right to mark their work with a Guild stamp, and to be listed in the FEGA Certified Professional directory.)

International membership is available to those who are not residents of North America.

Associate membership is for all individuals who are not engravers or actively learning the craft but who wish to participate in Guild activities and support the art. They shall have all of the rights of regular membership except that of voting or holding office.

FEGA Certified Professional membership is for all individuals who have chosen to have their work juried under repeatable guidelines to verify basic firearms engraving skills. See the application procedure for Certified Professional Membership.

1.2.1 ADDITIONAL CLASSIFICATIONS OF MEMBERSHIP

Member Emeritus includes all Regular, Associate, or FEGA Certified Professional members who because of age or infirmity have retired from active engraving or participation in the Guild. They shall be carried on the rolls as Member Emeritus; they shall receive all Guild publications and shall pay NO dues.

Honorary Life Member is a classification given to those individuals who because of their activities have brought recognition to the craft of engraving. This recognition shall be by recommendation of the Board and approval by a majority of members present at an annual meeting. A person so honored shall have all of the rights of membership but shall pay NO dues.

1.3 APPLICATION PROCEDURE FOR FEGA CERTIFIED PROFESSIONAL MEMBERSHIP

Applicants for FEGA Certified Professional Membership shall follow the steps outlined by the Guild. Contact the Guild Office for details or download the forms and criteria at www.fega.com

2 ENGRAVING REFERENCE MATERIALS & SUPPLIES

2.1 Books

Your Engraving Library -A Cornerstone for Reference

I once read a quote that said, "A person is only as good as his library." I think there is considerable truth to that assuming, of course, that the books are used and read. For engravers, I think it is especially true. We have limited access to our contemporaries because of our diverse backgrounds. We are further limited by geography; with hundreds of engravers spread (more or less) across this country there is little chance for visitation. Books are our best source of information and inspiration.

I am frequently disturbed when I see the work of beginning engravers over a period of time and fail to see any significant evidence of growth in the area of style. The quality of scroll may have improved and control of the tools may be better but the style of engraving remains essentially the same. If a person has been engraving for a year and he still thinks the style he started with is good, it suggests to me that he hasn't been hitting the books. I might add that this isn't limited to beginners. I know people who have been at it for 25 years and have not improved significantly. In these cases, they simply have not matured in the matters of style and quality. A good reference library can supply you with the means to research style, and will provide you with an unending source of inspiration.

I don't believe your engraving can significantly improve unless you study good engraving. There is a wealth of information, both technical and visual, available in books that you can have in your source library. Unfortunately, many books that are published in our field are inherently expensive. Good work is rare when you are trying to fill a book, and expensive to photograph and publish. That is no excuse for not starting a library of reference books. Study them, but remember that not all engraving in these books represents high quality or "good" work. You will learn to discriminate between what is good and what is not. Try to incorporate some of what you see into your own work; it's the only way you will grow. Let me end this with another quote: "If you are not moving forward, those who are will run over you."

B. Evans

2.1.1 A good library

A good library is an asset to an engraver. The following book titles have been suggested as being useful. In addition, a very good source of animal line drawings is children's books, in the 10-12 yr. age bracket. Some of the books listed are now out of print.

It also pays to get these books as soon as you come across them. They are generally specialist books that are printed in small runs and their availability is usually limited.

"American Engravers" by C. Roger Bleile, 1980. Good pictures of a variety of engraving styles, interesting biographies of engravers, and excellent vocabulary of engraving terms. (B, H)

"Art, Alphabets, & Lettering" by Berling. (B)

"The Art of Engraving" by James Meek, 1973. A MUST - the Bible for Beginners. (B,F)

"The Art of Engraving - A Practical Treatise on the Engravers Art, With Special Reference to Letter and Monogram Engraving"

"Art Monograms & Lettering" by Bergling. Excellent book on the styles of lettering.

"Artistry on Arms" by Norton Art Foundation. (B)

"Baroque Book of Illustration" by Philip Hofer

"Basic Engraving" by Benno Huene

"The Big Game Animals of North America" by J. O'Connor & G. Goodwin Pub. Excellent paintings and sketches of animals (may no longer be in print). (D)

"Birds and Mammals of Alaska" by Doug Lindstand. This is a good source of sketches and photos of animals. (A)

"The Book of Colt Engraving" by R.L. Wilson, 1974. Out of print; and superseded by later edition.

"The Book of Winchester Engraving" by R.L. Wilson, 1975. Out of print and expensive.

"Colt Engraving" by R.L. Wilson, 1982. Expensive but worth it, excellent photos of engraved Colts, also good history. (B)

"Drawing and Understanding of Scroll Designs" by Ron Smith. The best book on scroll design ever written! (E,G)

"Drawing with Pen and Ink" by Arthur Guptill

"E.C. Prudhomme, Master Gun Engraver" by Norton Art Foundation. (C)

"Engraving Precious Metals" by A. Brittain. Out of Print. Available for about \$10.00, hardback. (B, C)

"FEGA How-To Handbook"

"Firearms Engraving as Decorative Art" by Dr. Frederic Harris.
 "Firearms Engraving Theory and Design" by George Sherwood
 "Florid Victorian Ornament" by Karl Klimsch
 "A Gallery of Waterfowl and Upland Birds" by D. Mass & G. Hill.
 "Grandi Incisioni su Armi D'Oggi" Abbiatico's earlier Italian version of "Modern Firearms Engraving."
 "Gun Engraving Review" by E.C. Prudhomme, 1961. Out of print, rare, and expensive, this book is a collectors item.
 At last report reprints were made by the NgraveR Co. (C)
 "Handbook of Ornament" by Meyer. (B)
 "How to Engrave" by Ray Phillips
 "The Jewelry Engravers Manual" by R. Allen Hardy. Available for about \$6.99, softback. (B,C)
 "L.D. Nimschke, Firearms Engraver" by R.L. Wilson, 1965. Was out of print, rare, and expensive, however a new edition has recently been released. This is Nimschke's engraving record. (B)
 "L'Incisione Della Armi Sportive" Mario Abbiatico's newest book, and, in my opinion, the best of the three because he includes a number of non-Italian engravers, including several Guild members, but the text is in Italian.
 "Master French Gunsmith Designs" Winchester Press, NY. Out of print and rare - only 1000 printed - excellent book.
 "Modern Custom Guns" by Tom Turpin
 "Modern Firearms Engraving" by Mario Abbiatico, 1982. Be careful on this one as there are three editions of the Abbiatico books, two are in Italian and one English. This is the English version.
 "Ornamental Designs & Illustration" by Bergling. (B)
 "Perspective Drawing Handbook" by Joseph D'Amelio.
 "Scroll Ornaments" by Knight
 "Techniques of Copperplate" (Script Lettering)
 "Waffen Gravuren" by Goldschmidt & Schwend. Written in German, with excellent photos of work by Ferlach engravers.
 "Steel Canvas The Art Of American Arms" by R.L Wilson
 "British Gun Engraving" by Douglas Tate Excellent photos of inspirational workmanship
 "Fine European Gunmakers" by Marco Nobili full of great photos of some of the best European engravers
 "Advanced Drawing of Scrolls" by Ron Smith The definitive word on scroll design. A must for all learners
 "Custom Firearms Engraving" by Tom Turpin Great photos showing good detail
 "The Basics of Firearms Engraving" by Neil Hartliep (normally available at Brownells)
 "2002 FEGA Collectors Edition Engravers Profiles" only available at www.fega.com
 "The Technical Pen" by Gary Simmons

2.1.2 Book Reviews

2.1.2.1 The Art of Engraving

Norbert Brubach, a FEGA member from Arlington Heights, Illinois, sent along a copy of a fine book on hand engraving. Mr. Brubach suggested that few of us would be familiar with the book, and he's probably correct.

The title of the book is ""The Art of Engraving - A Practical Treatise on the Engravers Art, With Special Reference to Letter and Monogram Engraving." It was originally printed in 1904.

The book reads like an apprentice's study text. It begins at the basics of engraving and works through fine monogram lettering - with a lot of good solid technical information squeezed between! It references hand burin cutting exclusively and describes tool making, letter styles, the various approaches to engraving particular objects, and other valuable information for any engraver.

M Dubber

2.1.2.2 "Firearms Engraving as Decorative Art"

Dr. Frederic Harris has divided this book into two main parts. In part one, he traces many of the current engraving motifs back to their origins in ancient and medieval times. He engaged in extensive research and illustrates the various designs with excellent photography. He very effectively answered the question, "Where do all of these designs and motifs in use originally come from."

In part two he uses high magnification photography to highlight the individual engraving techniques that allow us to identify the work of the 19th century engravers Gustav Young, the Ulrich family, Helfricht, Nimschke, and Hoggson. He makes extensive use of color photographs.

The book is well researched, well written, and has excellent photos of firearms engraved by the masters of the 1860-1900 period. It is a rather specialized book. I differ with the author on the artistic merit of some of the engraving he features - but that is a minor criticism. If I were a beginning engraver, it would not be the first book I would buy; it is a bit too specialized. It is a must for the collector of firearms of that era and a very useful addition to the library of the serious and advanced engraver.

It is an excellent book that I will include in my own library. The book, published in 1990, has 156 pages and over 250 color plates.

2.1.3 Book Sources

- | | |
|--|---|
| A. Internet only sources
Amazon Books www.amazon.com
E-Bay auction site www.ebay.com | B. Ray Riling Arms Book Company
PO Box 18925
6844 Gorsten St.
Philadelphia PA 19119 |
| C. The Ngraver Company
67 Wawecus Hill Rd
Bozrah CT 06334 | D. Outdoor Life
355 Lexington Ave.
New York NY |
| E. FEAGA
www.fega.com | F. Brownells
200 S. Front St
Montezuma IA 50171 |
| G. Ron Smith
5869 Straley
Ft. Worth TX 76114 | H. C. Roger Bleile
5040 Ralph Ave.
Cincinnati OH 45238 |
| I. Lindsay Publications Inc.
PO Box 538
Bradley IL 60915
815-935-5353 | J. Taylor Publishing Company
8935 SW Laurel Leaf Terrace
Portland OR 97225 |
| K. Glendo
PO Box 1153
Emporia KS 66801
www.grstools.com | L. For out of print books you could also try on the internet at Ebay www.ebay.com or try searching other web sites. |

For Out-of-Print books, try:
Rutgers Book Center
127 Raritan Avenue
Highland Park. NJ 08904
732-545-4344

2.2 *Creating a "Morgue" of Animals and Figures for Engraving Reference*

In an earlier article, I mentioned creating a "morgue," a collection of useful pictures, drawings, etc. for future reference material for engraving subjects. This self-created library can become a valuable resource when an engraver is requested to cut animal or bird figures as part of a commission.

As engravers, many of us lack formal art training and feel limited in our ability to draw animals and birds. True animal artists understand what makes an animal move, and a bird fly; all the various muscle groups that cause a drawn figure to appear lifelike. This was true of the old masters - they had reference morgues that were kept in drawing notebooks, which they created from nature - before the time of cameras and printing. Engravers should do as they did, developing a collection of pictures and drawings that we can refer to when we engrave these figures into steel.

I try to concentrate on high quality pictures that show good detail. I especially look for pen and ink drawings in magazines, books, advertising material, and newspapers. I cut them out or Xerox them to enter into my "morgue." The morgue is a three-ring binder, indexed according to the subject, and organized into categories of animal and bird species.

Not only does this morgue contain a variety of animal subjects, but also includes a selection of trees and backgrounds that are appropriate to the animal figures. With this arrangement I can thumb through the binder and easily pick out the very subject needed for a particular engraving; it has become a most valuable source of subjects to which I constantly add. Remember that the background subject matter can be as important as the actual animal to be engraved. The proper background must be fitted to the subject- mountain, plain, and woodland backgrounds have to match the subject.

Over the years, I have accumulated a great deal of information in my morgue: unusual borders, banners, different breeds of hunting dogs, flowers, and references to pictures in other books in my engraving library. My only admonition is that whatever goes into the book should be of good quality.

In all of this, be sure to observe properly the copyright laws. If something is copyrighted, you cannot duplicate it without first obtaining the artist's permission. When I put a picture into my file, I try to include the artist's name and address, if it is available. Then I contact him or her to explain and obtain permission. If you are in doubt about something being copyrighted, err on the side of caution.

Actually, I don't see copyright laws as much of a problem unless what you engrave is clearly identifiable as someone else's art. If you make significant changes in the picture, you are probably safe from infringement. After all, how many ways are there to draw a duck, or a deer? The safe thing to do is to use generic pictures or ones that are no longer under copyright.

2.2.1 The Internet As A Resource

The internet is also a great source of reference material Everything from clipart, photos and fonts. Some of the material is free and other things you have to pay for. Some images are copyrighted and others not. Have a good search around and you'll find pictures of just about anything

2.3 Video Tapes

2.3.1 FEGA Seminar tapes

FEGA offers a varied selection of engraving seminars, available in either VHS or DVD format. You can purchase them directly from the FEGA website www.fega.com or write to the secretary for a current list.

2.3.2 Other video tapes on engraving

Many other engraving videotapes are available from reputable companies. Try a search on the internet to find them. Lynton McKenzie produced three video from beginning to advanced engraving techniques using hammer, chisel and burin (push graver) available at www.brownells.com The techniques he demonstrates are still relevant today.

2.3.3 Castings

FEGA offers a good selection from engravers both past and present that are available to purchase from their web site at www.fega.com or you can contact the secretary. They are an invaluable source of study for the novice engraver.

2.4 Education

Engraving instruction is offered by individuals, colleges, and commercial enterprises. Guild members and others teach all across the United States, throughout the year. Classes are available at the following places.....

<p>GRS Tools 900 Overlander Road Emporia, KS 66801 Phone: 620-343-1084 Toll Free: 800-835-3519 Fax: 620-343-9640 E-mail: grsTools@grsTools.com www.grstools.com</p>	<p>Stockton Jewelry Arts School Brian P. Marshall Stockton, CA 95209 phone: 209-477-0550 email: instructor@jewelryartsschool.com www.jeweleryartsschool.com</p>	<p>Fine Art Engraving School, Ray Cover Festus, MO 63028 Phone: 636-937-5955 email: cover@sbcglobal.net www.rcoverengraving.com</p>	<p>Johny Weyerts School of Engraving 1-800-687-2969</p>
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3 ENGRAVING DESIGN

3.1 *The Art of Engraving*

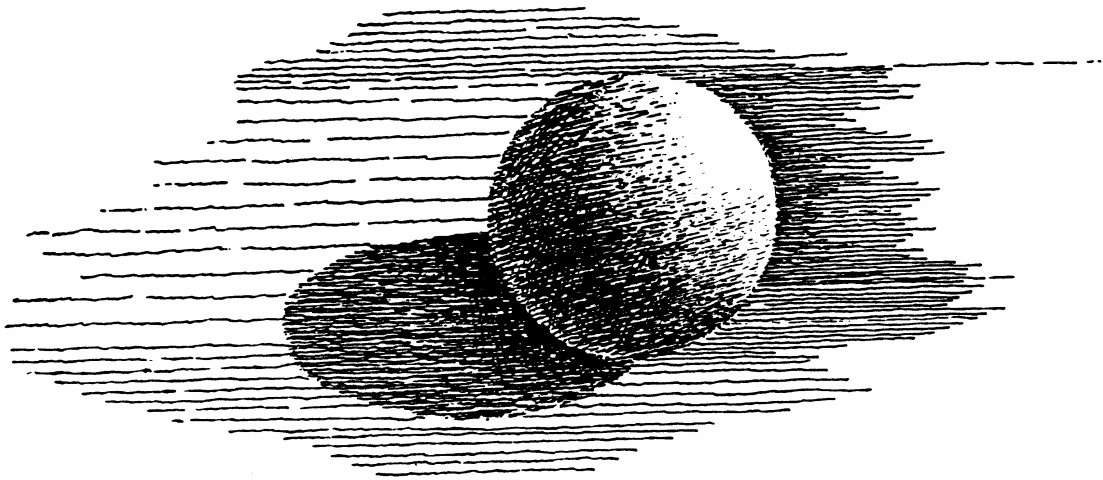
3.1.1 Understanding and Drawing Scrolls

Good symmetrical scrolls are essential to quality engraving. Very often when you draw a scroll it will look great, but be sure to turn it upside down and look at it. Very often, something that looks good one way will look awful when viewed upside down. A good scroll will look right from every angle.

B. Evans

3.1.2 Comments on Shading

To shade an area is to do to that area just what the name implies. You take part or parts of the area out of the light. Whenever you're working on a two-dimensional surface -- paper, canvas, steel, etc. -- you have to create the illusion of light and dark areas in order to depict form.



Understanding how the light strikes an object is necessary for an artist to be able to achieve the illusion. Probably the best way to gain this understanding is to consider a simple object, say a ball, and a simple light source, say a single light (a light bulb, the sun, or whatever) striking the ball from a given angle overhead.

In the above illustration, there are two major areas of darkness - a "shade" and a "shadow." There is a difference between the two. "Shade" is the dark area on an object (the ball in this case). This shade is caused because the light can't illuminate all of the surface. "Shadow" is dark cast from an object onto another surface -- a table, the ground, etc. It happens, of course, because the object comes between the light and the surface, obstructing the light. The shadow is almost always distorted because of the viewer's relationship to the light and the horizon. The distortion in the ball illustration is called an ellipse. One thing about ellipses - They are never pointed on the end (like a football). They are always rounded.

Notice the faint light area on the surface of the ball next to the shadow. This light is reflected from the surface on which the shadow falls and is called reflected light. Your treatment of reflected light will really make your objects look real. Be sure, however, not to get this area too light.

Also, notice the light in the shadow area. The farther from the object the shadow extends, the more light it has in it.

Nature is always the artist's best source for studying light and dark values. Sometimes with the confusion of everything else around however, one fails to see important things. So study all you can about what others have discovered, and the examples will be easier to spot in nature.

There are so many good reference books on drawing and rendering these days, I hesitate to list any; however, I will mention a few that I find helpful:

"Drawing with Pen and Ink" by Arthur Guptill. This is a very old publication, so there is no zip code in the address of the publisher. Check your local library for this one. It is a great reference for drawing with pen and ink that translates well into creating line engraving.

Reinhold Publishing Corporation
330 West Forty-Second Street
New York, N.Y.

"Perspective Drawing Handbook" by Joseph D'Amelio.

The Tudor Publishing Company
221 Park Avenue South
New York, N.Y., 10003

I think all beginning engravers should acquire a copy of Karl Klimsch's work which is entitled, "FLORID VICTORIAN ORNAMENT," published by:

Dover Publications Inc.
180 Varick Street
New York, N.Y. 10014.

The great value in this work is two-fold, and lies beyond having a reference for designing corners and borders, or the superficial observation of the different shapes. All of these things are terrific but there are two other important aspects of the book. One is the way this artist understands light and shade and shadow, and the other is his execution of the shaded areas with an engraving chisel. In almost every example in the book, you have the opportunity to observe the lights effect on two or more views of the same pattern.

FOR EXAMPLE: When a leaf (motif) is on one side of a design, it appears one way, and when the same leaf (motif) is repeated on the other side of the design it is "twined over." Therefore, because of the constant single light source it appears a different way. Notice in the illustration that the motifs on the right of the figure are repeated on the left. The light source is from high left so each motif takes on a different appearance because of the way the light strikes it. Also, note the cast shadows that add to the credibility of form and space. OBSERVE the very important way in which Mr. Klimsch utilizes line in order to make the dark areas.

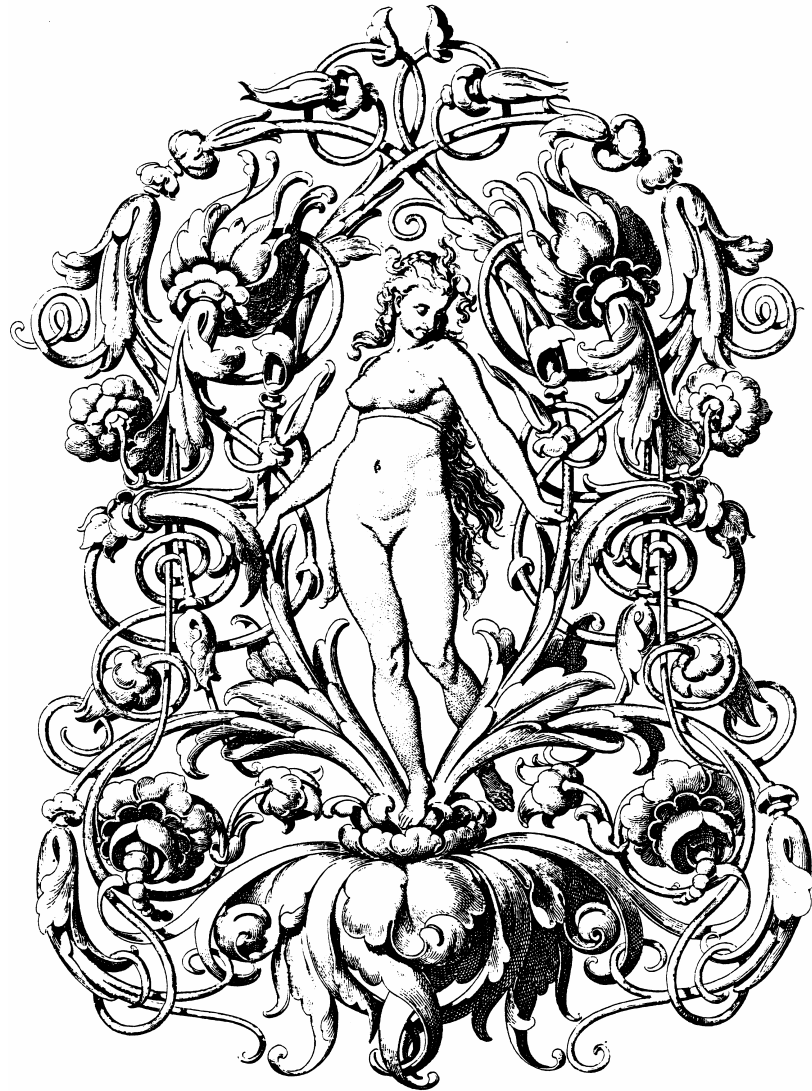
It is relatively simple to place tones of shade on an area with paint or pencil or charcoal. It is quite another matter to do so with pen and ink, and it's even more difficult to pull the illusion off using steel as a support and burin as a medium.

To accomplish dark areas in metal the artist cuts a series of lines. These lines have to be controlled as to their size, their depth, and as to their relationship to one another. Lines are cut deeper for darker tones, and they are placed closer together for darker tones. Both of these methods are often used on the same area. Study the example by Karl Klimsch. Some lines are thicker than others are, some are placed farther apart, and the darkest areas are the deepest. Be sure to notice the extensive use of crosshatching.

You can again look at the ink drawing of the ball and observe the rich texture available by varying the line quality. (Thick lines, thin lines, wavy lines, broken lines, etc.)

I believe the Italians are using (cutting) dots to come up with even more startling realism because you can put them so close together. You can render a mass with more subtle transition from dark to light. At any rate, in order to grow as an artist in any medium, you have to figure out some way to give the illusion of light and dark – not only on a single object, an animal for example, but also in a whole scene.

The first part of this brief discussion has been concerned with treating surfaces more or less realistically. Unless you begin to understand the effect that light has on surfaces, you will find yourself struggling to bring off the realism that you are seeking.



There is another way to shade, and it obviously developed from the first method. It is one that may be thought of as “ornamental” rather than “realistic.”

The area to be shaded is simply treated with “ornamental cuts,” and this method is most applicable to scroll designs.

To accomplish the “ornamental” approach it is necessary simply to follow the general lines of your pattern in most cases. If you look at good leather carving, you can get a good idea of how this method works.



In the above illustration, you can see that the “shade lines” are merely repetitions of the same lines used to draw the pattern. (You might also notice the similarity of the scroll designs that you have been drawing). These “shade lines” look good if you make them wider and deeper on one end – just the way it is done in leather.

These “decorative cuts” can be carried to the extreme and still look good.



I am referring to the cuts at the top of the leaf design, which change direction when I say "extreme." Because of the "natural" direction change of scroll design, this method looks O.K. for ornamental. Your cutting has to be smooth, however, and your design has to be well conceived or nothing will look good.

In conclusion, let me repeat what I suppose all good engravers have always said. You can't draw enough, and you really need to be very critical of your work. If you don't draw well, you will be missing much of the satisfaction that comes from doing your own work, and you'll be handicapped and limited by having to use someone else's designs.

I hope that this little article will at least start you to thinking about areas that will improve your work.

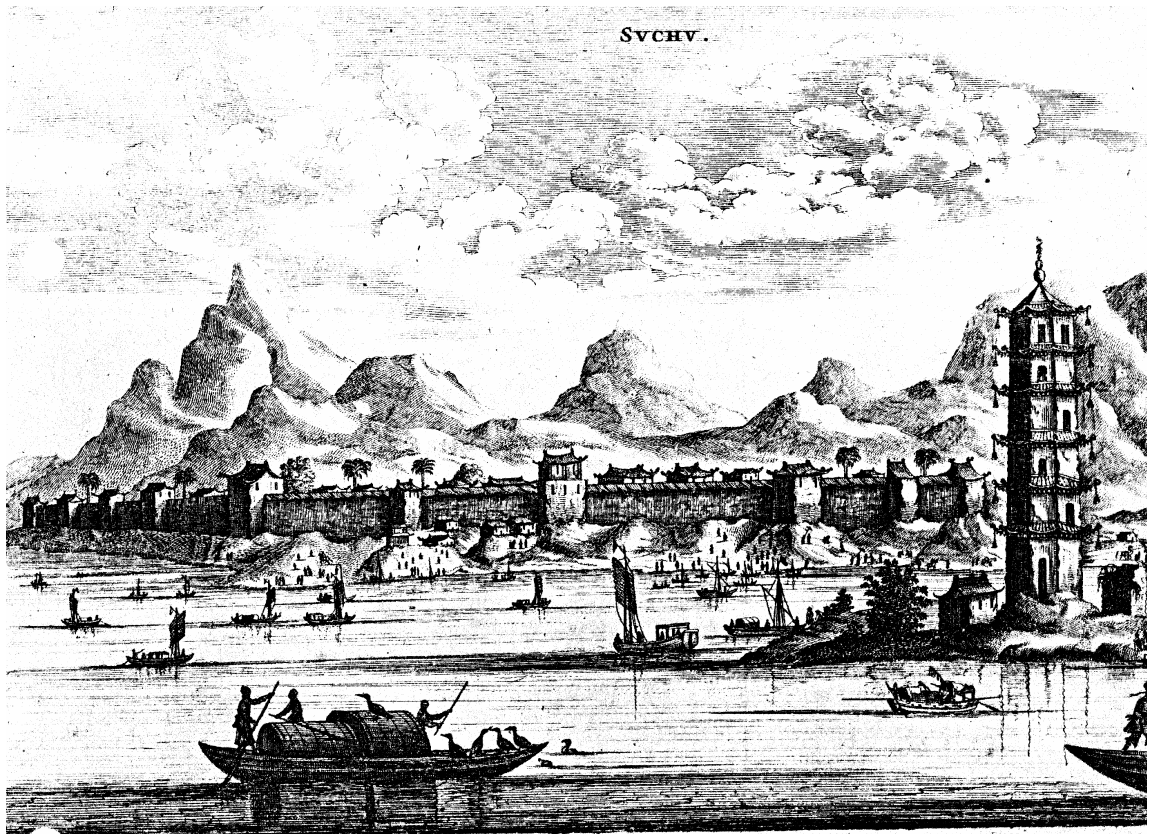
J. Weyerts

There is a very good book called *The Technical Pen* by Gary Simmons that goes in depth on shading. Although the subject matter deals with pen and ink it is equally relevant to engravers of all levels.

3.1.3 Planning The Overall Design

If you have trouble doing clouds in your game scenes, the best "studies" I've ever come across for clouds are pictured in a book titled "*BAROQUE BOOK OF ILLUSTRATION*" by Philip Hofer, Harvard University Press. Look at plates 5, 10, 15, 58, 110, and 143. By cutting the lines with different density and depth, you can produce excellent cloud scenes.

J. Vest



Everyone will tell you that if a beginning engraver is to progress, he must spend a great deal of time drawing and refining design patterns. This kind of practice requires many hours of time. It can be more enjoyable if your sketching fits the actual shape of a gun. You might find this helpful; take any gun that is reasonably flat, i.e. auto pistols, lever action rifles, etc. Lay then on a Xerox machine and make a copy. Trace the outline of your copy with a pen to make lines distinct. This becomes your master copy. Purchase a pad of artist's tracing paper from a stationery store. If you place the master copy under the tracing paper it will show through and you can draw patterns to your hearts content. Simply by moving your master copy, you have a fresh clean pattern.

B. Evans

3.1.4 Sources for Art

Occasionally you're faced with a request to engrave a design, logo or picture that you just can't find. Let me suggest a possible source for a variety of such design art.

Almost every printing shop has a book named "PRINT ART." It's a collection of almost every design, picture, or logo that has ever been produced for copy on business cards, stationery, and advertising layout. If you explain what you need, most shops will Xerox whatever you want and hand it to you.

Another excellent source today is the internet. There are many free and pay for web sites available. Some things are copyrighted and others not.

3.2 Design Layout Techniques

3.2.1 Enlargement and Reduction

Use a Xerox machine that has reduction or enlargement capabilities. You lose some detail but you get a good profile and with a little practice, you can get any size you want.

T. Radant

If you enlarge or reduce on copiers, watch out for the percentage relationships. For example, you have an outline of a part and want to enlarge it 25%, draw your design in the enlarged outline, and then reduce the finished product to original size. If your original pattern was, say, 4 square inches, then after enlarging it by 25% (4.00 X 1.25) you have one that's 5 square inches. You'd think that a 75% reduction would get back to original size, right? Wrong! It works out to:

$$5.00 \times .75 = 6.24 \text{ Square inches (too small)}$$

$$5.00 \times .80 = 4.0172 \text{ Square inches (just right)}$$

Using the 80% reduction gets it back to original size. For every enlargement factor there is a not-so-obvious reduction factor. To get the reduction percentage, just divide the original size by the enlarged size. When you are paying for each copy you enlarge or reduce it also pays to know the proper reduction/enlargement math.

Unknown

Computers are another way of enlarging and reducing your artwork. Programmes like Photo Shop, Corel Draw, Adobe Illustrator and Freehand can be useful

3.2.2 Pattern Layout Techniques

One way to do a layout directly on the gun is to wipe a small amount of grease (or modeling clay) on the surface. (Muzzle loading patch grease works well.) Brush some talcum powder over the grease and blow off the surplus. With your scriber, (or very sharp pencil if you don't want to scratch the surface) you can then draw right through the grease.

Remove blue from gun and sand with 400 emery. Coat surface with flat spray paint (white); let dry for 12 hrs. You can then draw on the surface with a #2 pencil. Any mistakes can be easily erased. When the pattern is drawn, spray the surface with artists matte fixative to prevent smudging. Engrave right through the painted surface.

R. Pedersen

A good layout fluid is KIWI brand shoe white (like nurses use). Apply a few coats then draw and erase on it with a soft to medium pencil. Remove with alcohol.

S. Alfano

The MARKS ALL SHOP PEN listed in the engraving section of Brownells catalog is really permanent if the metal surface is dry and grease free. It's easily removed with a little lacquer thinner.

J. Harwood

If you like to do your layout on a dark surface, try coating your metal with a felt tip magic marker. It dries very quickly and you can scribe your pattern right through it. If you make a mistake, just black it out with the magic marker.

E. Martin

There are numerous ways of putting a pattern on a gun. This is only one:

1. Remove blue from area to be engraved.
2. Sand the area to be engraved lightly with 400 or 600 automotive sandpaper. (This helps the Chinese White to adhere to the metal.)
3. Dampen your finger, rub it over the Chinese White, and then run it lightly over the area to be engraved. If done properly you will have a thin gray even coating of Chinese White on the gun. This may take practice. If it beads up the metal is not clean.
4. Use either a highly polished metal scriber, (one that will not scratch the metal) or a very sharp #5 lead pencil.
5. Draw your pattern on the metal.

6. If you make a mistake, simply take a small camelhair brush dampened with Chinese White and paint out the error.
7. When the design is drawn, spray the area with a little clear lacquer from a spray can. (I use clear Krylon.)
Now you can handle the item without fear of smearing your design. I prefer this method to using a scribe because mistakes can be easily corrected and it leaves no marks on the metal to confuse me.

R. Evans

"Blair Spray Fix" works well as a fixative. It can be removed easily with water.

T. Swenson

I was all fired up to start a new project the other day, but thoroughly disappointed when I discovered that I was completely out of Layout Fluid. Engraving supplies are not easy to find in Los Angeles, so I ransacked the house looking for something else that might work. This is when I discovered that ordinary Liquid Paper (correction fluid) is a terrific substitute because:

- it dries very quickly
- covers with a bright white, matte coat
- allows you to draw and erase easily
- takes various inks without "beading"
- dissolves with acetone
- comes in a handy little bottle
- has a nimble little brush for application
- it is available everywhere!

M. Brahme

If you use Chinese White for design layout, try using a little Brownells Hold Rust preventative along with it. It will keep the metal from rusting up.

unknown

3.2.3 Pattern Transfer & Duplicating Techniques

A simple way to make a record of your engraving with a smoke pull is to smoke the engraved area with a smoke lamp. (A candle will work, as will an alcohol lamp filled with paint thinner). Purchase some Scotchbrand #845 book tape; it's a clear plastic tape three inches in width. Simply apply the tape to the smoked area and then apply the same tape to a white 3 x 5 card. It makes a beautiful, permanent, and clean record. The tape can be purchased at any store that sells office or school supplies.

S. Alfano

Birchwood Casey's sight black makes a good blackening compound for "smoke pulls." Not quite as good as smoke but quicker. For some reason, it also makes an excellent gold polish.

R. Pedersen

To transfer a pattern to the other side, rub engraving with lampblack or other such powder. Cover engraving with clear tape. Burnish with toothpick or end of small paintbrush. Peel off tape and stick to white surface. A piece of Formica or an old dish plate works well. Tape a piece of mylar over the transferred pattern, scribe and you have a mirror image.

T. Grogg

Make a smoke pull of the pattern and then trace onto matte finish drafting material. Coat the receiver with Ngraver layout compound and let dry. Reverse the tracing and tape to receiver. Use plain carbon paper between tracing and receiver. Trace with stylus or pencil. Remove carbon and tracing. Touch up with a pencil and you are ready to cut.

R. Dilling

SCOTCH 3M #845 Clear book tape is useful in a number of ways. Works great for smoke pulls. It is also excellent for masking off areas to be bead blasted. (Apply to a clean, oil-free surface and trim carefully around the area that is to remain polished). It also works for masking off the center section of rifle bolts when hot water rust bluing.

R. Barnard

If you are using acetate to make transfers, a good ink is #514, which can be purchased from:

Graphic Chemical and Ink Co.

P.O. Box 27

Villa Park, IL 60181

The cost is \$5 for a lifetime supply. Save yourself the frustration of cheap water-soluble ink and get the good stuff.

D. Lauck

Try keeping a roll of toilet paper on your workbench to clean off ink after transfers. It's cheap and handy. To keep ink off your fingers buy some extra thin surgical gloves, cut off all five fingers and use one at a time on the index finger to apply and remove ink.

unknown

An easy way to transfer patterns is with scotch tape. Fill the basic cuts with Vine Black (Brownells) then apply tape and burnish lightly. Coat new panel with Damar varnish and apply the tape to make the transfer. Lift the tape and spray with a fixative. You can reverse the pattern by using two pieces of tape and transferring from one to the other.

T. Haynes

If you have used carbon paper to transfer patterns onto a gun, you have probably found that regular paper leaves a heavy oily line. Use the one time throwaway carbons like found in Visa card receipts. They will trace a much finer, lighter line.

R. Evans

Here is another method of transferring a pattern to metal that might be useful. Get the drawing to the correct size with a zoom copier, make a copy on mylar film (hourgraphic, 3 mil, clear), and use book tape (Scotch #845) to pull the image from the mylar film. If the copy is fresh, every bit of the ink will be transferred to the tape. Coat the piece to be engraved with a thin film of Damar varnish and let it set until almost dry. Lay the tape with the image in place and burnish it into the varnish. Pull it off carefully, laying it back and burnishing more if necessary. If everything works, the ink from the copy will end up on the varnish nearly as sharp as originally drawn. It is reasonably durable, but be careful with it anyway.

Don't use anything but mylar, it comes so clean it can be used again. The clear tape has the advantage of allowing you to see if you have image positioned properly.

B. Trindle

I figured this out during the '86 Super Bowl Game, so watching that wasn't a total waste of time. Also, this was one of my unusual ideas; this one worked! You'll find it a real time saver and, after all, the successful engravers are those with talent, combined with the judicious use of time.

The office copier (electrostatic) with image reduction capability is a tremendous tool. It will copy and reduce to the desired size. Sometimes this takes several passes to get the reduction required. It really works well. The cute trick is that you can transfer this image directly to metal, wood, glass, ivory, etc., quickly.

Clean the surface with solvent, and place the copy paper in position, face down on the surface. Dampen with solvent. The solvent will transfer the electrostatic ink to the object, and it is a surprisingly durable image. Solvents I have found that work are: Acetone, 1,1,1 Trichloroethane, and some lacquer thinners. The trick is to wet the paper with the right amount of solvent. Too little, and of course it doesn't transfer. Too much, and the image bleeds.

My best results have been achieved by using one thickness of cloth, dampened with solvent. Rub this with a bit of finger pressure over the image area. Start with light pressure and watch the effect of the solvent in wetting the paper. (It turns somewhat translucent when wet.) The solvent wets through the paper, and softens and transfers the ink.

With a bit of practice, you'll be pleased with the result. Make a few extra copies in case you goof the first time. The image is really durable, but can be easily removed with solvent.

You'll be amazed, as I was. As Tennessee Ernie Ford once said, "This beats anything I ever seen or stepped in."

D. Glaser

Fingernail polish remover works very well when transferring Xerox copies to a gun. It's also a self-stocking item, just steal your wife's supply.

C. Peterson

After transferring a pattern to polished metal via the Xerox method, give the metal a light coat of hair spray. It will fix the design and keep it from smudging; it will also diffuse and reduce light glare considerably.

