TYPICAL FIREARMS FORGERIES AND FAKES AND METHODS FOR DETECTING THEM

by Stanley M. Diefenthal

While the forgery or faking of valuable firearms for the sole purpose of deceiving collectors is relatively new, activity of this type for other reasons has been going on for centuries as evidenced by the many imitations of Comminazzo barrels, the numerous military wheelocks and flintlocks that were given high-art decor in the 19th Century, and the scores of Winchesters and Colts to which amateurish engraving was applied in imitation of factory work.

Fortunately these early efforts are not cause for great concern since, whatever they were considered in their day, they are not true forgeries or fakes because little attention was paid to minute details that reveal their origin to a modern collector with reasonable experience. Conversely however, today's forgers and fakers go to great lengths to exactly imitate the style, materials, and markings of an original piece and even to match the effects of time, thus even the most astute collector is now well advised to exert every caution before acquiring a piece with substantial value.

At this point let's define some of the terms frequently used in connection with our subject. A replica or reproduction is a more or less faithful copy of an antique weapon, usually made for an honest purpose, and while its overall appearance is similar, its materials, measurements and quality bear no relationship to those of the original. A forgery is a weapon made in its entirety as an exact duplicate of an antique in every obvious respect, fabricated with intent to deceive, while a fake is a genuine weapon which has been altered for the same purpose by having:

1. Any of its major parts replaced.
2. The addition of any historical name, or legend, apart from fact.
3. The addition of any engraving, carving, stock inlay or other decoration.
4. Any part modified to cause resemblance to another model or to create a "variation."

By way of clarification, "major parts" are usually considered to be the barrel, stock and lockplate of a muzzle-loader plus the action of a breech-loader and the frame and cylinder of a revolver.

The replacement of minor items such as screws, pins, triggers, hammer, or internal lock parts, or the repair of major parts, may constitute extensive restoration and make a piece wholly undesirable but does not place a weapon in the category of a fake. On occasion the dividing line between restoration and fakery is a rather thin one, and while some may disagree with the use of the word "fake" for a piece with only one major part replaced, I believe there is simply no other word to describe a pistol with a replaced stock or barrel, deliberately made to match the original, marked in the original style, and aged to duplicate the effects of time.

Before embarking on a discussion of specifics, let me make some general observations on the problems that confront a modern forger. While some rudimentary machines existed by 1800 and were used in gun manufacturing to a limited degree, all earlier weapons were largely made by hand, with finishing operations entirely by hand, and no two guns being exactly alike. Although such lack of uniformity simplifies a forgers work, it is also true that in that era a complete gun was the product of a team of specialists – lock filers, barrel makers, stockers, and decorators, who performed the same job day after day and became absolute masters of the fine points of their particular art with quality being primary and time relatively unimportant. In contrast, a forger almost always works alone, or perhaps with a single helper, and when he attempts a complete copy of a hand-crafted weapon he must be stocker, engraver, lock filer and barrel maker and while his skill in some of these fields may be equal to that of the original craftsmen he never makes any particular item in large enough quantities to duplicate their manual dexterity and it is almost certain that his overall work will be lacking in some respect. Further, his primary interest is in turning a fast dollar and thus he takes every short cut and eliminates every detail he possibly can. On the other hand when he attempts a complete copy of a rare 19th century mass-produced piece he may rely largely on machine work but here he finds that hundreds of pieces were made in the exact image of each other, even to complicated curved surfaces, with the help of jigs and fixtures. Since such complex machine set-ups are economically prohibitive for the production of a few forgeries, the forger must do these operations by hand-machining in which case the chance of his fabricating each one of the numerous parts as an exact copy of the original are very minute. Fortunately, up to this point, collectors need not

Reprinted from the American Society of Arms Collectors Bulletin 28:21-40
Additional articles available at http://americansocietyofarmscollectors.org/resources/articles/

concern themselves too much with forgeries of mass-produced weapons because very few, if any, have been made that would pass even a casual inspection by an alert amateur, but if prices continue to rise as they have in recent years forgeries of these too may become a real threat.

With respect to a faker who attempts to reproduce only one or two major parts of a hand-made or mass-produced weapon the skills required are greatly reduced in number but then he is confronted with the need to exactly match the style, materials and finish of his new parts to the adjacent original ones so that no glaring difference will be apparent—this in itself being a task demanding quite a bit of ability.

Turning now to specifics, let's discuss the most common types of fakes and forgeries in the order of their prevalence, wherein our first category consists of *fakes created by embellishing plain original pieces with added engraving or stock decoration.* Modern engraving in imitation of factory work or that of the old masters is not only the most common type of fakery but, if top-quality work, is also very difficult to detect by appearance only; however, unless the faker is quite skilled at covering his tracks it's usually possible to reveal his work with the help of a good lens plus the knowledge of a few facts about the art.

First, let's consider American weapons wherein the present value of such pieces and the fact that they are being duplicated so often, make it important for a prospective buyer to be on guard the moment one is offered. A good starting point toward proof that such a piece is genuine is to have a reliable statement of provenance which, while rather common in the field of valuable paintings and other art, is unfortunately seldom available for antique weapons. Just because a formal statement of provenance does not exist, however, one need not completely ignore the theory behind it which is that valuable engraved weapons are seldom found in attics anymore and someone must have owned them previously. Secrecy about the identity of a former owner is certainly not proof of fraud but it is a valid reason for suspicion.

Next to a reliable provenance perhaps the easiest method of reassuring oneself about a piece whose value has been greatly enhanced by extensive engraving is to seek the advice of a modern gun engraver who may be able and willing to venture an opinion about the origin of the work. Since probably no two engravers ever cut in an identical fashion, even when copying the work of another, variations of style and technique are often obvious and if a modern expert engraver has a basis for comparison he may very well be able to determine that the piece

Figure 1. This shows a sideplate of a brass-frame Volcanic pistol with original engraving in typical American style. Note the rather coarse sawtooth cuts typical of almost all American engraving from the earliest period to the present day. Note the numerous scratches and blemishes that represent true aging and note particularly that almost every scratch either terminates at an engraving cut or, if it continues across a cut it terminates and recommences at the very edges of the cut.

being offered was never done by the man it's attributed to or perhaps that its style or quality is different from what was in vogue at the time the gun was made. Of course such an opinion cannot be completely without qualification and while it may not be conclusive, a negative opinion would indicate that a closer examination is in order.

For engraved European weapons the same comments about a provenance will apply but one may be somewhat easier to obtain as Europeans valued, collected and catalogued their high-art and famous weapons long before we cared anything about our mass-produced Colts and Winchesters. Unfortunately the war and the Nazi occupation destroyed many European antiques and scattered others to the winds so that positive identification by association is no longer possible in many cases. Since most highly engraved European weapons were produced at an earlier time than those of American origin, when the art was much commoner and practiced by a great number of artists, even an expert engraver would probably be unable to render a valid opinion about the style of any single individual, notwithstanding the existence of many pattern books, most of which are largely imaginative and were seldom followed faithfully even by the men who originated them. In some cases however an engraver with a thorough knowledge of his craft may be able to distinguish period engraving from modern work by examining closely facial details and costume of human figures and the methods of depicting animals and scenery.