B. Adair

If you find that you need to repeat a pattern several times, such as the design between the flutes of a revolver cylinder, then I suggest the following:

1. Cut the basic design once. (Don't relieve the background yet.)
2. Take modeling clay and form a dam around the engraved area.
3. Mix some epoxy rubber - I use Brownells RTV-25-A Silicone rubber. Dental rubber from any dental supply house will also work.
4. Pour the liquid rubber over the engraved area to a depth of at least 3/8".
5. Let the rubber set and harden.
6. Peel off the rubber and the clay (the clay can be used over and over).
7. Coat the area where you want to repeat the pattern with Chinese White.
8. Press rubber mold onto a regular stamp pad.
9. Press the mold to the appropriate spot on the gun and you have transferred your pattern.

It may take a little practice to find out how hard to press the mold down.

R. Evans

If you need to repeat the same pattern several times, such as between the fluting on a cylinder, cut one pattern but do not do background. Brush Damar varnish on the area where you want the pattern transferred. Dust the engraved area with a substance such as lampblack. Just before the varnish is quite dry, press a chunk of plasticine (non-hardening, oil-based clay) over the engraved area. This will pick up the black, which can be transferred to the varnished area.

unknown

For duplicating patterns after the engraving is completed, coat the area to be duplicated with a light coat of Vaseline, wipe off the excess, and then use regular latex caulking compound. It comes in a couple sizes, is made by GE or Dow Corning, and available at any hardware store. Squeeze the appropriate amount onto the gun and spread as evenly and thinly as possible. Allow to cure for 8 to 12 hours and peel off. You now have a pattern that can be transferred using talc or ink.

R. Barnard

Use a hot glue gun and melt some glue on an engraving pattern. After it hardens it will be easily removed (put it in the freezer for a few minutes) and you will have a good impression of the engraving. With an inkpad, it will work as a rubber stamp or you can keep it as a record.

B. Henna

After you have made your basic scroll cuts, cover the work to be duplicated with a piece of scotch tape. Use a needle to perforate the tape along the lines. Peel off the tape and place where you want the pattern duplicated. Stick the needle back in each hole, twist slightly, and you will leave a dotted pattern that can be followed.

P. Pouder

Buy some transfer magic solution and wipe onto clean metal. Print out from the computer your design onto a transparency and burnish on. Transfer magic comes complete with instructions and what printers and inks work. Some printers and transparencies don't work with this method.

Available from

Transfer solutions

10170 Poquito Valley Road

Prescott Valley AZ 8614

E-mail: transfersolutions@commspeed.net

3.2.4 Reversing & Transferring a Pattern

If you wish to reverse a pattern use a thick piece of leather and soak it in water until it sinks, (about 1/2 hr.). Clamp the leather tightly to the engraved pattern. Remove the leather; apply it to a fingerprint pad. Apply scotch tape to the leather and you have a reversed pattern, which can then be applied to the gun.

G. Forte

While at the dentist's recently, I was woken in order to bite down on a piece of two-way carbon paper and I had a great idea! When using tracing paper to put a pattern on a gun, coat the metal with Chinese White, put tracing paper in position, and put a strip of two-way carbon under it. Trace pattern onto gun and at the same time you get the exact reverse pattern on the backside of your tracing paper that can be used for the other side of the gun.

T. Swenson

When drawing a pattern, use thin tracing paper and a dark lead pencil or ink. Then you can just turn your paper over for a reverse pattern. Copy machines will copy from either side of the tracing paper. I use the copy machine in the public library. It has reduction and enlargement capabilities.

R. Pedersen

Draw your pattern on 5mil mylar. Take the finished pattern to a copy machine (Electrostatic type). The mylar will copy from either side so you can make both left and right hand patterns. Load some 8 1/2" by 11" mylar sheets into the copy machine and make desired copies. (The mylar will run in the machine just like paper.) Clean the surface of the gun with thinner. Apply a very light coat of Damar varnish. Allow it to dry until no longer tacky. (The pattern should not pick up any varnish. If it does, the varnish is not dry enough). Tape pattern in place and burnish thoroughly. Highly detailed patterns can be transferred this way. Spray lightly with a fixative.

J. Fogle

If you find yourself removing your work from the vise to see what you did on the other side, try sticking a mirror under your work. It will even reverse the scroll for you.

S. Pilkington

If you are drawing a pattern where one side will be the reverse of the other (for example, a floorplate where the left side will be the reverse of the right), draw one side and then set a small rectangular mirror on edge on the center line. That will show you what a complete drawing will look like. It saves drawing time by enabling you to spot any flaws in your design early.

R. Evans

If you are doing a basic layout, such as the main scroll lines, and you want a quick and simple way to duplicate or reverse the pattern, make your basic cuts, then rub a little graphite, ink, lampblack, etc. into the cuts. Press a piece of Scotch Magic tape to the pattern, and pull it off. If you want a reverse, then place a second piece of tape to the first and pull off an impression. Take that piece of tape and place it on the metal where you want it. Take your graver and cut the pattern right through the tape. It won't work on fine detail but it's quick for a basic pattern.

R. Evans

3.2.5 Line Spacing Patterns & Diamond Fill Transfers

By making a smoke pull of a file, you can get nicely spaced lines to transfer for engraving. A single cut file works best, of course, but a cross cut will create a perfectly spaced checker diamond pattern.

To do this, simply smoke the file with a carbon flame (candles work great), press scotch tape onto the surface, and lift off the patterns. These can then be used to lay out a checkering or diagonal line pattern on steel by pressing the tape to the surface of the piece to be engraved.

You can scribe through the tape onto the steel surface and then re-cut the lines with a graver. Or, you can burnish the tape before lifting it off; the fine carbon smoke will adhere to a cleaned steel surface and re-cut from there.

T. Bakewell

For those of you who have shared my frustration at drawing and cutting perfect diamonds to fill space in an engraving pattern, I suggest the following. Take the following checkering pattern and put it on a copy machine, use the reducing capability to make several copies of different sizes. When you need diamonds in a pattern, cut a small piece from one of the sheets, place it face down in the proper position, and wipe the back of the paper with acetone. You have transferred the diamonds to the metal and you are ready to cut. It works great on curved surfaces like barrels and cylinders.

I have found that I can make acetone transfers of patterns made on some machines and not on others. I suppose it has something to do with the imaging process or toner. My experience has been that machines with a sliding top section (moving back and forth) does not make usable copies; while the ones with a stationary top will. If the process isn't working for you, try a different machine.

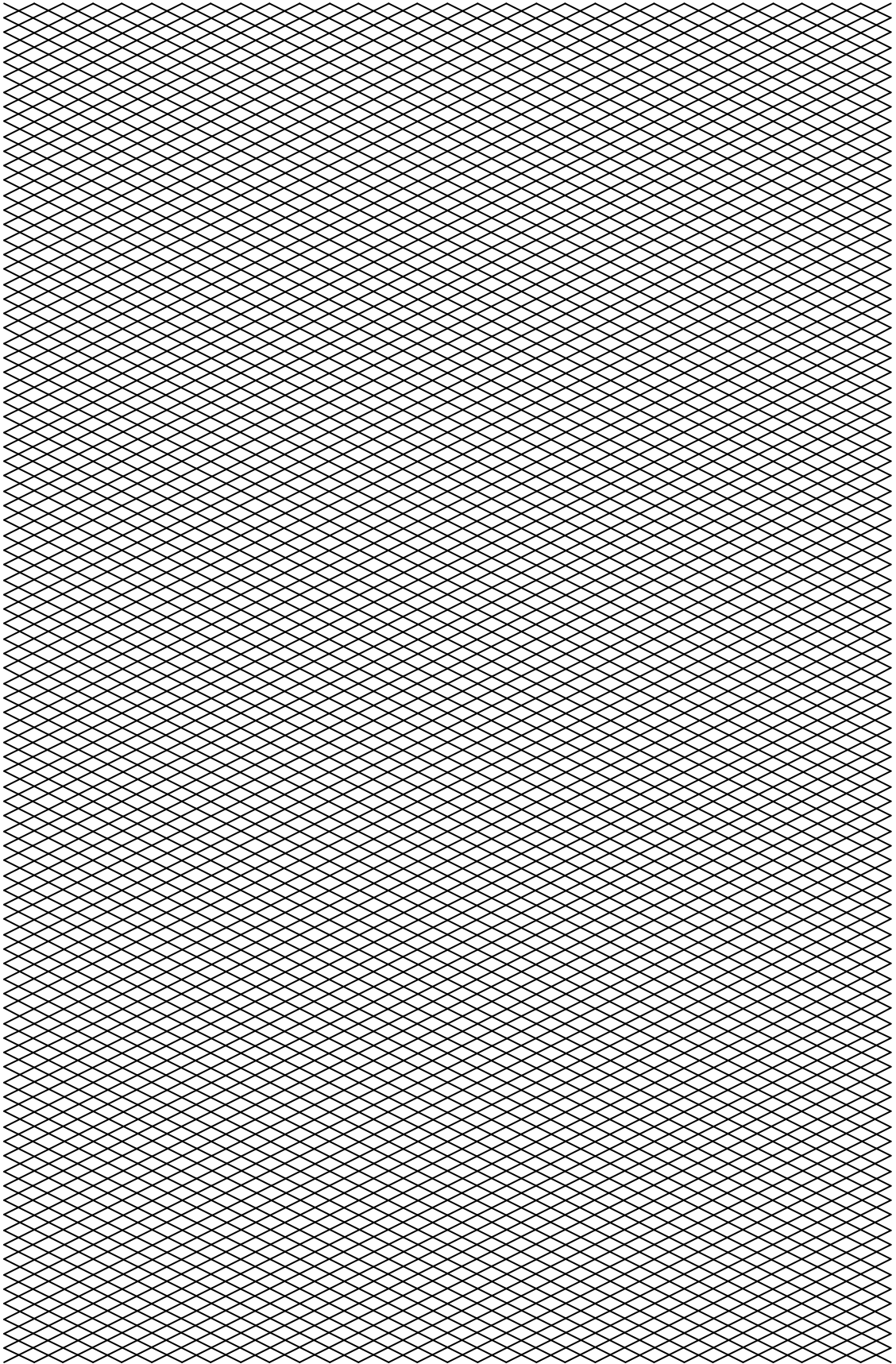
B. Evans

3.2.6 Transferring Patterns On Curved Surfaces

On a reproduction Patterson Colt, I was attempting to transfer the pattern off of the recoil buffer (which is pretty much spherical) to the other side.

I took a piece of clear plastic sheet (like mylar or Xerox plastic), heated it with a heat gun (heated air), and let it form to the surface of the buffer. After it hardened, I scribed the surface tracing the engraved lines. I then "popped" it inside out and inked the scribed lines. With Damar Varnish, a little luck, and little profanity, I got a pretty good "print" on the other side.

T. Bakewell



4 ENGRAVING TOOLS & TOOL TECHNIQUES

4.1 Engraving Supplies, Tools, and Equipment

Supplier's addresses:

Hauser & Miller
10950 Lin-Valley Dr.
St. Louis, MO 63123
1-800-462-7447
Hoover and Strong
10700 Trade Rd.
Richmond, VA 23236
(804) 794-3700

For the benefit of beginners - Brownells is a gunsmith supply house. They stock nearly everything, and you should have the catalog.

Brownells Inc.
Rt. 1, Box 2
Montezuma, IA 50171
www.brownells.com

If you have trouble breaking graver points on modern steels, you might try RED TANG gravers from the Gesswein Co. They are a bit harder to sharpen than Grobet or Muller tools but they hold up a lot better. If you order be sure to specify RED TANG.

Paul Gesswein Co. 255
Hancock Avenue
Bridgeport, CN 06605
(203) 366-5400
Or
676 West Wilson Avenue
Glendale, CA 91203
(213) 240-7113

4.1.1 Sources of Gold

Ray Viramontez
601 Springfield Dr.
Albany GA 31721
(513) 462-6762

NEW GOLD - Richard Harrison just sent me a sample of a brass called "New Gold". It looks a lot like gold; I think it has more copper than regular brass. It cuts very nicely and in my opinion is prettier than regular brass. I don't know the price but I think it's about the same at regular brass. It can be purchased from:

Western Traders
363 Allison Dr.
Roseville, CA 95678
(800) 821-6346.

B. Evans

4.1.2 Sample Plates

There is a company called Cronite that sells a high-quality, 2 x 3 inch, steel, practice plate. The surface is smooth and ready for engraving - soft steel that cuts smoothly. Price is per square inch at a very reasonable cost. Their address and phone numbers are:

Cronite
120 East Halsey Road
Parsippany, NJ 07052
New York (212) 233-3210
Illinois (312) 454-1977
California (213) 255-0729.

B. Evans

4.1.3 Intaglio

If anyone is interested in doing some Intaglio work, here are a couple suggestions. Use good plates - pure copper, zinc, or the steel proof plates in the Brownells catalog are excellent; they cut beautifully! Kate McGuinness can make excellent

prints from your plates. She charges \$3 per print plus paper. Within limits, she can use multiple colors in a single print. Her address is:

Kate McGuiness
208 Grant St.
Denver, CO 80203

M. Moschetti

4.1.4 Stamp Dies

Scroll Stamps - those neat little stamps you have seen on borders of engraved old Winchesters, Stevens, etc., 1/8" high, good for thousands of hits, are now available. These are sharp, custom-cut, not headed type stamps. They give sharp impressions, and are heat-treated to R60C.

Star Stamps for inlaying gold and silver stars are also available. The kit contains a set of four sizes, from about 1/16" to 3/16", a center punch, centering block, and instructions. With this kit, a star can be inlaid in 2-4 minutes. These Star Stamps are geometrically unique, and may be sharpened when worn. A very small size STAR stamp is available on special order. It is about .050" diameter.

Also available are stamps for the fishhook and mule foot, traditional on many of the old Winchester engravings.

For information and pricing contact:

The NgraveR Company
879 Raymond Hill Rd.
Oakdale, CT 06370

R. Phillips

4.1.5 Drawplates

The SRM-O1 Gesswein Carbide drawplate starts at about .01 and goes down to about .005 thousands. One should really have the SRM-10, which goes from .040 (1mm) down to about .0105 thousands. It gets difficult drawing under .006.

Something that helps is using Graverslide as a lubricant instead of beeswax because it doesn't plug the holes as beeswax does. For a source of Graverslide, contact the contributor, Ray Viramontez. The drawplates, SRM-O1 is approximately \$93 and the SRM-10 is approximately \$96, available from:

Paul Gesswein Co. 255
Hancock Avenue
Bridgeport, CN 06605
(203) 366-5400

R. Viramontez

4.1.6 Special Services for Engravers and Gunmakers

One of the toughest parts of learning the ins and outs of firearms engraving is learning where to go for professional help when you need it. For instance, how do you approach the subject of engraving when you have a good client and excellent commission, but a poorly finished or abused firearm to engrave Or need the gun to be finished with a special blue, case hardening etc. Make sure you have good, reliable and professional contacts to do this. After all you don't want all your hard work to be destroyed by a poor finish. Ask around fellow members of FEGA for any recommendations

4.1.7 Buckles

Brass buckles - I finally got around to engraving a brass buckle that Ray Phillips of Ngraver sent to me. (It's neat to get all these free things to try). It was good quality brass and cut very nicely. If you have need of brass belt buckles, contact Ngraver.

B. Evans

Brass buckles - that inquiry brought a couple responses. Guild member Ray Phillips of Ngraver Co. says that they carry two shapes of brass buckles, oval and rectangular. (They appear to be of excellent quality). They also carry jewelry-grade nickel silver in half hard, 1/8" x 3" x 6"

The NgraveR Co.
879 Raymond Hill Rd.
Oakdale, CN 06370

4.1.8 Gun Cases

4.1.9 Accessories

4.1.10 Full Spectrum Lights

For Chromolux Incandescent Bulbs:

Lumiram Corporation
615 5th Ave.
Larchmont NY 10538
800-354-1044

For Vita-Lite Fluorescents:
Durotest Corporation
1-800-289-3876

D. Wright

4.2 Tools and Tool Fabrication

4.2.1 Dental Tools

As a dentist, I often discard high-quality, stainless steel instruments with broken tips. Many of these I have reshaped for use in areas where other engraving tools just won't work. Some I leave long and others I cut in half, or to a desired length. Be careful in grinding and re-tempering metals that have nickel or cadmium in or on them. These metals can be very harmful to breathe into your body, so avoid the dust and fumes of any metal you suspect. Contact any dentist in your area; chances are he would be glad to give you his discards.

R. A. Williams

The next time you go to a dentist, see if you can talk him out of some of his old scaling tools. They have a lot of different uses for the engraver. They can be heated, reshaped, and tempered. They make great scribes, tools for sculpturing, or woodcarving. The dentist may also have some used grinding burrs that will fit in your Dremel or similar tool.

D. Lauck

4.2.2 Beading Punches and Beading Blocks

Punches made for the jewelry trade don't hold up well on gun steel. To make your own, use carbon drill rod, 1/8" diameter, cut to approximately 2 1/2" in length. Taper it to the point that you want. If you want a beading tool, you will need a beading block (it makes the little circles on the end of the punch).

Once you have the tip that you want, fill a small juice can with beeswax being careful that there are no bubbles or cavities in it. Use a torch and heat the drill rod to cherry red (not bright red but cherry, 1425 to 1450 degrees). Plunge the tool into the wax. The heat will cause it to settle deeper into the wax. This should draw the temper to the correct hardness to give you a durable tool.

E. C. Prudhomme

If cherry red doesn't produce the temper that you want, try heating to a yellow color before quenching.

S. Alfano

High-grade carpenter's nail sets also make good beading tools, punches, etc.

T. J. Kaye

One reason why commercial beading tools do not stand up well to hard steel is that the hole in the center is too deep, making the walls weak. Use fine emery paper and with a circular motion work the face of the tool down until the hole is very shallow. This will also round off the lip of the circle producing a tool that holds up much better. You can also adjust the diameter of the circle that way.

R. Evans

Cut a piece of 1/4" drill rod about 2" long. Polish one end nice and smooth and flat. Take a commercially manufactured beading tool and punch 4 or 5 dots into this polished end. Then harden. Now whenever you need a new beading tool, sharpen a piece of 1/8" or 3/32" drill rod and tap it carefully into one of the beads. Presto! A fresh beading tool. Now harden like previous instructions.

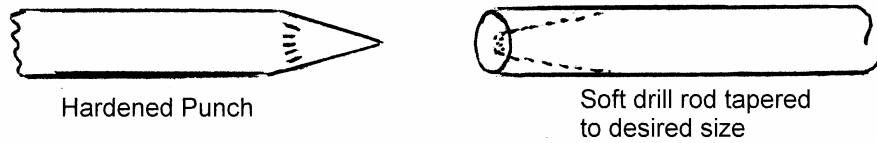
S. Alfano

If you are using beaded punched backgrounds and having a problem getting into small spots or up against your scroll, try grinding a tool down to half of a circle. This will allow you to snug right up to the raised portion of the engraving.

D. Lauck

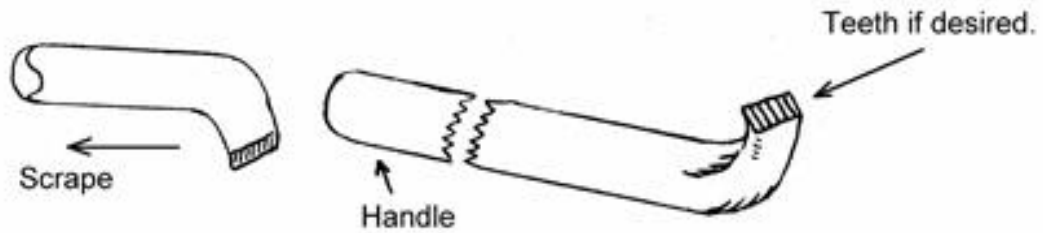
4.2.3 Matting Punches

Use 1/8" soft drill rod cut to preferred length. Flatten and polish one end with a hardened punch (pointed and polished). Make a series of small punch marks very close together in the soft rod. Taper, polish, and harden the soft rod. Many different patterns can be made this way.



B. Blackmon

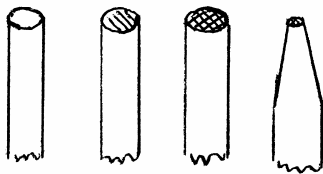
For smoothing backgrounds in relief cut scenes, use 1/8" drill rod or spring wire that can be hardened. Flatten one end and bend as shown. File to shape and harden. Then stone face to appropriate angle. If you want a texture, draw a file over the scraping edge before hardening. Textured matting punches can be made the same way.



T. Bakewell

If you want to make your own punches, put a lining tool in the vise. Take an annealed punch, tap the end against the liner, turn 90 degrees, and tap again. Temper punch, grind to desired shape, and you have a punch matted on the end. You can vary coarseness by the size of the liner you use.

T. Bakewell



To make background matting tools take 1/8" drill rod, face one end off square, take a liner, and cut across the face. Using the same liner cut across the first set of lines, grind to desirable (assorted) shapes, and harden by heating bright red and quenching in 30W motor oil. Remember - shape first, temper last. This will make a punch that will matte nicely without chewing things up as a single point punch is prone to do.

M. Rabeno

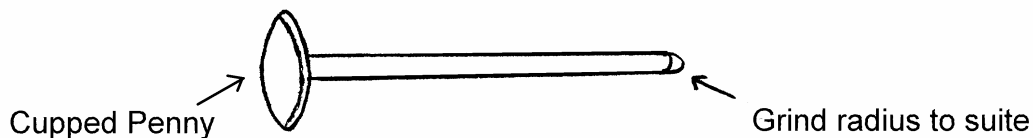
4.2.4 Punches for Setting Gold Inlays

Brazing rod works well. It comes in various sizes and can be tapered to desired diameter. Because the brass is soft, they have to be refaced frequently.

T. Bakewell

4.2.5 Chisel for Trimming Gold Inlays

Take a penny and cup it in a dapping block, or use a lead block and ball peen hammer. Solder to a short piece of 1/8" square drill rod. Sharpen to suit. Hold chisel between thumb and middle finger. Place index finger on the penny. Make different sizes and shapes for different jobs.



S. Alfano. Attributed to L. McKenzie

4.2.6 Scribes

Exacto Company (of Exacto Knives) makes a replacement scribe point. They make several sizes, but I have found the small ones (approximately 1 1/4") are evidently made of tool steel, because they make excellent single point punches for background frosting with a Gravermeister.

R. Swan

If you have large hands that will not fit the commercial scribes, then try this. Serrate the shank of a high-grade phonograph needle and use it in a mechanical pencil. A Gaber Eagle Prestomatic #3377 works well for me but make certain the needle fits the collet snugly. For guys with hams instead of hands, try a #50 high speed carbon drill rod of .065 to .070 diameter, tapered to your personal desire and secured in a Starret or Brookstone pin vise. The short overall length is advantageous for use under an illuminated magnifying glass.

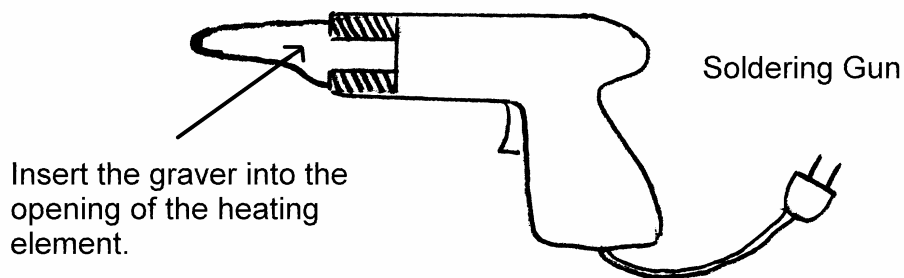
N. Fotelis

I have found that a dentists hand tool, ground to a point, makes an excellent scribe. You can sharpen both ends.

R. Evans

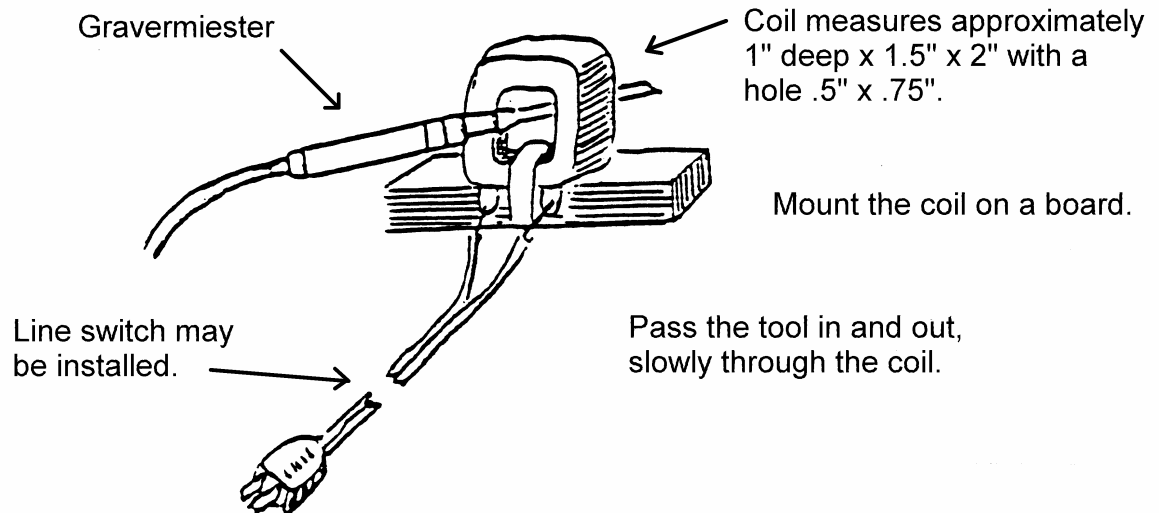
4.2.7 Demagnetizing Tools

To demagnetize gravers and other small tools use a soldering gun (large size). Just plug it in, pull the trigger, and pass the tool slowly through the area shown by the X in the sketch. It only takes a few seconds.



R H. McCrory

It's a common problem to have a graver tip become magnetized and have steel slivers cling to it. Matt Klein solved the problem with the following rig. The coil is available from most electronics shops for about



M. Klein

There is also available a small magnet that was designed for either magnetizing or de-magnetizing small screwdrivers. It requires no electricity and is only about 2" in diameter. It seems to work very well on gravers. I don't know the brand name but you should be able to find one in a hardware store or automotive supply house. In my area, they are sold in Bi-Mart stores.

R. Evans

4.2.8 Magnetizing Tools

When doing very fine detail work under magnification, it is sometimes helpful to magnetize the tip of your graver to help lift off the chips so your work will not be damaged.

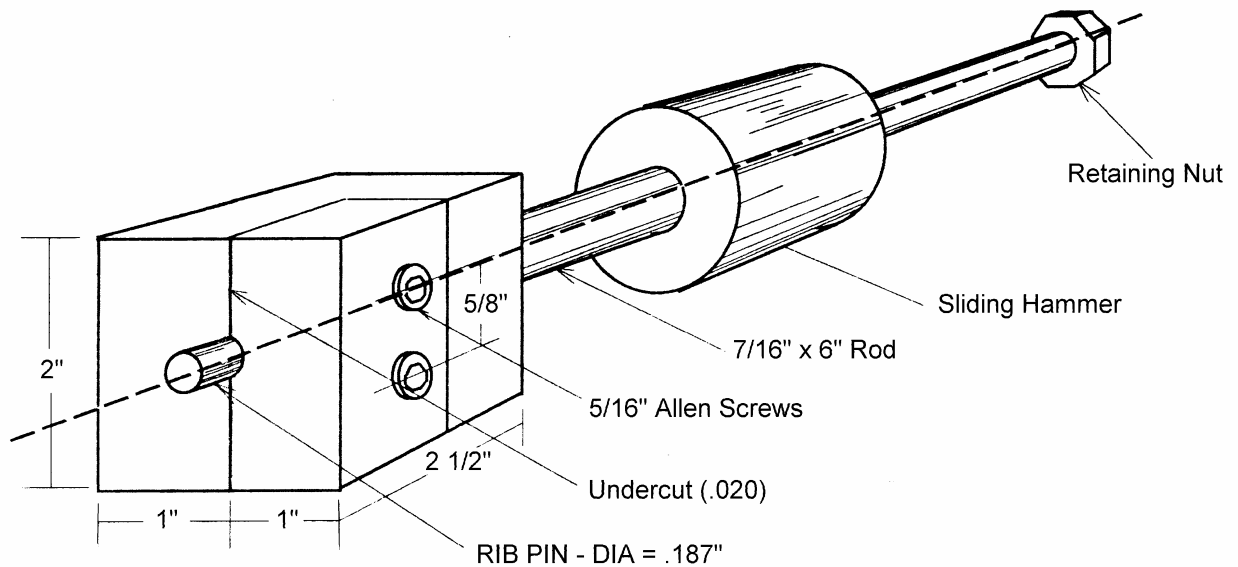
unknown

4.2.9 Ruger #1 Quarter Rib & Rib Pin Removal

If you are an engraver who disassembles most of the firearms you engrave, chances are you have sworn at Ruger #1 factory quarter ribs. If you can get the Allen head screws out, you then have to deal with the rib pins.

First thing to do is get a good flat punch (smooth steel or brass) to fit the diameter of the Allen screw. Give the screw a good rap with a hammer and it will come out easily.

To get those confounded pins out, a friend of mine made me a pin puller as shown. Tighten the block on the pins (use a little rosin) and give the sliding hammer a rap upwards. Sure beats using vise grips!!



R. Pedersen

4.2.10 Resurfacing of Ruby Red (Degussit) Stones

Materials needed:

- 1 tube of Permatex Valve Grinding Compound
- 1 piece of window glass, 8 x 10"
- 1 glass of water

Procedure:

1. Put glass pane on flat surface.
2. Put small amount of valve grinding compound on glass pane.
3. Lap stone in a figure 8 motion.
4. If compound gets gummy, put a few drops of water on it.
5. Lap until gouges disappear.
6. At first, it seems that the stone has a finer grit than before, but this is temporary. It might be that the stone loads up with its own grindings but reverts to its own grit as they dislodge.

A good cutting solution to use when sharpening is kerosene. It seems to help in the sharpening of gravers and keeping the stone clean

R. Viramontez

4.2.11 Finishing Sanders

The wooden paint stirring sticks that paint stores give away can be made into great finishing files by gluing wet or dry finishing paper to them. I make up several at a time by gluing them and clamping them in a vise with wax paper between them until they dry.

D. Lauck

4.2.12 Correcting Slips

If you are a little careless with a graver and slip, try a carpenter's nail set slightly rounded on the end to repair the mistake. You have to work all around the scratched area, working back toward the line from both sides.

P. Pouder

4.2.13 Building a Work Bench

If you want excellent material for a workbench, keep your eyes open for a bowling alley that is being demolished. The lanes are usually made of yellow pine or maple and make excellent bench tops.

R. Spokovich

4.2.14 Solvents

If you need a handy container for solvent, lacquer thinner, etc. (not acetone) take a lighter fluid can, pop off the plastic top, fill, and then replace the top.

B. Shostle

I find acetone a very useful all-around solvent. It doesn't leave the film or residual odor that lacquer or paint thinner does.

D. Glaser

4.3 Gravers

4.3.1 Making Gravers

You can make your own gravers from select hacksaw blades. The best blades are 98 thousands thick and are made by Millers Falls (Bul-Mol #4814M), or by Starett. Put the blade in a vise and using a Dremel Moto-Tool and a cutting disk, cut out a section about 2 1/2" long and 3/16" wide. Keep your cutting wet with a sponge to avoid losing temper. Grind to shape and set in a suitable handle. This makes an excellent chisel. Mine is still in use after a year. (Mr. Roberts sent me a sample graver, and I'm impressed with the way it holds its point. Evans)

J.J. Roberts. Attributed to W. Churchill

4.3.2 Sharpening Gravers and Graver Geometry

4.3.2.1 Sharpening Gravers

When using my power hone with a 600 grit diamond lap to sharpen my gravers, I found that it was a bit too coarse to give me the smooth cutting face I wanted on my graver. I didn't want to mess with changing to a finer grit and I didn't want the expense of two hones.

The solution, when it finally came to me, was simple. I cut a piece of 600 grit emery paper into a 2 1/2" circle with a small hole in the center and put it on my hone. Now to sharpen quickly, I use the outside of the hone, and to get a final polish, I touch the graver to the paper in the center. Put a few drops of oil on the paper just as you do on the diamond surface.

unknown

If you have some stainless that is extra hard to engrave, try sharpening your graver on a Gravermeister power hone with 280 grit wheel and use it that way.

unknown

Emery polishing compound on a thick, stiff piece of leather glued to a small block of wood will put a beautiful polish on the heels of gravers with just a few strokes. Drag the graver towards you with the point trailing. Try to keep the heel flat against the leather to avoid rounding the cutting edge.

D. Lauck

When sharpening Carbide or tool steel gravers, extreme care must be used not to overheat. If they show color from heating, then you have ruined the temper. Momax gravers can be heated to high temperature when grinding to shape without loss of temper. It's still a good idea to avoid extreme overheating though.

Unknown

High-Speed steels and carbides are normally silver brazed to other steels for typical machine shop use. Therefore, heating these cutters to 800-1000 degrees F. will not noticeably degrade the cutting or wear qualities of these steels. Carbon tool steels are much different; they will begin to lose some hardness at 300-350 degrees F., even before you notice a color change from the heating.

R. Phillips

4.3.2.2 Instructions for use of GRS Carbide Square Gravers

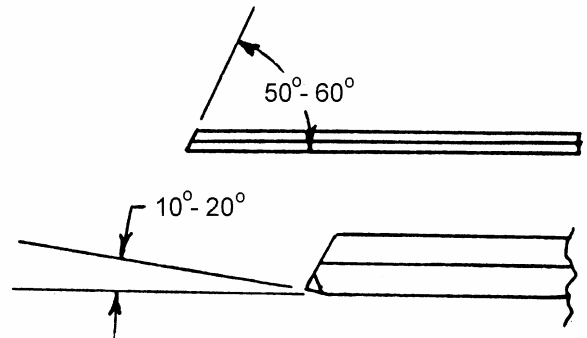
GRS Carbide Square Gravers are made from a special grade of carbide for impact usage. This carbide will cut materials of greater hardness and toughness than high-speed gravers, and is also suitable for use on softer materials.

Even impact resistant grades of carbide are subject to point failure and must be sharpened in a manner that produces a durable point. Generally, the angles used on the graver must be increased as the hardness of the material being cut increases. A graver lube also helps. TIP: Try a lubricating penetrating fluid, the kind that is sold to loosen rusted bolts and nuts.

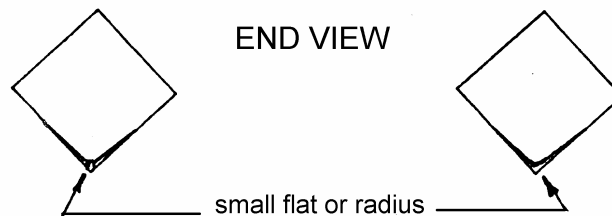
CARBIDE MUST BE SHARPENED WITH A DIAMOND WHEEL. For the best finish, a 1200-grit wheel is desirable.

Sharpen in the following manner:

1. Sharpen face at 50° to 55°, or even 60° for very hard materials.
2. Sharpen the heel surfaces at 10° to 20°.
3. Remove the sharp edge from bottom of heel. To accomplish this, clamp the graver in the DG-3 Sharpening Fixture with the point down (in the v groove) and at the same angle setting used to produce the heel. Turn off the Power Hone and sweep the graver lightly across the diamond wheel. BE CAREFUL! It doesn't take much.



As an alternative, produce a slight radius on the bottom of heel freehand on the diamond surface. This produces the best point, but is more difficult to achieve because of the freehand operation. Practice will help.



4.3.2.3 The Versatile "Bright Cut" Tool

Engravers should be familiar with the definition of "serendipity" - the gift of finding valuable or agreeable things not sought after. Many of our new materials and techniques come in that manner from other industries - metalworking, jewelry manufacturing, etc. Here's a good example.

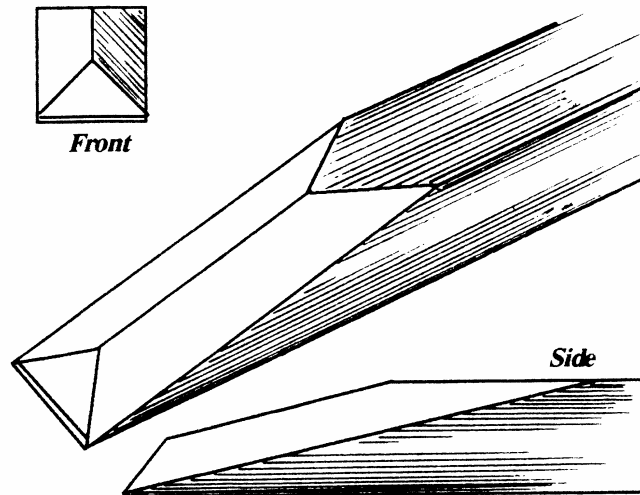
During a recent visit with Lynton McKenzie, we discussed diamond-setting techniques. I showed him how I prepare a carbide graver for bright cutting a plate-set diamond. A few days later, Lynton told me he tried this graver for trimming excess gold from a flush inlay, and he was so pleased with it that he suggested we share the technique with the Guild.

Removing most of the excess gold from a flush inlay with a flat graver speeds up a tedious process and makes it easier to capture the scrap gold. But, depth control in soft metal is always a problem - the same problem I always encountered in arriving at a nice bright-cut border around a diamond.

This technique involves making the graver more like a scraper - with a very steep, polished face of 80 to 85 degrees, and a polished heel of 10 to 15 degrees. This results in a negative rake cutting angle, but the sharp edge and polished surfaces

give good cutting action with more predictable depth control. When I tried it on a flush inlay, I had to agree with Lynton. It works! I did feel a bit sheepish because I had this graver on my bench for years and never thought to try it on inlays.

The Bright Cut Tool



Material - 1/8" Carbide Graver Stock

It's best to make this tool from a Carbide square graver blank. Carbide does not have the affinity for gold that carbon or high-speed steel does. The same geometry and polished surface will work with other gravers; however, carbide gravers do not come out of the cut with a gold-plated belly!

The 45-degree top facets on the sketch aren't really necessary for trimming inlays, but Lynton told me he prefers it to help keep the graver visually oriented parallel with the surface. The facets serve two purposes for diamond setting. First, the cuts should slope away from the diamond at a 45 degree angle, so visually orienting the graver with a top facet of the tilted graver parallel with the surface accomplished this. Second, the corners of the graver must be reduced to almost a sharp edge to cut down to, and even beyond the girdle of the diamond without interface.

To prepare the carbide graver using a diamond power hone and sharpening fixture.

1. Set the fixture slightly above 0 degrees to clean up both sides and reduce the width desired.
2. At a 5 to 10 degree setting, grind the 45 degree facets down to almost sharp corners; a coarse wheel helps.
3. Grind the face at 45 to 50 degrees. You don't use this angle for cutting, but rather for an improved view.
4. Put on a 10 to 15 degree polished heel. It is best to do this with a ceramic lap and spray diamond. I prefer a radius heel - racking the fixture on the lap between the desired angle and slightly above 0 degrees - with the clamp screw loose.
5. Now set the fixture at 80 to 85 degrees, and again with the ceramic lap, put on a very short polished face and negative rake.

The resulting sharp, polished edge cuts surprisingly well for shaving off most of the excess gold, with less tendency to drive into the soft metal and violate the surface of the base metal.

Carbide gravers are the best tools for cutting gold. Try it, you'll like it.

D. Glaser

4.3.2.4 Testing Hendrick's Tool Geometry

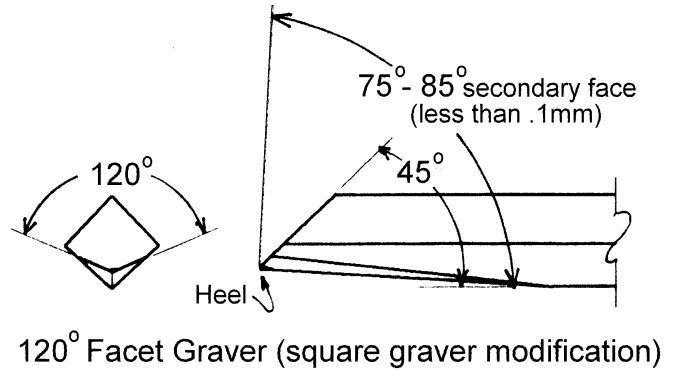
Some of the good stuff Frank Hendricks shared with us about graver shapes and sharpening techniques in his early FEGA seminars took over two years to get my attention. One of the reasons for this was the fact that I did not have a convenient way to duplicate his point geometry to arrive at 110, 120, or 130 degree points. I have habitually used a 90 degree point because it was so easy to sharpen on the GRS sharpening fixture. But I had recently received the prototype of a sharpening fixture developed by Hubert Manning that provides for rotation of the graver to any desired angle. With this fixture, I could easily modify the belly of a square graver to any desired greater (or lesser) included angle. A production model of this fixture is now available from GRS.

We all know that a graver with a wide point angle is stronger than one with a narrow point angle. I reviewed Frank's discussion of his graver points and sharpening technique, and planned a test to compare the durability of his geometry with the 90 degree geometry I normally use. The results were surprising.

Frank's standard gravers for cutting scroll are a 120 degree "facet" graver and/or a 120 degree "spitzer" (like a fat onglette). He told me that he will go down to a 110 degree point for the smaller scrolls, and even up to a 130 degree point for some larger scrolls, which Frank grinds to his own specs. With Manning's sharpening fixture, I could easily modify the belly of a square graver to arrive at Frank's wider "facet" graver geometry.

I used the same carbon steel graver for the comparative tests to eliminate the possibility of graver material variation. I sharpened this square graver with my usual 55 degree face, and 15 degree short heel surfaces. After only a couple of inches of cut into a test block of 4140 steel, the point would dull.

Then, I reshaped the belly to the 120 degree angle, and sharpened according to Frank's instructions – 45 degree face, short 10 degree heel, and even shorter 15 degree burnishing heel surface. And then, with the sharpening fixture set at 85 degrees, touched the face of the graver on the ceramic lap to put a small (less than .1mm), virtually square secondary face surface. This graver, then, enters the metal with a negative rake angle, but it works surprisingly well! The resulting chip travels virtually straight up the face without the annoying curl that obscures the path ahead, just as Frank promised!



Performance was a surprise. I got bored cutting lines and curves in that 4140 steel block after several minutes. The tool was still sharp and obviously ready for more. I now see why tool sharpening isn't much of a problem for Frank, because he doesn't do much of it!!

Besides cutting with a stronger point, forces on the tool point are further reduced because you aren't cutting as deep - about 2/3 the depth of cut compared to the same width cut with a 90-degree point. But the cut appears to be deep. And in my engraving, appearance is really the prime objective. My cuts began to take on the appearance of those I remember seeing on Frank's pattern transfer plates. Then I cut a Nimschke-style scroll with this tool. The result looked a lot better than my earlier attempts at this with my 90 degree point. A further benefit was that background removal was a lot easier, and punch dot background looked cleaner and more distinct.

Years ago, I had the opportunity to visit Arnold Griebel. He showed me a Model 12 Winchester receiver he was engraving. I did not get to see his gravers, but I do remember that his cuts appeared quite similar to what I was getting with Frank's tool geometry. Then I examined a Model 21 Winchester engraved by Griebel. Under the microscope, the 120 degree graver point appeared to match his cuts best. Upon close examination, it appeared he probably used a 120 degree spitzer with a slightly rounded belly, even though his scroll was relatively small - about 10mm in diameter.

Finally, I experimented with the 110 and 130 degree point angles. Frank warned me that the 130 degree tool presented quite a challenge. He was right, because a slight amount of graver tilt will really flare the cut, and depth control must be more exact. With all these tools, however, I felt more comfortable with a radius on the heel surface by rocking the fixture between 15 and 5 degrees on the ceramic lap, rather than the flat heel surface of 10 and 15 degrees that Frank described. I'm sure this is a matter of individual preference, though.

In conclusion, I found that adding a small, virtually square, second, face angle to a 90-degree graver, greatly increases the strength of the point with minimal effect on the control you have of the tool. So those tough, tool-eating projects we inadvertently get into all too frequently, can be a lot less aggravating when we apply one or more of Frank's graver geometry techniques.

D. Glaser

4.3.2.5 Polishing MOMAX Gravers

After sharpening a graver, cut a 2 1/2 inch circle out of a piece of wet or dry sandpaper and center it on the GRS power hone with the grit side down. Apply a little semichrome polish to the paper back. Start the power hone, and touch the graver to the sandpaper. The paper has just enough give to polish the edges of the graver without dulling the tip.

M. Hoechst

4.3.2.6 Graver for Making a Dot

In response to a question, a dot can be made several ways. A simple method is use a single point punch and stone off the metal that is pushed up. If you want to make a larger dot, make a small dot with a point punch, take a small round bottom graver, and stick the point in the indentation holding the tool at about 45 degrees. Rotate your ball vise and the tool will cut a perfectly round hole.

R. Evans

4.3.3 Graver Lubricant

There is a product called Jergins Tool Aid available at machine tool suppliers that is great for engraving tools (particularly carbide), and when engraving on stainless steel. It prolongs tool life and cuts down on chipping points. It also seems to make a cleaner cut. Only problem is that a little bit goes a long way, and it's expensive, and available only in gallons.

T. Swenson

A good container for your graver lube is a furniture coaster. They come in sets of four, 2" in diameter, padded with a rug material, and crimped with metal. Use carpet side up. Put the oil on the carpet part and blot with a Kleenex, it leaves enough oil on it and it won't bleed on to your workbench. Aluminum tap Magic works well for aluminum and Screw Loose Penetrating Oil works well for steel.

T. Swenson

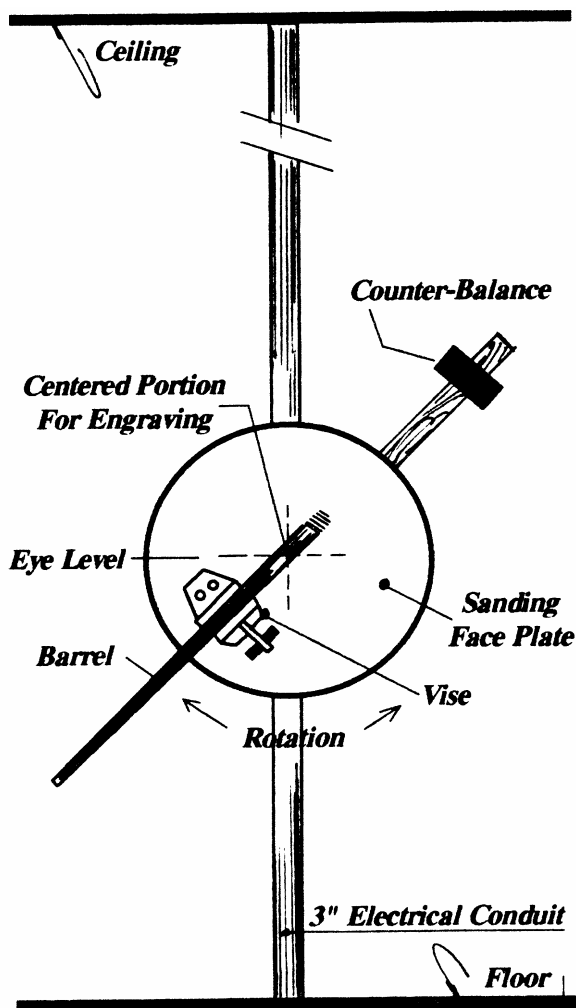
I recently obtained a graver blank from Brownells that is tungsten carbide, but a grade that is less brittle than the kind used on machine tools. I sharpened it at the angle suggested in the instructions and it worked very well. The instructions also suggested using a penetrated fluid as a graver lubricant. A quick search of my shop turned up an old can of Brownells "Do-Drill." I put a little of it on a cotton ball and touched my graver to it. The results were astonishing. That graver took a bite you wouldn't believe!

J. Harwood

4.4 Vises and Holding Fixtures

4.4.1 Vertical Swinging Vise – for engraving a barrel

For those of you who prefer to engrave sitting, engraving a barrel is a pain. There is no convenient way to swing them. Your body is always in the way and movement is restricted. I have developed a method that works very well, especially if you are using a Gravermeister or GraverMax.



Purchase an 8" round sanding face plate and bolt an inexpensive aluminum wood vise to it. Cut a length of 3" diameter, thin-walled electrical conduit, to the length of your shop, floor to ceiling. Drill the conduit at eye level, the sander face plate to it using spacers, and allow for free spin. For me, eye level meant the level my eye met the pole as I was seated on my stool.

To counter-balance the apparatus, use a round wood dowel onto which is attached a drilled weight. The weight should resist free sliding, but will move on the dowel with force.

The vise is placed off center, and the barrel is tightened into a position that centers the area for engraving. The counter-balance is then positioned so the barrel can be swung about 60 degrees with little effort.

Since this device gets limited use (barrels only), I have chosen to make mine portable by employing a tight fit in the floor to ceiling length. I pieced a baseball bat knob in the top of the conduit, allowing me to jam the device into place and remove it for convenient storage.

My vertical vise works very well, you just have to remember to keep your knees out of the way when you swing it. It actually works better than it may sound from this description. Getting use to the vertical swing is quite easy. Copper bullet jackets make good bushings in a barrel vise.

B. Evans

4.4.2 Holding Irregular Shapes for Engraving

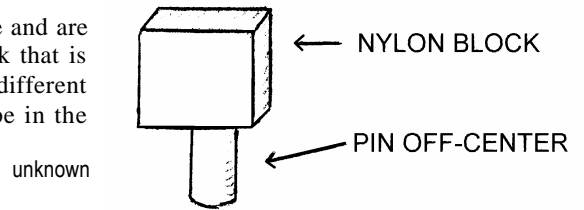
If you are working with a difficult shape that has a flat side, (pistol hammers, side plates, etc.), cut a block of wood that will fit in your vise. Get a hot glue stick and melt a couple spots onto the block. You can melt the stick with an alcohol lamp or a cigarette lighter. Press the item to be engraved onto the glue. Don't waste time as the glue hardens quickly.

When you want to remove the item from the glue, stick a screwdriver or other suitable instrument under the glue and pry upward. Be careful not to let the pry contact and mark the engraved object. It will pop cleanly loose from the block. In the unlikely event that the glue doesn't release, stick the block in the freezer for a few minutes. An item can be mounted very quickly this way and removed just as quickly.

B. Heune

4.4.3 Block Pins

GRS Corp offers a set of pins that fit the GRS Magnablock vise and are extremely useful. Each pin is topped with a square nylon block that is off-centered on the pin. By rotating the pin, one can create different dimensions. I find that you can hold almost any irregular shape in the vise using them. It is very clever and very useful.

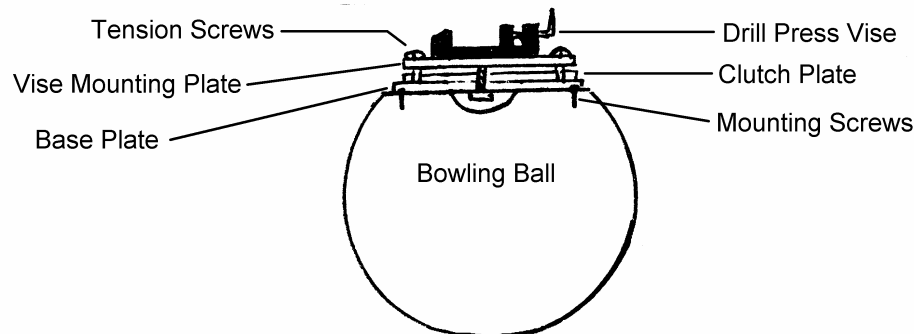


4.4.4 Bowling Ball Engraving Vise

A "Poor Man's Vise" can be made from a bowling ball and an inexpensive drill vise. Cut about a 5" slab off the ball, mount the vise, and then set the ball in a hole in the bench.

R. McCrory

The problem that I found with the bowling ball was the effort it takes to muscle it around. I solved it in the manner shown. Now I have everything from a freewheeling to a stationary vise, just by adjusting the tension on the socket head bolts.



All plates are a quarter inch cold rolled steel. Use a good grade of white grease between the clutch and base plate. Total investment is about \$35.

D. Lauck

4.4.5 Engraver's Stand

A 6" pipe approximately 43" long with a flange welded on one end makes an excellent pedestal for an engraving block or vise. If securely bolted to the floor with good lighting, you can walk around the pipe making non-stop cuts. The GRS magnablock fits perfectly on the top

S. Alfano

4.4.6 Jewelry Engraving Block

For any of you using the old jewelry engraving block that spins too freely for the Ngraver or Gravermeister, try this. Take the block apart, get a thin piece of aluminum flashing, cut a hole in it to fit the center, place it on the block, and put block back together. Mark around the outside, cut the aluminum about 3/8" inside this line, and crimp the aluminum washer in about 8 places to create the proper drag. Put some auto chassis grease on the washer and re-assemble. It works great!

T. Swenson

4.4.7 Vise Control

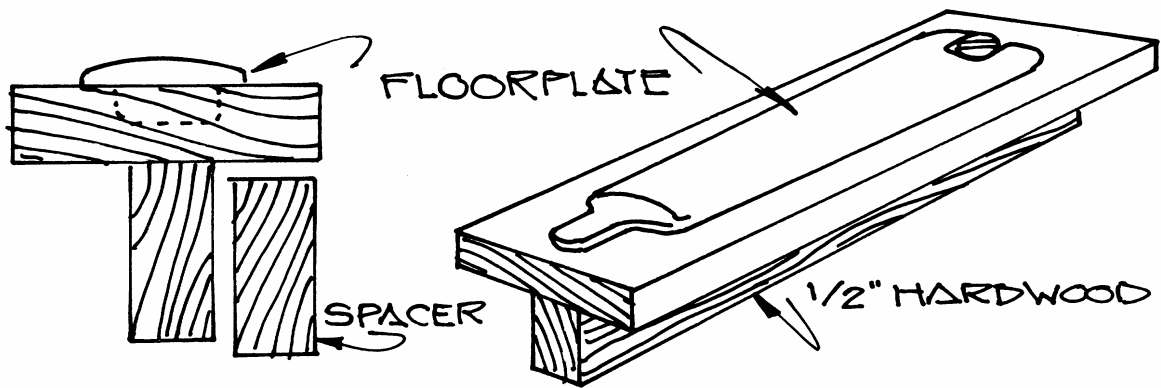
If you are using a ball vise, you can improve your control of it by applying a rubber non-skid material such as the type used on steps and boat decks. It comes in rolls with a peel-off adhesive back. It's inexpensive, about a dollar a foot, which is more than enough. Cut a rectangle of it that will fit around the outside of the vise jaws. It gives you a better grip when you are rotating the vise. It comes in two forms, one is rubber impregnated with sand, which gives a heck of a grip but is tough on rings or anything that hits it. A better choice is the plain pebbled rubber surface.

B. Heune

4.4.8 Holding Fixture for Floorplates

I use Devcon Epoxy Gel to "set" the floorplate. Allow the epoxy to flow out from edges and then trim to suit (don't forget to use wax or release agent). Other epoxies or "bondo" may work, but Devcon sets in 5 minutes and is flexible for some time, allowing you to release the item if it has a negative draft.

HOLDING FIXTURE FOR FLOORPLATES.....REX PEDERSON



This fixture removes the "bounce" from cut-aways under the floorplate because the epoxy fills the void. Sliding the "T" fixture in the magna-block centers the work length-wise. Use of the spacer blocks will center the work width-wise. This fixture can be made in a few minutes and re-used.

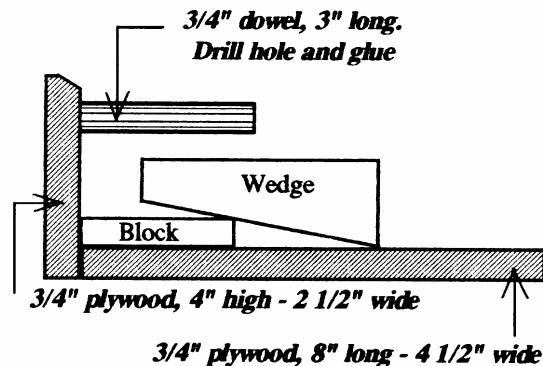
R. Pedersen

4.4.9 Holding Double Barrels for Engraving

I don't know about you, but for me the most frustrating object to hold in position while engraving is a double shotgun barrel. They drive me nuts! I can never position them correctly in a vise, and an engravers pad isn't solid enough.

I recently fashioned a simple device, shown in the following drawing that works surprisingly well, especially with the GraverMax. While it isn't perfect, it does solve many of the problems inherent in vising up doubles. It's really helpful while working under the stereoscope. As you rotate the barrel, it always remains on the same plane!

Just slide the breech end of the barrel onto the dowel, and place a pad under the muzzle. Either hold barrel in position with free hand or use the wedge.

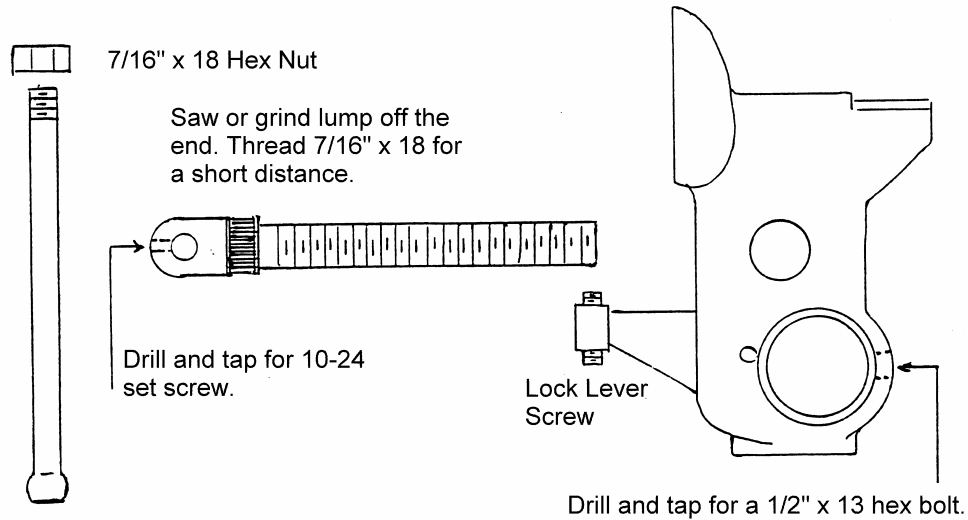


B. Evans

4.4.10 Versa Vise

I find the Versa Vise a very useful adjunct to an engraver's ball, and an inexpensive alternate for a beginning engraver. Its ability to rotate 360 degrees, and with tilt attachment, to tip up and down, and lay on its side, and its smooth jaws, make it attractive indeed. The vise does have two shortcomings for an engraver - its self-locking feature, and the "T" handle getting in the way when the vise is rotated over the bench. The self-locking (against rotation) feature will not work when holding something light or delicate. These faults are easily corrected, as witnessed in the related drawing.

The jack screw is easily removed; simply open the vise and continue turning the handle until the screw is free. Grind or file the ends of both the 10-24 and 1/2"-13 set screws smooth. Otherwise, they will eventually tear up the "T" handle and mounting post. Neither screw has to hold a great deal, and as a matter of fact, the 1/2"-13 screw can be adjusted finger tight, to add a bit of drag for rotation. When used this way, loosen the lock lever screw.



The vise is available from Brownells, and most any machine shop can do the alterations. I will be glad to do it for anyone in my area.

B. Lokker

4.4.11 GRS Positioning Vise

Engraving and jewelry making with the aid of a binocular microscope is becoming more popular. The GRS positioning vise is designed for use when engraving or making jewelry under a stereoscopic microscope. When greater magnification with good resolution is required, use of a microscope is a next logical step.

There are, however, some limitations inherent in the use of the microscope, and those must be dealt with.

The microscope must be mounted in a relatively fixed location, and it has a relatively small and restricted field of view. Because engraving and jewelry making requires that the work piece be rotated, the microscope must be mounted directly in line with the center of rotation of the work-holding vise. As the work progresses, the work piece only must be adjusted to keep the work area over the center of rotation and, therefore, in the field of view.

The GRS positioning vise addresses the limitations imposed by the microscope and allows easy and quick adjustment. The base of the vise features an adjustable tripod mount so that it may be set and adjusted to a comfortable work position. The crown and jaw assembly is similar to that of the Magnablock, and provides completely adjustable rotational brake.

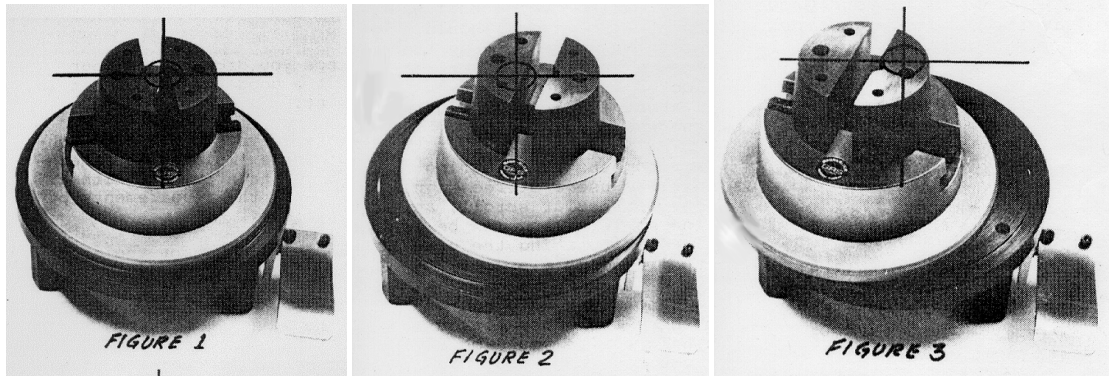
To quickly position the work, the entire crown and jaw assembly may be shifted to any location within a 2" diameter of the center of rotation. To adjust the position, a slight downward movement of the quick release lever frees the crown assembly, so that it may be moved in the desired direction. Release the lever and the assembly locks automatically to rotate about the desired point.

Most importantly, adjustment can be made without taking your eyes off the microscope, or even laying down your tools. In just a few seconds, you quickly reposition your work piece to the new, desired location.

Figure 1 shows the vise with the crown and jaw assembly adjusted near the central position. (Where the lines intersect shows the approximate center of rotation, and the oval shows the approximate field of view through the microscope).

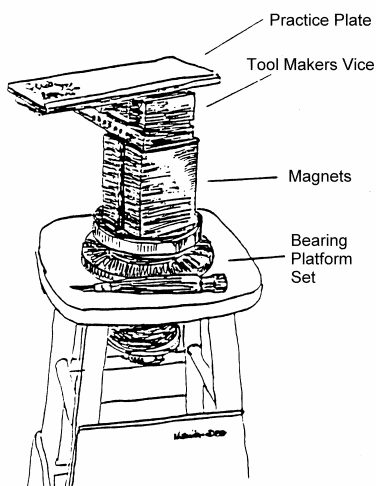
Figure 2 shows the crown and jaw assembly shifted upward and to the right, and the lines and oval show a new center of rotation and field of view. Note that the crown and jaw assembly will rotate in an eccentric mode.

Figure 3 shows an adjustment to the left and slightly downward. This position is shown near the limit of adjustment capability. Work beyond this limit would require that the work piece be repositioned in the jaws.



GRS

4.4.12 Poor man's compound vice



Today, many computer disk drives are being thrown away in scrap metal yards. Within them are many useable parts. These huge magnets come out of the head positioning device. They are very strong, and hold the vise very steady, but when you want to move the work, you simply push the vice where you want it.

Machinists use electrically activated magnets to hold their work. An electromagnet may also work for engraving.

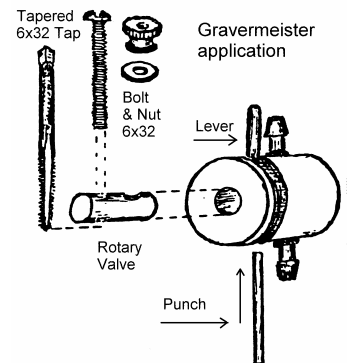
The bearing set also comes from these discarded hard disk drives. These come in many different sizes and shapes. Mine weighs 50#, but 20-25# is more common. They spin perfectly smooth and parallel with their machined base. You will need to damp the bearing set so it does not spin too easily. A leather strap at the base can do this.

These disk drives use 16" copper clad aluminum platters, which are spun on these bearings. Perhaps they could be impregnated with diamonds to do sharpening. (Has anyone ever tried this?)

4.5 The GraverMeister/GraverMax

4.5.1 GraverMeister Two-Way Valve Improvement

The two-way valve is used to tone the pressure up or down to do those very delicate engraving jobs. To accomplish this, remove the valve from the machine, vise it up, drive the friction lever out of the valve body with a punch, and remove the rotary valve from the valve body. Tap the hole from topside with a 6-32 tapered tap. Just when the tap is visible from the bottom of hole, stop and back the tap out. Place the rotary valve back in the housing and drive in a 6-32 bolt with a screwdriver until its tight. Now, saw the bolt off 7/16" from the housing. Clean up your threads and place a washer under a knurled nut. Step on the throttle and adjust to the desired pressure for the handpiece. Lock the lever in place, adjust the handpiece, and enjoy your engraving skills.

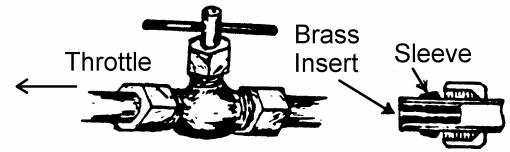


T. Swenson

4.5.2

4.5.3 GraverMax Application

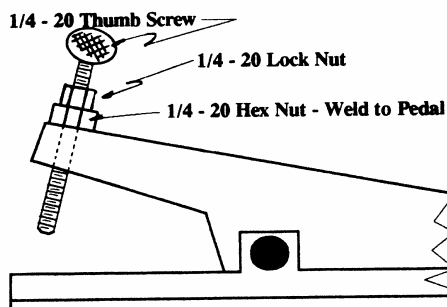
This 1/4" needle valve is placed 2" from the GraverMax, on the throttle line. It will provide for a very fine tuning adjustment. Be sure to get a kit with a brass insert and plastic sleeve for the plastic tubing that runs to the handpiece. File and seat the bottom of the needle valve for instant response when adjusting.



T. Swenson

4.5.4 GraverMeister Foot Pedal

I found that at times my foot seemed to get tired working the pedal and I figured out that it was because the pedal face was smooth and my foot tended to slip a bit. I got a piece of the rubber stair tread with the adhesive backing (it can be purchased at any lumber yard or hardware store with a textured rubber or sanded surface). I stuck a small piece on the face of the foot pedal and it helped a lot.



R. Evans

There are many times when absolute consistent power to your Gravermeister hand piece is necessary. For instance, when you are "dotting" or filling in a background, or when you are doing light scrimshaw or bulino work. These techniques require that your handpiece deliver consistent power. There have been several good suggestions in past issues about controlling power through refined and rebuilt valves. To me, obtaining consistent power (at whatever level) requires that the

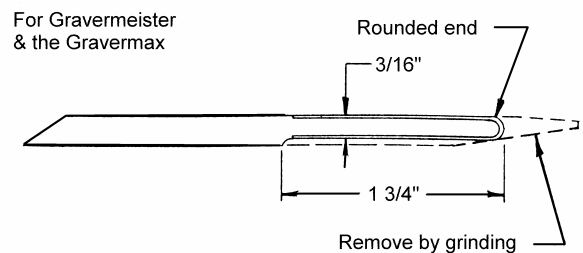
foot pedal be controlled with out fluctuation in applied pressure.

To achieve this consistency, I've made the following attachment to my foot throttle. When I need consistent power, I adjust the set screw and put the pedal to the metal. No matter how hard I press, I get the same consistent drive power at the hand piece.

B. Schostle

4.5.5 Care and Use of GraverMeister Handpieces

All handpieces require only a minimum of care. They are ruggedly built, but not immune to damage if misused. Be sure that the tool shank fits the chuck. Tapered shanks (like those on most woodcarving tools) will generally not work well. A wobbly tool indicates that it either does not fit the chuck, or is not properly positioned in the chuck. This problem is easily corrected with a little grinding to clean up the tool shank. An ideal shank is either square or round, and of uniform size along the clamping area. Never use a tool with a shank larger than specified for the chuck. The following sketch shows how the graver should be modified.



Tightening and loosening the chuck while applying power to the hand piece is much easier and provides a more rigidly clamped tool.

Gravers must be firmly seated in the chuck on the face or on the ledge provided in the chuck jaws. This will prevent slippage and transmit maximum impact to the cutting edge.

NOTE: Large hand piece has no ledge and the short square gravers, small points, etc. cannot be readily used.

Standard gravers normally used with wood handles (point, knife, liners, etc.) may be used in all handpieces. The tang (or shank) end must be modified by grinding to fit the chuck properly. These gravers are clamped between the chuck jaws with the tang end inserted to the bottom of the chuck. Gravers of this type furnished by GRS Corporation are modified to fit and may be used as guide for modifying gravers you already own or purchase from other sources.

5 ENGRAVING TRICKS & TECHNIQUES

5.1 *Developing your supportive skills*

Each of us has the desire to become better engravers, to increase our skills so that we are recognized as one of the best. I believe that throughout our engraving careers we should pursue that goal. I also believe that "presentation" can make a big difference in the recognition in the final perceived value of an artist and his work. There are subtle ways in which we present our work for the public that will help in that recognition. For lack of a better term I refer to these as "supportive skills."

The skills to which I refer are those that come before and after you do your engraving work - specifically, preparation and finish work. There are no figures available that indicate just how many working engravers prepare and finish their own work. Many times these jobs are left to others. I have seen more fine guns vandalized and abused by amateurish bluing than by any other single item. It is not the color of the bluing that I refer and object to, it is poor polishing (rounded corners, smeared lettering, uneven surfaces) that can destroy the effect and quality of otherwise fine engraving.

As a beginner, you should understand that experienced engravers are also accomplished at preparation and finish work, which they perform themselves. Or, they know where to get the work done right. If an engraver does not do his own preparation and finish work, you can bet that he has sought out masterful individuals to do it for him. These individuals are found and a business relationship cultured over the years, and they appreciate the special attention that engraved guns require and deserve.

These skills also apply to other finishes which include nickel plating, electroless nickel, bead blast, cold rust bluing, color case hardening, and French gray. Each of these requires a level of expertise to perform properly. And the preparation has a profound effect on the overall success of any of these finishes. Poor preparation will show through the best of final finishes. I do not suggest that each of us become a master of final finishing. I do suggest that we should seek out those individuals who can enhance our work to its fullest degree.

When your engraving is completed, and you have found a competent bluer, there are a few final aspects of "finishing" to be considered. These involve how you present your work with regard to accouterments such as presentation cases or boxes, handgun grips, etc. It takes some years of experience to recognize how guns should be presented. The contemporary engraving clientele and devotee has become acutely aware of trends, tastes, and standard of practice where his firearm is concerned. If you are not aware of these standards, your reputation will suffer. I have seen otherwise respectable engraving work suffer for poor presentation; poorly designed and executed cases, abominable handgun grips that did not fit a theme, bright polish finishes where a soft luster would have been better, etc. These tastes and trends are learned through observation and experience. Remember, your engraving will be partially judged on the way it is finally presented...only a foolish person places a Rembrandt in a dime store frame.

Everyone will tell you that if a beginning engraver is to progress, he must spend a great deal of time drawing and refining patterns. This kind of practice requires many hours of time. It can be more enjoyable if your sketching fits the actual shape of a gun. You might find this helpful; take any gun that is reasonable fast, i.e. auto pistols, lever action rifles, etc. Lay them on a Xerox machine and make a copy. Trace the outline of your copy with a pen to make lines distinct. This becomes your master copy. Purchase a pad of artist's tracing paper from a stationery store. If you place the master copy under the tracing paper, it will show through and you can draw patterns to your hearts content. Simply by moving your master copy, you have a fresh clean pattern.

Good symmetrical scrolls are essential to quality engraving. Very often when you draw a scroll it will look great, but be sure to turn it upside-down and look at it. Very often something that looks good one way will look awful when viewed upside down. Good scroll will look right from every angle.

Use of Chinese white. There are numerous ways of putting a pattern on a gun. This is only one.

1. Remove blue from area to be engraved.
2. Sand the area to be engraved lightly with 400 or 600 automotive sandpaper. (This helps the Chinese white to adhere to the metal.)
3. Dampen your finger, rub it over the Chinese white, and then run it lightly over the area to be engraved. If done properly you will have a thin gray even coating of Chinese white on the gun. This may take practice. If it beads up, the metal is not clean.
4. Use either a highly polished metal scribe, (one that will not scratch the metal) or a very sharp #5 lead pencil.
5. Draw your pattern on the metal.

6. If you make a mistake simply take a small camelhair brush dampened with Chinese white and paint the error.
 7. When the design is drawn, spray the area with a little clear lacquer from a spray can. (I use clear Krylon).
 8. Now you can handle the item without fear of smearing your design.
- I prefer this method to using a scribe because with this method, mistakes can be easily corrected and there are no marks on the metal to confuse me.

B. Evans

5.2 Health and Safety

This section covers safety and health issues that specifically pertain to the engraver.

5.2.1 Chemicals

5.2.1.1 Mixing Acid

NEVER, NEVER pour water into acid!! Rather, pour the acid into cold water slowly while stirring with a glass rod.

B. Evans

5.2.1.2 Trichloroethane

Danger!! If any of you are using 1,1,1, Trichloroethane, the vapors are harmful and can be absorbed through the skin. This can result in possible liver and kidney damage. Use it with great care.

H. Ensley.

5.2.1.3 Jergens Tool Aid

If any of you are using "Jergens Tool Aid," as a graver lubricant, it might be a good idea to read the label and heed the warning about using it with adequate ventilation.

E. Pranger

5.2.1.4 Calcium Carbonate (Working with Pearl)

If you are shaping pearl grips, be extremely careful not to breathe the dust. It's like tiny pieces of broken glass and can make a mess of your lungs.

B. Evans

5.2.2 Optics

5.2.2.1 Lighting

Full Spectrum Lighting

At the 1991 FEGA Exhibition, one of the most discussed topics was, "What level of lighting do you use?" While many said they use cool and warm fluorescent, other were using halogens, kitchen lights, etc.

All of the above lights are rich in the yellow and blue spectrum. Lighting, as we've grown accustomed to, is not balanced. Sunlight produces what we refer to as "full spectrum" light. Unless you have a north skylight to work under, or if you work at night, you should try full spectrum lights. These are available as both patented fluorescent tubes, and as incandescence. Full spectrum bulbs are handmade and last many times longer than ordinary bulbs.

So, why full spectrum light? Full spectrum light reduces eye stress and creates a relaxing environment. The best news is that they produce "contrast lighting," which shows off engraving to its best while it is being cut. Colors in the center of the spectrum (yellow) are perceived as the brightest; as a result, other colors appear diluted. Full spectrum bulbs eliminate the bright yellows, allowing the eye to see glare-free images without fatigue. Black and white contrasts (engraving) are enhanced.

A resulting side benefit is "SAD" elimination! What's that, you ask? *Seasonal Adjusted Disorder*. Ever feel let down on a winter day? Well turn on your full spectrum lights! Wow, you'll feel great and be able to work hour after hour without fatigue.

I use the Vita Lite fluorescent for overhead, and a chromolux for my close up incandescent.

A side note on fluorescent HUM. You can eliminate it by removing the ballast from the unit, hanging it from the ceiling, and rerunning the wires with no more vibration. Another means is to use one of the solid state transformers which change the 60 cycle HUM to some where around 156,000 cps, way beyond human hearing.

I'm happy to report that these lights work great on 12 volt systems with 110 volt converters. I may be the only engraver on the planet making all his power from photovoltaics.

D. Wright

Since Dwain Wright's article on full spectrum lighting, I have installed full spectrum lighting in my studio and have been using them for about six months. I can honestly say that I will never use anything but full spectrum lights again. They really do eliminate the yellows and reduce glare to a minimum.

I installed 100W incandescent bulbs in my desk lamps and 48" fluorescent bulbs overhead. I found that it took about three weeks to get used to the new light, but after that period I was firmly convinced that I could no longer work without them.

Full spectrum tubes and bulbs cost considerably more than traditional light tubes and bulbs. It cost me about \$175 to relight my studio (eight overhead fluorescent bulbs and five 100W incandescent bulbs).

unknown

5.2.2.2 EYESIGHT: Focusing on the Facts

Eyesight is generally regarded as the most essential of the five senses; we are naturally eager to preserve it. And to do that, it's important to know what can go wrong with our eyes and how to avoid problems. Unfortunately, many people harbor misconceptions about vision that can cause needless worry or lead to serious consequences. Here, then, are the fallacies and the facts:

MYTH: Poor lighting ruins the eyes.

FACT: Until the nineteenth century, people read by candlelight, yet there is no evidence that this damaged their eyes. Proper lighting merely reduces eye fatigue and makes reading more pleasant.