Lacking either a reliable provenance or the advice of a modern engraver, a prospective buyer of a valuable engraved gun must then rely on his own resources aided by the knowledge of a few facts

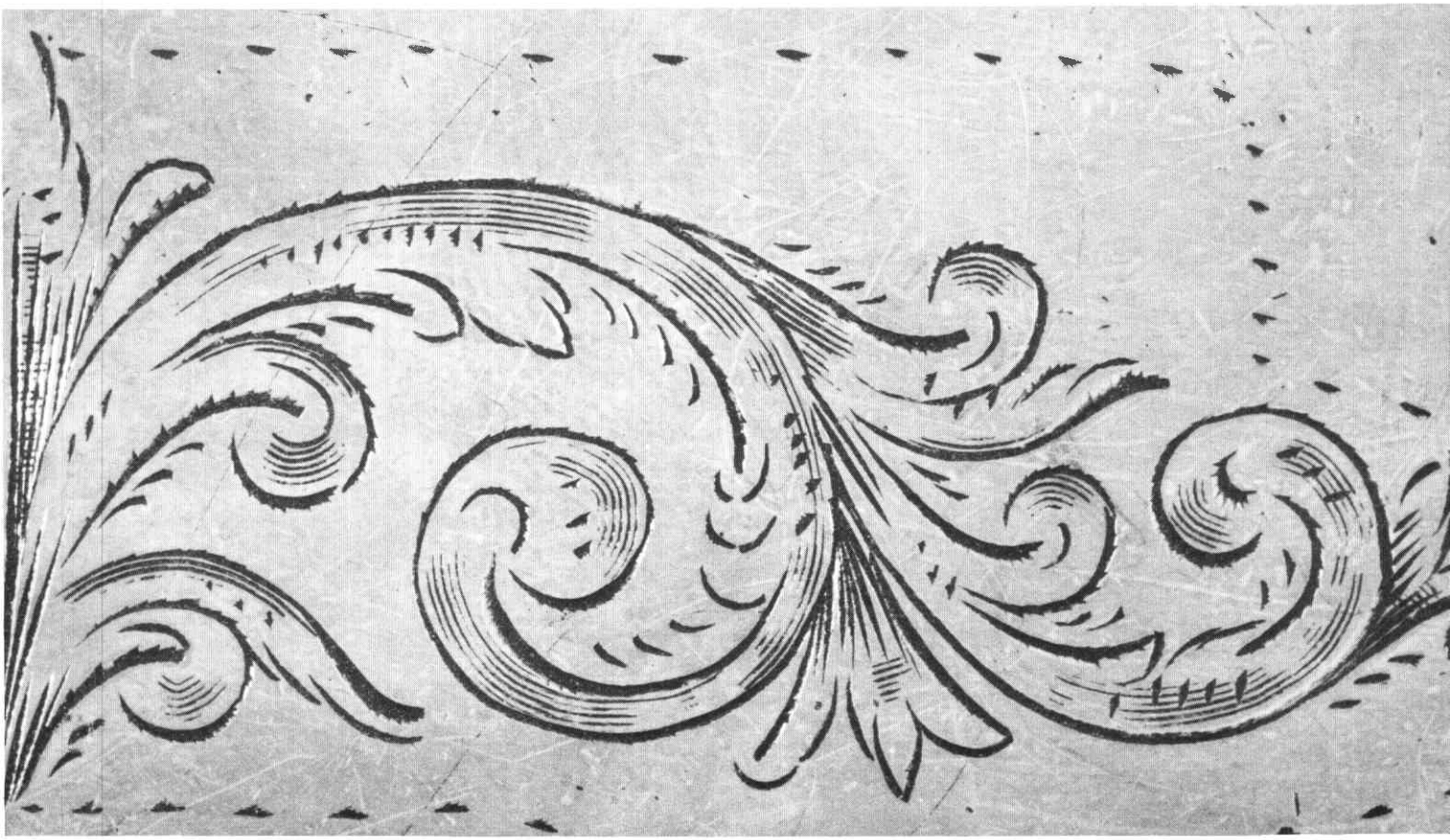

Figure 2. This is a modern engraving on brass, very recently made, that duplicates the pattern of the original Volcanic engraving but is executed in typical English style by a man trained in London. You may note that the much smaller pitch of the cuts and the fact that the grooves have a true V-shape instead of the buttress type groove of the American style. The differences in these two styles are not only the result of training but are also due to the shape of the tool used, the method of holding the work and several other factors. Just as there are major differences in these two national styles there are also subtle differences between the work of any two engravers and while it is certainly possible for one man to copy the style of another it would be unnatural over the period required for an elaborate job and could probably be detected by an expert observer. This modern engraving on brass was executed in the last 60 days and closely duplicates the original Volcanic engraving in every respect. The brass surface before engraving had marrs and scratches similar to those of the original but after the engraving was applied and the hills and burrs polished off you will note that almost all of the scratches cross engraving cuts and in at least 17 places where they do, they terminate or recommence some distance short of the edge of the cut which is positive evidence that the scratches ante-date the engraving and that the piece was already well used before the engraving was applied.
Figure 1 of the original Volcanic sideplate shows the wear at the edges of the engraving cuts. Figure 2 shows there is obviously very little evidence of wear compared to the hundred year old piece even though the hills and burrs have been thoroughly polished away.

about engraving and about the processes used by fakers to blend new engraving into the appearance of an old piece. Since brass and steel present different problems, let's consider them separately.

First, with respect to brass, no matter how sharp the burin nor how skillful the engraver, the tool always throws up a small hill on at least one side of the valley it cuts and always leaves a slight burr at the termination of each cut. The engraver usually smoothes these off or else they are knocked down or worn away in use and disappear among the multitide of dents and scratches that occur on any metal subject to frequent handling. When a faker applies new engraving to such a surface, sharp hills and burrs are obviously inconsistent and therefore must immediately be removed by polishing but when this is done, tiny borders of smooth surface surround the engraving cuts and a low power microscope will easily reveal a few of the original scratches that now stop at the smooth borders, clear evidence that the engraving was applied after the gun was used and not before (note figures 1 and 2).

Second, in any engraved brass surface of 50 years or more the interiors of the cuts will be well oxidized and the products of oxidation and corrosion firmly embedded in their bottoms whereas in a newly engraved piece the cut surfaces are completely bright and remain so for perhaps as much as ten years. As it is rather difficult to artifically oxidize or corrode the interior of an engraving cut without discoloring the adjoining surface, most fakers merely fill the cuts with some combination of wax and dirt which gives them the superficial appearance of old cuts but which can be easily removed with solvents or cleaning agents to reveal bright metal underneath which is completely inconsistent with antique engraving.

Figure 3. This is a portion of the Colt cylinder showing lines of the original rolled scene under later scroll engraving, the result of the faker's failure to remove all of the original scene for fear of reducing the diameter of the cylinder too far.

Third, any 100 year old gun, especially an engraved or inscribed one, will have felt the caress of many hands, each of which removed some minute amounts of metal from the soft brass, the sum total of which may not be more than .001" or .002" but the effect of which will be greatly accentuated on all sharp edges, including those of the engraving cuts, tending to round them off in a manner easily visible under a low power microscope, while in new engraving the edges of the cuts will be sharp and distinct making it quite easy to distinguish them from the old.

A perceptive collector may hasten to point out that a clever faker would recognize these pitfalls and take steps to avoid them. For example, he could polish the metal before engraving it to eliminate old blemishes that would show up after he filed away his hills and burrs, then he could hand rub the whole part with fine emery and oil for a couple of days thus simulating the effect of many years of handling, then he could "re-antique" the part with light scratches and dents and finally apply an oxidizing agent to it, later cleaning back only the surface and leaving corrosion in the cuts. It's very true that a faker could do all these things and if he did them exactly right the fake detective might be fooled but fortunately there are few fakers with sufficient knowledge to pursue these procedures in a detection-proof manner and even more fortunately those with the knowledge always seem to lack the required patience and prefer the short cuts that leave a clue for the discerning eye. There are also other reasons that prevent a faker from following all the procedures needed to escape detection. For example, the dents and scratches in a soft brass frame are usually fairly deep and if a faker polishes the metal sufficiently to remove them he will not only change its dimensions but may very well change its entire contour. Actually, in faking a firearm one alteration usually brings on the need for another and another until somewhere down the line the faker makes his fatal mistake. The unfortunate part about fake engraving on brass is that we must rely on such slim clues and that there's no sure method or scientific tool available to make a positive identification; happily this is not the case with many other types of fakery.