MYTH: Eye drops are a remedy for tired eyes.

FACT: Only rest cures fatigue. If your eyes burn after reading or working a long time, it doesn't mean they're tired. Most likely, they've become dry as a result of concentrating too hard (or blinking too little), and any fluid will relieve the burning. Over-the-counter drops are harmless if used correctly, but shouldn't be used for infections or irritations caused by foreign bodies or chemical injuries.

MYTH: Only one reading distance is correct.

FACT: If the distance you hold your book or other material is comfortable, it's right.

MYTH: Children eventually outgrow all eye disorders.

FACT: Some problems, such as crossed or lazy eye conditions (amblyopia), do *not* improve on their own and must be treated early to prevent lifelong damage. If a child favors one eye while visual areas of the brain are developing (up to age seven), the ignored eye will, in effect, become blind - the brain will never learn to see with it. Ophthalmologists advise that youngsters have a visual exam before age three and again when they start school.

MYTH: A burst blood vessel should be cause for alarm.

FACT: A spot of blood on the white of the eye (called a subconjunctival hemorrhage) is harmless and should fade away in a week or two.

MYTH: Eyes should be cleansed on a regular basis.

FACT: Routinely flushing eyes with water is unnecessary. For the rare times when eyes need to be washed out - to rid them of dangerous chemicals for example - quick action and large quantities of fluid are crucial. The best approach is to stick your head under an ordinary tap or shower, letting water flow over the open eye.

MYTH: If your eyes feel fine, they must be healthy.

FACT: One important exception is the most common type of glaucoma (a condition caused by high pressure of the fluid in the eye), which is symptom-free for years - until there is permanent loss of sight. Everyone past 40 should have his or her eye pressure checked every few years; you can get the simple test from an eye doctor or optometrist.

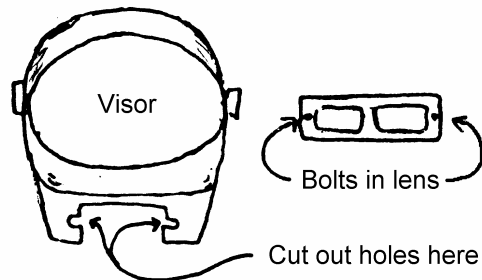
MYTH: Eyes can be permanently damaged by overuse or extensive detail work.

FACT: The muscles of the eye can tire, but can't "strain" the way back muscles can. People with cataracts or other visual problems need not fear that frequent reading or sewing will further harm their sight - eyes simply can't wear out.

M. Oppenheim, M.D.

5.2.2.3 Optivisor

There are those among us who aren't blessed with perfect vision and use an Optivisor. If you wish to use more than one magnification, a simple way to change lenses is to modify the retaining holes in the headpiece into notches. Put a short bolt through the retaining holes in the lens. To change, just snap the old lens out and new ones in. The flexibility of the visor is sufficient to allow the lens to snap into place and hold it securely.



B. Mains

There are a number of variations on this useful accessory. Some are a bit lighter (the MagniFocus), and have easily replaceable lens plates. Another is the headband loupe, which consists of the adjustable headband and a simple lensplate on a short support rod. Its advantage is that there is nothing in front of your eyes except the small lens plate - no hood to prevent seeing around the lens to refer to sketches, tools, or even the clock.

R. Phillips

5.2.2.4 Magnifying Glass

If you like to carry one in your pocket, take the glass out of an old bathroom scale. They are quite powerful, smooth on the edges and comfortable to carry.

E. Pranger

5.2.3 Body Positions

5.2.3.1 Exercises

If you've never had tendonitis in your forearms, consider yourself lucky! I believe it comes from the engraver's need to move the engraving block around for position. There are probably many other contributing factors; perhaps the positions required to hold gravers, hand-pieces, or chasing hammers. I doubt that any of us have counted, but if we knew just how many times we reach out to re-position the block, or tapped a hammer against a graver during the course of an engraving job, we would surely be astounded.

The closer one gets to fifty, of course, the more pronounced the occurrences of such maladies. None of us are getting younger, and to guard against developing such afflictions, there are some simple exercises that could help reduce the chances of a debilitating injury.

1. Squeeze a tennis ball - ten times each hand, 3 repetitions.
2. Stretch forearms - while holding your arms in front of you, horizontal to the floor, bend your hands backwards (up) as far as you can and hold for a count of ten - 3 repetitions.
3. Strengthen forearms - twist 5' piece of rope around a 2" piece of PVC pipe, tie a 2-1/2 lb. weight on the rope. Holding your arms straight out, twist the weight up, and then let it down to the floor by twisting in reverse - increase to five pounds after a week. Do 3 sets of ten repetitions.

5.2.3.2 Carpal Tunnel Syndrome

This is a potentially debilitating injury. It is a serious nerve injury problem, which cannot be easily counteracted through exercise. It is developed by continual and repeated positioning of the wrists in torqued positions, usually downward. It is caused by compressing the carpal tunnel, which encases the nerves extending from your arms to your hands - usually through extreme and repetitive positioning and bending at the wrists. When the problem exists, the hand is numbed and weakened. Surgery, with considerable rehabilitation, is required to correct the condition when it has developed to the state of producing numbness.

If you suspect there is a problem developing, it's best to get a doctor's opinion on how you might control the course of the injury. Rehabilitation facilities can review your work practice to pinpoint the causes of carpal tunnel and address your work habits.

Don't mess around with this one. Remember, its occurrence in the workplace is most often found in jobs where repeated positioning of the hands (such as on an assembly line) are found - kind of sounds like the kind of thing that takes place in engraving? It could very well end an otherwise successful engraving career.

5.2.3.3 Bad Back

This is a rather offbeat suggestion, but maybe it will help someone. I found that after a while standing hunched over my engraving vise, my back was killing me; so, I started working at a high bench, seated on a barstool. My back was still hurting me. The local physical education teacher finally solved my problem. He put my feet on a bench so that my knees were as high as my hips. No more back pain.

R. Evans

5.2.3.4 Help for your Bad Back

Just about any practitioner of a trade, craft, or art form that involves standing or sitting with the back curved forward over the work, runs the risk of developing back pain as an occupational hazard. The reason for this is simple - as the spinal column bends forward, the forward edges of the individual vertebrae are forced together while the back edges separate. (Think about what would happen to a series of cylindrical beads strung on a metal rod as the rod was bent into a curve shape).

With the forward edges of the vertebrae being forced together, the spinal nerves which pass through the spaces between the vertebrae are pinched or compressed. The result is pain - due to stimulation of sensory nerves - and muscle spasm due to stimulation of motor nerves.

To prevent the onset of such problems, and/or ease the pain if you're already subject to back pain, try wearing a weigh/lifter's belt (these are available at stores selling exercise equipment such as weightlifting sets) while working. These belts are nice and stiff, and about 8 to 10 inches wide at the back. So, they stabilize the region, including the small of the back, which is the most frequent site of back injury, taking the strain off the otherwise tight muscles. Also, they apply pressure to the small of the back - which in itself tends to stop the pain. (Doc Harris says "I wear one of these belts myself every time my own back acts up - and I know I have pinched nerves due to a ruptured intervertebral disc. I might have to wear the belt four or five days running, including at night. I can keep right on working and moving around when otherwise I might have to lay flat on my back in bed or walk with a cane.")

The weightlifting belts I refer to are made by the "Sta-Slim Products" Company of San Pedro, California. Just to help the fellows identify what I'm talking about - the one I purchased most recently still has the price tag of \$34.95 on it.

Dr. F. Harris

5.2.3.5 Comfort

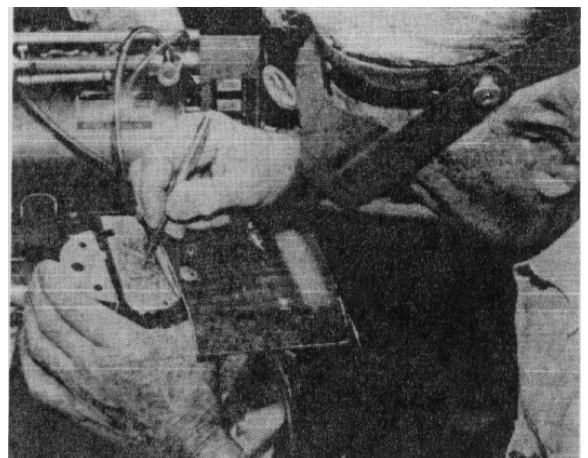
For those of you who wear cowboy boots when engraving with the Gravermeister or Ngraver, put a block of wood under the front of the pedal. It gives a much more comfortable angle for your foot.

T. Swenson

5.2.3.6 Hand Support

When work is in the engraving block, it is difficult to draw, sketch, redesign, etc. with your hand unsupported. Jay solved that problem with a nifty gadget of his own design. His photo tells the story. He uses a piece of a fiberglass snack tray and three studs placed to fit the holes in the magnablock jaws to steady his hand.

J.T. Modloff



5.3 Background Treatment

I'm not sure what the "best way" is to remove background, but I can tell you how I do it. First, make every effort to minimize your background - most beginners have far too much, which means that their scrollwork is not tight enough. Background removal requires patience and it is not very exciting work! When done properly and clearly it adds greatly to the final results.

I use a liner for almost all of my background evacuation, either a 6-3 or an 8-3. These are very fine liners, both of which have been narrowed. I use them because the teeth make the tool track; they don't slip or "skate" like flat graver. The liners do about 95% of the work, and for the small or tight areas, I use a small onglette. Care and patience is necessary, but if you nick the side of a scroll don't panic. After cutting your background, go over the work with a burnisher. It will smooth out most of those nicks.

But to minimize the nicks in the first place, you should start your cut about 1/3 of the way into the background area and then reverse and cut in the opposite direction. This will minimize the chance of the back of your liner scarring the scroll.

unknown

5.3.1 Background Tools

Make your own tools by using 1/8" drill rod. Texture one end with a liner by cross hatching, file or tapping onto sand paper. Taper the end to appropriate size. Heat to bright red and quench in a ball of beeswax. Let cool then polish off fire scale. You can also make single point punches for stippling this way that work in air assisted tools. Make a few at a time as the points and textured surfaces eventually wear out.

5.3.2 Matting Backgrounds

A Vibra Tool works well for matting the background on scroll. You can make different tips to give backgrounds. The carbide tip that comes with it works very well on especially hard steel.

T. Bakewell

When using matting tools or single point punch, move the tip around in a circular motion to get an even texture.

5.3.3 Background Removal

After chiseling away backgrounds, apply a touch of baby powder with a soft artist's brush. It cuts the glare and clearly shows any high spots.

S. Alfano

First cut around all scroll work etc. with a flat (leaning the tool into the wall of the engraving. Get to desired depth. Then hog out excess metal with a high speed rotary hand piece and burr. Be very careful if you are going to try this method as one slip can do a lot of damage.

5.3.4 GraverMeister for Matting

If you are using the machine for matting backgrounds, hang a rubber band above your vise, and attach it to the back of the handpiece so that the tool floats above your work. You can then control the tool with more accuracy and less fatigue.

M. Hoechst

5.3.5 Use the Acid Etch Process For Multi-Level Background Removal

I've recently tried a process of three-level background removal. It worked quite well and was rather simple to achieve the results I hoped for.

To start, cut the outline of your highest level of background (least material to be removed), apply chipping out ground and etch. I found that the etching process on step 1 took from 10 to 15 minutes to achieve desirable depth.

Next, remove the ground, cut the outline of the second depth to be removed, apply ground, chip out, and etch to the second desired level.

Finally, after the ground has been removed, the third level outlined, and the ground chipped out once more, the third level of background is etched.

In my experiment, I had an animal in the foreground, foothills in the near background, and high mountains in the far background - all roughed in (or etched in) and ready for detail work in about an hour. It is simply a matter of etching out the subsequent background levels, working from the lightest to the deepest, by observing the depths achieved in each etch.

5.4 Tricks and Tips

5.4.1 Finger Grips

The rubber finger pads, like secretaries use, work well when using a hand graver. I use a large one on the thumb and a small one for the index finger. They aid in getting a good grip.

J.J. Roberts

5.4.2 Shavings Sticking to Graver

I find this is sometimes a problem when doing very delicate work. To remove them I place a small ball of modeling clay next to my vise. To remove the chips, just stick the tip of the graver into the clay. It will hold the chip without leaving any residue on the graver.

R. Evans

5.4.3 Engraving Thin Walled Guns & Cerrosafe

When working on a large thin walled receiver, such as a model 12, Browning Auto-5, etc., that are prone to vibrate, fill the receiver with Cerrosafe chamber casting material. Fill the entire receiver with it. Use duct tape to cover the holes, ejection port, etc. Degrease so the tape sticks. Melt Cerrosafe in a cast iron pot or elect lead pot. Do not overheat! Once it is melted, (at about 250 degrees) it will stay liquid for some time. Three or four pounds may be needed to fill a receiver and it's expensive. It is \$11.50 lb. from Brownells but it lasts forever if you are careful. When pouring, work over a cake pan so you catch any spills. Wear gloves, it's HOT! When it cools, it will be like working a solid block of steel, which is especially helpful, if you are inlaying gold.

When you are finished, melt it out in the kitchen oven. Hang it from a rack over a cake pan. Clean out corners and threads with a Q-tip. It will also melt under a heat lamp or a couple of big light bulbs but it takes longer.

M. Moschetti attributed to J. Rohner

WARNING.... If you use CERROSAFE to reinforce an item that you are engraving, be sure that every bit of it is removed before that object is placed in a bluing tank. If there is the smallest amount of Cerrosafe that gets into the bluing and a gun with any gold on it is placed in the bluing, then the Cerrosafe may adhere to the gold, creating a real mess.

L. McKenzie

If you have an odd shaped piece that you can't hold in your vise, melt some Cerrosafe into a rectangular tin can such as a "Spam" can. Set the piece into the molten Cerrosafe, and let it cool. Peel the can away, set the whole thing in your vise, and go to work.

M. Moschetti

5.4.4 Tape

Scotch 3M #845 Book binding tape has a number of uses. It comes in various widths up to 4 inches. Its excellent for making pulls using smoke, graphite, or bone black. For rust bluing, it can be used to mask off areas such as the center section of rifle bolts. It also makes a good mask when bead blasting. Apply to a grease free surface and trim with an X-acto knife or razor blade.

M. Moschetti

5.4.5 Mixing Epoxy

Anyone who uses epoxy or bondo might find this mixing technique helpful. I invert a soft drink can using the concave bottom for mixing. The tab is bent or removed so that the can sits level. The concave bottom keeps the epoxy, (or whatever you are mixing,) in a nice small area. Holding the can with one hand while mixing with the other sure can speed up the process. The remaining mixture can be left on the can. There is no clean up, simply recycle the can as it is.

N. Ensley

5.4.6 Cutting a Straight Line

Scribe the line fairly heavily. Use a rather long heel on your tool. This helps the graver run straight in the cut. I recommend that the cut be made with an onglette. (I use a #3). If you use a V tool, any change in the depth of the cut will result in considerable change in the width of the line and will produce ragged looking results.

S. Welch

The graver **MUST** be sharpened so the face is perpendicular to the length of the tool. Any deviation from 90 degrees and the point will drift. The main thing is to practice and practice. I know no other way.

E.C. Prudhomme

Remember when you are cutting a straight line for borders to come back and "back cut" the beginning end of the line, so it will all be the same depth and width. This is especially important at corners.

R. Evans

If you have trouble cutting a straight line, try doing what a carpenter does. Scribe the line very lightly and then instead of cutting on the line, cut right next to it.

M. Rabeno

If you are working a mean piece of steel and having difficulty cutting a straight line, try gluing a flexible steel ruler to the piece with a hot glue gun and using it as a guide. When finished, the glue will peel right off.

S. Pilkington

5.4.7 Saw Piercing

Jewelers saw blades will twist and work off the straight line if they are too tight in the frame. They will break if too loose. The blades will wear out quickly if pressure is used on the return stroke. Remember jewelers saws cut on the stroke towards the operator's body, just the opposite of a regular saw. Beeswax makes an excellent lubricant for the saw blade.

B. Evans

5.5 Inlays and Overlays

5.5.1 What karat and size of gold wire to get

Buy 24K gold. Don't try to save money by purchasing an alloyed gold (14K or 18K). Buy one size wire that represents the maximum size that you will use. (I buy 50 thousandths diameter).

The next step is to invest in a good quality draw plate. It's easy to draw the wire down to any size you will need. Drawing gold wire down to diameters is easy if you just remember a few important issues. Use pliers with smooth jaws and mount your drawplate in a vise; it should not move or chatter when you are pulling the wire through. You must use a lubricant (WD40 or Kerosene will do) and you must also anneal the wire frequently as the diameter is reduced.

Annealing is accomplished in two ways. First, if you have a short piece of wire you may easily anneal with an alcohol lamp. Secondly, if you are pulling a longer section or heavy wire you may use a torch on a charcoal block. Practice will tell you how much heat to apply, but basically, you should distribute the heat evenly without heating the gold red-hot. At the red-hot temperature, it is easy to melt the gold, especially when it is 24K. The final step is to anneal one more time after your final pull. This will render the gold "dead soft" and ready to inlay. During the annealing processes, you may quench the gold in water - it will not harden like steel during the quenching. Remember that when you hammer the gold into place some work hardening will occur.

unknown

My personal experience has been that 24 K gold works best for borders and fine line inlays. I find 18 K pretty hard and difficult to work. I don't recommend 24 K for very large or sculptured inlays. Although it works easily, it doesn't wear well. Very little handling will cause the detail of the inlay to become worn.

R. Evans

5.5.2 Tracking gold used

Before you begin a job, weigh your gold on a powder scale. When you have completed that piece you can weigh it again and then subtract to find how much was used. 480 grains on the powder scale equals one troy ounce and one pennyweight (DWT) is 24 grains. Gold is priced by the pennyweight. You can find the exact amount of gold used from your original supply and then multiply the pennyweights used by the value of the gold when you purchased it or according to the daily indexed market value, whichever is greater.

5.5.3 Practice Wire

Take the individual strands of twisted copper wire (like speaker wire). It's soft copper, and you can find it in a variety of sizes.

T. Davis

5.5.4 Preparing Gold/Silver Wire for Inlay

5.5.4.1 Annealing Gold

Someone asked about this earlier. My experience is limited but I anneal simply by heating with a torch and allowing the gold to air cool. It's not necessary to heat to a visible red. If you are annealing gold wire coil it up, place it on a charcoal or asbestos block, and heat it evenly by moving the torch around. When the wire reaches annealing temperature, the coil will usually collapse like wet spaghetti. If you are drawing wire through a draw plate, anneal the wire more frequently as the wire gets smaller. Silver can be annealed the same way. Small quantities of either gold or silver can be annealed easily over a small alcohol lamp.

B. Evans

Small quantities of gold can be easily annealed with an alcohol lamp. Just pass the wire through the flame.

M. Rabeno

My experience in the jewelry field is that after heating the gold should be dropped into denatured alcohol. It will turn white and then return to its natural color.

G. Marek

5.5.4.2 Wire Drawing

5.5.4.2.1 Reclaiming scrap gold

I wondered for a long time how to reclaim scrap gold, being too cheap to pay some smelting outfit to do it for me. After thinking over several complicated methods, I tried this simple one.

Clean your scrap gold of iron contaminants with a magnet and lightly blow the dust and dirt away from the remaining scrap. Melt the gold in a crucible with an acetylene torch or in a kiln. After cooling, the lump of gold is beaten into a flat with a hammer and anvil. (I polish both surfaces). It is not difficult to flatten the gold to a uniform thickness of just under one millimeter (1mm). Scribe lines 1 mm apart and cut strips from the piece with tin shears. These coils of square gold "wire" can now be run through your draw plate. If the strips are a bit too large you may work with a burnisher, hammer and anvil, or file to form them to a rough wire.

S. Welch

5.5.4.2.2 Making a Drawplate

It's difficult to find a drawplate to draw gold wire down to very small diameters. You can make your own drawplate, with holes about any size you want. Take a small piece of soft steel approximately 1/16" thick. Using the smallest drill you have, drill a hole almost all the way through it. Take a long shank dental bur and taper it to a sharp point. Put it in a drill press and push it into the drilled hole until a dimple appears on the bottom side of your steel plate. (The rotating bur polishes the hole as it penetrates). Stone the bottom side of the plate until a small hole appears where the dimple was. With a little practice, you can make a hole any size you want. Clamp the steel plate in a vise, lubricate the hole with a little light oil and you have your drawplate. Make sure the hole is close to the jaws of the vise. If the plate flexes or vibrates when you pull the wire through the wire will break.

R. Evans

5.5.4.2.3 Tapering Wire for Draw Plate

Use a hand or pin vise that will securely hold the wire you are working with. Pass the wire through the end of the vise and allow two inches to protrude. Tighten the chuck to hold the wire. On your SLOW SPEED belt sander, hold the protruding end against the belt and twirl the pin vise. At slow speed, your finger will not erode. Use a 320 WORN belt. A long thin taper can be formed in seconds.

F. Hendricks

Lay a flat fine cut 6" file on a bench so it won't slip. Put your finger on the end of the wire to be tapered. Pull the wire with the other hand, while applying even down pressure with the finger. Rotate the wire slightly and repeat several times.

R. Viramontez

To taper your wire so that you can pull it through a drawplate, obtain two perfectly flat pieces of steel. Place the end of the wire on one plate. With gentle pressure, rub the other plate over the wire. This will cause the wire to roll between the two plates and with a little practice, you can produce perfect tapers.

S. Alfano

5.5.4.2.4 Drawing Wire

Never use pliers with serrated jaws to pull wire through drawplate. Smooth jaws only. Never pull wire backwards through drawplate. Always anneal wire before you put it in storage for future use. When the wire has reached 1/2mm diameter or less, always anneal wire after each draw. After you have drawn wire to the desired diameter, attach a label with the size. Transparent tape you can write on is useful as a label. After drawing, if the wire feels springy it should be annealed before additional drawing. Wire that glows orange is annealed. You can cool it in water without rehardening it.

Many folks

Additional comments. Rub beeswax into the drawplate holes for lubrication. Put your drawplate in the vise lengthwise. Pull the wire through the same hole twice before proceeding to the next smaller hole. Always, pull the wire from the same end. If you reverse direction you break down the molecular structure of the gold and it will become brittle. After annealing, place wire in pickling solution for about one minute.

J. Popovits

If your drawplate won't draw your wire down far enough, try putting two wires through at the same time. It isn't easy but it can be done. I have drawn wire down to .006 this way. Perfect size for small lettering.

R. Bone

If your drawplate won't draw a small enough wire, take your smallest wire, flatten it to about half its diameter, split with something like an X-acto blade, anneal and use.

R. Bone

5.5.5 Cutting for Wire Inlays

When cutting tight curves to be inlayed with gold, you might try a tool that looks like this. Works for me!



J. Vest

To maintain the proper width when you are cutting scroll to be inlayed with gold, try the following. Increase the angle on the heel of your graver, keep the heel very short, and cut a little shallower as you go into tight curve. Try tilting the graver slightly to the outside of the curve. These things will help in preventing you from chewing up the outside of your cut in tight scroll cuts. When cutting straight lines for an inlay, a long heel is helpful to keep the tool going straight. It is essential, however, that the face of your tool is 90 degrees to the axis of your tool or it will drift to one side when you cut.

S. Welch

When inlaying barrel bands, here is a hint that may save some time on gold inlayed barrel bands. First, use scotch tape to mark the line to be cut, then make your cut with a jeweler's saw, using the width of the blade to determine the width of the inlayed band.

T. J. Kaye

5.5.6 Setting Wire Inlays

If you sometimes feel that you need three hands to inlay gold borders, then here is a possible solution: When you start, you have to hold the gold, the punch, and your hammer, so get a spring loaded center punch. Carefully grind the point to a flat surface. Place the gold wire in place, and instead of using a hammer and punch, press down with the spring loaded punch on the gold.

When the punch trips it will seat the gold in place. (For those of you not familiar with the punch described above, it has a spring mechanism in the handle so that when pressed against something it will fire almost like the firing pin of a rifle. They can be purchased at any major hardware store).

J. Richley

If a wire inlay ends with a ball on the end, heat the tip of the wire until it melts into a ball. Now you can inlay the ball first and follow on down the line. This way you have one solid inlay instead of two pieces.

M. Rabeno

5.5.7 Inlaying Gold Into Small Areas

For inlaying gold into small areas like serial numbers, etc. try the following:

Materials needed:

One 1/8" Momax tool bit (or equivalent)

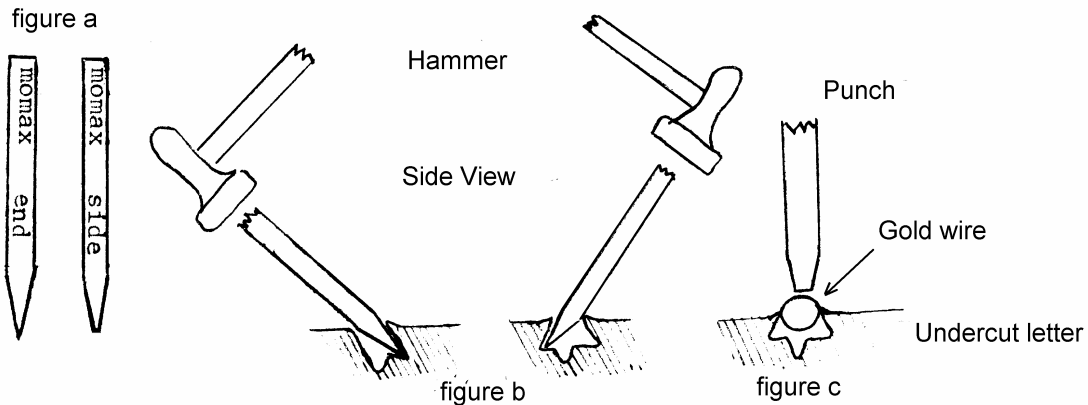
One 1/4" sq. x 2 1/2" long brass punch with one end tapered to a 3/16 tip.

Gold or silver wire that will just fill the cavity (usually .012 or less). Be sure the wire is annealed

One sheet 500c sandpaper. (Automotive type works best.)

Procedure:

1. Grind down Momax tool bit so that tip resembles a small cold chisel. Sometimes the flat is only 1/64" across, depending on how small the letters are. (See figure a)
2. Undercut along both sides of the letter. (See figure b)
3. Use brass punch to drive the inlay wire into the cut. (See figure c) The most common reason for inlay not staying is that the wire being used is too big in diameter. It's like trying to put 2 pounds of pooh in a one pound bag. By using the brass punch, you won't usually mark the steel around the letter and this saves finishing time.
4. Sandpaper flush, polish to taste.



Afterthoughts:

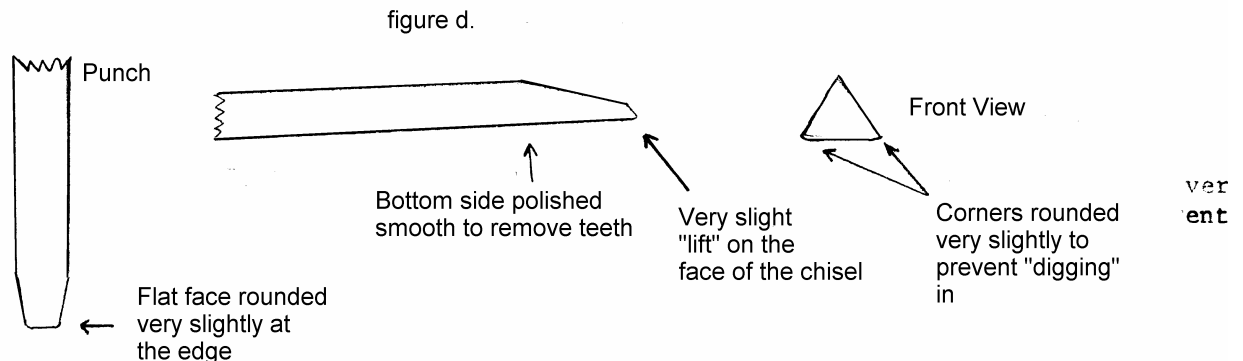
Although a brass punch is not as durable as a steel one and you have to keep refinishing the tip, the time saved in taking the dings out of the piece being inlayed is worth it.

For periods I use a very sharp pointed punch and make pin pricks underneath the period and then inlay it.

Additional thoughts on inlaying gold:

I have found another way of driving the gold wire into the cuts that works pretty well.

1. Prepare the cut to receive the gold as Ray described.
2. Punch your wire down with a brass or steel punch being careful not to mar the steel. Then I take a round steel punch about the diameter of a common pencil with a polished face slightly rounded at the very edge. (See figure d) I use this to drive the gold the rest of the way down. I find that it spreads the impact over a large area and does not mar the steel. (Obviously, this will not work on a concave surface, but it works well on flat or convex.)



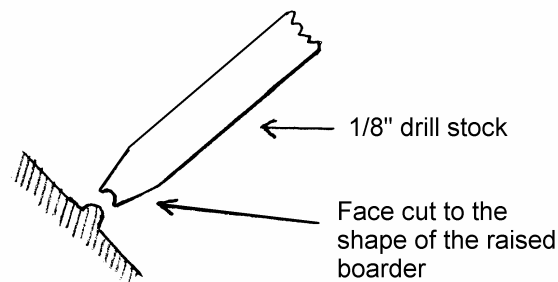
3. Usually you will find that after you have set the gold into the cut there is some surplus that must be removed. I use a 1/4" three cornered file that I have ground flat on one side and polished smooth. I then round the corners slightly to prevent them from digging in. (See Figure d) I go over the inlayed cuts with this tool and it cuts the gold away flush with the steel. I find that as a result I have very little sanding or polishing to do and I recover the unused gold.
4. I find that the long shank dental burrs can be ground down to make excellent tiny chisels for inlaying very small lines. unknown

When setting gold into periods, dots over 'i's,' etc., use a small round pointed punch and undercut from 3 or 4 directions and then set your gold.

S. Welch

5.5.8 Raised gold/silver borders

Cut and prepare the lines just as you would for a flush line. Use wire that is oversize for a flush inlay. Now you must make a tool for setting the gold and shaping its surface. Use 1/8" drill rod cut to approx. 2 1/2" length. Using a small file, shape the face of the tool as shown in the drawing. Be sure that the curve you cut into the bottom of the tool, is less than 1/2" the diameter of the wire to be inlayed. After the gold has been set with this tool the surplus gold can be carefully cut away and the surface of the steel stoned if necessary. Caution! Be careful that you don't hit the punch hard and leave dents in the steel on each side of your line.



E. C. Prudhomme

A method of shaping the raised gold and removing any excess that you might have is to use fine grit wet/dry emery paper backed with an art gum eraser. This will shape itself to the contour of the raised gold.

B. Shostle

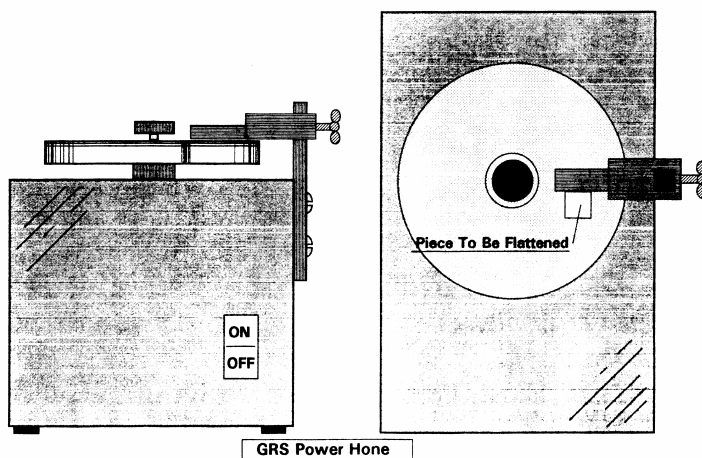
WARNING ON RAISED BORDERS: Practice on plates first; it's easy to screw up.

B. Evans

5.5.9 One Piece Inlays

A good way to mark an outline for a gold inlay is to cut the cavity and then make a smoke pull of the cavity. Transfer the pull to the sheet of gold. You can scribe the outline before cutting, or if you use clear tape you can cut right through the tape with a jewelers saw.

D. Zietz



For fast, accurate flattening of inlays and other small parts, mount a steel post to the side of the GRS Power Hone with two screws. A stop is then fashioned to locate just over the honing plate by using a thumb screw for adjustment. Emery cloth or other abrasive sheet medium can then be glued to the face of an old worn out hone. Small parts to be flattened are then held in place against the stop (a pencil with eraser down works good for holding the part secure). Hit the switch, Presto!, A great way to hone all kinds of things absolutely FLAT.

B. Shostle

Use them as overlays instead. Lap them so they fit perfectly to the surface of the gun and then solder them in place with a good low-temperature nickel solder like Eutectice or Stay-Bright. If you are competent and the heat will not matter use silver solder, (remember hot bluing will eat lead solder).

F. Hendricks

Traditionalists may object to overlays but often the reason was that soft solder (lead) could not be trusted to hold up under bluing and recoil. I have experimented with some of the new solders and they will hold fully as well as any inlay.

In soldering, the strongest joint is produced by the least amount of solder that will spread evenly throughout the area of contact between the metals to be joined.

5.5.10 Removing Surplus Gold

After you inlay a gold border, you have a little surplus gold that must be removed (and if you're smart, saved). Take a piece of 16 gauge aluminum or sheet brass (rolled, not cast) and shape it like a chisel. The material is harder than gold but softer than steel and will shave off the surplus gold without marring the gun. On rounded edges, you can use a long strip of aluminum or brass held like a drawknife.

D. Glaser

5.6 Metal Work and Finishing

5.6.1 Sources for Various Metal Finishes

5.6.1.1 Case Coloring

Ask around fellow FEGA members for a recommendation of who does a good job in your area or the closest contact to you. The FEGA forum (www.fega.com) is a great place to get up to date information from fellow members.

5.6.1.2 Electro-plating

Texas Platers Supply provides inexpensive electroplating supplies for small jobs (small plates, triggers, hammers, screws etc.) that operates off batteries. The plating "solutions" are actually "gels" that are painted on by brush and come in copper, nickel, silver and gold. For information contact:

Texas Platers Supply
2453 W. Five-mile Pkwy.
Dallas, TX 75233

5.6.1.3 Professional Metal Finishing

Ask around fellow FEGA members for a recommendation of who does a good job in your area or the closest contact to you. The FEGA forum (www.fega.com) is a great place to get up to date information from fellow members.

5.6.2 Sources for Professional Heat Treaters

Ask around fellow FEGA members for a recommendation of who does a good job in your area or the closest contact to you. The FEGA forum (www.fega.com) is a great place to get up to date information from fellow members.

5.6.3 Removing Anodizing from Aluminum

To remove anodizing from aluminum, heat slowly with a propane torch. It will turn yellow and then white as it burns off.

S. Pilkington

5.6.4 De-Bluing and Selective De-Bluing

To de-blue a specific area and French gray it, first clean the area with acetone or lacquer thinner. The metal must be perfectly clean and grease free throughout the entire process. Mask off the area that is to remain blue with a good quality lacquer. (I use Behr clear-Lak or Parks brushing lacquer). Use a small artists brush. Make the lacquer strip at least 1/4" to 1/2" wide. You must mask entirely around the area to be de-blued. Let the lacquer dry overnight. When dry, apply Birchwood Casey blue and rust remover with a cotton swab or small brush. Let it work for 5 or 10 minutes, and then scrub the area with a pencil eraser. The lacquer will stand some rubbing but be careful. After the bluing has disappeared sprinkle the area with a pinch of baking soda and let it work until it stops fizzing. Rinse with hot water. Wipe dry (use something

oil free). A little more rubbing with the eraser may be needed to even the color. In some cases, a second treatment of Casey's may be necessary. Guns that have been rust blued (as opposed to hot blue) will have a deeper shade of gray.

M. Moschetti

I mask with fingernail polish. (Sometimes diluted with a little acetone). I prefer it because it is colored and it's easy to see where you are putting it against the metal. It also dries in minutes. To remove the blue, I use Brownells blue remover, applied with a camel hair brush, sometimes a very small one. The solution is clear so you can see where it's working. When finished I just rinse in hot water. No soda is necessary; remove the fingernail polish with acetone, then oil.

B. Evans

Strip blue with a rust or blue remover. (Naval Jelly, or Brownells Blue Remover works well). Remove all chemicals by washing with a good brushing. If you don't, the chemical may keep working and pit the metal. Sand the parts with fine sandpaper, 500 or 600 grit (automotive paper works well). Buff only with jewelers rouge, as it will not round edges or mess up the lettering.

R. Viramontez

5.6.5 Hand Finishing Actions

Materials:

- Solvent and cleansing tank;
- clean rags;
- soft mold polishing stones;
- vise, or a means to secure the part;
- plenty of light;
- light oil;
- patience.

Procedure:

Do all the machine work -- lapping lugs, squaring bolt faces, truing face of receiver, etc. Clean action and disassemble. Secure the part in vise. A good place to start would be a receiver tang by selecting a 150 grit silicon carbide mold polishing stone (1/4" square), applying plenty of oil, and stoning the radius cuts above the cocking piece slot. The stone should quickly break down and match the contour to cut down the tool marks, etc.. Stone until all pits, marks, etc. are gone; check with light from different angles. Proceed to back of bridge, stoning away marks, but maintaining angles, etc.. By now, you should see a big change -- no pits etc., but an unpleasant frosted surface where you stoned. Grit your teeth and resist reaching for a finer stone. Instead go to work on the inside of the left receiver wall and get the surface cut true, then the rails, back of receiver hood, thumb slot, and finally finish the outside.

Wash and dry the receiver and then inspect it under a good light from different angles to be sure you got every tool mark, etc. If not, then stone them out and inspect again. This is critical; you don't want to have to go back later because of sloppy roughing out work. When you are satisfied, put the 150 stones away, and toss the rags out after you've rinsed the receiver clean and dried it.

Now go over it again as before with 240 stones, removing the surface the 150 stones left. Then wash, inspect, correct misses if needed, and clean thoroughly. Next use 400 stones as before. Now you see a softer smoother surface. You may want to use a bit larger stone, one that holds its shape a bit better in order to better shape the detailing around the radius cuts, etcetera. Clean and inspect as before. When satisfied, put the 400 stones away and get the 600 stones out and clean rags.

Go over everything again; check, correct, clean, and repeat as necessary. Put some 555 Polish O Ray on an 8" loose cloth wheel and lightly run the receiver across it to bring the sparkle out. It should be very pleasing. If it isn't, 9 chances out of 10 you got in a hurry and didn't remove the previous stone's marks, or you jumped the gun and tried to do the job in patches rather than one step at a time.

Remember: one grit at a time all over the part, clean, inspect, correct, and then the next grit all over, etcetera.

The same procedure is used with bolts, only with more patience. Bolt faces are time consuming; so are guide ribs and around the boss at rear of the bolt. But the stones really pay off by working lengthwise of the bolt to improve smoothness. By now, you should be able to see your course on other parts. Stone the bolt stop spring in place on the receiver. Save the small pieces of stone you've had pop off as they'll reach into corners and get plenty of use. Segregate your stones -don't mix them. You can final polish the inside of the left receiver wall with Semichrome, worn 600 wet or dry, or what ever suits you.

Polishing stones are generally made of silicon carbide or aluminum oxide. Either will work, but those of silicon carbide are probably the most used. Each company makes them in several degrees of hardness, so you will need to experiment as

you go since there are no instructions. The most used size on actions is 1/4 square, but 1/4 round, 3/8 square, and 3/8 round are also needed.

Suggested Grades

Congress	"Regular"	"Super"
Gesswein	Moldmaker	Diemaker
DME	Type A	Die Star

J. Westrom

Great sanding and polishing blocks can be made by sawing a hockey puck in half and then tacking a 1" wide strip of emery paper to it. Use coarse on one half and fine on the other.

R. Sampson

After stoning a steel part for only a few minutes, the stone (any kind) will get clogged with micro steel particles, reducing its effectiveness quickly. All stones can be very easily made like new by wiping with a paper towel, using a liberal amount of MEK (MethylEthylKeytone); it's available at most paint stores. One brand name is Crown. MEK will also clean about anything off your hands. My primary use of it is dabbing the reverse side of a Xerox design to transfer it on to steel. MEK evaporates quickly and leaves no residue. Makes a super degreasing and cleaning agent.

B. Adair

Make sure you read all labels and take the appropriate precautions when using any kind of chemical. Always wear eye and breathing gear and avoid skin contact. Sometimes with chemicals it is not the once or twice you breath them in but an accumulative effect over several years that they do all the damage.

5.6.6 Polishing

After 30 years of experience, I can tell you that in preparing a gun for bluing or engraving, there is NO SUBSTITUTE for careful hand polishing.

R. Bone

If you insist on polishing with power tools, the subject is well covered in Brownells GUNSMITH KINKS starting on page 201.

J. Richley

Polishing brushes are perfect for brushing, cleaning, polishing, and removing rust from hard to get places. The brush tip comes out just like a lead pencil with a simple twist of the cap. Fiberglass tips are excellent for miniature work. Both are obtainable from Brookstone Co.

N. Fotelis

There is no way that you can do extensive buffing without washing out lettering or screw holes, making dips and wavy surfaces, or avoid rounding the corners and edges in some areas. Significant metal removal, especially over varied surfaces, is not done with a buff. It is done with abrasive belts. Alter a 1" x 42" vertical belt sander so that the belt travels at about 150 to 200 RPM, (525 to 700 feet per min.). Convert the steel backing anvil to a leather cushion. Glue on with contact cement a 1" strip of 1/8" thick leather. Have a stick handy so that you can prop up the upper swinging arm of the machine to cause the belt to be taut whenever you wish it to be. Buy only glue bond J weight belts in 120, 240, 320 grits. Use the belt free standing or with your finger as an anvil, or use the leather faced anvil. A little practice and you will be amazed how terrific your polishing and re-conditioning can become. Buff only to polish if necessary. Worn 240 grit makes a super texture for bluing.

F. Hendricks

When buffing a gun I don't buff over the lettering. I hand polish with an item called the RENNOVATER, which is basically a large ink eraser available from the SPANDEX Corp., Allentown, Pennsylvania. Then I finish off with Norton Crocus Cloth.

B. Bryant

White rouge on the flesh side of a heavy piece of leather works well for polishing to a near mirror finish without rounding edges or washing out engraving. It also works well in putting a final polish on gravers after sharpening. It won't work on carbide however.

M. Moschetti

5.6.7 Finishing and Coloring

5.6.7.1 French Gray

Thoroughly clean the gun parts to be treated. (I suggest plastic gloves to avoid fingerprints). Submerge it in a solution of 10% nitric acid for about 8 seconds. Flush with cold water then dry and finish cleaning with art gum. Many guns treated this way are also sprayed with clear lacquer as an added rust preventative. (Remember the danger of mixing acid and water; use caution).

E.C. Prudhomme

This finish can be produced by applying a phosphoric acid solution to the gun parts. Most lumber or paint stores carry a product for treating galvanized metal that contains phosphoric acid. (Don't try to mix your own solution). One is called METAL TREAT and comes in gallon jugs. The darkness of the finish is dependent upon the type of steel and the length of time treated. Some steels will develop a spotty look. This can be blended into an even shade by rubbing with polish like jewelers or auto polish. It takes a little experimenting to get it right, so try it on some junk first.

T.J. Kaye

Here is yet another method. After engraving, re-blue the gun. Then strip the blue with Brownells Blue Remover. Then polish with a pink pearl eraser.

S. Alfano attributed to L. McKenzie

Can be produced by taking approximately 1/4 cup of Naval Jelly and one teaspoon of cold blue (4140 works well). Mix them together in a paper cup. Apply the mixture to metal with a Q-tip. You will get a color change almost immediately. To blend variations of color or to get an even color, card with 0000 steel wool. You can vary the color by how hard you card.

Y. C. Soderholm attributed to N. Hartliep

5.6.7.2 Case Coloring

Here's how to return case color to Smith & Wesson hammers and triggers. First, polish bright the part with a loose 240 wheel. Then take a swab of Birchwood Casey's Gun Cleaner-Degreaser and thoroughly wet the part with it. Without wiping it off and with it still wet, take a pin punch and dip it into some of your Dicropan T-4. With the drop on the end of your punch, touch it to the part that is wet with the Cleaner-Degreaser. Wait a few seconds until the mottled color is about right then wipe off with a clean rag. Then oil. I'll bet you can't tell it apart from the factory case color! Really looks good." (Comment by BB: - I tried this and it truly works, not only on S&W but also on other pieces of steel. However, I ended up doing it beside a water faucet with the water running, and the minute I got the color I wanted I dunked the part under the faucet of running water and rinsed thoroughly without touching. I then patted it dry very carefully and let set until the next day and then used a very mild mineral oil. Darned it if doesn't look beautiful. This may not be very durable, so would suggest spraying with a dull lacquer before oiling to add to its wear life.)

From Brownells, credited to Matneys Gun Shop Elkhorn City.

The following are responses to the question of how to heat blue screw needs and small parts:

Polish the part to a high finish (very important), heat to cherry red, and drop in water. The parts are now very hard and brittle. Re-polish the parts and clean with alcohol. Do not touch with fingers after polishing. Take a small piece of copper plate approximately 2" x 3" 24 gauge. Bend as shown in drawing. Heat slowly over an alcohol lamp or Bunsen burner moving plate so screws roll. Heat until you get the desired color.

G. Marek

Polish parts to a high finish. Make sure the parts to be blued are clean. Heat in an open flame just brushing the flame back and forth across the parts being heated. Remove heat from time to time, as the color begins to change. Just before the desired blue is reached, remove heat and let the part air cool. The last bit of color will appear as the part cools. If you miss on the color, polish and do it over again.

T.J. Kaye

Polish part to a high finish (555 Brownell) and clean thoroughly with alcohol or T.C.E. On screws, use a propane torch. Use a small flame and heat slowly from the shank of the screw below the head. Hold the screw with pliers and turn the screw while brushing the flame back and forth about the shank. Use good lighting and magnification to see the colors develop. When you reach a purple color draw the flame back from the shank and tease a little to get that beautiful royal blue color. Remember the parts to be blued must be perfectly polished and perfectly clean to get the color desired.

B. Lane Jr.

Polish part to high finish, and clean carefully with lacquer thinner. Hold or set the part so it can be heated without the polished surface being touched. After heating small parts to desired color, let them air cool. Larger parts should be quenched to retain the desired color. Either oil or water can be used. The quenched parts have a brighter color.

E. Haga

5.6.7.3 Gray Etch

You need regular hot bluing equipment and powdered phosphoric acid, a quantity enough to bury the piece. You proceed just as though you were bluing the piece. When it has been in the hot bath long enough to blue, you remove the piece and bury it in the phosphoric acid for 10 to 15 minutes. Then remove, wash with a soapy rag, and place back in the bluing solution. This is repeated 7 or 8 times until the piece takes a nice gray color. On the last removal from the phosphoric acid it should be washed again and lightly carded with a very, very fine wire wheel. Then oil. Degreasing is important, also washing after each quenching in the acid. This method works very well on those pieces that won't take a good hot blue because of metal hardness or nickel content.

H. Bonham

5.6.7.4 Charcoal Bluing

I have hesitated in sending this recipe because my attempts have not always been successful, but talking to a person who uses it, the process does take practice.

Open hearth method-

1. Brightly polish the metal as scratches, no matter how slight, will distract from the objective of charcoal bluing.
2. Clean the surface of any oil, grease, and polishing compound. Rubbing with soft cotton and denatured alcohol will determine if any foreign materials are left.
3. Take hardwood charcoal (that which is not self-starting) and break it down into pea-sized chunks, enough so that the piece will be surrounded by at least an inch on all sides. Put this in a steel baking pan or something similar then place the whole thing on top of a hot heat source. (I use a two-burner Coleman camp stove.) When the charcoal is burning, place the part so that it is completely covered by the hot coals until it turns a deep brown in color; one must peek occasionally as time varies with the size of the piece. Once this color is obtained, remove from coals, and dust with dehydrated (masons) lime until the part has cooled somewhat. This varies too. While dusting, the heat left should be sufficient enough to continue to turn the part to the desired color blue; if not, repeat the above process.

Closed furnace method-

Everything is the same as above except that the pan containing the part is put into an oven and heated up to 900° F when it is brought out and dusted with the lime.

The above came mostly from a friend who has little trouble using this type of bluing, but he has little trouble doing anything. Talking to a couple of others that use the same methods, they claim that it does take practice. The reason for using the lime, or so I am told, is that the heat removes all of the moisture from the steel's pores, and once removed from the flame oxidation rapidly takes place. The fine dust of the lime helps to prevent the moisture from returning.

R. Race

"Machinery's Handbook," which can be found in the reference section of most libraries and in most machine shops, has a section on coloring metals and describes the charcoal method. It also has information on acid etching using copper sulfate, alum, vinegar, and salt. I understand that it works great with no toxic fumes.

G. Crocker

5.6.7.5 Coloring Brass

5.6.7.5.1 Red Brass

To make brass redder, dissolve out some of the surface zinc by the use of dilute hydrochloric acid and then burnish or polish the article.

B. Evans

5.6.7.5.2 Blackening Brass

Rotten eggs will blacken brass because of the sulfur content. Simply submerge part in eggs and leave till desired colour is reached. Be warned...try not to breathe when doing this for obvious reasons. Also if the part is small enough place it on a fire brick and sprinkle or cover with black powder and ignite. Do this outside with a very long match and keep well away NO not under any circumstances stand over it or you will get burned. Black powder is an explosive so only use very small amounts. Like anything else try it on a piece of scrap first.

5.6.7.5.3 Antique Brass

Try using cold gun blue.

unknown

5.6.7.6 Background Treatment

For a black background, apply flat black enamel paint to the engraving (a Q-tip makes a good applicator). Quickly wipe off excess paint with your thumb. Then clean your flat black thumb.

S. Alfano

For a black background, block printing ink works pretty well. You can also use acrylic polymer paint. Remember to put a drop or two of water in the acrylic, or it will just ball up on you. Both methods require using the fingers to get the desired effect. It's messy, but it works.

R. Viramontez

5.6.7.7 Sand Blasters

Sand blasters are available through Brownells and most auto stores, even Sears. Use glass beads, not sand. Go outside and let them fly. A 50lb. bag will last a long time. It's usually not worth investing in a sand blast cabinet unless you plan on using one a lot. Glass beads are also available at many auto stores. Buy them locally and save the cost of shipping.

R. Pedersen

5.6.8 Soldering, Welding, Brazing, etc.

If you do much soldering, either silver solder or low temperature soldering, I really recommend the "LINK" soldering flux and Anti-Flux. The Anti-Flux keeps the solder from going where you don't want it to. It's the best stuff I've ever used. It can be obtained from Link Industries..

LINK INDUSTRIES
P.O. Box 927
Cannon Beach, Oregon 97110

unknown

There have been several comments over a period of time about using soft solder. DON'T USE ANY SOLDER CONTAINING LEAD! Hot Bluing will eat lead solder away. There are several brands of nickel/tin solder with a melting point of under 500 degrees. One of the best is Eutectic, which has the solder in a powdered form and mixed with the flux. Such solders are very strong and not affected by hot blue. I repeat, don't use lead solder on a gun. When you do use solder, it's a good idea to use anti-flux to contain the solder where you want it, to avoid the problem of an ugly spot of solder that won't take a blue. Good low-temp solder is very useful in areas where you want to avoid the problem of warping or ruining the temper of something.

unknown

Sid Bell sent me a report on an alternative to silver solder. It is some stuff that he had been experimenting with. It is a low temperature solder called TIX available from Brownells (order #4GOOHGE, Flux #4GOOLKH). It melts at 275 degrees F. and contains no lead. He used it to solder heads, etc. to knife bolsters without injuring the handle material.

B. Evans

5.6.9 Annealing and Hardening

5.6.9.1 Checking Metal Hardness

A quick way to check the hardness of gun parts is during stripping. I use either Birchwood Casey Blue & Rust remover or muriatic acid. Hardness will affect the shade of the metal. Softer metals will be the lightest gray, harder metals, a darker shade. On automatic pistols that are spot hardened, you can see the hard areas. If the metal shows dark gray or black it's likely to be hard to engrave.

R. Pedersen

5.6.9.2 Dealing with Hard Spots or Hard Surfaces on Guns

Parts may be hard for one of three reasons: hard spots are specifically designed to be hard for structural reasons; spot hardening was used to resist local wear; or hard spots occur because of foreign inclusions that occur in steel made from scrap.

Hardened parts that must be annealed to be worked should be annealed and re-hardened by an expert. He will take hardness tests and then, anneal the part in an inert gas furnace or pack annealing it in an ordinary furnace. After engraving, he will re-harden and draw it back (temper) to the proper hardness he recorded earlier.

Spot hardened parts are usually simple carbon steel and can be annealed with a torch. Use a neutral flame and heat the hard area red hot. Then slowly withdraw the flame so that the piece passes slowly through the red phase (in dim light). To re-harden it, heat it red in fair lighting and quench in water or oil. Test it with a scribe; if super hard, clean and draw it to a straw color in excellent lighting conditions.

Scrap inclusions are usually an exotic alloy trapped in the metal and are almost impossible to anneal unless the part is pack annealed or put in an inert gas furnace. Usually it is best to try to live with the section. Normally these inclusions are not very large.

F. Hendricks

When annealing Colt single action hammers, leave the roller but remove the rivet holding the firing pin. Remove firing pin, but be careful on new Colts because inside the firing pin is a tiny coil spring and two tiny ball bearings. On single action numbered guns, wrap a cloth around the hammer when removing the pin so that these parts will not be lost. When

they come out, they tend to come out with the pin, and spring off into distant locations. Store the parts in a small pill bottle.

Clamp the lower portion of the hammer in a vise (large vise) between two pieces of aluminum, which will act as a heat sink. Use a torch (neutral flame) and heat the head of the hammer and most of the neck to red hot in good light. Once a good red has been obtained, hold it for about 15 sec. and SLOWLY withdraw the flame. The head and neck will clean up easily and be soft enough to cut well. Because of the heat sink, the lower portion will remain hard. Unless the gun is totally shot to pieces in the future, you do not have to re-harden the hammer. Before you engrave it, re-chamfer the rivet hole. When done, use a nail or soft wire and re-rivet the firing pin; then stone it flush.

F. Hendricks

You will run into three types of hardening: case hardening, carbon steel, and exotic steel. Case hardening was originally intended for and used on guns made of low carbon steel which would not harden. These guns include old manufacture single action Colts. To remove case hardening, wrap in aluminum foil (include a small ball of steel wool if you like) and bake the piece at 900 degrees F., for about three hours. DO NOT GO ABOVE 900 DEGREES OR YOUR ALUMINUM WILL MELT! Because case hardening affects only the wearing qualities and not the strength, you do not necessarily have to re-case harden the gun. Stainless steel foil is better than aluminum as it will take more heat, but it is also more expensive. It can be purchased from Brownells.

Carbon steel, is best left to the expert, but if you are knowledgeable, and the piece is not critical in shape or function, you can usually anneal and re-harden yourself.

Exotic steels in modern guns are usually cast parts. Best leave those to an expert as well. Annealing and especially re-hardening can be extremely tricky.

unknown

5.6.9.3 General Annealing

A jewelers alcohol lamp will work well for annealing small pieces of wire. Just pick up the wire with tweezers and draw the wire through the flame.

B. Evans

To soften a small hard spot on a gun, heat the area with a torch until the area turns from a straw color to a light blue and then let it air cool. Do not use an oxidizing flame, and don't hold the torch in one place. Move it around a little. Do not use this method to soften areas subject to pressure such as barrels and cylinders.

To soften gun parts that are not subject to pressure, put them in your oven, bake them at 550 degrees for two hours and then turn off the oven. Let parts cool inside the oven overnight.

An old-timer gave the following trade secret as his remedy for gravers that are brittle. The next time the wife bakes a cake, wrap one, or several gravers in a piece of dough and bake it along with the cake. Let it cool in the oven. If that does not do the trick, stick them in to roast for about two hours or more.

B. Evans

5.6.9.4 Re-hardening softened parts

If the part is not subjected to any pressure or excessive wear, it is probably not necessary to do so. If re-hardening is needed, it is best that you not try it yourself unless you really know what you are doing. It is better to use a professional heat treater.

5.6.10 Heat color chart

Colors to use in estimating temperature:

yellow	480 degrees F.
brown	500 "
purple	530 "
light blue	580 "
deep blue	590 "
light blue w/ greenish tinge	640 "

5.7 Lettering

There are many good books on the market today explaining lettering. They need not be expensive and can be obtained from just about any good book store. The "Speedball" (Speedball pen nibs) book is a very good one as a reference and explains basic shape and layout very simply. Even if you use a computer for your layouts and lettering you should devote some time to studying lettering layout as the computer generated lettering and spacing is not always right.

Below are some fancier samples of text that all have an appropriate place somewhere in engraving.

BLOCK

A B C D E F G H I J K L

M N O P Q R S T U V W

X Y Z &

a b c d e f g h i j k l m n o p q r s t u

1 2 3 4 5

v w x y z

6 7 8 9 0

EGYPTIAN

A B C D E F G H I J K L

M N O P Q R S T U V W

X Y Z &

a b c d e f g h i j k l m n o p q r s t u v w x y z

1 2 3 4 5 6 7 8 9 0

French Print

A B C D E F G H I J K L
M N O P Q R S T U V W
X Y Z

a b c d e f g h i j k l m n o p q r s t u v
1 2 3 4 5 w x y z 6 7 8 9 0

German Text

A B C D E F G H I J
K L M N O P Q R S T
U V W X Y Z .

a b c d e f g h i j k l m n o p q r s t u v
1 2 3 4 5 w x y z . 6 7 8 9 0 .

Text Hand

A B C D E F G H I J
K L M N O P Q R
S T U V W X Y Z
abcdefghijklmnopqrstuvwxyz
1234567890

ITALIC

A B C D E F G H I J K L M
N O P Q R S T U V W X Y Z
abcdefghijklmnopqrstuvwxyz
1234567890.

Grace L. Howard

JOHN F. DAISY

F G H I K L

F C D R

EDW. H. BRADLY

A B C

G B H

R A

27

Greta F. Lubino

R S T U V Y Z

STEVE W. CRANE

O S S S

D S S

G B C

M L

REUBIN S. THOMAS

Isa F. Stephon

H J K L M

A B C D

Carlos E. Richmore

B M E

S R

George

J. T. K.

A B C

B

J. M. B.

S

28

A B C

C L H

35

R

30

G

B L

37

A B C

B

33

B

A B C

34

50

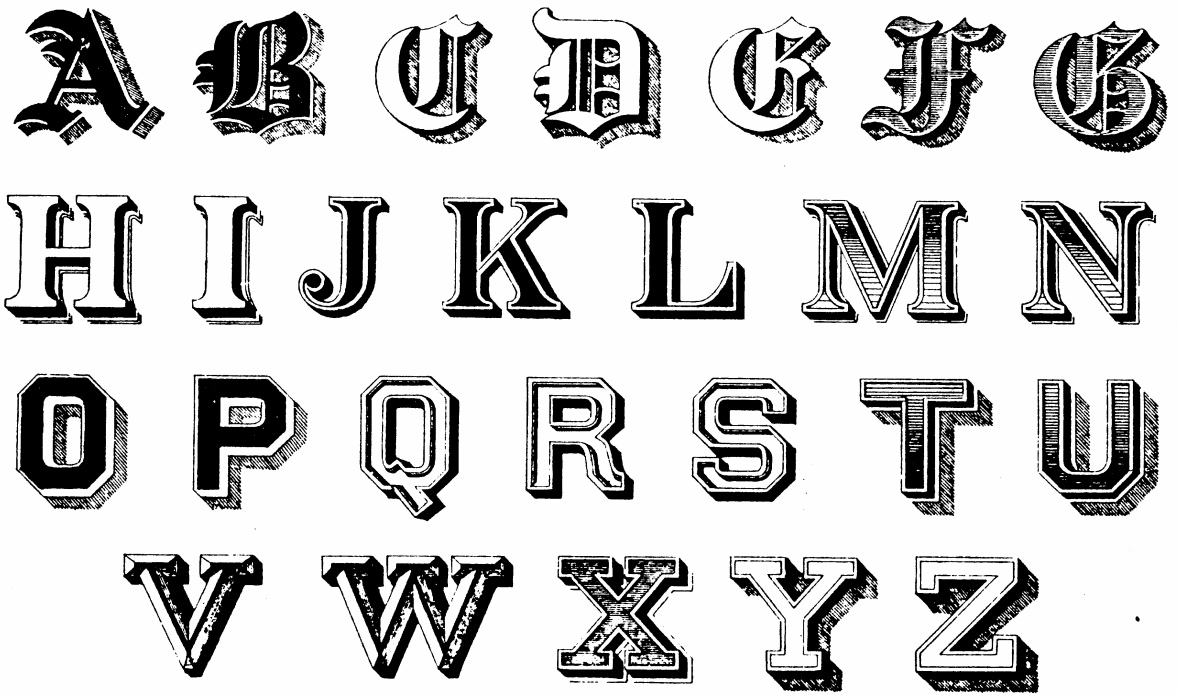
Ornamental

A B C D E F G H I
J K L M N O P Q R
S T U V W X Y Z

Old English

A B C D E F G H I K L
M N O P Q R S T U V
1 2 3 4 5 W X Y Z 6 7 8 9 0
a b c d e f g h i j k l m n o p q r s t u v w x y z

LETTERS VARIOUSLY SHADED



6 THE BUSINESS OF ENGRAVING

6.1 *Engraving as a Business*

I have frequently been asked by beginning engravers, "How do I get known?" A friend of mine gave the best answer. He said, "If you want to get known, get good." That is very sound advice, but there is more to it than that. It is true that your work will speak for you, but it is only one of the voices that the potential customer hears.

One way to "get known" is by attending gun shows. But not just any show will do. You need to select shows that attract quality firearms. That may require some investigation on your part and will often necessitate some travel. A word about gun shows; in my experience, few engravers actually do much business at gun shows. (If I had to live on the transactions I have actually conducted at shows, I would have starved long ago). Your presence there provides exposure and it's important that it be the right kind of exposure. Give serious thought to your appearance. The person who is prepared to spend a thousand dollars or more on engraving is usually a successful person who is accustomed to dealing with professional people. He is unlikely to do business with you if you are sitting there in bib overalls or dirty jeans and a sweatshirt, or buckskins trying to imitate Kit Carson. I'm not suggesting a suit and tie but LOOK PROFESSIONAL. It inspires confidence.

Take an objective look at your table display. It should project the image of quality. That means a neat, clean table cover of appropriate color. Patterned or gaudy covers tend to compete with the things on display. Good lighting is important. Whenever possible, a clamp on table lamp is recommended. (It also draws attention to your table). Pay attention to little things. I have seen nicely engraved guns poorly cased, or with badly made, ill-fitting grips. These things are not missed by the discerning viewer. Professionally made business cards are essential. Some engravers spend considerable money on brochures. I have never found that necessary but it does contribute to the professional image. Remember the purpose of your presence at a gun show is positive exposure. Don't expect a stampede of customers. People will look at your work, take a card, talk to other people about you, and hopefully, sometime in the future, send you some work.

A special word to beginners; Do not be in too much of a hurry to start displaying and selling your work. If you display poor quality work, it will be recognized as such. Long after your work has improved, the bad first impressions will be remembered. Do not undertake a job that is beyond your skill. It is sometimes very hard to say to a potential customer "Sorry, but I am not yet capable of doing what you ask." Attempting the job and botching it will be far more damaging to your image and career. Do not turn down the small jobs. Customers will often test you with a small job before deciding to give you a big one.

Your business practices will speak as loudly as your work. We have all heard it said of people, including engravers unfortunately, "He does good work, but I don't like the way he does business." If you undertake a job be sure that both you and the customer clearly understand what work is to be performed and the terms.

If you quote a price, stick to it; even if you have to take a loss. Never quote a price and then try to raise it before the work is delivered. When a job is done, I have found it good public relations to submit a bill for slightly less than I quoted. If you specify a delivery time, meet that deadline. Early delivery is good customer relations. If the gun is to be returned uncased, allow a few dollars in your price quote to send it back in a zippered case. (I can't take credit for that idea but it's still a good one.) Charge what your work is worth, not what the customer is worth. Many engravers have made the mistake of saying to themselves, "This guy has a lot of money and can afford to pay a high price for my work." That person didn't accumulate that wealth by being stupid. Always give the customer more than he paid for. The best advertising is a satisfied customer because he will do a lot of your advertising for you. The voice of one unsatisfied customer will be heard over a dozen happy ones.

In our profession, the person who will be successful and respected is the one whose appearance is good, his work is good, and above all his word is good.

Over the past year I have become progressively more concerned over a pattern that I see emerging in our profession. I have received an increasing number of communications from members who have one, two, or three years of engraving experience who are planning to enter into commercial engraving, often on a full time basis. This makes me very uneasy. Without actually seeing the quality of their work it is risky (and perhaps even unfair) to generalize, but I think they are making a mistake. I doubt that they realize just how limited the market really is and how few Guild members earn their living just from engraving. Even fewer make a livelihood just engraving guns. The world is not waiting to beat a path to your door. I can name at least a dozen competent engravers who have quit the profession in the last two years because they couldn't make an adequate living at it.

I'll tell you what I think is happening. An enthusiastic beginning engraver shows his work to friends and perhaps at a local gun show. Some people look at his work and have him do some engraving for them. The engraver suddenly finds that he is making some money and decides that fame and fortune is beckoning and he is on his way. Let me perform the unpleasant task of throwing some cold water on you. The probability is that your early customers don't know a damn thing about engraving - about style, quality, technique, or anything else related to engraving.

Remember that engraving on a firearm should do two things: it should enhance the beauty of the gun and it should enhance the value of it.

Your customer will keep your prized engraved gun for a while and then he will tire of it and attempt to trade it off or sell it. He will have to deal with someone that is more knowledgeable about engraving. He will find, much to his dismay, that no one wants to buy the gun because the hard truth is that the engraving did neither of the things it was supposed to do. The angry owner, because he cannot sell his gun for what he thought the beauty was worth, will tell everyone within sight or hearing that the engraver is no damn good! And he is at least partly right.

The result will be that your market will dry up. The knowledgeable gun owner has known all along that your work was not yet quite good enough and now the ignorant are also bad mouthing you.

But this is only part of the problem. With determination and practice, you will get better. **IT WILL TAKE YEARS FOR YOU TO GET OVER THE REPUTATION OF YOUR EARLY WORK.** People will remember all the bad things that they heard long after your work has improved.

If you are skeptical about this, just go to a gun show and look at the engraved guns that are offered for sale. Many of them remain unsold month after month because the engraving is poor quality. Every one of those guns is a negative advertisement for some engraver, even if he did the work years ago.

This is not to suggest that an engraver must be another Nimschke or Kornbrath before he offers his work for sale. Rather he should seek the advice of people who know quality engraving. This is not an art that can be mastered overnight. Don't be impatient. Bad engraving has a way of coming back to haunt you. In addition, it is harmful to all engravers and to our Guild.

B. Evans

I would like to reinforce the comments that Bob Evans made concerning beginning engravers thinking they are going to "clean up" in the engraving business.

I am an engraver of 22 years experience and have yet to find the pot of gold at the end of the rainbow. Eighteen years of my career have been devoted to running my own business.

Anyone who thinks there is a great deal of money in engraving is badly mistaken, and particularly in gun engraving. If it were not for my versatility and ability to work in metals in many other forms such as jewelry engraving, diamond setting, jewelry manufacturing, wood carving, scrimshaw, buckle making, and other related skills, I would have been hard pressed for work much of the time. Even after twenty-two years with a good reputation, I have to work my tail off to produce a living.

Bob was right with the statement that your past efforts are hard to overcome. I am still trying to overcome impressions that people had of my early work. I would recommend that when a person decides to solicit engraving, he should be sure the quality is such that it will help rather than hinder his evolution as an engraver. This can only be determined, most of the time, by a trained eye.

If you listen to the stories of other engravers, (successful ones) you will find a remarkable similarity, for all engravers have experienced the same hardships and sacrifices to achieve their status.

People who are retired with a comfortable pension, or working at a full time job and pursuing engraving as an enjoyable pastime, are far better off than the engraver who is involved in his own business. The "Professional" engraver who is active in his trade as an occupation finds that the expenses of running a business are staggering. The monetary rewards are pretty meager. I could almost live on what it costs me (expenses) to run my business, so you see, it takes more than twice as much money for me to make a living. So those who work at home can charge far less and make more money than those who have a retail location. The buying public has a hard time understanding this.

To sum it up, if you can survive on very little money, work your fanny off eight to twelve hours a day, and take the constant abuse from customers who think you charge too much, then you are engraver material.

R. Smith

Congratulations and thank you on your very timely remarks concerning fledgling engravers jumping into the marketplace. You hit the nail on the head in every respect.

As you know, I have been engraving for 30 years and I must say that it has been an uphill struggle at best to earn a living at it. I started engraving full time in 1963 only because I was laid-off from a machinist's job and could not find another. I strongly advise anyone to think twice before giving up the security of a job to engrave guns full time, at a time when most of the major gun manufacturers with custom engraving shops are in serious trouble. To that, add the closing of Browning's operations in Belgium, which has brought several skilled engravers into our marketplace. Remember that as a self-employed individual, you pay for your own medical insurance (at a much higher rate), have no paid vacation, no retirement, or other fringe benefits. And you work 7 days a week, most likely for less pay than the person who delivers your mail.

On a related matter, if the beginning engraver finds some of us old timers reluctant to pass on some of the trade secrets that we have spent years learning, it might be that someone we have helped in the past has turned around and offered the skills we taught them to our customers for less money than we can afford to do it and earn a living. In other words, we have been stabbed in the back! Then there are the skilled full-time engravers with other sources of income (pension, etc.), who will do jobs for much less money than we full-time engravers earning a living at it could possibly do.

Regarding quality of engraving, we are being sent far too many high-grade guns to try to "salvage" after they have been chopped up by a person who should still be doing practice plates. If an engraver isn't absolutely sure of his/her skills, please leave the Browning over & unders, Winchester M-21's, Purdey's, etc. alone for now. As you said Bob, they will definitely come back to haunt you and give us all a black eye.

I don't mean to discourage any aspiring gun engravers by these remarks, but rather encourage them to proceed with caution. I must admit that I do enjoy some recognition, but most certainly no fortune.

B. Mains

HOW DO I KNOW WHEN I AM SKILLED ENOUGH?

How do you know when you are skilled enough to start engraving commercially (for money)? That indeed is a tough question to answer clearly; let me toss out a few ideas. It is never easy for one to be objective about their skill level. If you are a typical beginner, you practice in relative isolation, seldom seeing the work of other engravers except photographs (which can be very deceptive). You really have no way of evaluating your own skills. The hard truth is that you probably don't yet know enough to know what is good engraving. OK, you say, that's great, but it doesn't answer the question. Following are some specific points I consider fundamental in evaluating your readiness for the commercial engraving market.

DON'T LET ENTHUSIASM CLOUD YOUR JUDGMENT

It is very difficult, perhaps impossible, to be objective about yourself, but try! This may sound odd, but it takes time for an engraver to learn how much he doesn't know. So if you must err, do it on the side of patience. If you have been seriously practicing for less than a year, I can almost guarantee that you are NOT ready to enter the market. Several years are much more realistic.

BEWARE OF FAMILY AND FRIENDS - they will probably tell you that you are great!

The family praises you because it their nature to do so - friends because they have that old squirrel rifle they want engraved -for free. It's almost certain that none of them know a darned thing about engraving. Their opinion and advice is worth about what you paid for it. So smile, and say thanks, but don't listen.

SEEK OUT THE OPINION OF KNOWLEDGEABLE PEOPLE

The key here is "KNOWLEDGEABLE" and "PEOPLE." It means putting your ego on the line, but do it !! Don't ask the self-proclaimed expert at the local gun shop. Seek out people whose expertise and judgment you trust and make it clear to them that you want their unvarnished opinion; not pleasant generalities. Seek the opinion of several people and listen to what they say.

RECOGNIZE THE DANGERS OF ENTERING THE MARKET TOO SOON

The prospect of money is a real temptation. But recognize that the market for engraving is limited, and much of your business will come from word of mouth recommendations of your customers. If the quality of your work is poor it will be quickly recognized, and your reputation will take a severe beating. The memory of your early poor quality work will be remembered long after you have improved. Be patient and avoid that trap.

DO NOT DO "FREE" WORK WHILE PRACTICING

Inevitably, these early pieces will find their way into the marketplace where they will do great damage to your reputation. It is a living fear for all engravers, to have substandard work turn up years later to haunt them.

I know what you're thinking; do I have to be a total master of the art before I try to sell my work? Of course not, but to paraphrase part of the Physicians Oath, "You must not do damage to the item you work on." If you engrave a gun, it should be worth more when you are finished than when you started. Your customer must be able to offer his gun for sale to at least recover his investment. If that is not possible, it is my opinion that you have done damage...your reputation as an artist will suffer.

B. Evans

6.2 Engraving Charges

Let me preface my comments by saying that I'm expressing my personal opinions; there is no Guild position. We do not even suggest to members what they should charge for their work.

One of the common questions from beginning engravers is "What do you charge for your work?" Or, "What should I charge for my work?" It's almost impossible to get a clear answer to the first question. Guild members are a great and helpful bunch of people and they will tell you almost anything, except what they charge. I'm not quite sure why we are so reluctant, but we are. Perhaps it's a last refuge of our ego. Also, I'm not sure how relevant that information is, as there is such a variety of skill and technique involved across the spectrum of engravers.

So, let us concentrate on the second question. Many engravers establish an hourly rate as a basis for their price quotes. It's difficult to say to a customer "I charge X dollars per hour." He will want a total figure, not something open-ended. You will have to be able to accurately estimate how many hours you will spend on a particular job. That includes numerous variables such as, how hard is the steel? What is the difficulty of the engraving job, the amount of coverage? Is there any restoration to do, pre-engraving preparation, or post engraving refinishing. Each variable costs, including these and many more (even down to the final shipping costs). This all takes experience to evaluate and beginners do not have the luxury of experience to fall back on in making such estimates.

Some engravers quote on square inches of coverage. I consider that risky business. It takes a lot of experience to estimate in this fashion with consistent accuracy. Once again, the variables can ruin your estimate.

What is the best system then? I don't really know. It comes down to whatever works best for the individual, given some experience. I can tell you what works best for me. I figure costs basically by the week. I know what I want (and need) to make in a week, and I know through experience what I can do in a week. I quote my work on that basis. If I can do the job in two days I price at 2/5 of my weekly income. It's really no different than charging by the hour, it just involves bigger numbers and it depends on the ability to accurately estimate the time required.

Part two of this question is how much do I actually charge. I can't give you a dollar figure. It depends very much on the market and the quality of your work. Poor work isn't worth a lot no matter how long it took. Some engravers say they should be able to make as much as a mechanic or a plumber. In my area, mechanics and plumbers charge about \$40 per hour. Few engravers come close to that.

Charge what you think your work is realistically worth and see what happens. If you don't have any customers you're probably too high. If you are a relative beginner, you cannot charge as much as those with high skill and a reputation. We have to try to judge what the market place will accept. It's not an easy business and it takes time and experience. Of all of our members, probably fewer than 20 make their living just by engraving.

There are several things about pricing your work that I have some strong feelings about. Never set your price on the basis of the wealth of the customer. If you fall victim to the idea that a client has lots of money, and you are going to take a bunch of it, you are doing yourself a disservice. When you make your price, stick to it - when you make an error in judgment take your lumps and stick to the price. Raise your price in the middle of the job and you will certainly make an enemy. Always do your best work - never sacrifice quality for an inexpensive job. Always give the customer a little more than he paid for - a really happy customer is the best advertising you can buy!

Comments on Estimating

"How much time does the average engraver spend on a piece of work?" This is sort of like asking, "How long is a piece of string?" The answer is not easy, but I know what the person means.

Time, and thus monetary compensation, on a job roughly breaks down to the following factors:

1. Administrative costs (attending to the customer, logging the gun in, storing the gun, any special correspondence or other activities necessary to get the job going.)
2. Preparation costs (disassembly, stripping the finish, oiling the parts, special jigs for holding odd parts, preparation of the surface, gunsmithing costs.)
3. Engraving costs (this is determined by the complexity of the pattern, the amount of area to be covered, and sometimes the complexity of the surfaces to be engraved).
4. Cosmetics costs (coloring, final surface texture/finish, plating, bluing, etc.)
5. Reassembly (putting the gun together, gunsmithing costs).
6. Delivery costs (mailing fees, log-out of the gun, other administrative costs.)

All these things are pretty well cut and dried, except for #3, and it can be determined by knowing how long the pattern takes, how big the gun is, and how much of the gun is to be engraved. Here are some basic figures:

TOTAL AREA OF TYPICAL GUNS:

20-22 Sq. in. - Small pistols, box-lock shotguns, bolt action rifles

22-26 Sq. in. - Larger bolt action with scope, mediumsized pistols; side-lock shotguns.