With respect to fake engraving on iron or steel, the fakers work gets a little harder and that of the detective a little easier. It's considerably more difficult to successfully fake engraving on iron or steel because antique weapons of this metal always have a distinctive finish—charcoal blue, chemical brown, case hardening, pitting, or just plain rust, but all much harder to duplicate than the natural patina of brass. Obviously, when working steel, the burin throws up the same hills and burrs as when working brass and again these sharp edges on an old piece would be inconsistent and must be removed with some surface blemishes being interrupted and thus providing a clue that the engraving is of recent vintage. If the gun had been mint without scratches or dents, or the parts completely polished before engraving, then this test would fail but in the case of the mint gun the removal of the burrs would destory the surrounding finish, whatever it was, thus requiring local refinishing, and if the parts had been polished before engraving, they would then require total refinishing to match the rest of the gun. In either event the easy job is over because it is practically impossible to locally refinish new engraving cuts to match any kind of original finish beyond detection and if the parts to be engraved were completely polished before engraving not only would the faker have to match their finish but also their surface condition to that of the original gun. In both cases he'd probably be better off to consider refinishing the entire weapon which means the necessity of reproducing the distinctive brown, heat blue, case-hardening colors or rusted surface of an antique piece. While it's technically possible to accomplish such work I have never seen a case of extensive polishing, fake engraving, refinishing and aging back, where the faker didn't slip up on some minor point which to an expert gives the whole job away. Of course, I'm not referring to the apparent slips of a butcher who polishes off lettering, or rounds off corners that should be square, but assuming the technician to be a thorough craftsman who makes no obvious mistake it may often be found that he polishes a part which, in the originals, always shows machine marks, or is required to polish a part so much that its contour is changed or its dimensions reduced beyond tolerances that could have occurred during manufacture. Sometimes he is forced to leave some small pits to avoid over-

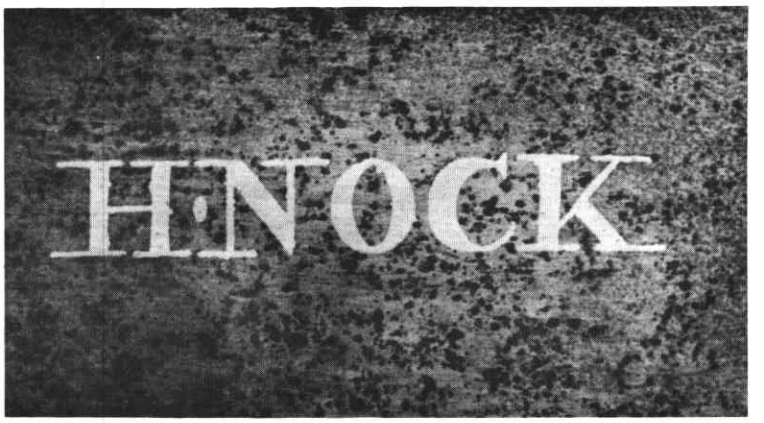

Figure 4. This is a fake inscription inlayed in gold. You will note that the gun was pitted and the engraver evidently decided to leave it that way in order to avoid refinishing the entire piece. The fake is revealed by the fact that in several places the gold flowed into an adjoining pit, clear evidence that it was applied after the piece was old and corroded.

polishing, and when the refinishing process is completed a microscopic examination of the surface will reveal these pits without rust in them, an obvious impossibility. During refinishing he may wrap a part while hardening it so that its edges no longer mate exactly with those of its adjacent parts or he may leave finish on parts where no finish could be expected such as the striking survace of a percussion hammer, or the inside of a barrel. During aging-back he may apply imitation pitting by using a small punch or even several punches which leave many "pits" of exactly the same shape, a thing that could never occur in nature.

A classic illustration is the case of a presentation engraved Colt Navy that I recently examined. The piece was properly cased with all correct accessories and fully engraved in typical factory scroll with no original finish but a patina that appeared quite genuine. The back strap was inscribed "To _____ from the Inventor" and bore a date consistent with its serial number. There was absolutely no reason to suspect its authenticity until one examined the cylinder (see figure 3), where a strong lens revealed lines of engraving that were apparently unrelated to the overall theme. A closer examination revealed that the cylinder has originally been deeply impressed with the naval scene common to all plain specimens of this gun and in one or two small areas the engraver had failed to polish it off completely, leaving the lines that formed the waves visible under his new engraving. As the factory would surely have used an unstamped cylinder for an important presentation piece, this was, in my opinion, certain proof that the engraving and inscribing was a later addition and that the piece was wrong, an excellent example of how a minor detail can discredit an otherwise well-executed fake.

Leaving the matter of engraving, let's consider stock alterations where wood, ivory and bone reveal more secrets than do scratches on brass or iron. The main items that concern us in the area of stock embellishment are the fairly numerous wheelocks and flintlocks that started out as ordinary pieces and, with later decoration and engraving added, are now passing as high-art pieces made for nobility and signed by or attributed to famous contemporary stockers. Not all fakes of this class are original guns with later decoration, as some are merely composites of original locks, barrels and furniture with entirely new stocks. Especially notable in this latter group are the many Maastricht pistols with ivory stocks of which there are probably more fakes than genuine ones. Of course, these generally involve metal work as well as stock work but at this moment we're only concerned with the means of detecting a new stock, wood or ivory, and its decorations, from an original one. It might be well here to sound a note of caution with respect to a few ivory stocked Henry's and Winchester '66's that are beginning to turn up as originals.

Although there is an excellent scientific tool to assist a collector in discovering fakes created by decorating or replacing an old stock, he may find that scientific aid is superfluous if he can acquire the ability to judge "patina" which is the visible effect of time on surface appearnace. The value of judging patina, on metal as well as wood, lies in the fact that while it can be imitated it can seldom be reproduced beyond detection, especially in areas of the weapon that are usually unseen. For example, unfinished old wood in contact with metal under a lockplate or trigger guard acquires a very distinctive surface appearance from accumulated oil and dirt and should be several shades darker than those portions of a stock exposed to the bleaching effect of light and air. Newly cut surfaces in the same locations will be much lighter in color and even careful staining or a hurry-up oil and dirt treatment won't give them the proper patina. In an old weapon that has been much handled, its stock's outer surface also will have gained a special appearance and texture. Old wood tends to harden due to oxidation and to dust particles forced into it's pores during cleaning and polishing, furthermore, especially in a carved piece, the high spots will always be lighter in color and somewhat smooth and rounded from wear while sharp angles will retain *hardened* despoits of oil, wax or dirt.

Like wood, old ivory and bone also acquire a patina which is difficult to reproduce. Aging gives them a surface color ranging from pale yellow to dark brown, while drying-out produces cracks that may extend completely through a thin section such as that used for an inlay. Both ivory and bone can be stained to simulate the color of age and fakers frequently pack the pieces in damp tea leaves or in manure for a period of several days. Cracks are produced by boiling the pieces and drying them quickly in an oven or over an open flame. Solvents such as alcohol and lacquer-remover will often remove a false patination but have no effect on a true patina and cracks produced by a boiling and quick-drying process are usually much more pronounced than age cracks and are seldom accompanied by the myriads of hairline cracks that come from the slow drying of many years. Sometimes fakers use legitimately old ivory for their inlays but in these cases freshly cut edges will betray them and if its possible to remove the inlay the reverse side will be lacking in patination because of the removal of the old surface in the thinning-down process.

Fortunately, if a collector lacks an eye for patina, ultra-violet light is a valuable scientific tool in the examination of organic materials. The source of ultra-violet is a quartz tube containing mercury vapor which gives off visible illumination rich in ultra-violet rays. When the visible illumination is screened out by a proper filter the remaining ultra-violet radiations cause most organic substances to fluoresce and, more important, to fluoresce to a different degree in accordance with age, origin and physical composition. Examination of objects under ultra-violet should be in a darkened room where repairs or additions made to a stock in the course of

Figure 5. This is a Waters Navy pistol showing what appears to be a perfectly sound stock.

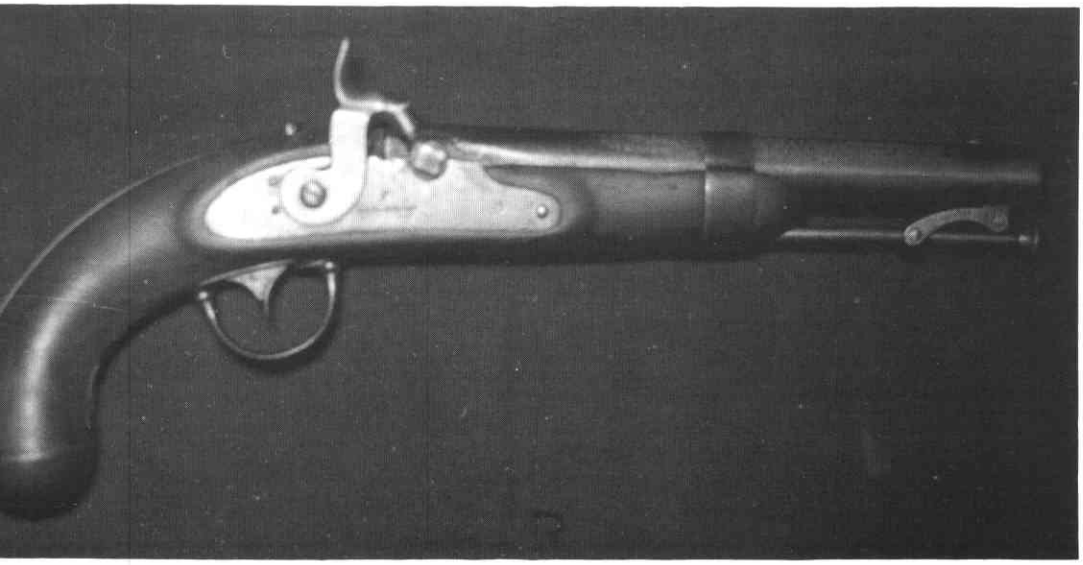

Figure 6. This is an ultra-violet photo of the same Waters Navy showing the obvious glue-lines of a repaired crack in the grip.