26-30 Sq. in. - Medium large pistols

30-40 Sq. in - Large pistols

PATTERNS, TIME PER SQUARE INCH:

1/4 to 1/2 hr.: Larger, abbreviated patterns (such as the type used on Colt 45 Auto WWI Commemoratives), most Japanese engraving

1/2 to 1 hr.: Improved, moderate-sized abbreviated patterns (current Colt factory patterns).

1 to 1 1/2 hr.: Simpler German -type engraving; the better Browning patterns

1 1/2 to 2 hrs.: Better quality German engraving, the simpler Nimschke patterns, abbreviated scenes.

2 to 3 hrs.: Most "better-type" Nimschke patterns; really nice German type patterns; simpler scenes.

3 to 5 hrs.: Very nice, well-executed patterns of the flat type; better type scenes.

5 to 8 hrs.: Very complex, well executed patterns; contour relief patterns (good ones); well executed contour relief scenes and animals.

DETERMINATION OF TIME:

If you are engraving a gun of 28 square inches, with 60% coverage, and your pattern takes 1 1/2 hours per square inch, you should do the engraving in about 25 hours and 15 minutes.

The same coverage and pattern on a big gun with 42 square inches would take almost 38 hours.

The average engraver only cuts one or two styles. Learn how long it takes you to execute an average square inch (curved surfaces take longer than flat surfaces). Then, get an idea of how big certain guns are. It will fool you now and then. You can engrave two Model 21's in about the same time it takes for one Ruger Blackhawk or a big Winchester.

F. Hendricks

If you use a Gravemeister and you want to record the time on a job, hook an electric clock into the circuit so that the clock runs when the machine is on.

R. Swan

6.3 Gun Engraving - Problems To Avoid

6.3.1 HARD GUNS & HARD PARTS

Winchester Model 21 shotguns - Trigger plates are sometimes hard. Opening lever near the stem is often hard.

Winchester Model 70 - Receivers are almost (not quite) impossible. Mauser Actions. Also cocking shroud, & bolt handle. Sako Actions. Converted military bolt actions. Krags impossible. **TO BE SAFE, BE WARY OF ALMOST ALL BOLT ACTION RECEIVERS.** Check carefully before you make any commitments.

RUGERS - most Rugers are difficult to work with. Some #1 rifles are OK, some so-so and some are near impossible. Levers are a particular problem, very hard, trashy, full of inclusions, can be a real problem if you try to plate one, unless you use extreme buffing to smear the metal all over the pin holes. Loading gates on Ruger pistols are very hard but can be annealed.

COLT 45 AUTOS - GI models are usually hard. Commercials are sometimes spot hardened onto the slides where they wear and where the notches are. Be very careful when engraving the front of a Colt slide. The metal is very thin in one spot.

MAGNUM PISTOLS - Most have hard cylinders, some barrels are also tough.

LUGERS - They vary, but usually the slide is hard, and the toggle bolt super hard.

REPLICA PISTOLS - Especially European, many have case colors, but are not actually case hardened. Can easily be checked in an obscure place with a scribe.

EUROPEAN DOUBLES - Most German guns have slight case hardening (remember you can have case hardening without color showing).

L. C. SMITH & PARKERS - Some are case hardened, some are not.

WINCHESTER LEVER ACTIONS - The old ones vary a lot. Most are nice to work with except for some levers and bolts. Some frames on unusual models were case hardened.

WALTHER PP, PPK, PPKS - Some parts quite hard. Trigger guard, safety lever super hard. Do not molest riveted parts inside frame.

REMINGTON 32 - The locking hood, top rear of frame is usually hard. BEWARE some areas of this part can be paper thin.

BROWNING SHOTGUN - Usually nice to work on but it has some super thin areas near the cartridge cut-off lever, left side, lower front of frame.

BROWNING MODEL 78 - Hard frames, often extra hard near corners. These can be a real nightmare to reassemble unless you really know how.

AUTO MAGS - Very hard stainless, bad news.

NORTH AMERICAN DERRINGERS - Very hard stainless.

Cheap single shot shotguns, and new manufacture model 94 Winchesters are made of cast iron and impossible to refinish once the bluing is removed. The factory will refinish them in time, and they do not engrave well.

F. Hendricks, and others

Comments on Hard Chrome over Engraving: I believe the chrome craze got going because many consumers confused chrome and nickel. Many people call nickel plating "chrome." Chrome is stark white, and very hard. It has some drawbacks: Being very hard, it is liable to peeling, especially on guns that "swell" when they are shot. Good chrome jobs are the result of a super good nickel job, which is only flashed with chrome.

F. Hendricks

6.4 Legal Aspects

Let me preface my comments by saying that I am not a lawyer. What I will say is based on discussions with people who presumably know what they are talking about.

Periodically I get inquiries from members asking what they need to do to start engraving as a business. There are numerous things one should consider before going commercial, too many to discuss in one article. So, let me limit consideration to just one. The legal aspects of engraving commercially.

I sincerely hope all of this doesn't sound too discouraging. It is a nuisance and a hassle, but it is better than not having guns to engrave, or being penalized for non-compliance.

6.4.1 Liability Issues

I don't have a solution to this problem but be aware that if you engrave a gun, and the owner shoots it and it blows up, you could be sued. Note I didn't say you were liable, I said you could be sued.

Liability, and how to deal with it, is of course up to the individual. These are some of the important issues to remember.

1. Generally speaking, you are liable for your customer's gun while it is in your possession.
2. Usually your homeowners insurance will not protect you against liability or loss that results from a commercial activity in your home.
3. Disclaimers (not responsible for, etc.) may afford some protection, but don't count on them too much. If you do have a customer sign a disclaimer, be sure it is a separate document, and not a part of the contract or receipt.
4. Commercial insurance is quite expensive, especially when you mention the word "firearm."
5. Remember we live in the age of the lawsuit. If some bozo overloads a gun you engraved and it blows up, you can be sure he is going to blame you. Beware of the risks and protect yourself as best you can.

*FOOTNOTE: I must say that so far, I have not heard of an engraver being sued as a consequence of his engraving, but it has happened to a lot of gunsmiths and gun dealers, so the possibility is very real.

6.4.2 FFL

If you engrave firearms for money you must have, or be employed by someone who has, a Federal Firearms License issued by the Bureau of Alcohol, Tobacco, and Firearms. You need a class 1 (one) license, the cost of which is \$200.00 the first three years, and \$30 per year thereafter. This is mandatory! You can write BATF for an application. You should investigate to find the address of the regional office serving your area. Federal law also requires that you keep a register and log in and out every firearm you work on. Generally speaking, anything that has a serial number on it is a gun. When you receive your license, BATF will send you instructions on how to keep your records along with a copy of federal regulations. It is important that you read those regulations and comply with them.

If, in addition to engraving you sell guns, then there are additional regulations and paperwork. The rules are explained in the BATF material. All this can be a nuisance at times, but get the license and obey the law.

6.4.3 Other Laws

Depending on where you live and work, there will most likely be state and local laws that you will have to comply with as well. I cannot tell you what they will be (there are only 20,000 gun laws on the books in the USA). There may be a city license required, and there may be limitations on where and how you conduct business, etc. Please, check it out before you begin.

6.4.4 IRS

Do not forget the IRS, our friendly tax folks. If you are going to engrave as a business (full or part-time), you should obtain an IRS tax number. Inquire of your local tax office and they will tell you how to apply. Also, keep a good set of books as you will probably have to pay estimated taxes on a quarterly basis. IRS can get downright cranky if your bookkeeping consists of bits of paper in a cigar box.

6.4.5 Shipping

Be sure that you comply with federal law when you ship firearms (it is in the BATF book). Also, be sure to insure for the value of the gun plus the cost of your engraving work. I recommend shipping UPS and sending the item COD. COD requires signature for delivery. It's a good idea to have a photo of the item being shipped. Insurance companies are great at taking your money, but they undergo a distinct personality change if you have a claim.

B. Evans

6.4.6 "FAKES," MAKING SURE YOUR WORK IS IDENTIFIABLE

Recently I was dismayed to find that several of the guns I had engraved in the past have had my signature removed, been artificially aged and sold to unsuspecting buyers as originals. One was so well done that I was almost fooled. Fortunately, I was able to prove that the work was mine only because I photographed the piece when I was finished and was able to compare the photo with the original.

I believe that this may be a bigger problem than we all imagine, especially if you work on older firearms and replicate the work of Nimschke, Helfricht, Hoggson, and others. These enduring masters provide us with wonderful examples to follow and techniques to emulate. I would, however, suggest the following: if you are engraving in the old traditional styles, be true to that style but add enough distinct features so that it cannot be confused (or promoted) as original period work. In an unobtrusive way, you should add some feature to the work that you can recognize - even if others cannot. For instance, I know one engraver who adds some small dots to his work; however, on close examination you will notice that the dots are square!

B. Evans

6.4.7 A DIFFERENT CONCEPT OF COPYRIGHT AND INFRINGEMENT

In one of the FEGA newsletters, Giuseppe Forte and Bob Evans pointed out some important points to consider. These points pertained to having a "morgue" of photos, and copyright ethics relating to where we get our visual inspiration.

We have all seen an engraving design or animal picture that has turned us on and we feel that we have to use this somehow in our works. The key word here is "use." When we are using something, we are NOT making a copy. Something about that image attracted our eye. Now is the time to study it carefully. What is there that makes this particular image stand out? In the case of engraving, it could be layout, the movement created by the lines, or the particular style of scroll.

Try to isolate these images in a sketch on paper. Now comes the time to USE, not COPY. Just as our handwriting is different from others, so is how we perceive images. Use your individuality to interpret these elements in a way that you are comfortable with, which is suited to your ability. By understanding your abilities, you can now add to this layout.

When working from an engraving by a more experienced engraver, remember that he may be, and probably is, more skilled than you are, and can work in greater detail. Simplify the designs to the point where you are comfortable. How we interpret this inspiration to suit our own abilities is when we "USE" or "WORK FROM" an image.

Artists throughout history have always had their "Masters" to learn from and use for inspiration. In today's world and in our craft, the experienced engravers in FEGA (and elsewhere) are our "Masters." We learn from studying their work at the annual meeting and from photos. We can learn and improve when we have determined what we can use. We can develop

our own style and techniques given these inspirations; however, it does not necessarily mean that we are producing exact images of copyrighted material.

You should not be deterred from using such material as mentioned here for inspiration. In the same breath, we might say that those issues brought forth by Giuseppi and Bob are serious matters and exact replication is infringement. It is unethical, and it can be criminal. "Use" and "work from" the images laid out before you. Transform them into your own statement. If nothing else, you will gain the satisfaction of doing something that is uniquely yours.

M. Rabeno

6.4.8 Gun Control and the Engraver: Where do we stand?

I'm always a bit uncomfortable writing an editorial because it implies that the writer has some special wisdom or expertise. But this topic is so important that I must write about it. We are facing a crisis in the form of mountainous firearms legislation!

Every law is a restriction of human freedom. In our imperfect society, some restrictions are both necessary and desirable, but every new law should be designed to accomplish a specific and clearly defined purpose. The benefits of the restrictions it imposes should clearly outweigh the evils of curtailing our freedoms. If the law does not achieve what was intended, then it is a "bad" law. Our lawmakers seem to have forgotten these basic rules, and now we are in real danger of having our 2nd Amendment freedoms buried under an avalanche of "bad" laws.

I am not optimistic about our ability to preserve the right to keep and bear arms. A number of factors are against us - steady urbanization, media hostility, decline in hunting, drugs and crime. It is sad that except for the lunatic fringe, both the pro and antigun forces want the same thing, a safe and peaceful society - but we differ mightily on how to achieve it. There are many studies relevant to the firearms issue, and almost without exception, these studies support the pro-gun position. We pride ourselves on being rational people, so we should be in a strong position to defend the 2nd Amendment, right? Wrong !!!

Unfortunately, most Americans seldom think logically or deeply. We like simple answers and quick solutions. The anti-gun groups, with great help from the media, are growing rapidly and becoming better organized. They cloak themselves with morality and ignore or distort fact and reality. They are masters of the "Compromise," that great foundation of our political system. We are continually taught that rational men sit down with their opponents and compromise their differences. What a deadly trap that has been, because each time we compromise we give away a bit of our freedom - and each time they come back with another compromise. And of course, if you refuse to play the compromise game with these "moral" folks, you are pictured as obstructionist, or un-democratic (just look at the way the NRA has been tarred with that label).

If you think the tactic of the compromisers isn't working, just look around at the anti-gun laws that have been passed since 1968. Here in Oregon we have a classic example. In the last legislature, we compromised. In return for a 15-day waiting period on handguns, we got a liberalized law for concealed handgun permits. This session they are right back again with bills to restrict handgun permits, include long guns in the waiting period, and restrictions on gun shows; and the word is still "compromise!"

In California, they are talking about prohibiting high powered weapons. In other parts of the country, there are bills to ban certain calibers of ammo, prohibit all semi-automatic weapons, prohibit all weapons with more than 8-shot capacity, confiscate all handguns, place a prohibitive tax on firearms, and make lead a hazardous substance and restrict its use; and many more are coming. The animal rights activists and anti-hunters are joining with the anti-gun forces to curtail hunting and access to public lands.

So, then, what do we do to preserve our 2nd Amendment rights? First we must recognize that logic and rational discourse is not effective against those who believe that the end justifies the means. We must quit making excuses for doing nothing and we must get involved. We must fight back with every ethical means available to us.

It all comes down to power, which translates into numbers and money. If you become involved, that increases the numbers. The big thing is the money, because that's what enables us to get the attention of the politicians who make all the "wise" laws. We must support organizations like the NRA. I frequently disagree and become angry with the NRA, but let's be realistic, it's the only hope in the battle to preserve the 2nd Amendment. It all comes down to what my grandfather used to say, "I'll listen to what he says, but I'll judge him by what he does."

Here is what I do, and I hope you will all join me. I make every effort I can to educate people, to get them interested in shooting or collecting. I follow what my legislators are doing and I let them know my views. I write or phone my Senators and Representatives. I support those who share my views and oppose those who don't!

FOR EVERY ENGRAVING JOB I DO THAT AMOUNTS TO OVER \$100, I ADD \$10 TO THE BILL. THAT \$10 GOES TO THE NRA LEGISLATIVE FUND.

The threat is real! If we lose, we may become like England, where there are about six practicing engravers. As someone else's granddaddy used to say, "All that is needed for evil to prevail is for good men to do nothing."

B. Evans

6.5 Bookkeeping and Business Procedures

Now that a few of you are ready to do some commissioned work, there are a few rules you should know to go by when dealing with a customer:

1. Greet the customer with confidence, no matter how confident you feel. A customer likes to feel he is paying an expert to do his work. After all, in most cases, you do know more about the actual engraving of a piece than he does.
2. Be sure to get a clear idea of just what the customer wants. What kind of scroll? What kind of pictures? Carved scenes? If he wants a name or initials, be sure to make notes as to the proper spelling of the name, the proper initials. What kind of lettering? How big? Make some rough drawings of the kind of scroll, where the scene will be placed, etcetera.
3. Now comes the difficult part. Price! From the description that you get from the customer, you should be able to estimate how much time it should take you, in hours. Quickly multiply your hours times what you think your time is worth by the hour. Most people would agree that \$10 an hour is a fair price. Engraving is a specialized field and if you can engrave at all well, your time is worth at least \$10 an hour. Remember, a carved scene will take more time to do, so it will cost the customer a little more. Beware of the person who says, "I'll let you engrave my gun for practice." This means, "I don't intend to pay you anything, you are still an amateur who needs practice." Once you have arrived at a price, tell your customer, "the job will cost you this much." Make sure you make him understand the price. Write this figure down, right in front of him on the drawings you have made on his job, or on a sheet of paper, writing his name and address and telephone number so you can contact him when finished. Write the price quoted and date. He may want to dicker with you about price, but don't let him talk you down on your price. Ask him how much he planned to spend and tell him that you can give him a lesser amount of engraving for that price, but still give him an excellent job. Stress the fact that upon completion of the job, you must be paid before he can take delivery on the job.
4. Now about delivery time. Most people would like their job yesterday. By this time in the conversation, you have arrived at about how long this job will take you in hours. Ask your customer if he has a deadline to meet. If not, figure the hours it will take to do the job and add on a week. If you think the job will take 1 week, tell your customer 2 weeks. This gives you time for unexpected things like illness, visiting friends or relatives who don't like to watch you work, etc. A person tends to do a better job if he has plenty of time and no rush.
5. When finished with the job, call your customer. There will be those who want to pick up their gun before the job is paid for. Unless this is a very trustworthy friend, don't release his job until you have that "long green" in your hand. If you keep his gun, or whatever item it may be, until the job is paid for, you have a security deposit. He is going to want it back. Consequently, he will make more of an effort to pay you to get his item back. These are hard facts, but true.
6. Once the job is paid for and picked up, be sure to thank your customer for his business. Make sure he is satisfied with your work, by asking him, "Is this what you had in mind?". A satisfied customer is your best and cheapest advertising.
7. One last rule to go by, don't take on any job that you feel you can't do yet. Your confidence in yourself is the most important thing to consider. You'll know when you are ready to take on any kind of job.

*Your trustworthy friends are the ones who will screw you the worst. So, watch them best. I would rather deal with a stranger.

R. Wells

As a word of advice, if you are mailing firearms, I suggest you use UPS, but be sure you have an understanding with your customer as to how much he wants the items insured for. Insure for that amount plus whatever your bill is. Don't under insure! Be sure to specify when shipping with any carrier that you want a signed receipt from the recipient. It only cost a few dollars more and its proof that the merchandise was delivered. UPS is very good, but sometimes something will go astray.

B. Evans

In the event there are those among us that are new or inexperienced in Gun Show Courtesy, I would like to offer a few basic rules gleaned from over 40 years of attending and showing. They apply EVERYWHERE!!

- NEVER....NEVER....NEVER....Uncover a table that has a cloth over a display signifying the display is CLOSED!
- Never handle any firearm or item without first asking permission.
- Never lean on a table.
- Never lay your firearm on a display.
- Never allow your spouse, child, or friend to do what you know is discourteous.
- Never interject yourself into a deal or something that is ongoing, and does not involve you.
- Always act with dignity and courtesy when at a show. It will beget the same treatment. Many engravers, who are called "Prima Donnas" by some, have brought this feeling out by being approached by those who in their eagerness to acquire knowledge forget simple courtesy.

B. Shostle

6.5.1 Marketing and Promotion

For additional income, do things that probably few engravers do. Take class rings that are worn and re-cut the animals, letter, etc. It's easy to do, and it's good advertising.

B. Bates

On delivery of a finished gun, a nice touch is to add a few dollars to your price for engraving job, and then return the gun in a hard gun case. It makes a good impression on the customer and protects your engraving efforts and his investment.

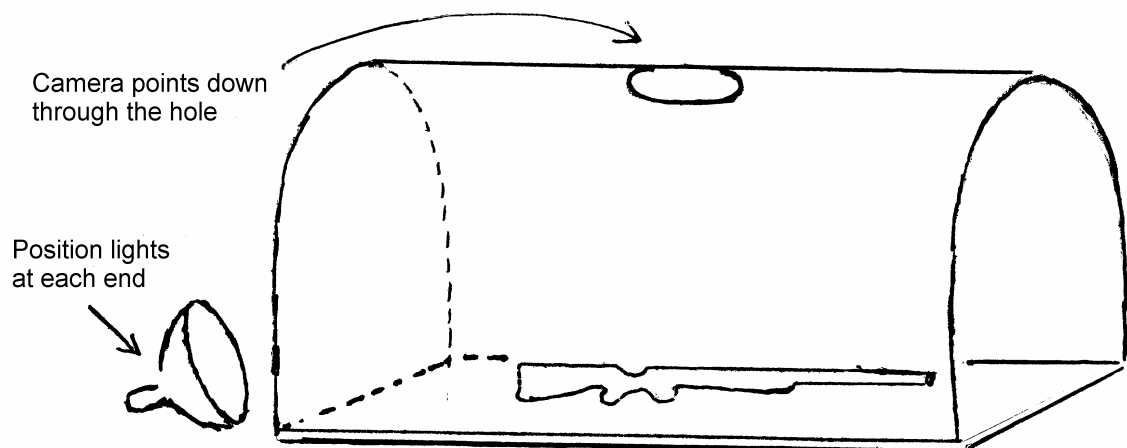
M. Rabeno

On advertising in the FEGA newsletter - to make sure that no one will feel that because of name or position, anyone receives special consideration, the Board of Directors has formulated the following rule. ANYONE who wishes to advertise in the newsletter for the purpose of profit shall be charged an advertising fee. However, if an individual wishes to advertise something for the convenience of other members or as a courtesy to other members and profit is not the purpose then there will be no charge. (Example. If you should happen to have an extra vise, or book, etc. that some other member might want and your motive is not primarily profit then there is no charge. However, if you have manufactured something that you want to sell in quantity, or you are retailing items, then you would be charged for advertising).

B. Evans

6.6 Photography

The use of a light tent as shown in the following figure will help to produce the shadowless lighting that is often desirable when photographing guns. The curved roof of white cardboard or plastic fluorescent light fixtures act as diffusers. If the tent is translucent, you can shine the lights right through it.



J. Kusmit

6.6.1.1 Photos of Engraved Guns

When I finish engraving a gun, I take some 35mm pictures of it for my records. It occurred to me that it would be a nice touch to make some extra prints and send them to the customer when returning the gun. Thus, the customer has an immediate photo record for insurance purposes. And it is a good way for the engraver to get his work seen, as the customer is likely to show the pictures to more people than he would the gun. The extra copies don't cost much and they are good public relations.

R. Meyers

6.6.1.2 Reducing Glare

Reducing glare on a firearm prior to photographing it, can be accomplished by touching it gently all over with ordinary modeling clay. It is said that this is the way Kornbrath did it.

Attributed to E.C. Prudhomme

6.6.1.3 Photography for the Engraver

In my youth, I worked for several years as a commercial photographer. I can tell from experience that there are very few things more difficult to photograph well than an engraved gun, especially if it is blued.

If you simply want a record photograph for your file and are not concerned with publishable photos, a 35mm camera and decent lighting will do. The problems crop up when you are trying to acquire a really high quality photograph for reproduction.

After considerable expense and experimentation I came to the conclusion that it just wasn't worth my while to try to produce my own quality photographs for magazine reproduction. To do it right it requires a professional camera with an adjustable back, good lighting (preferably strobe), a lot of technical knowledge, and a full measure of patience. And unless you are going to do a lot of photography, it just isn't worth it!

Some of you may be wondering why you need picture in the first place. There are several good reasons, but basically, you need to keep a photo album of your work to show potential customers. The quality of these photos is essential to the promotion of your art. It's much better, of course, to have a few good photographs than a lot of poor ones!

You will, on occasion, have to mail photos to a potential customer (who almost always never returns them). The quality of these is extremely important in showing this customer what you can do. Moreover, it may illustrate how you conduct your business. He will not be impressed by poor photography.

You may also need to ship photos for publication. Ever noticed that there are relatively few photos of engraved guns in magazines? It isn't because the publishers don't like them; it's because they can't get them. You can send in the greatest article ever written, but if it's not accompanied by good photography (especially if it's about engraving), it won't get past the editor's desk.

It's unfortunate that engravers don't make a lot of money; we certainly can't afford to have everything we engrave professionally photographed. However, if you produce an engraving that is especially impressive, to you or others, you should probably bite the bullet and have it professionally shot. Like business cards and telephone service, they become an integral part of promoting your work.

In regard to professional photographers, approach them with caution. It's been my experience that most do not have that special skill required to produce clear, crisp photos of engraving. If you're going to use a local who says he can do the work but can't show you any samples, you should provide him with examples. The best approach here is to cut and catalog good photography from gun magazines and reference these when you discuss the work. Explain clearly to the photographer what you want, provide an illustration showing placement and orientation on the firearm to best show your work. Discuss pricing, who will control the negatives, and what the cost will be for additional prints and transparencies (most publishers prefer transparencies when printing color). Always remember that there are vast differences between commercial, portrait, and still photographers. If you are not satisfied with the locals, and if you have something really special, consider contacting a recognized professional firearms photographer for the work.

B. Evans

6.7 Castings

Occasionally you will have a potential customer who wants to see an example of your work before he makes a commitment. A photograph is the usual response, but if you really want to impress him, send him a casting. For those of you who haven't had an opportunity to see how its done via our video tapes, let me describe the process.

MAKING THE RUBBER MOLD.

Materials

You should start by acquiring rubber mold compound. GE RTV 8III Plotting compound is the simplest to use, but it is also the most expensive. GE RTV 630 and DOW CORNING HSII RTV are other choices and each come in a one pound container. You will also need a roll of 3/4" masking tape, a packet of florists clay, and soft wood blocks approximately 3/4" thick, sufficient in size to clear the object you are molding by about 1/4". (Too much excess just wastes rubber).

Directions.

Let's use a rifle floorplate as an example; it's the most common item duplicated. If necessary, cut a recess into the block to allow the plate to sit flat on the wood block. Round the corners of the block as tape goes around curved corners easier than around square corners. Roll out a bead of clay to about the diameter of a soda straw. Lay it around the bottom edge of the floor plate and press it down into the wood causing the clay to ooze out and seal the plate to the wood - and preventing any rubber from seeping under the plate. If there are any gaps between the plate and the wood, fill them with clay also. Trim the excess clay away from the floorplate before casting.

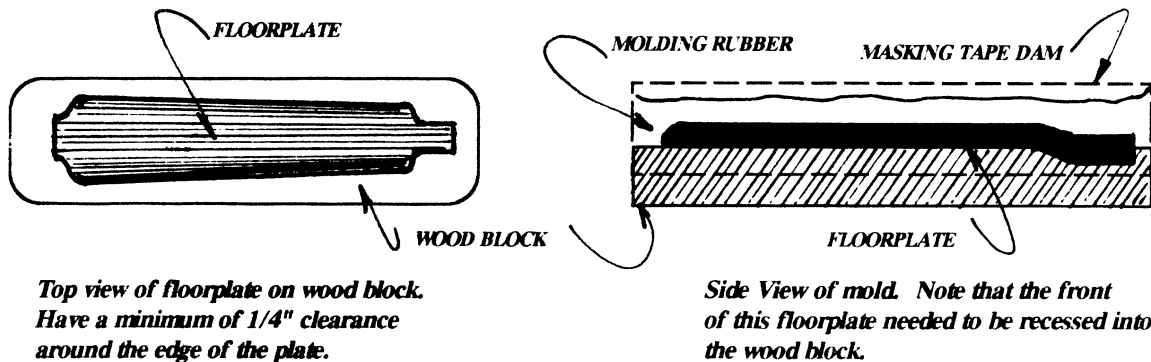
Wrap the masking tape around the wood block to create a form into which you will pour the rubber compound. Make sure the plate is perfectly clean and oil free, but do not use a mold release!

Mix mold rubber in the quantity you need and according to the directions. Hold the mold at about 45 degrees and pour the compound allowing it to run down over the floor plate in a small stream. This technique prevents the formation of air bubbles. Once the plate is covered set your mold level to the top of the tape and allow it to cure over night. When it is thoroughly cured, peel the tape away and remove the mold from the wood block.

MAKING THE CASTING

Materials

There are a number of epoxies or polyester resins that will work. I have used TAP Polyester Resin Type A, Finish Coat Surfacing Resin. I have also used Gougen West System 105 Epoxy, which is the easier to use of the two. Both need a white coloring agent. Ralph Bone tells me he uses Sears BOAT ARMOR and white India ink for coloring agents. The epoxy is generally available in local stores and is not as critical as the molding rubber. Mix the amount needed, and pour the mix, at a 45 degree angle, into the mold. Do your best to try to prevent bubbles. When the epoxy has hardened, you may remove it from the mold. Coat it with a paste ink. Rub away excess and you have an exact copy of the floorplate. The mold may be reused several times.



COMMENTS: If you want a casting of some other engraved area (like the side plate of a lever action rifle receiver), you will have to build a dam around that area with clay. Then pour the rubber into the dammed area to make the mold. Do not experiment with cheap molding rubbers. Use the kind I recommend.

B. Evans

FEGA has a good selection of various castings made by past and present engravers. They are an excellent study aid for the beginner and are available from our web site at www.fega.com or contact the secretary.

6.7.1.1 MAKING A RECORD OF AN ENGRAVED GUN

Put the gun on a copy machine and copy it from several angles. Cut out the parts or angles that you want, assemble, and run a master copy. If the copier has a light adjustment you can make excellent records this way.

S. Hayhurst

7 PRECIOUS METALS

7.1 Gold Reclaiming and Testing

Since the beginnings of recorded history, gold has been used for art and money. Today at least one third of the world's gold is in art objects such as jewelry, statues, and plating. The greater two thirds is devoted to monetary systems and some industrial uses.

Most of the gold used in art is not pure. Often it is merely plated onto other metals in incredibly thin layers. Layers so thin that the metal under the gold often corrodes. Even solid gold is not necessarily pure. For reasons of strength and cost, gold is alloyed with metals such as copper, platinum, or silver, and the gold content is measured in the mysterious quantity "karats." Twenty-four (24) karat gold is pure 100% gold, while twelve karat gold is only 50% real gold. So a karat is really a measure in percentage. Pure gold (24k) is hardly ever found outside the monetary system.

Gold is a soft, heavy, and brightly yellow colored metal. When compared to lead, gold has the following characteristics. Its hardness is 2.5-3.0 on the hardness scale, which is twice as hard as lead. (Note: A fingernail has hardness of about two on the hardness scale). Its density is 19.3 grams per cubic centimeter which is about one third heavier than lead, and its melting point, 1945 degrees F, is more than three times higher than lead's.

7.1.1 Physical Properties of Gold

The quickest and simplest procedure for identifying gold is by observing its physical properties such as color, weight (or specific gravity), hardness, etcetera.

(A) COLOR: Gold has a bright metallic yellow. Any gold material that shows corrosion of any type is at the very least not pure gold. Pure gold does not naturally corrode or deteriorate in any manner. NOTE: Greenish deposit on the surface indicate copper, a common metal of gold.

(B) HARDNESS: The hardness of pure gold is 2.5-3.0, which puts it slightly harder than lead and about the same as copper (Copper hardness is 3.0). Alloys of gold are harder than pure gold. The exact hardness depends on the alloy.

(C) DENSITY OR WEIGHT: Pure gold weighs 19.3 grams per cubic centimeter of gold. This density will vary downward or less for alloyed gold materials.

7.1.1.1 Gold Alloy Properties

MELTING POINT CENTIGRADE.

18K green	1810	988
18K yellow	1700	927
18K white	1730	943
18K red	1655	902
14K green	1765	963
14K yellow	1615	879
14K white	1825	996
14K red	1715	935
10K green	1580	860
10K yellow	1665	907
10K white	1975	1079
10K red	1760	960

PERCENTAGE OF GOLD IN KARAT GOLD

	Gold	Copper	Silver	Zinc
10K yellow	41.7	43.8	5.5	9.0
10K green	41.7	9.1	48.9	0.3

14K yellow	58.3	39.7	10.0	2.0
14K yellow	58.3	33.1	4.0	6.4
14K yellow	58.3	16.8	24.8	0.1
18K yellow	75.0	10.0	15.0	0.0

Before remelting scrap gold or silver, go over it several times with a strong magnet to remove iron filings or bits of steel.

B. Evans

8 GLOSSARY

BRASS - good average quality, is 80% copper and 20% zinc

BRONZE - copper 88%, tin 11%, zinc 1% (percentages can vary some)

BURNISHER - A "BURNISHER" is a highly polished piece of hard steel, usually about 2" long and mounted in a handle. They are generally oval shaped in cross section. Sometimes they are straight and sometimes with a slight bend near the tip. They are used to rub (polish) a surface. Small scratches can often be removed by vigorous rubbing with a burnisher. By placing a pattern on a gun surface and rubbing with the burnisher, it presses the pattern from the paper onto the gun. Burnishers can be purchased from an engravers or jewelry supply house. "That should confuse the heck out of everyone!"

COIN SILVER - is 90% silver, 10% copper

COLORED GOLD - can be made by alloying pure gold (24K) with the following: Red Gold = 75% gold 25% copper
Rose Gold = 75% gold, 22 1/4% copper, 2 3/4% silver (fine, not sterling) Light Red = 75% gold, 20% copper, 5% silver (again fine) Medium Green = 75% gold, 20% silver, 5% copper

FINE SILVER - is 99.9% pure, Sterling is 92 1/2% pure silver and the balance is usually pure copper

GERMAN SILVER (OR NICKEL SILVER) - contains no silver. It is a combination of nickel, copper, and zinc, and so named because of the color resemblance to silver.

GOLD COLORS - yellow, white, pink and green are produced by variations in the alloy. Silver and zinc tend to give a green color, copper gives gold a red color, and nickel produces white gold.

GOLD FILLED - is made by joining a layer (or layers) of gold alloy to a base metal alloy by soldering or welding it and then rolling or drawing to the thickness required. The gold content is 1/20 or more of the total weight.

GOLD PLATE OR ELECTROPLATE - is usually made by depositing fine gold onto base metal through electrolysis. The thickness of gold may range from 7 to 100 millionths of an inch.

JEWELERS PALLADIUM - contains .950 palladium and .050 ruthenium. The ruthenium acts as a hardening agent.

JEWELERS PLATINUM - contains .900 platinum and .100 iridium. The iridium acts as a hardening agent. Derived from the Latin *platina* meaning "silver of little value," in 1735 by Spanish explorers of Columbia who did not know what to do with it.

KARAT - is a measure of fineness. 24 karat is fine gold. One karat equals 1/24 or .0417. Thus 14 karat gold is 14/24 or .583 fine gold and the balance (10/24 or .417) alloy. The usual alloy metals are silver, copper, and zinc. Nickel is used in white gold. 10K = .416 gold and .584 alloy 18K = .750 gold and .250 alloy.

Don't confuse Carat with Karat. A Carat is the term used to express the weight of a stone, for example a 1 carat diamond. Karat refers to the proportion of pure gold in an alloy. A Karat is 1/24th of the total weight of the alloy. 24K = pure gold, 18K = 18 parts pure gold and six parts alloy, 14K = 14 parts gold and 10 parts alloy, 12K is equal parts gold and alloy, etc.

MEXICAN SILVER - Silver content can vary, often it is as high as 95% pure, sometimes Mexican silver will contain original impurities which means that it cannot be safely melted and reused without refining.

NICKEL SILVER (OR GERMAN SILVER) - contains no silver. It is a combination of nickel, copper, and zinc, and so named because of the color resemblance to silver.

PENNYWEIGHT (DWT) - is one twentieth part of a troy ounce. The name originally applied to the weight of an Anglo-Norman agent. When weighing precious metals with powder scales remember that 1 pennyweight = 24 grains. One troy ounce equals 480 grains, thus one troy ounce equals 20 pennyweights.

PEWTER - an alloy of tin and lead with tin in the excess. Good Pewter contains about 95% tin but not more than 10% lead. The very best pewter is lead free and may contain tin 94%, copper 4 1/1% silver 1 1/2%. British Pewter commonly contains about 85% tin, 7% antimony, 4% copper, and 4% lead. French Pewter is generally 82% tin, 18% lead.

ROLLED GOLD PLATE - is the same as gold filled, but usually of lower quality. The gold content is less than 1/20th the total weight.

STERLING SILVER - contains .925 silver and .075 copper. (Coin silver contains .900 silver and .100 copper.) The word has been generally derived from the '*Easterlings*,' the North German merchants who settled and formed a Guild in London during the 13th Century, and whose coins were uniform in weight and excellence.

TROY OUNCE - is about 10% heavier than the common avoirdupois (grocery store) ounce. There are 14.583 troy ounces in an avoirdupois pound. The name is derived from Troyes, France, where the system was used prior to its introduction in England in the 15th Century.

9. Additional List of Suppliers.

Steve Lindsay	Classic air graver, palm control, graver blanks and general engraving equipment. Internet forum and engraving tips and tricks	www.handgravers.com 3714 West Cedar Hills Kearney, NE, 68845 Email: steve@lindsayengraving.com
GRS	GraverMax, Gravermach , graver blanks, engraving classes , and general engraving equipment.	www.grstools.com 900 Overlander Road Emporia, KS 66801 Phone: 620-343-1084 Toll Free: 800-835-3519 Fax: 620-343-9640 E-mail: GrsTools@GrsTools.com
Sam Alfano	Transfer wax, instructional DVDs, tips and tricks for beginners.	www.masterengraver.com
N-Graver Company	MagnaGraver, General engraving equipment, graver blanks, curved liners, dot punches etc.	67 Wawecus Hill Road Bozrah CT 06334 Phone: 860 823 1533 Fax: 860 887 6252
Gesswein	Jewelry manufacturing tools etc. Polishing stones , burnishers. All sorts of useful bits and pieces for the engraver	255 Hancock Avenue P.O. Box 3998 Bridgeport, Connecticut 06605-0936 Phone: 1-203-366-5400 Fax: 1-203-366-3953 Export Fax: 1-203-331-8870 Email: info@gesswein.com
Amazon	Internet only book store	www.gesswein.com www.amazon.com
Ebay	Internet auction site. Useful for out of print books and all sorts of new and second hand equipment.	www.ebay.com
Brownells	Gun parts, tools, finishes and equipment Printed catalogue available.	Brownells Inc. 200 South Front Street Montezuma, Iowa 50171 Ph. 1-641-623-5401 or 1-800-741-0015 Fax. 1-800-264-3068 Email info@brownells.com www.brownells.com
Ray Viramontez	For gold wire	601 Springfield Dr. Albany GA 31721 (513) 462-6762
FEGA	Castings, books, instructional videos and internet forumto discuss engraving	www.fega.com

10 The internet

The internet as an engraving resource cannot be underestimated. You're no longer restricted to buying or borrowing books from the library and writing letters to people or waiting for printed catalogues arriving in the mail. In today's world you have almost instant access to anything you want via the internet. Here are some examples.

Tools, equipment and supplies:

Most suppliers have internet web sites that show almost their complete range of products. The previous page names just a few. You can purchase most of these supplies on line by using your credit card and a few days later the product arrives. If you have any enquiries you simply email the company and it's been my experience that most people get back to you in a very timely fashion. This is especially useful if you are in an isolated area or a different country.

Other Engravers Web Sites:

If you are looking for inspiration and examples of high quality engraving then check out other engravers web sites. You'll be amazed at the quality of work you can find (and not so good work). If you are a beginner this is especially helpful as a study aid. Not to copy, but to study various types of shading and design. You're no longer restricted to books that can be expensive and in some cases hard, if not impossible to get.

Your Own Web Site:

In today's world you can advertise your work at home and internationally on the internet. You're not restricted to relatively expensive printed brochures anymore. A web site displaying samples of your work, experience and business practice is a low cost way of getting more business. It's something that can be updated and changed easily. You have the choice of getting a professional web site designer to do all the work for you which can range in price considerably. Or you can make your own for very little cost in monetary terms but will be time consuming. There are some excellent "do it yourself" programmes to aid you. Microsoft's FrontPage is excellent and simple to use. Don't be put off by the idea that you have to be some sort of computer Guru to make your own web site. Because you don't. Take a night class if you have to as it's not as hard as it looks.

Information:

Want to know how to photograph your own engraving work properly? What about the process of colour case hardening? or acid etching? Just about any question you have, or information you need, can be found on the internet. Some of it good and some not so good, but it's all out there. All you have to do is find a good search engine (I personally like Google www.google.com) type in the question, and up pops the answers.

Email:

A great way to keep in touch with friends, exchange ideas, send photographs and designs. A good example is that I live in New Zealand and because of my location I can email people all over the world and get a reply the same or next day.

Internet Forums:

For novice engravers these internet forums are a God send. They are an excellent place for sharing of ideas and information about engraving and to meet fellow engravers all over the world. Sort of like being in an international club. There are quite a few on the internet covering all sorts of topics from knives and guns to jewelry. Here are three that I personally use to get you started.

FEGA	Yes our own organization has a forum with some great people on it.	www.fega.com
Knife Network	Another excellent forum Mainly a knife forum but includes any kind of engraving that you can think of. Also has an excellent section on photography and anything to do with knives	http://knifenetwork.com/forum/forumdisplay.php?f=46
Engraving Forum	An excellent forum about anything to do with engraving.	http://www.engravingforum.com/forumdisplay.php?f=2

Clip Art and Photographs:

The internet is awash with different types of artwork. If you need a picture or photograph of a lion or kangaroo then the internet is an ideal place to find them. If you are a novice and need clip art to practice your engraving cuts while you develop your own drawing abilities then there is plenty of clipart to choose from. Most of it free but some you can pay for. Not all of it is suitable and the quality can range from rubbish to very high quality. Most of these types of web sites have their own search engines so you have to type in what you are looking for.

But be warned.....Just because you can get it for free off the internet doesn't necessarily mean that it has no copyright. Always read the fine print. Copyright law still applies. There is nothing wrong with downloading the pictures as study material so that you can alter or draw your own pictures. For instance I live in New Zealand so I have to rely on photos of lions if I want to draw one.

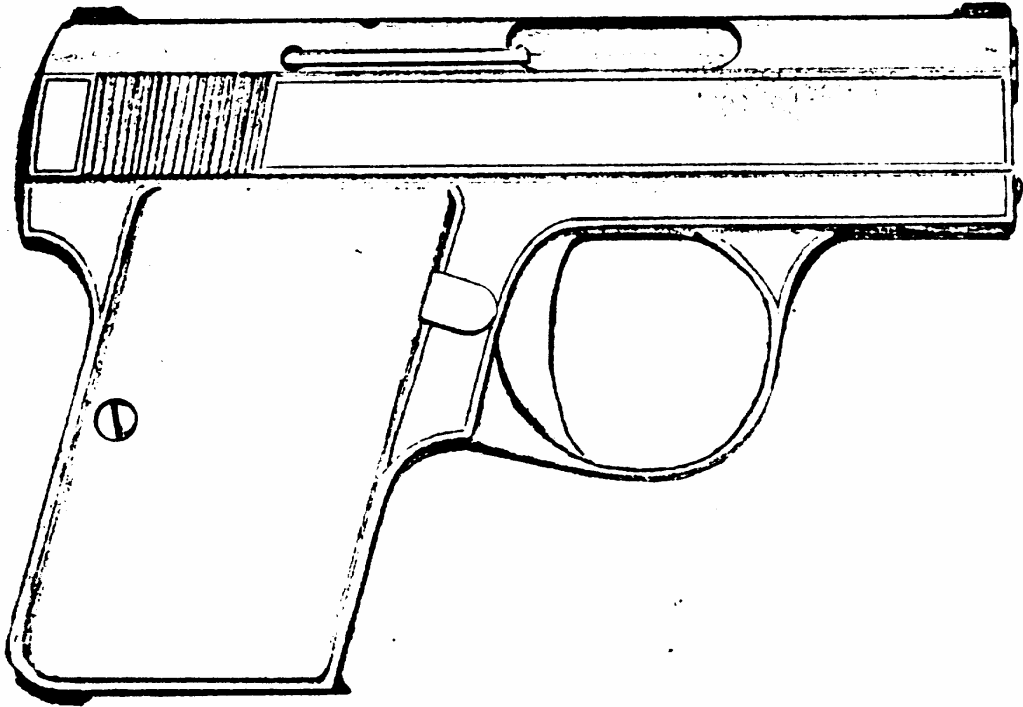
Generally when you purchase an image from an image warehouse (a place that sells images) that means that you have brought the rights to reproduce that picture and you don't have to worry about copyright. You may in some cases have to acknowledge the original artist or photographer. But like anything else...read the fine print on the web site. Here are three places to visit to get you started.

Microsoft	Free clipart and photos.	http://office.microsoft.com/clipart/default.aspx?lc=en-au
Google images	Photographs galore.	www.google.com then click on the word "images"
iStockPhoto	A commercial image warehouse where you have to pay for the photo/design. Their prices are very reasonable and affordable. The quality of their images are at the top end of the market. They provide clip art and photographs. Well worth looking at.	www.istockphoto.com

Andrew Biggs
New Zealand

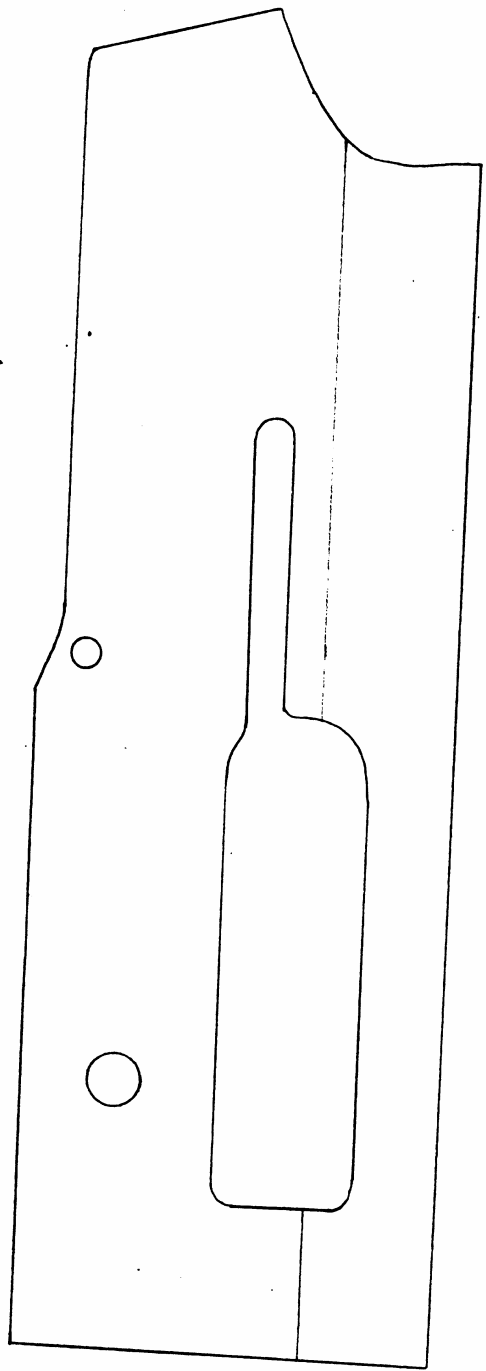
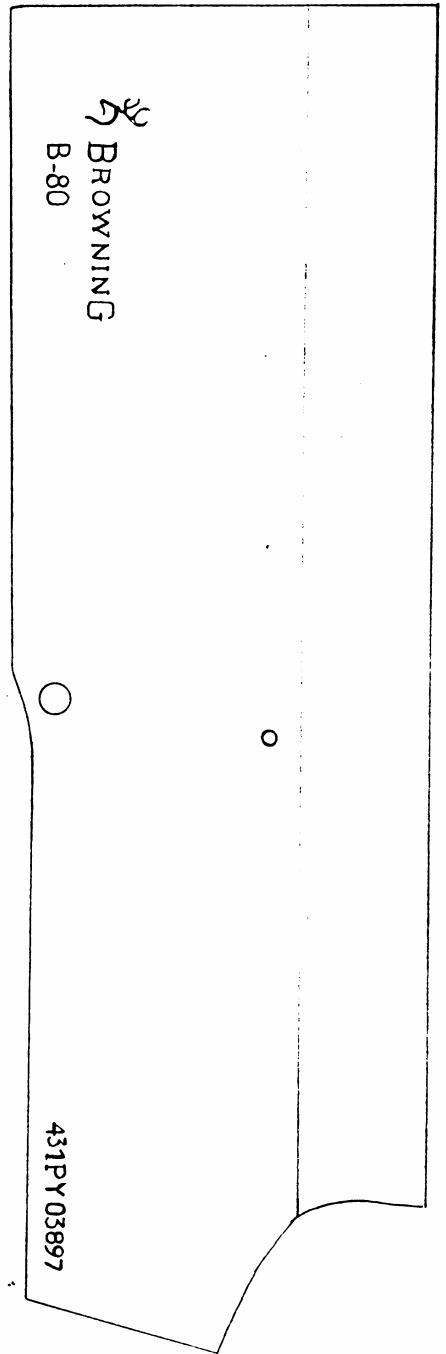
11 FIREARM DRAWINGS

*The following drawings are not exactly to scale. Use a scaling photocopier to adjust the scale.



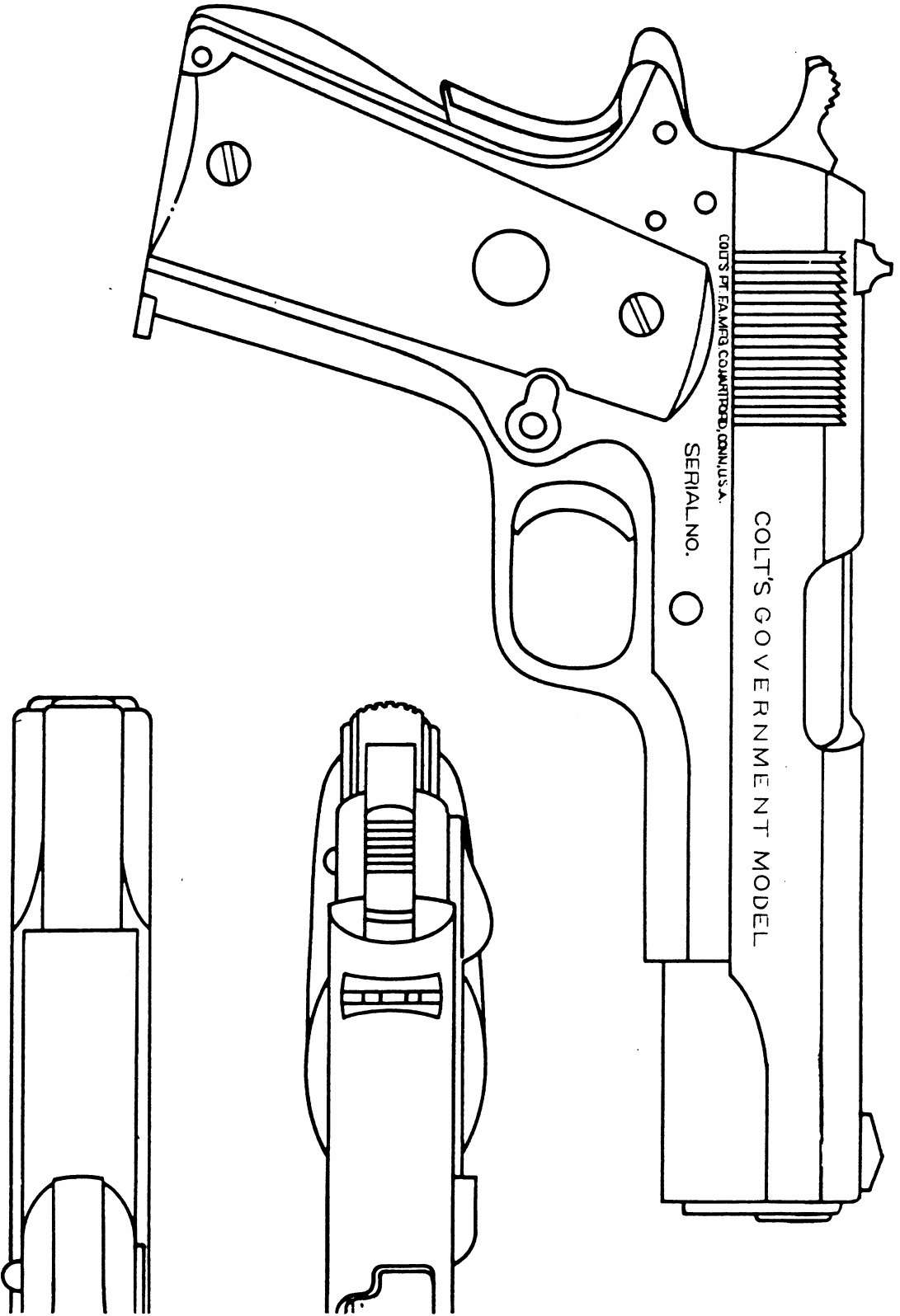
Ron Smith
APR '87

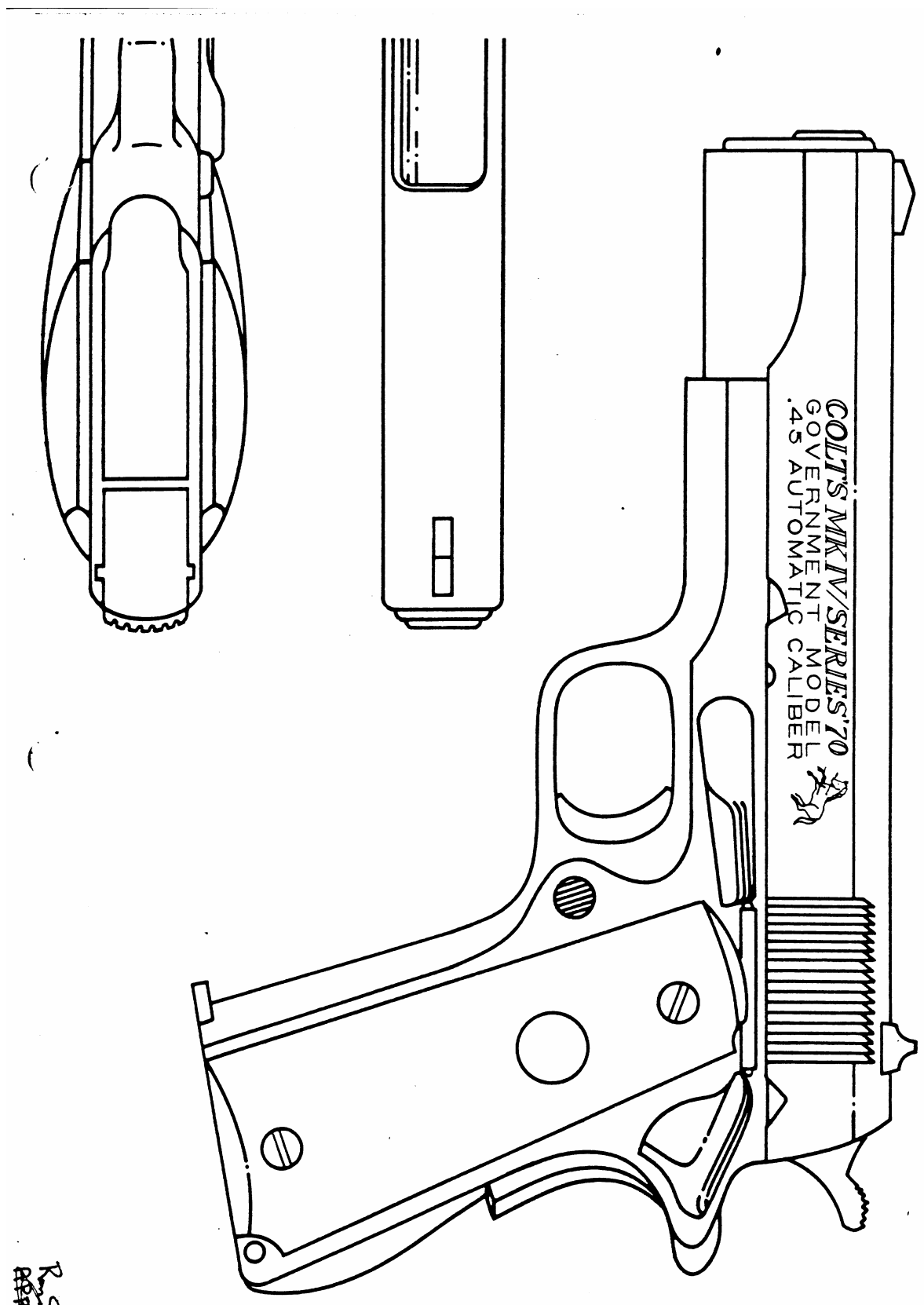




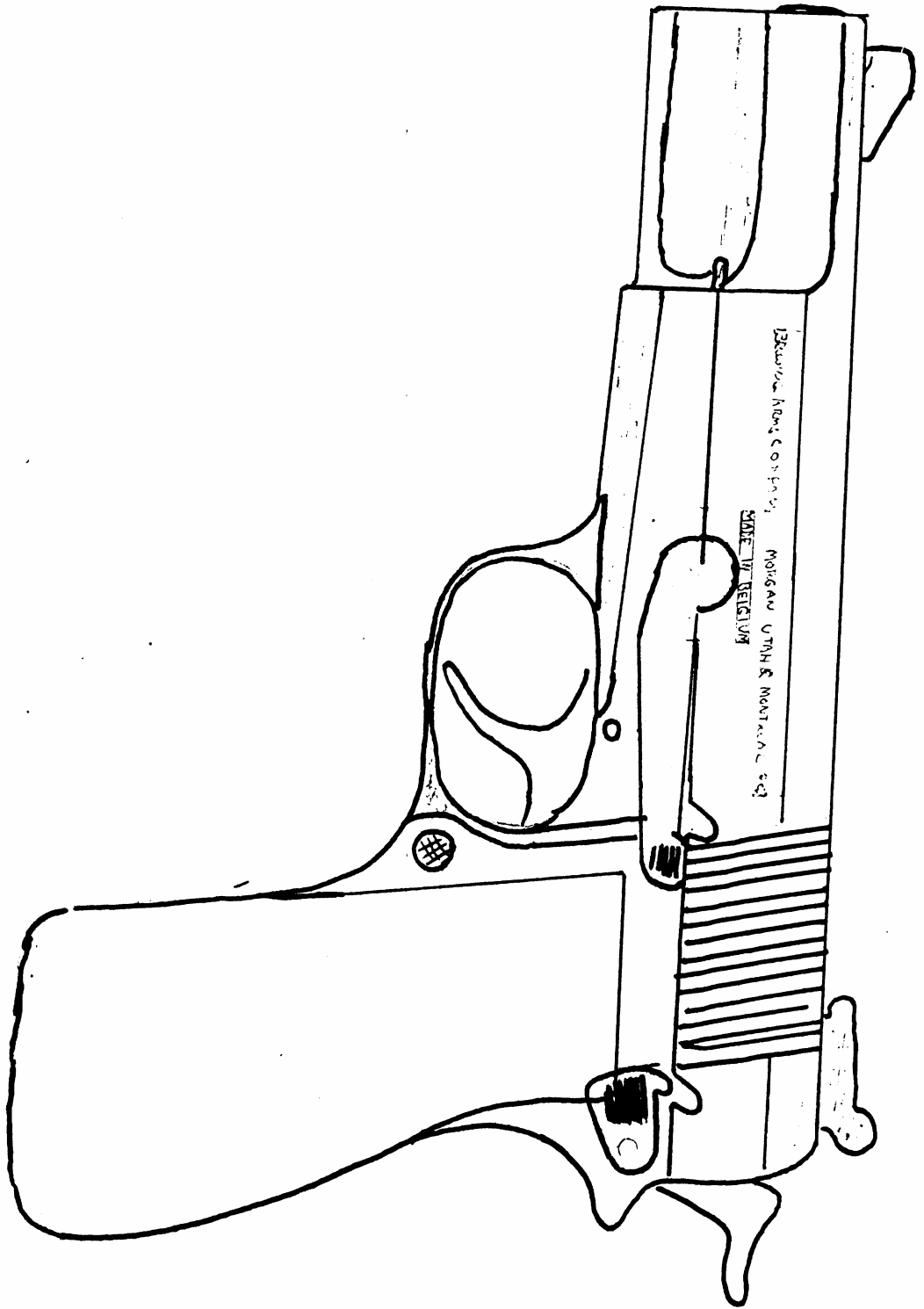
Browning Shotgun
Bill Bennett
APR '87

Colt's Government Model .45 Auto. Pistol

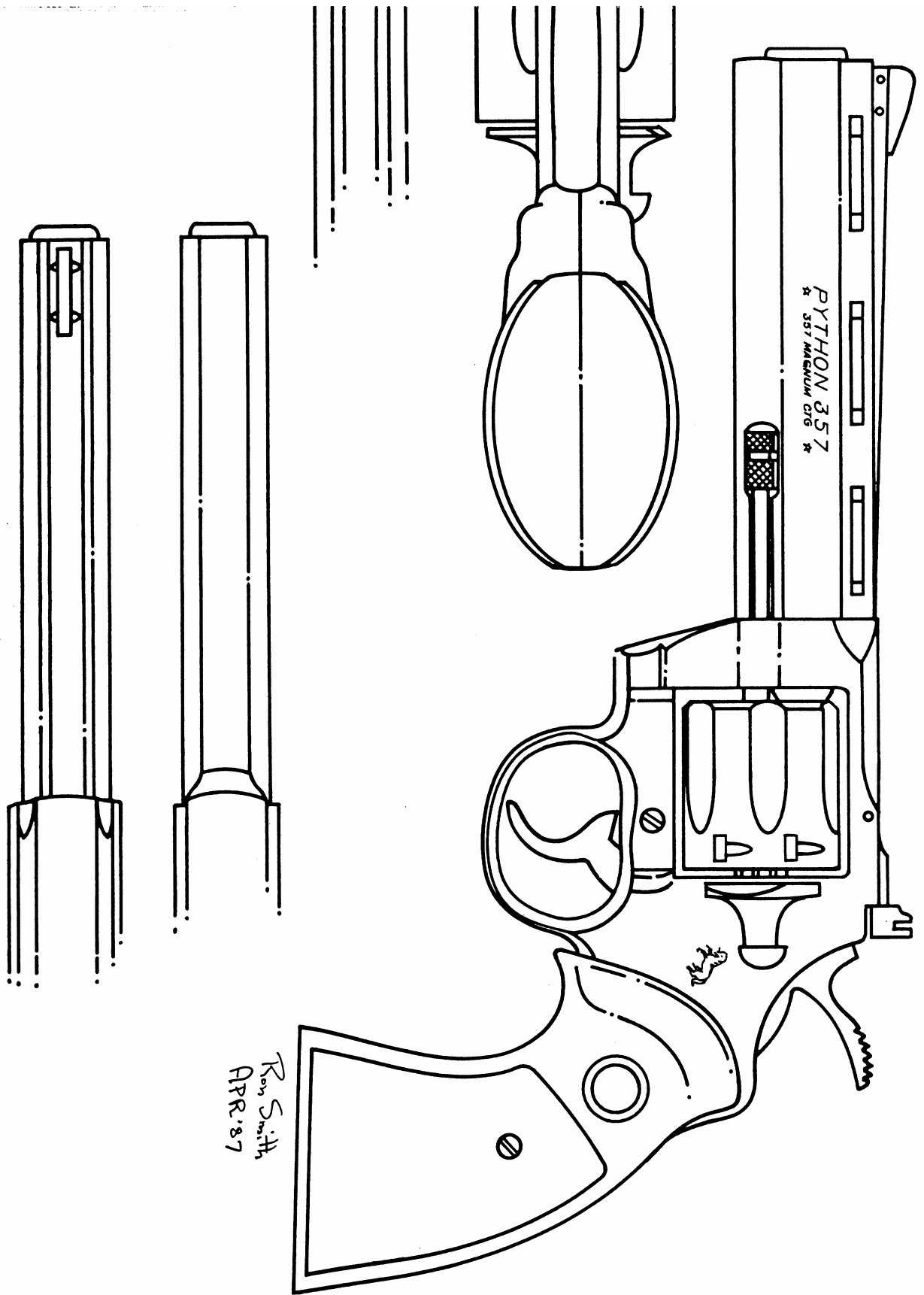




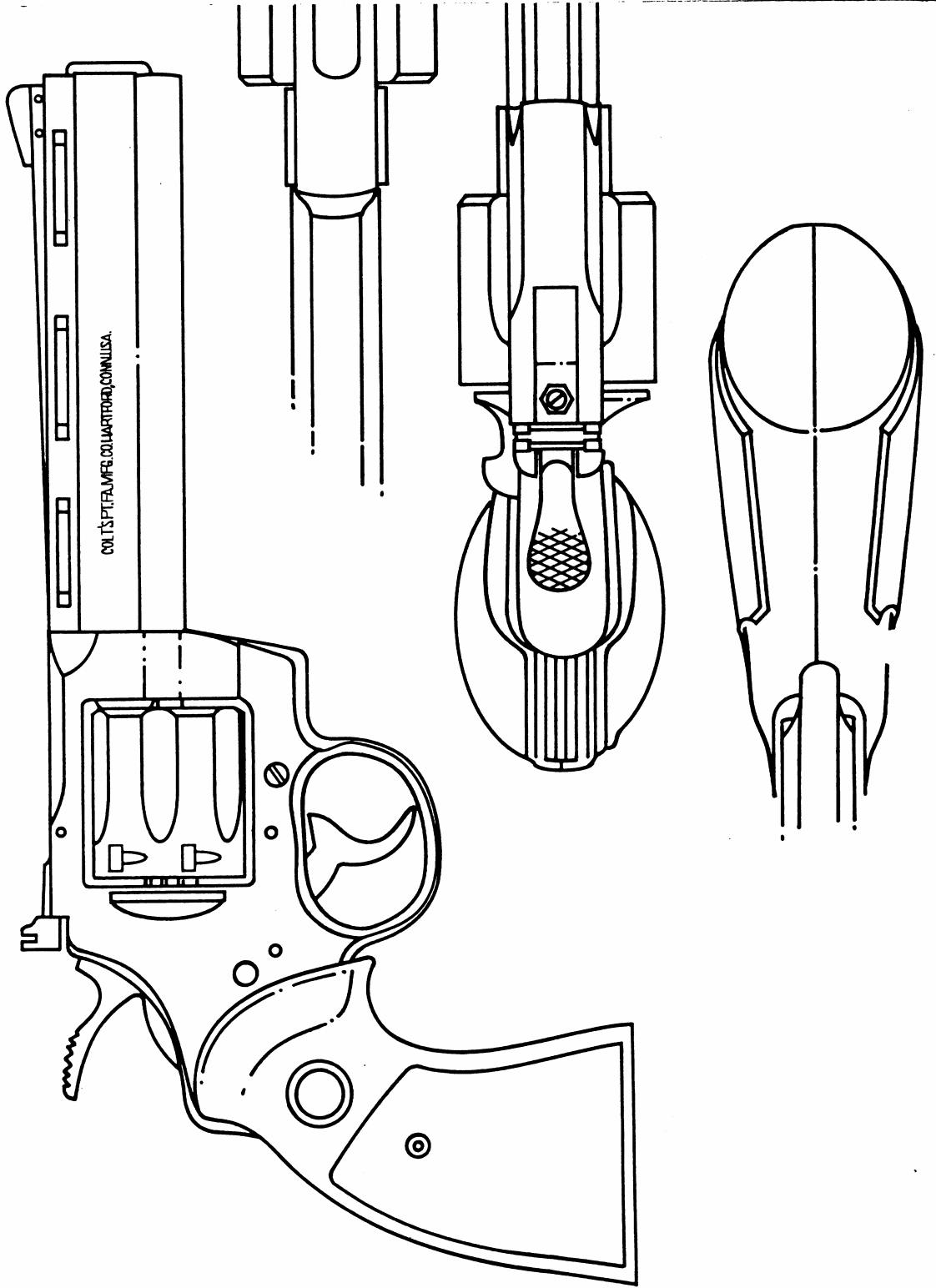
RMS
RFR-07-7

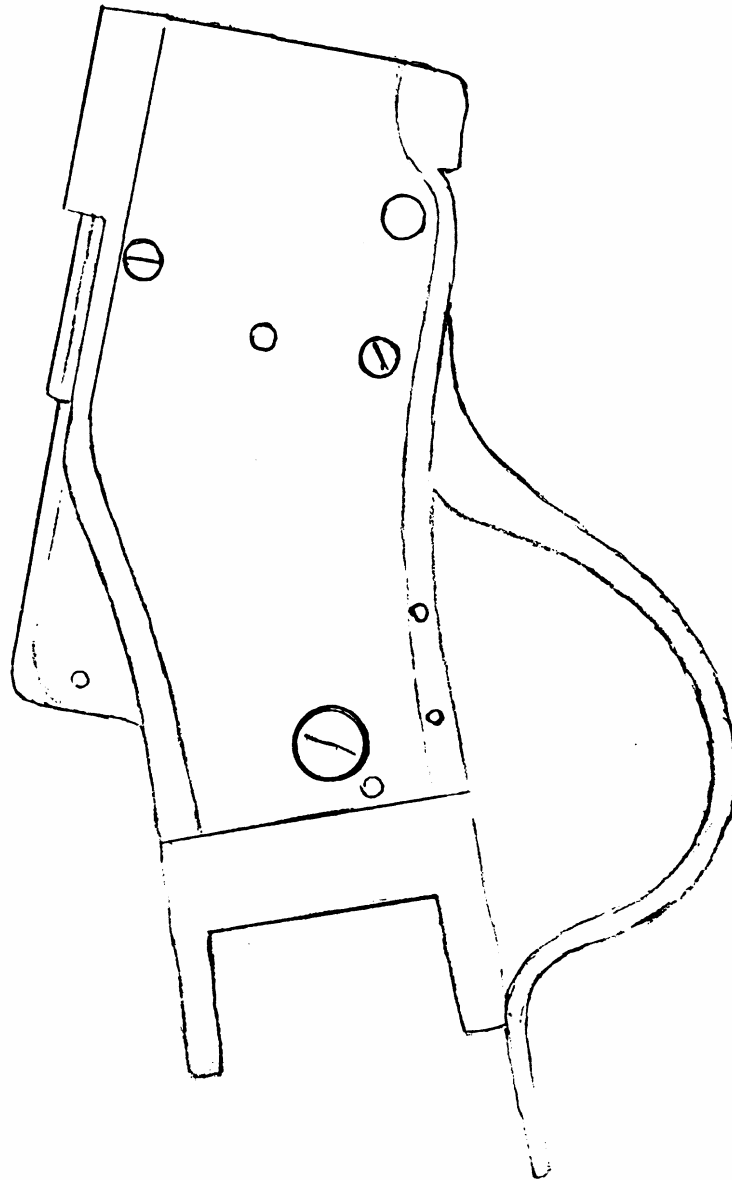


Bob Evans
APR '87

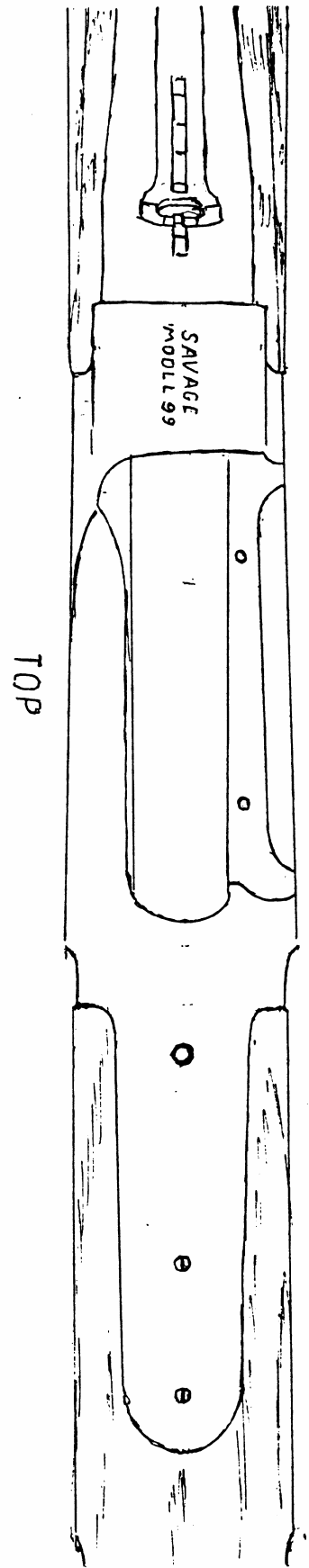
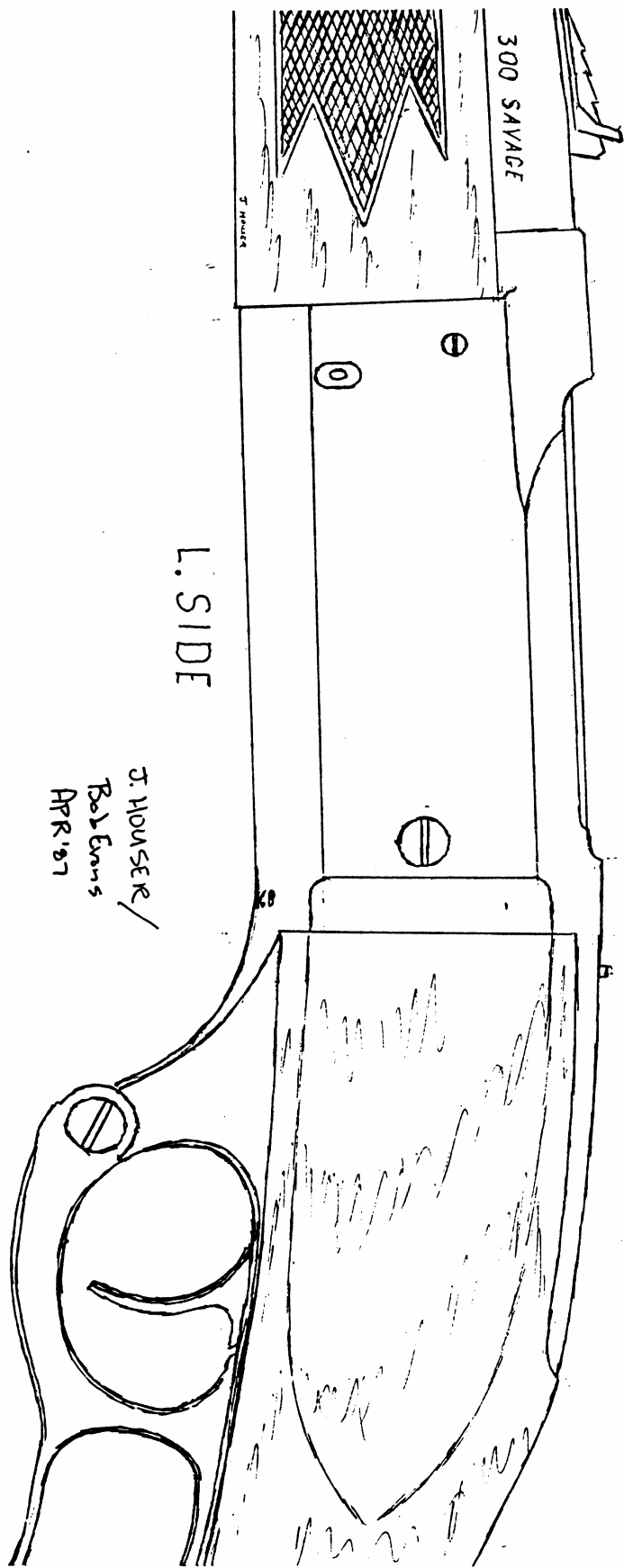