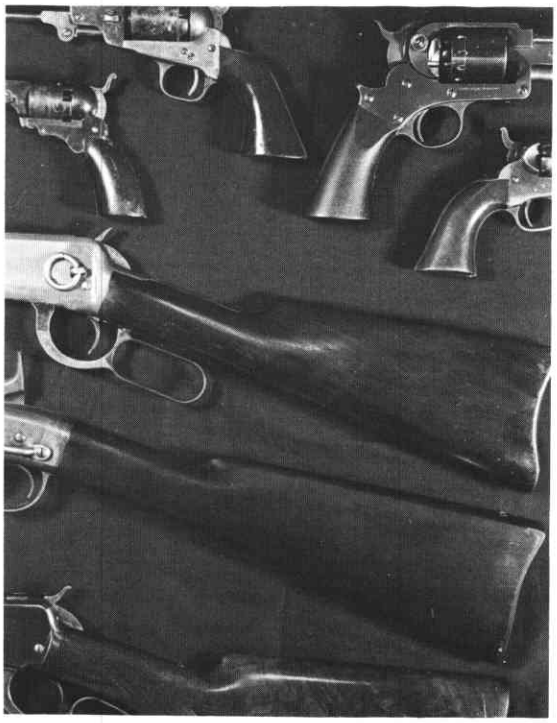

Figure 7. This photo shows a Colt 1851 Navy, a Paterson Colt and a Colt .36 Pocket Pistol all with shellac finishes or a heavy shellac undercoat; also a single action Starr with an oil finish, a 94 Winchester carbine with varnish finish, a Smith civil war carbine with oil finish and a deluxe .92 Winchester with shellac finish or a shellac undercoat.

Figure 8. This is an ultra-violet photograph of the same weapons showing the different appearances of the finishes under ultra-violet light.

Figure 9. This is a normal color photo of a Boutet pistol with several of its accessories.

Figure 10. This ultra-violet photo shows the Boutet pistol to have a shellac finish while the accessories have an oil or lacquer finish. This is not necessarily surprising since usually the accessories of a garniture were made by different workmen in different shops from those where the pistols were made.

restoration will stand out in startling clarity. Glue lines which are absolutely invisible to the naked eye leap into prominence under ultra-violet (see figures 5 and 6). Replacement ivory or bone inlays stand out clear and distinct from original ones due to a difference in fluorescence and the same is true of different types of stock finish, especially shellac which fluoresces brilliant orange and varnish which in most cases fluoresces with a flat green color. Contrary to the popular belief that most old finishes were either varnish or oil, an examination of many stocks and grips indicates that both in Europe and America the base of most finishes was shellac used as a filler to close the pores of the wood whereafter a coat or two of lacquer or even oil, which has practically no fluorescence, completed the job; the only true oil finishes found appear to be those on some American military weapons of the Civil War and pre-Civil War period, both handguns and long-arms (figures 7 through 10). Metals themselves do not fluoresce but repairs or additions by welding or brazing may sometimes be revealed by the shade and quality of reflected ultra-violet radiations.

Just as ultra-violet is a valuable tool in detecting repairs or alterations to an original stock it is also of great importance in detecting forgeries. In the case of a pair of guns made from a single original the variation of fluorescence between the original stock and the new one should be an immediate give-away. In the case of an entirely new single piece the examination would not produce such positive results but it's still reasonably dependable because freshly cut wood under lockplates or buttplates fluoresces very little while old wood in these same spots, with its pores filled with oil and dirt, will usually fluoresce brightly.

In the case of ivory or bone inlays, new untreated material exhibits a white reflection almost devoid of fluorescence while old ivory or bone is duly fluorescent with a mottled yellow color depending on its age and surface treatment. New ivory or bone that has been artificially stained with tea or other dyes will almost always fluoresce with a brownish lor while that exposed to a dung heap will fluoresce brilliantly but lose its fluorescence after being cleaned with alcohol.

Another method often helpful in detecting a fake stock is a physical and chemical examination of a sample of the wood itself to determine its type and origin. An expert can usually tell with reasonable certainty what kind of wood a stock is made from and under favorable circumstances can even identify its country of origin. While it may be difficult to draw a positive conclusion from such knowledge it is often possible to draw a negative conclusion such as the almost certain fact that no original European weapon was ever stocked with American walnut or that no genuine Italian or German weapon was ever stocked with English walnut. Unfortunately such wood experts are not found in many locations but the U.S. Department of Agriculture operates a Forest Products Laboratory in Madison, Wisconsin, and, upon serious request, will usually render an opinion on the type and origin of a wood specimen without charge. A small sample of the wood removed from an inconspicuous area of the stock will generally suffice.

Before leaving the subject of stock alterations one more point may be worthy of mention. In the case of carved stocks such as those sometimes found on French pieces of the Napoleonic and post-Napoleonic era and often on Kentucky rifles, beware of those that seem out of proportion on the skimpy side. A stock originally intended for carving was always left with generous amounts of wood and it's usually only those with later carving added that appear shallow and out of proportion.

Our second category in order of prevalence consists of *forgeries which are complete copies of European high-art weapons.* Perhaps the largest group of these in one location can be found in the Wallace Collection in London were numerous 19th century copies of 16th and 17th century high-art weapons are on display (figures 11 through 17). While elaborate, most of these were probably not intended to deceive but to serve as decorator pieces for people who didn't know or care that they were obviously incorrect in some respects. The same thing is not true of recent forgeries and those being made today, where the forger is using every skill he has to turn out pieces exactly right in every respect for the sole purpose of deceiving unwary collectors. This type of forgery of a complete weapon demands not only the mastery of engraving and the ability to make, decorate, and properly age a stock but also that the forger have a thorough knowledge of metals and casting techniques and be an absolute master of the chisel and file and a superb machinist with access to a variety of machine tools.

A knowledge of casting techniques is especially important because valuable weapons of this era were always decorated with elaborate side plates, butt caps and other fittings and usually with chiseled lockplates and pierced cocks which are much easier to cast than fabricate by hand. With the improvement of investment casting during the last few years it's rather easy for a forger to secure excellent lost-wax reproductions of any original and to the casual eye it's difficult to detect a difference however there are several positive distinctions which usually reveal the copy. Original cast fittings of the period were made by standard foundry methods using a hand-carved wood or metal pattern to proudce a mould in fine French sand. They had a slightly rough surface both inside and out and were of bronze or silver, depending on the quality of the gun. Their exteriors were polished to remove the rough suraces of the high spots and chased with the chisel to remove roughness in the depressions. After polishing and chasing, silver pieces were almost always hallmarked with a series of punches showing the place and date of manufacture and the makers name, while bronze ones were usually gilded by the mercury process.

Due to the difficulty of carving elaborate new patterns, reproductions of original cast fittings are now made by the lost-wax process which duplicates every tiny detail of the original but imparts a rather frosted finish to the casting that must again be polished and chiseled away. Even the hallmarks are perfectly reproduced but herein lines the first clue to a forgery. Since original hallmarks were applied with punches, the bottoms of the indentations were absolutely smooth whereas the bottoms of the indentations of a cast hallmark when viewed under a microscope will exhibit the characteristic frosty finish because it's impossible to polish the tiny indentations and to attempt to chisel or burnish them would not only be very difficult but also immediately obvious under a lens. Another give-away with respect to cast-in hallmarks is the fact that each casting has the marks in exactly the same place whereas originals were punched one at a time and never in the same relative positions although deviations may be rather slight. This fault of course is only obvious in the case of a pair or in the case of two separate guns with the same fittings but since most forgers who have gone to the trouble to copy antique castings seldom limit themselves to a single piece this can often be a valuable clue especially in the numerous cases where a single original gun was made into a pair.