Colt Python .357 Magnum

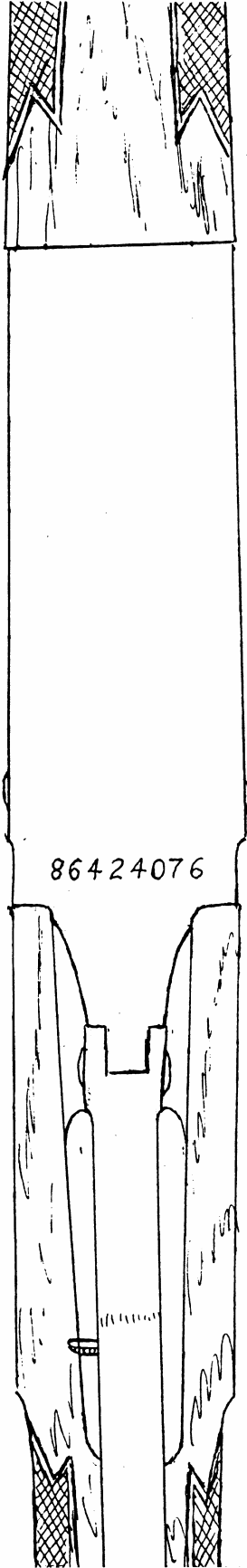




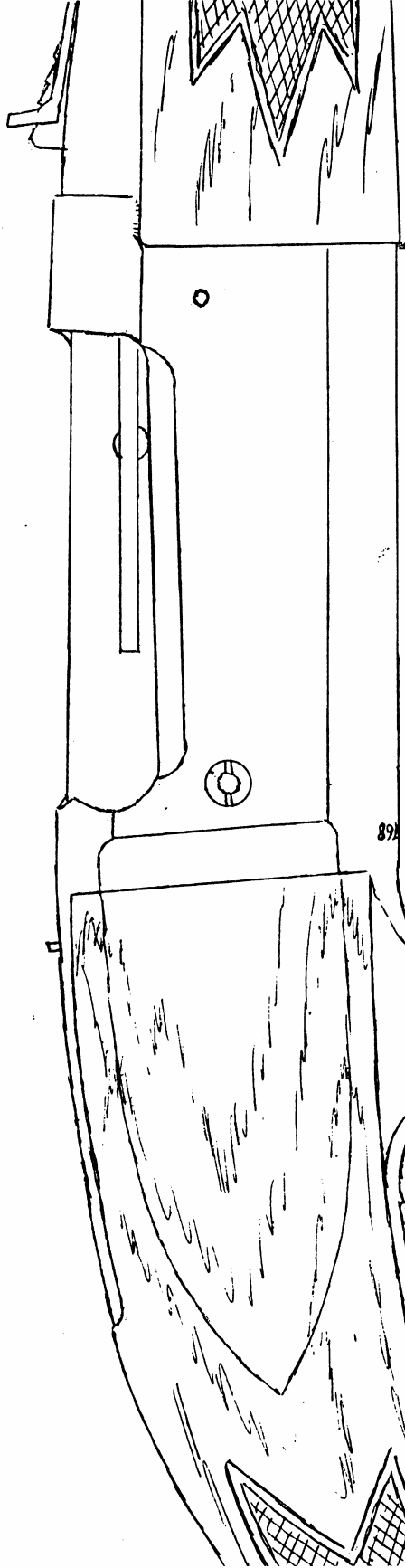
Bob Evans
APR '87



99 SAVAGE FULL SCALE

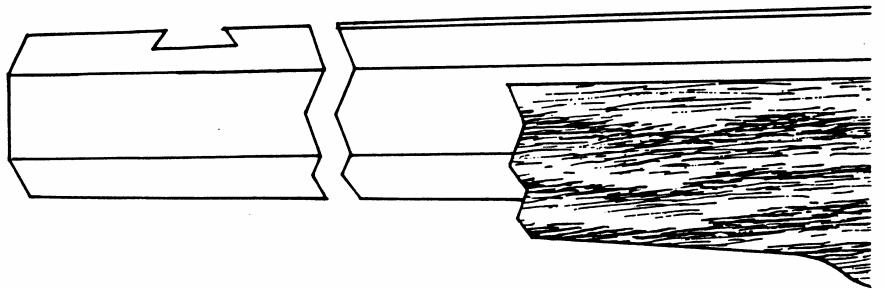
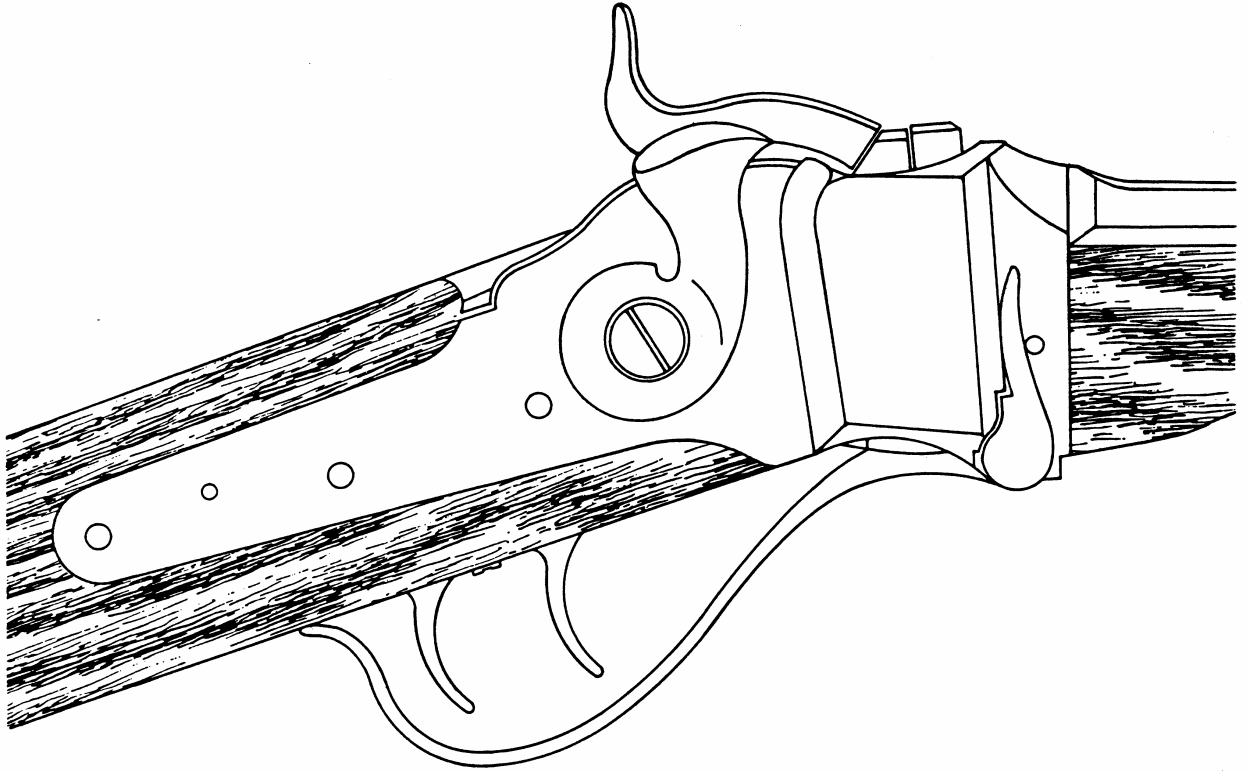


BOTTOM



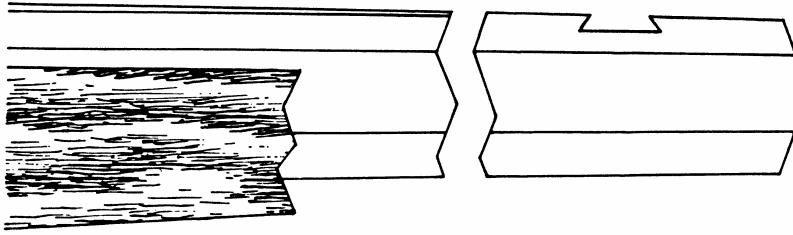
R. SIDE

J. Houser/
B. Evans
APR '87



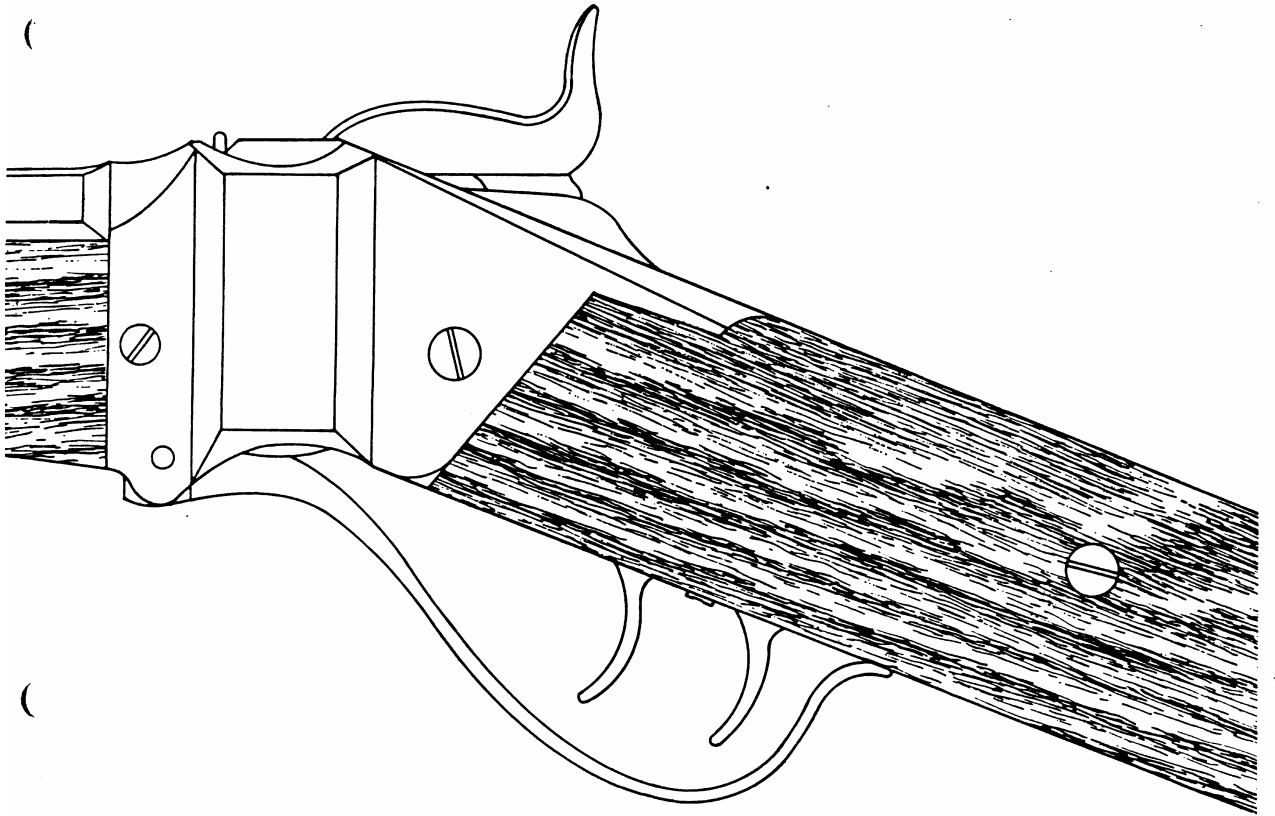
LEFT SIDE

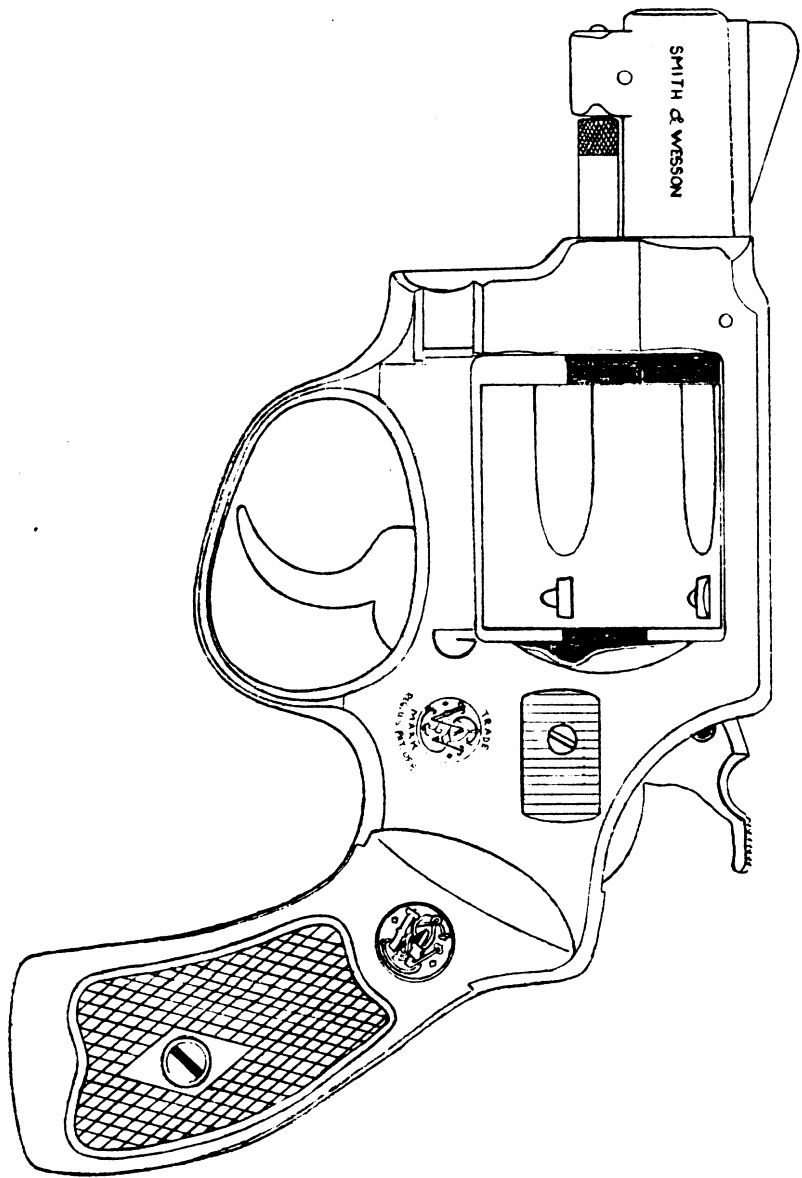
Bob Evans
APR 1987



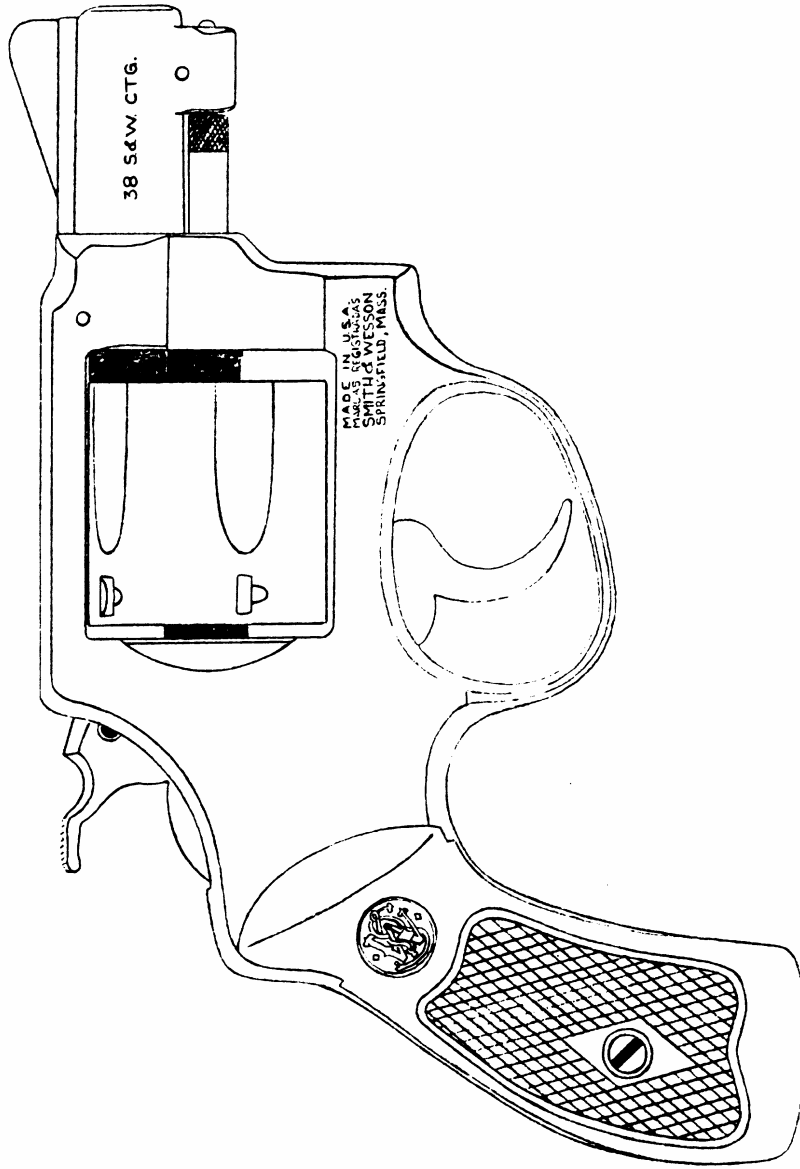
RIGHT SIDE

Bob Evans
APR 87

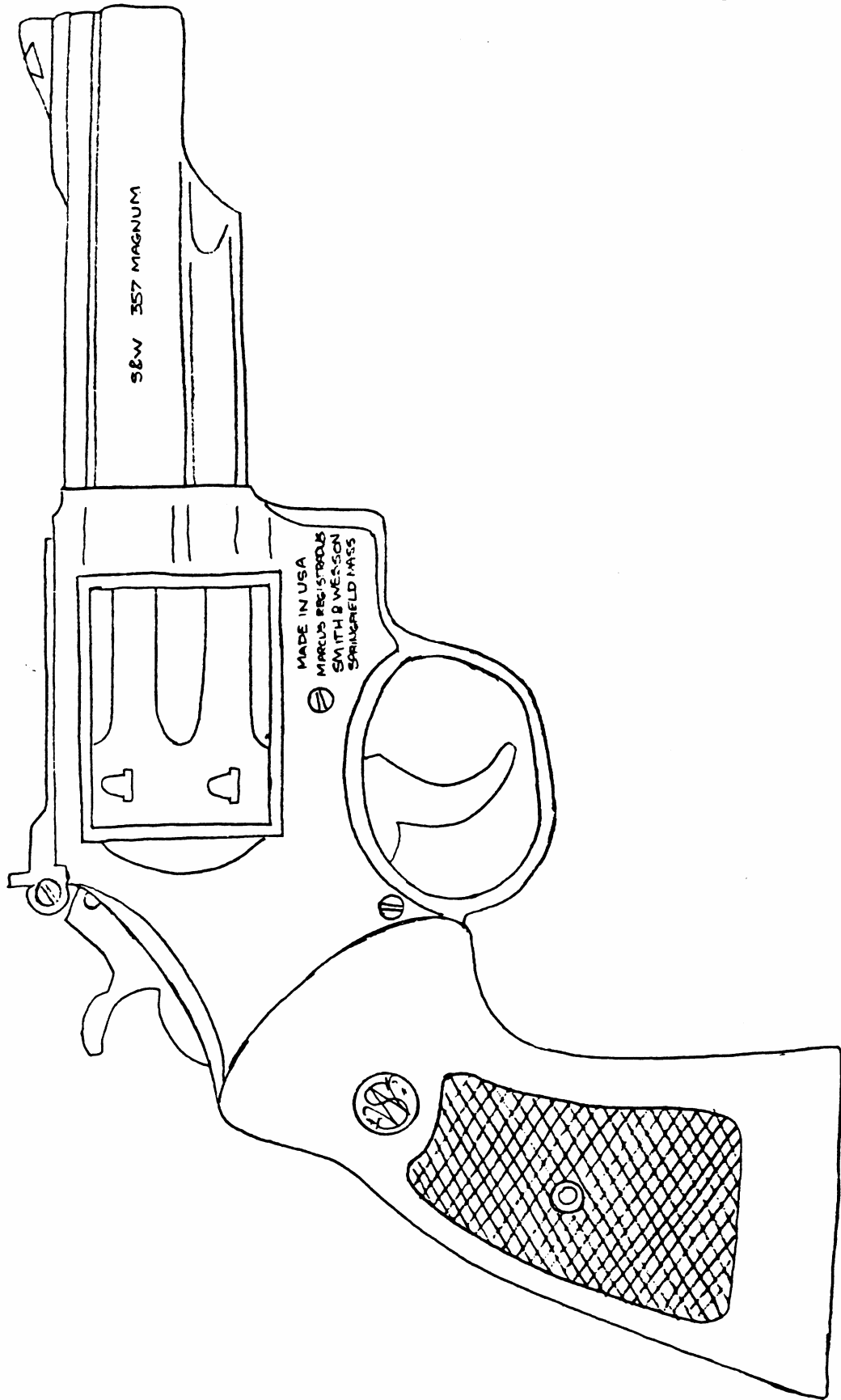




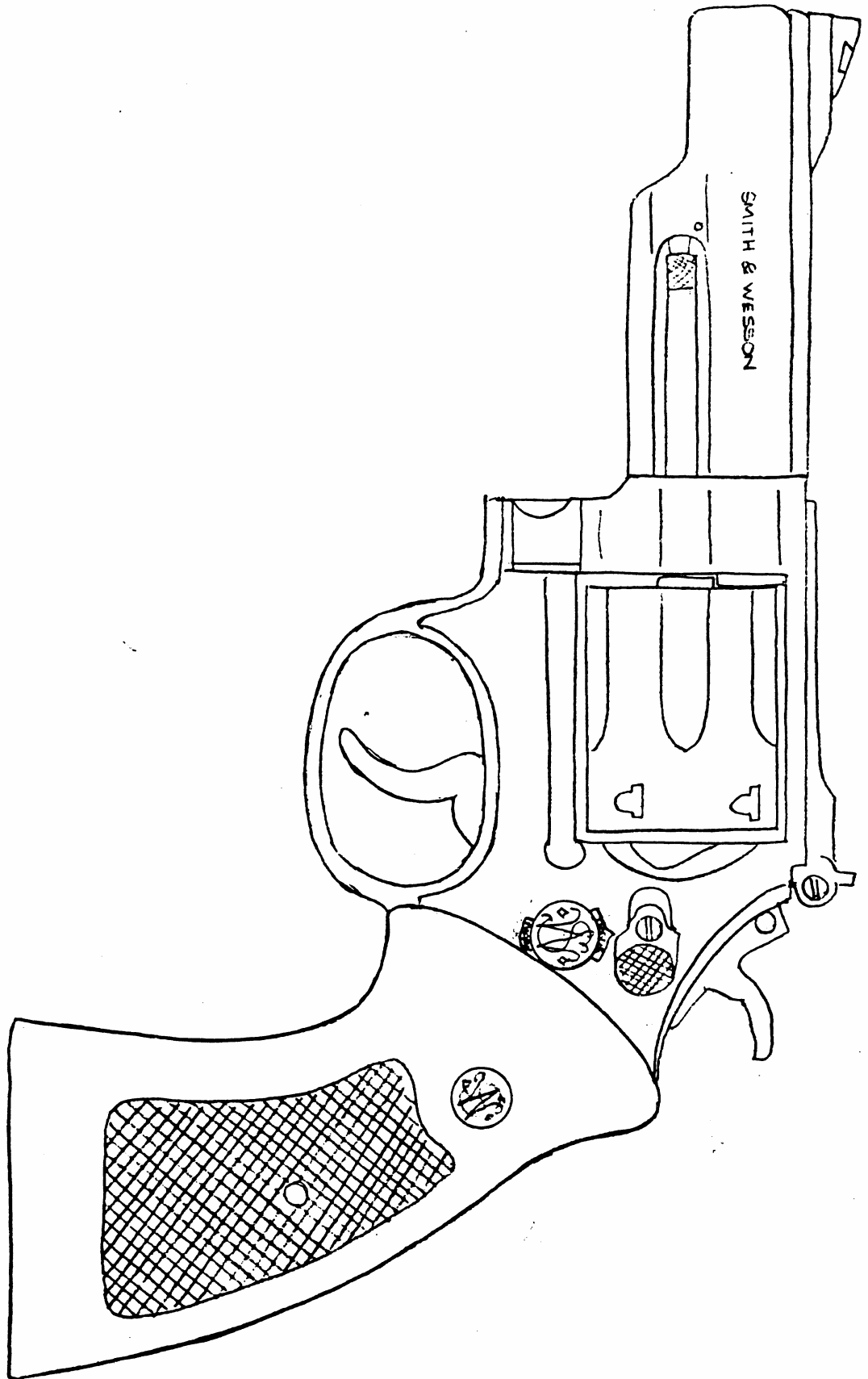
SM Model 32 Terrifier
Bill Bonnett
APR '87



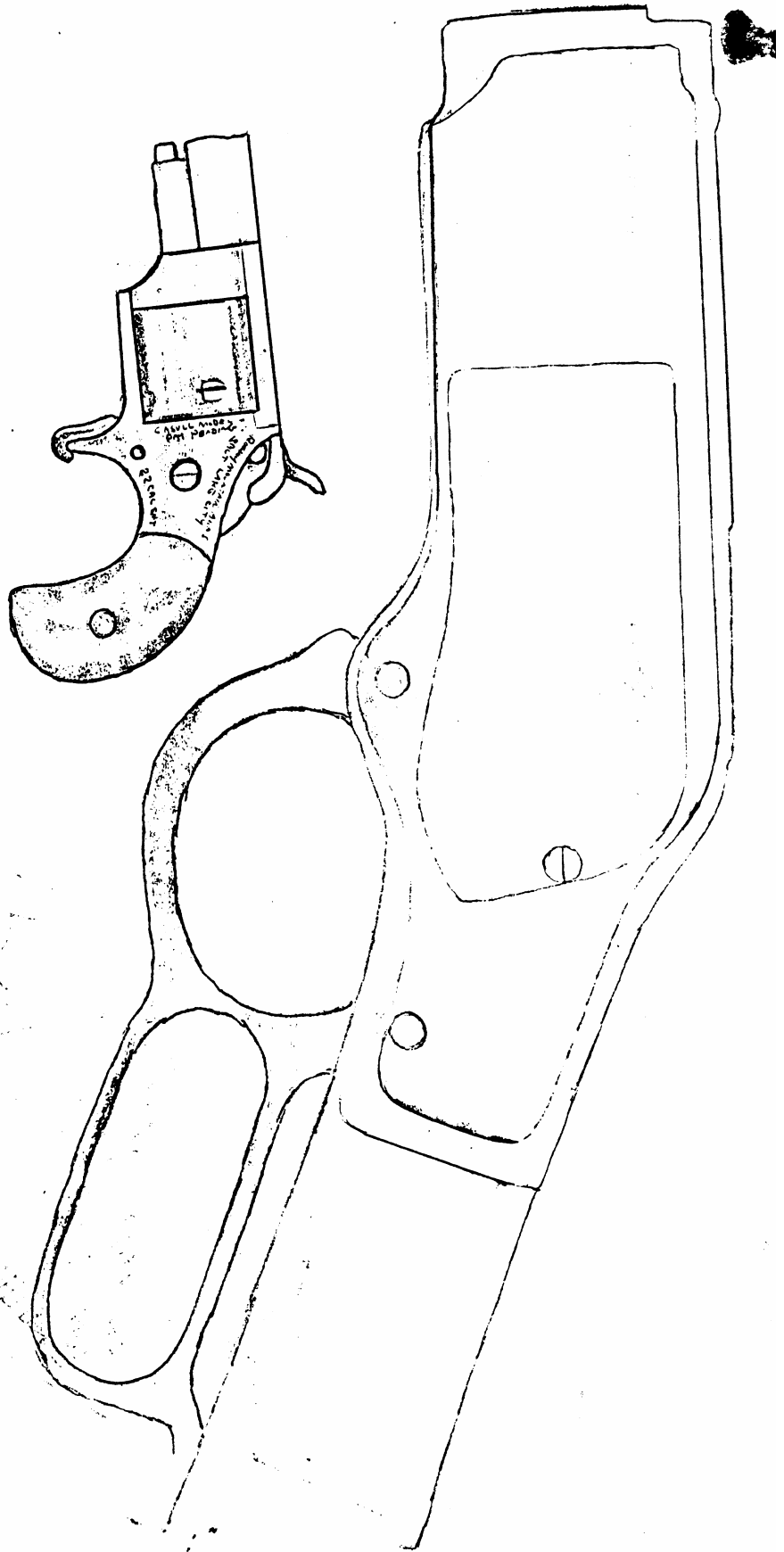
S&W Model 32 Terrier
Bill Bennett
APR 1987



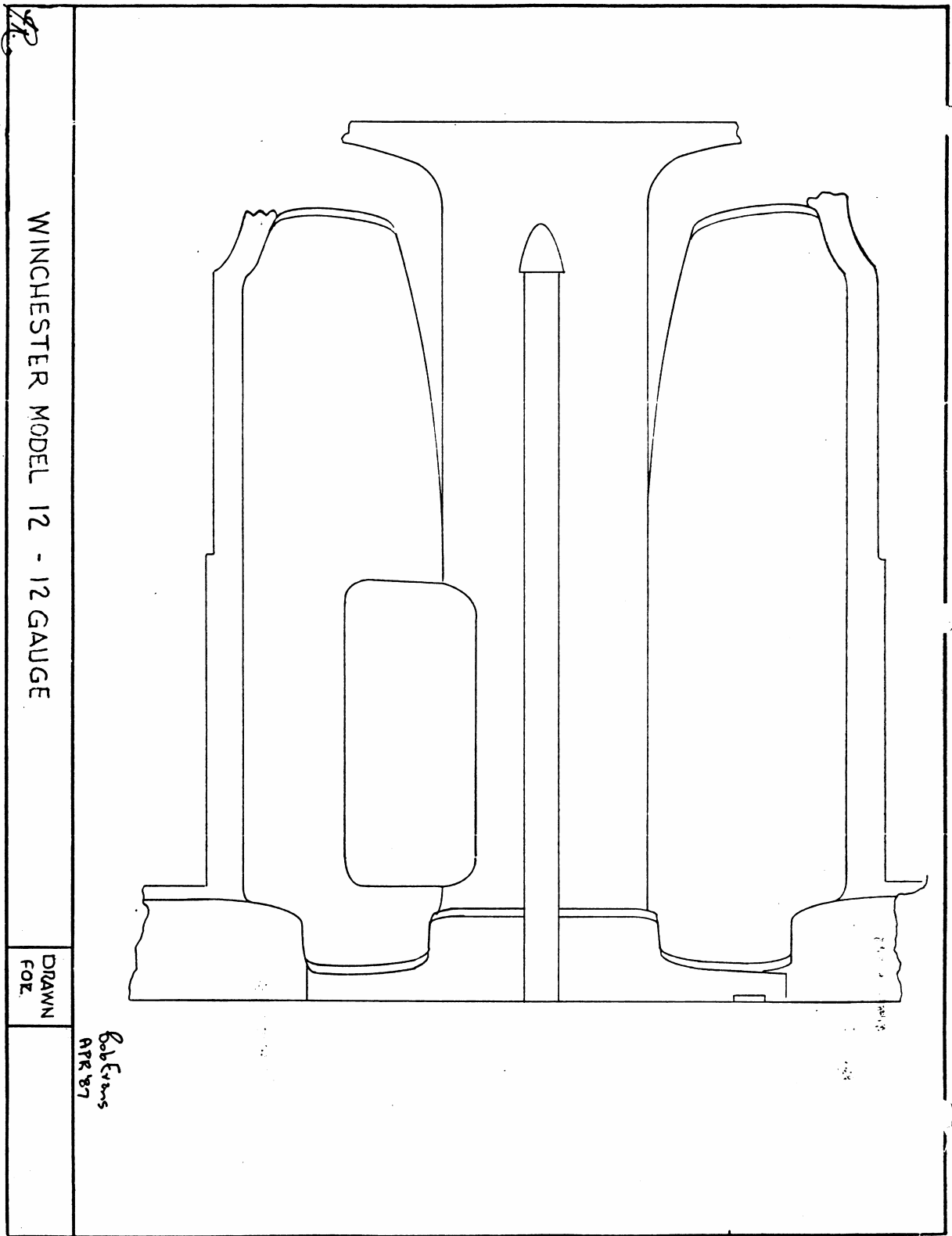
Bob Evans
APR '87



B. Evans
APR '87



Bob Evans
APR 1987



WINCHESTER MODEL 12 - 12 GAUGE

DRAWN
FOR

Bob Evans
APR 87

French Grey and Sealant Method

The basic product that I use is referred to in the automobile refinishing trade as "body prep" or "steel prep". The specific product that I purchase is made by Du Pont company and is labeled "steel refinishing system", "step b"*5718-s "conversion coating" + there are other brands but I know that this one does the job for me.

The product is obtained from an automotive paint supply store in a plastic bottle, .946 litre sizes for about \$20.00-\$25.00. Normal care should be exercised in the use of this product. Read the label. For our purpose the product can be reused many times so pour it back into the original container carefully after use. Pour enough material to cover the parts to be greyed into a non-metallic container; I use a large Pyrex measuring cup with a pouring lip as it is easy to re-pour the product into the bottle.

Fix a steel wire to each part so that it does not have to be handled directly. Clean each part by dipping it into lacquer thinner and allow it to air dry. Next, dip each part into the body prep and let it sit under the surface of the fluid for about one or two minutes. Raise part by the wire and check its colour. Check it against a piece of untreated metal when it turns a nice light grey, stop the action by immersing it in clean cool water. Take the part out of the water bath, holding it by the attached wire. Dry it with a warm air hair dryer. Make sure your part is grey all over and as dark as you want it. Do not be concerned about a slightly cloudy finish; it will clear up with the following steps.

At this stage, while the part is still warm, it should be dipped into a sealant to protect the finish. The sealant should be mixed, tested and contained in an air tight jar and be on hand before starting the finishing process. Mix this in a screw top jar, shake and test before each use, keep it thinned down as needed.

To make the sealant solution, half fill the jar with clean acetone and add about a tablespoon of spar varnish. Do not use plastic varnish; use the old fashioned resin type. Shake to mix, test as follows.

To test the sealant mix. Hold the back of your hand out in good light and notice the texture and light that reflects from it. Dip a finger into the mix and make a quick swipe on the back of the outstretched hand. The warmth of your hand will immediately flash off the acetone and leave a very light deposit of varnish which you will see as a slight shiny stripe on the back of your hand. If you don't have a stripe mix a little more varnish in and test on a different part of your skin.

After greying, with the part still warm from the dryer and being handled only by the wire; dip it into the sealant mix. Remove and re-dry the part in the air. Hang by the wire until fully dry, 24 hours if time permits. Apply ink to the engraving to bring out the detail. Remove the excess ink from the flat areas with cloth dampened with alcohol. Avoid flooding the surface, wipe several times with a just damp cloth. Lightly polish any dimensional gold or silver inlays with a soft eraser, stay strictly on the inlay.

Sit back and enjoy your handwork.

John Barraclough

Metal Checkering

First layout and establish a perimeter or border. If a border is desired cut it lightly about half desired depth. Sometimes checkering is done without a border, the end of the lines creating just a visual but uncut border. Very difficult to get right. On all early work, cut a border.

Layout two master lines, usually crossing at 60 degrees. A small piece of clear, flexible plastic with a 60 degree notch cut out of it is a great help on rounded or curved surfaces. After you have marked in this V go ahead and extend the lines using another piece of the same type of plastic as a straight edge.

Lightly cut these lines in, extending from perimeter to perimeter or border to border. An onglette or 60 degree square are best for this. Now there are two different ways to proceed.

Metal Checkering File

If you are using a METAL checkering file, available from Brownell's and others, select one with the desired tooth spacing. For right handed people place the left tooth of the file into one of your master lines and carefully move the file forward being sure to stay in the guide line. Left handed people place the right side tooth into the guide line. Go easy, it will take many passes to get nearly to the desired depth.

Do not attempt to extend all the lines right out to the edge at this stage or to get full depth. When you have a set of good lines established at nearly full depth use these as guides with some file teeth running in them, to add more lines and fill the pattern out.

Turn the job end for end in the vise and do the same on the other side of the design.

Because of the shape of the file it is impossible to end all the lines in the border.

This is where a 60 degree diamond shape graver, or one to match the same V grooves cut by the file, is used to extend the lines to the end. Then go over your whole design with both the file and the graver where needed to bring all your checkered diamonds to the same depth and desired sharpness.

Graver Cut Checkering

Proceed as above to establish a perimeter or border and a pair of master lines.

Use a sharp pair of dividers to lay out a line on each side of your master lines.

The checkering can be cut with a different amount sharpness, depending on the spacing of the lines and the shape of the graver selected. Be sure to keep the divider legs oriented at 90 degrees to the master lines to obtain evenly spaced and straight lines. Cut these lines to a half to three quarter depth at this stage. Layout more lines using the previous lines for a guide. Be sure to set the guide leg of the divider into the bottom of the previously cut line, not running along the wall.

When you have the whole pattern with a preliminary cut go over it again to bring the lines to equal and full depth and the diamonds up to a desired degree of sharpness.

If your design has a border re cut it to remove any nicks caused when cutting the lines.

John Barraclough

Liners (Multiple line cutting tools)

There are two types of liners in general use in the United States of America at this time.

One type is made by the N-graver Company. Their liners are made of tool steel and high speed steel. To the best of my knowledge they are the only liners made of high speed steel. Their regular liners are offered in sizes #5-7-10-12-15 and 20.

A #5 is 5 thousandths pitch, or to put it another way 200 lines per inch. A #10 is 10 thousandth pitch, or 100 lines per inch. A #20 is 20 thousandth pitch, or 50 lines per inch.

N-Graver liners are offered in several widths such as narrow, standard and wide. The number of lines on the graver is governed by the pitch selected. For example a narrow #5 will have twice as many lines as a narrow #10.

The N-Graver Company makes their liners in straight (flat) style and in a bent style. They are 2 ¾ inch long overall, with a one inch long by 1/8th inch round shaft.

The other types of liner in general use is the European or jewelry type liner offered for sale by various manufacturers.

They are about 4 ½ inches long including the shaft and made of regular tool steel. Too long for most gun work. They are offered in straight, curved and bent styles. The curved style seems to be the most useful of this type of liner but can be difficult to find sometimes in the required sizes. There is also a round bottom liner in this style which is very useful in the shading and texturing of sculptured engraving. Expensive and hard to find especially in curved style.

All of these type of jewelry liners have two numbers on them such as 20-8 or 16-6. The first number refers to the spacing of the lines in the metric millimeter scale. One millimeter being equal to .03937 inches. For our purposes we will round it off to one millimeter being equal to .04 inches. In the example of the 20-8 liner the first number, 20, refers to .20 or 1/5th of a millimeter. This is approximately 8 thousandths of an inch or 125 lines per inch roughly speaking. The second number on the liner refers to the number of lines the tool will cut. We could also have a 20-4, 20-6 or 20-10 etc. etc. In all of these the first number would indicate that the lines are the same distance apart, 8 thousandths. The only difference would be the number of lines that the tool cuts in one pass.

In the second example, 16-6 the lines are .16 of a millimeter apart, slightly closer than the other example and would leave a pattern of 6 lines if in full contact with the surface being cut. European or jewelry type liners are available in a great many line spacings from extremely fine to quite coarse cutting from 2 lines to 24 or more lines per pass. Broad liners of this type are used extensively in the belt buckle and western type engraving industry and also to hand cut the texture on the barrel ribs of expensive shotguns.

As mentioned above, I find this type of liner to be a little too long for gun work as supplied by the factories. This is a personal opinion as many engravers use them without a problem. My personal preference is for the curved type if I'm using the jewelry type of liner. When I find I need to shorten the liner for better control I shorten it from the shaft end to conserve most of the curved tooth portion of the tool.

These liners come in spacings of 6 through to 32 in even numbers. The #6 is extremely fine with the teeth being .06mm apart. The #32 is .32 mm apart, almost a third of a millimeter. Sizes 6 through to 10 are so fine that they show as a black or at least a dark grey mark. People with good eyesight can just see the lines made with a # 12 in good light. A #6 is roughly 400 lines per inch and a number 10 is about 250 lines per inch.

On English scroll, shading that is sometimes put on the outside of the main scroll backbone I usually use something in the neighborhood of a #8 or #10 in the N-Graver style liners or about equal in the jewelry style.

John Barraclough