Although difficult and tedious, it would be possible for a forger to make his own set of hallmark stamps but impressions from new punches will appear much sharper than genuinely old marks which, even at best, will have some wear from cleaning and, as previously observed, it's extremely hard to simulate true wear in a convincing manner. Another trick sometimes resorted to in the forgery of silver furniture for a valuable weapon is to cut away the hallmarked area of a piece of relatively worthless silver of the proper period and inlet this section into the new casting, soldering it into place and engraving around it to disguise the borders. Such a job is difficult to detect unless someone is looking for it but under a good lens it will be disclosed and possibly might also be revealed by ultra-violet light.

With respect to forgeries of bronze fittings, which are seldom if ever marked, the main clue may be found in their gilding. While there is nothing difficult about mercuric gilding, which characteristically has a lemon yellow color, it's extremely dangerous to the gilder and few if any craftsmen are doing such work today. Instead, electroplating is universally used and while it's possible to plate in serveral different colors an electroplated finish will never match that of mercuric gilding, not only because of the color problem but also because gilding is much thicker and less evenly applied than electroplating and usually exhibits build-ups in angles and corners, which never occur in plating.

Another fault of investment casting is that mould shrinkage is inevitable with current techniques and thus any copy of a piece of cast furniture will be slightly smaller than the original. Unfortunately, this is relative, and only truly noticeable in a pair of which one is original and the other a copy.

Equally as important to the gun forger as a knowledge of casting techniques is an understanding of metals and their properties, especially iron and steel. From the time man learned to smelt metallic ores until the middle of the 18th century, the main items produced were brittle castings and a malleable material called wrought iron which was easy to work but of rather low strength and contained noticeable inclusions of slag and cinder. During this period of development men also discovered, probably by accident, that bars of wrought iron heated in close contact with a source of carbon, such as charcoal or palm leaves, absorbed some of the carbon into their outer skin by virtue of which their surfaces became very hard if quenched in water while hot. Experimentation taught that subsequent reheating and hammering dispersed the carbonized outer skin throughout the body of the bar and this was man's first intentional production of steel, an alloy of iron and carbon with a carbon content of 0.30% to 2.0%. This early steel was called "blister steel" or "cementation steel," often inconsistent in quality even in different parts of the same bar, and retaining the slag inclusions peculiar to the wrough iron from which it was made (see figure 18).

In 1740, Benj. Huntsman invented a method of melting and refining blister steel in a crucible until it became homogeneous and slag free. This was high carbon crucible steel, of excellent quality and the first slagless steel ever made on a commercial basis however the process was costly and not conducive to large scale production. In 1856 Henry Bessemer invented a furnace in which cast iron could be melted and subjected to a decarburizing air blast which produced a low-carbon slagless steel of high quality and much cheaper to make than crucible steel. First used about 1865, Bessemer's furnace was subsequently later superseded by the open-hearth process but for our purposes the products were identical.

Ordinarily, cast iron itself has no place in the gun-making trade, especially for fine weapons, due to its brittleness and lack of strength in thin sections but some mass-produced weapons in the 19th century, mainly in America, did have parts such as frames and trigger guards made of gray iron castings which were annealed slowly until a change in crystalline structure took place that reduced the brittleness and gave them added strength. Such heat-treated pieces were called "malleable castings" and were used because they were cheaper to produce and easier to machine than wrought iron or steel forgings.

Thus, in the field of antique guns, depending on period, we find that makers used wrought iron, blister or cementation steel, crucible steel, Bessemer or open hearth steel and malleable iron. In addition

Figure 11. #A1096 in this photograph is a Wallace Collection fake consisting of a complete Wheel lock rifle built around nothing more than a plain but genuine lock. The barrel, the stock and all the decoration, including even the gold inlay on the lock, was done late in the 19th century. (Photo Crown Copyright)

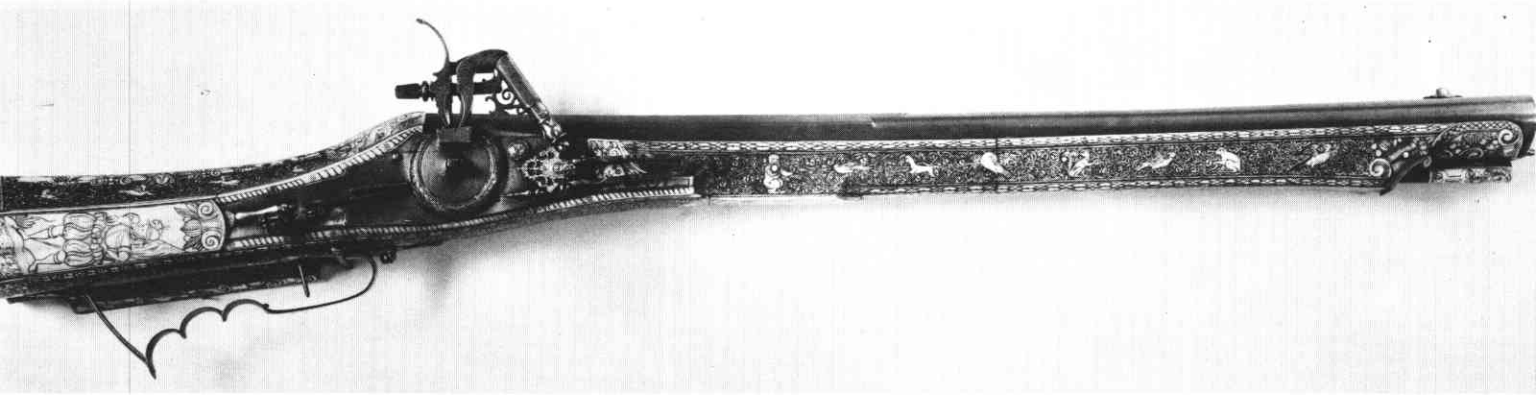

Figure 12. Wallace Collection #A1078 is a fake blunderbuss consisting of a genuine stock of the 1580-90 era fitted with a barrel from an Austrian musketoon of 1781 wherein the fore-end was widened to accept the replacement barrel and in consequence became opaqued to X-rays unlike the rest of the stock. The engraving of the cock appears to be 19th century with the sculptured gold head under the cock obviously not original. (Photo Crown Copyright)

Figure 13. Another Wallace Collection fake #A1076 with an original stock actually dated 1579, a lock of about 1670 and a barrel, probably original, chiseled to match the lock in the 19th century. (Crown Copyright)

Figure 14. Another Wallace Collection fake #A1138 consisting of an original German Dag with later gold inlay added to the lock. Incidentally while the lock is German the cock is Italian style and is probably a replacement.

Figure 15. The Wallace Collection fake #1113 in this photograph was originally a very plain Italian Gun to which lock and barrel chiseling as well as elaborate stock carving was added in the 19th century. (Crown Copyright)

Figure 16. #A1081, the barrel and stock are of the 1650 period and were probably quite plain in their original state while the lock is an 18th century one cut down to fit the stock which was then elaborately inlayed during the 19th century. (Crown Copyright)

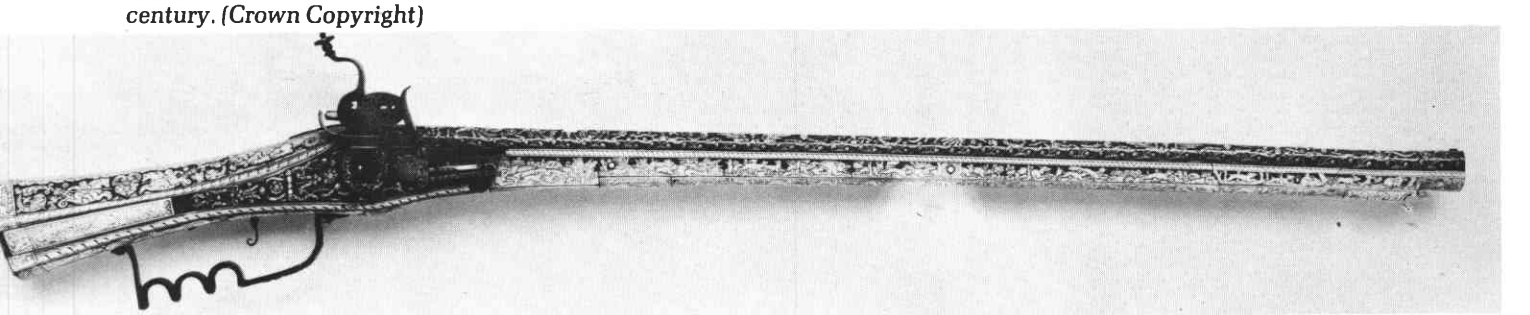

Figure 17. In this last item of Wallace Collection fakes, #1093, the stock may or may not be original but the barrel is definitely a replacement from a 17th century matchlock that was substantially cut away to make it fit the stock and was decorated with deep chiseling in the 19th century. The chiseled panel on top of the barrel, visible behind the cock, has left the barrel so thin as to almost guarantee its bursting if it were fired. The lock is original but I believe the added gold fretwork is a later addition. (Crown Copyright)

we also encounter case-hardening wherein finished parts of soft wrought iron or low-carbon steel were heated in contact with a carbonaceous material to give them a think skin of high carbon steel which could be hardened by heating and quenching. This process is similar to that used in the production of blister steel but the skin is much thinner and is not subsequently dispersed into the soft matrix.

With the exception of case-hardening, which was used from earliest times, each of the various steel making methods may serve to date or otherwise identify an antique weapon and distinguish a fake or forgery from an original. For example, the ferrous parts of any gun made prior to 1740 could only be of wrought iron or blister steel and if they are found to be made of crucible steel (often called "Cast steel") or Bessemer steel this would be positive proof that they at least, if not the whole gun, were forgeries. In a similar manner, parts made from Bessemer steel on any weapon dated prior to 1865 must also be forgeries. From this, some might only deduce that a forger or faker must be very careful in choosing his metals but the problem goes a little deeper than this in that first, he must be aware of the different types of iron and steel, second, he must be able to identify them, and third, he must be able to secure them for his use without too much trouble. In this latter respect, blister steel has not been made commercially for at least 150 years and wrought iron, although commercially available until a few years ago, is now hard to find even in used form. Crucible steel in bar form is also unobtainable today to the best of my knowledge. In the face of these difficulties and, either because of his own ignorance, or secure in the knowledge that very few collectors can distinguish between the various types of iron and steel, a forger or faker working today will surely use the materials at hand and just as surely will eventually be betrayed by them because in the case of iron and steel, and other metals as well, the fake detective again has several scientific tools and need not rely exclusively on intuition or circumstantial evidence.

The most important of these is the science of metallography which permits non-destructive identification of various metals and alloys by viewing their crystalline structure through a microscope. The preparation of specimens for inspection is quite simple consisting only of polishing a small area perhaps ¼" in diameter and lightly etching it with a chemical solution that accentuates the grain boundaries. For a valuable weapon this can be done on the bottom of the barrel, or the interior of a lockplate or other part, without any damage whatsoever, whereafter anyone with a knowledge of metallography can easily determine whether the specimen is wrought iron, blister steel, crucible steel, Bessemer steel or malleable iron.

Non-ferrous metals such as brass, bronze and silver also exhibit distinctive crystalline characteristics depending on their composition, method of casting, and the amount of cold work they were subjected to after casting. Unfortunately there were no abrupt changes in non-ferrous metallurgy that would permit accurate dating as in the case of iron and steel, therefore metallography in this area becomes a comparative tool in that a pair of guns made at the same time by the same maker would have brass or silver furniture with the same crystalline characteristics while in the case of an original and a forgery there would be almost no chance for the

brass fittings of both to possess the same physical structure.

Aside from a knowledge of casting techniques and the properties of metals it is probable that a forger who was not a finished machinist would not attempt the fabrication of a complete weapon therefore we must assume that his ability meets the task and he is able to perfectly duplicate the various forms of rifling encountered in antique weapons and to make a complete lock in the style and manner of the original piece, using materials consistent with the period. These are the obvious requirements and without them the copy would fail almost at first glance however there are certain subtleties of metalwork which he may overlook, or hope that his victim will overlook. Among these is the proper fashioning of wood screws (see figure 19) which are seldom removed unless there is reason for suspicion. The earliest wood screws appeared about 1600 and were usually crudely made by apprentices. Shanks were rough-forged and threads were hand-filed with rounded bottoms, shallow grooves, coarse pitch, a blunt point and usually a pronounced taper. Slots were wide at the top and tapered to their bottoms in the form of a knife edge and were almost always slightly off center. They were made in this manner with little improvement until about 1750 after which they retained some of these same characteristics but their threads were cut with a hand-die, the pitch becoming progressively finer, the bottoms of the threads more V-shaped (especially in England) and the taper rather slight. About 1840 to 1850 machine-made screws arrived with gimlet points, deeper groves, round or square-bottom threads, a return to coarse pitch with more taper and square-bottom slots that were truly centered. Unfortunately, the changes came at somewhat different times in various countries and even then not abruptly which tends to complicate matters but regardless of this it's easy to distinguish a hand-filed or hand-threaded screw from a machine-made one. To make a wood screw by hand by either of the old methods is a laborious, time-consuming job and this is one of the places where a forger almost always tries to cut corners by using a modern machine made screw, filing the threads a little, battering the head, and aging it back to match the overall condition of the gun he's copying, hoping that it won't be pulled, or, if it is, that the victim won't know the difference.

In our third category embracing those *fakes created by replacing major parts*, it appears that the faker's main stumbling blocks are again proper selection of material, the exact duplicating of metalwork without omission of details and the ability to match the finish of his new parts to the remainder of the weapon. As these factors have already been dicussed there's no need for repetition but instead let's look at a few actual examples of fakes created by replacing major parts, prominent among which is the Kentucky Pistol or Rifle. Many of these have been made by fitting original locks and barrels of English-made guns, not necessarily matched, to newly made stocks fitted with bronze furniture copied from an original Kentucky gun by means of investment casting and decorated with the brass or German silver inlays peculiar to original Kentuckies. Methods of identifying fake castings, new wood, and screw fastenings have already been touched upon but when the faker uses metal inlays, the nails holding them in place may present a very important clue (see figure 20). In original pieces, and in fakes as well, some of these nails are almost always visible, especially in the thin part of the forestock, and if they are round, instead of square cut nails, caution is in order. Until the early 1600's, nails were universally hand-forged, either round or square, and easily identified by their rough surface and the fact that they are made of wrought-iron. From about 1625 we find square nails cut from flat wrought-iron sheets and from about 1675 brass nails made in the same manner. Hand-forged nails, except for horseshoes, were discontinued by the end of the 17th century and round wire nails were not made until well into the 19th century and were not in general use before 1875 or later, thus throughout the era of the Kentucky Guns, both flint and percussion, square cut nails were the only kind available and a round nail found on such a weapon is either an unlikely replacement or indicates a fake or a forgery.

Another prominent item in the field of fakery by replacement of major parts is the Confederate revolver, due to the ease with which legitimate Colts or other handguns, and especially the modern replicas, can be made into Dances, Griswolds or Rigdons, and while many such conversions have indeed been attempted, an experienced collector ought never be fooled by these imitations because measurements and characteristics simply don't match up, in fact the only ones that even come close are the Colt 1851 Navy and the Leech and Rigdon. In this particular field the main hazard is that of paying full price for a composite gun with some genuine parts which give the whole piece an air of originality. Since most Confederate cylinders were made of wrought iron it was not unusual for one to explode in one or more chambers and even those of cast steel were frequently so poor they suffered the same fate; furthermore, because most Confederate revolvers were not of solid frame construction, barrels and cylinders often became separated and lost just as happened to many Colts and Manhattans. Since the latter were produced in great quantities a gunsmith or collector could substitute another original barrel and cylinder identical in every respect except serial number, which accounts for so many mismatched guns of these makes, but for Griswolds and Rigdons original replacements just don't exist and thus the composite fakes have come into being.

For example, it's possible to give a Colt 1851 Navy barrel the outward appearance of a Leech and Rigdon barrel by turning off the barrel flats and altering the lever latch but a Colt barrel so turned will be at least .020" smaller in diameter than a Leech & Rigdon barrel and more important the Leech and

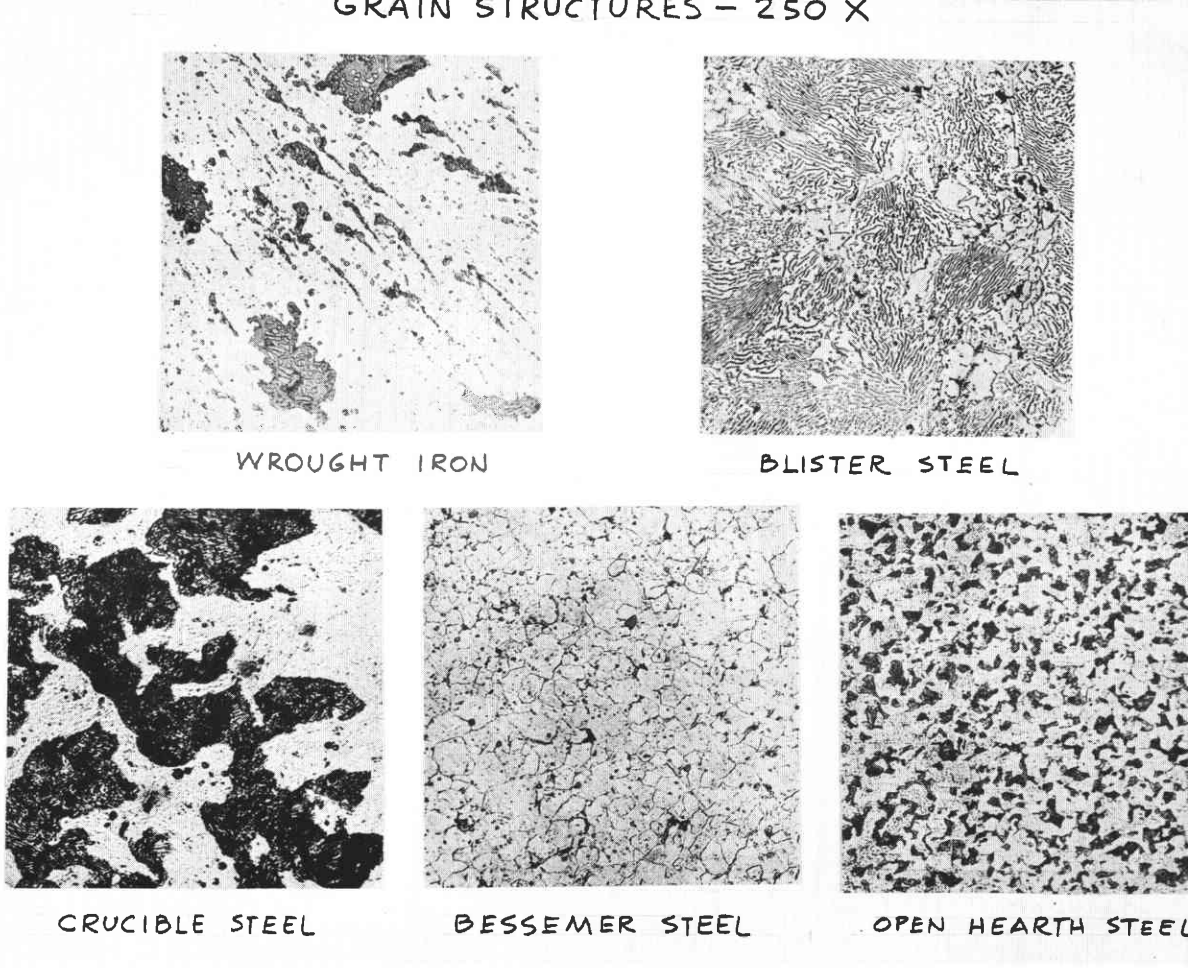

Figure 18. This composite photograph shows the comparable grain structures of wrought iron, blister steel, crucible steel, Bessemer steel *and* Open Hearth steel *with the differences easily visible.*

Rigdon rifling has a much faster twist than Colt rifling which is a dead give-away. Similary, a Colt 1851 cylinder will make a Leech & Rigdon cylinder but it starts off about .005" smaller in diameter and after removing the Colt cylinder engraving it ends up at least .015" smaller which is far more than even liberal Confederate manufacturing tolerance permitted.

As another example, a Colt 1851 barrel can be fitted to a Griswold frame but in this case after the flats have been turned off it will be at least .030" smaller in diameter and more important, the Colt barrel is cast steel whereas the Griswold barrel is wrought iron, with the difference easily discernable, and the same is true when trying to adapt a Colt cylinder to a Griswold, or a Whitney cylinder to a Spiller & Burr.

In the substitution of major parts of mass-produced weapons, even if a faker successfully overcomes the difficulties of matching materials, dimensions, and finish, he is still confronted with the greatest hurdle of all—the proper application of restamped serial numbers that match original stampings on other parts of the gun which, in my opinion, cannot be done to defy detection. I believe it's an impossibility to make a set of numbers or letter dies (or especially a combination of them) that will give impressions so exactly like those of an original handmade set that differences cannot be detected under a lens. Some slight variations in shape, angle, curve, or size, are bound to occur and when two sets of stampings on a single gun have different characteristics this is a caution signal that should not be ignored. By this I don't mean to infer that all minor parts of a legitimate weapon must necessarily be numbered with the same dies used on major parts but in the case of a Colt, Manhattan, or similar piece, you can bet that the stampings on the frame and on the barrel where they join will have been made with the same dies and this is also true of those on the trigger guard and backstrap. In the case of Confederate weapons where factories were so small and production so limited it is an absolute certainty that the stampings on any one gun will have been made with the same dies therefore any variations of characteristics is suspect and indicates that one part or another is a fake.

Our final category is that of *fakes created by modifying common varieties of mass-produced weapons to produce variations that command higher prices.* Outstanding and well-known among these are the square-back Colt Pocket and Navy Pistols made by cutting the rounded trigger quard of the common variety and rebrazing it to a square-back profile; the rammerless Pocket Pistol known as the "Wells Fargo" model made by removing the rammer assembly of the common variety and welding up the packer hole, loading slot, and screw holes (figure 21); the "Palmetto Armory" pistol made by removing the lock-plate and barrel markings of a common 1842 Martial and restamping them with markings typical of Wm. Glaze's South Carolina armory (figure 22); the Colt "full fluted" Army made by re-machining the cylinder of a standard 1860 Colt Army; and the '73 Winchester "1 of 1000" usually made up from an ordinary deluxe '73 by the addition of the barrel inscription and other changes.

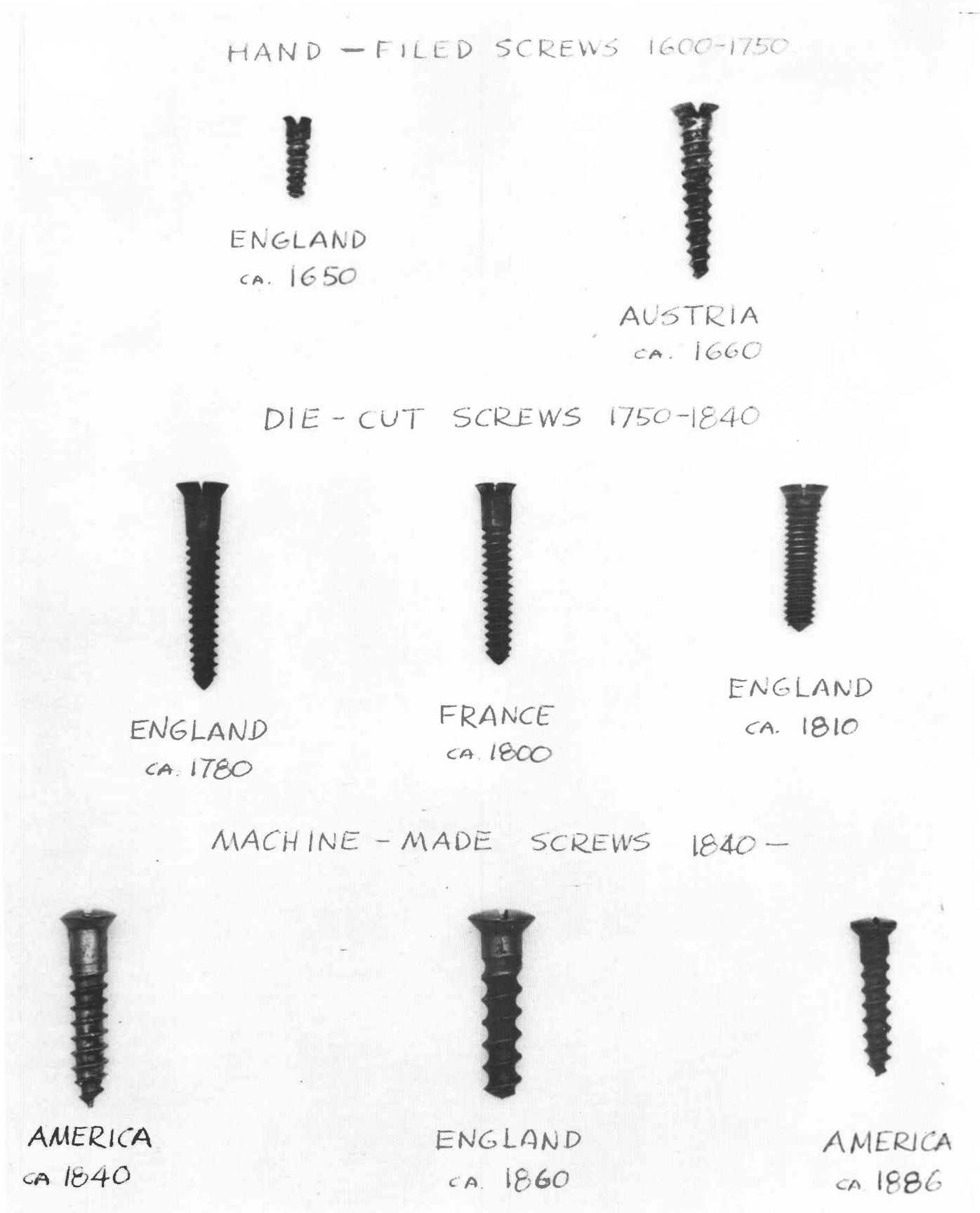

Figure 19. This shows the typical forms of hand-filed wood screws, die-cut wood screws and machine-cut wood screws.

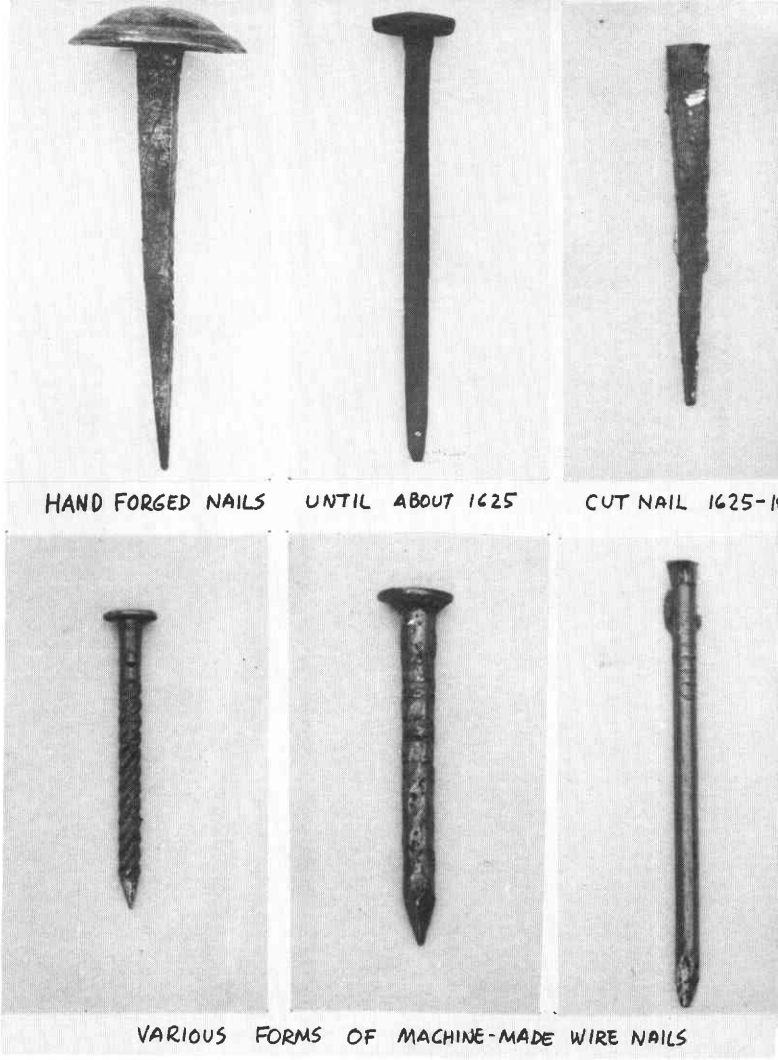

Figure 20. This shows the typical forms of hand forged nails, square cut nails and modern wire nails.

With respect to fake square-back Colt Pistols, the cutting and rebrazing of a round brass trigger guard to yield the square profile is a rather simple matter, but fortunately, such work, while perhaps perfect on the surface, usually has blowholes and inclusions on the inside that are readily exposed by means of X-ray examination, another scientific tool invaluable to the fake detective. If by some chance a truly expert welder was fortunate enough to secure a perfect weld, the faker of these models is still confronted with the obstacle of altering serial numbers, since square-back Pocket Pistol numbers ended at about 15,500 and square-back Navy numbers at about 4175 with practically no overlapping of serials between those and the subsequent roundguard models. Thus, in order to do a convincing job the faker must obliterate the round-guard serial numbers in at least four places or perhaps five (depending on cylinder stamping) and restamp them with digits that fall within the square-back series, a feat impossible to achieve without detection because of the need for removing so much metal during the obliterating process.

With respect to creating a "Wells Fargo" model from a common Colt Pocket Pistol, the faker has no great problem with serial numbers because both were produced simultaneously for many years and numbered indiscriminately but in this case he is faced with the impossible job of filling the packer hole in a manner that the X-ray won't disclose. An inserted cylindrical plug welded on both ends, the only practical method, is clearly revealed by the internal line between the plug and the hole.

Of Palmetto Armory fakes there must be a hundred or more floating around made from lock plates and barrels of the common 1842 martial pistols, but thus far all attempts to duplicate Glaze's unique palmetto stamp have failed to withstand a comparison with the originals. Either the trunks or branches of the Palmetto tree on fake stamps have always been quite different in size, shape and profile, bearing out the theory that it's practically impossible to duplicate one hand-engraved stamp with another. It's been said that this may not be an accurate test because Glaze himself probably used more than one stamp during the manufacture of 2000 pistols but if he did I'm convinced that he made them from one master die because I have never seen two original pistol stampings that were not identical in every respect. At this point it may be well to note that if a really clever faker could obtain a Glaze pistol with deep clear impressions on barrel and lockplate it would not be too difficult to duplicate them very closely by using the hardened original lockplate as a master die and pressing into it a red-hot bar of soft steel which would receive an almost exact negative impression lacking only a little of the sharpness of the original. Subsequent hardening of the soft bar would make an excellent stamp for duplicating the original marks and this has been successfully done with English and Continental proof marks on numerous occasions. Fortunately, the faker would still have the task of removing the original Aston or Johnson marks and in doing so would probably thin the lockplates and destroy the barrel contour to such an extent that his efforts would be noticeable on close scrutiny but a fake stamp made in this manner would be much more difficult to detect and it's always puzzled me why this method wasn't used instead of trying to hand engrave a completely new stamp that couldn't possibly match the original.

As concerns the Colt 1860 Army Pistol, the making of the rarer "full fluted" model from the common round cylinder one is perhaps the simplest faking job of any we have discussed. Serial numbers are no great problem because while only some 4,000 full-fluted models are believed to have been made, they have been found with serials up to 10,000 and a few with even higher numbers, which means that many of the common model could be converted without conflict of serials. Other characteristics may also fail as a test of originality because true full-fluted models like their later round-cylinder successors, are also found with 8" barrels, left twist rifling and 3 screw and 4 screw frames. Barrel legends are common to both models and unfortunately some original fluted cylinders have no patent dates or serial stamp-

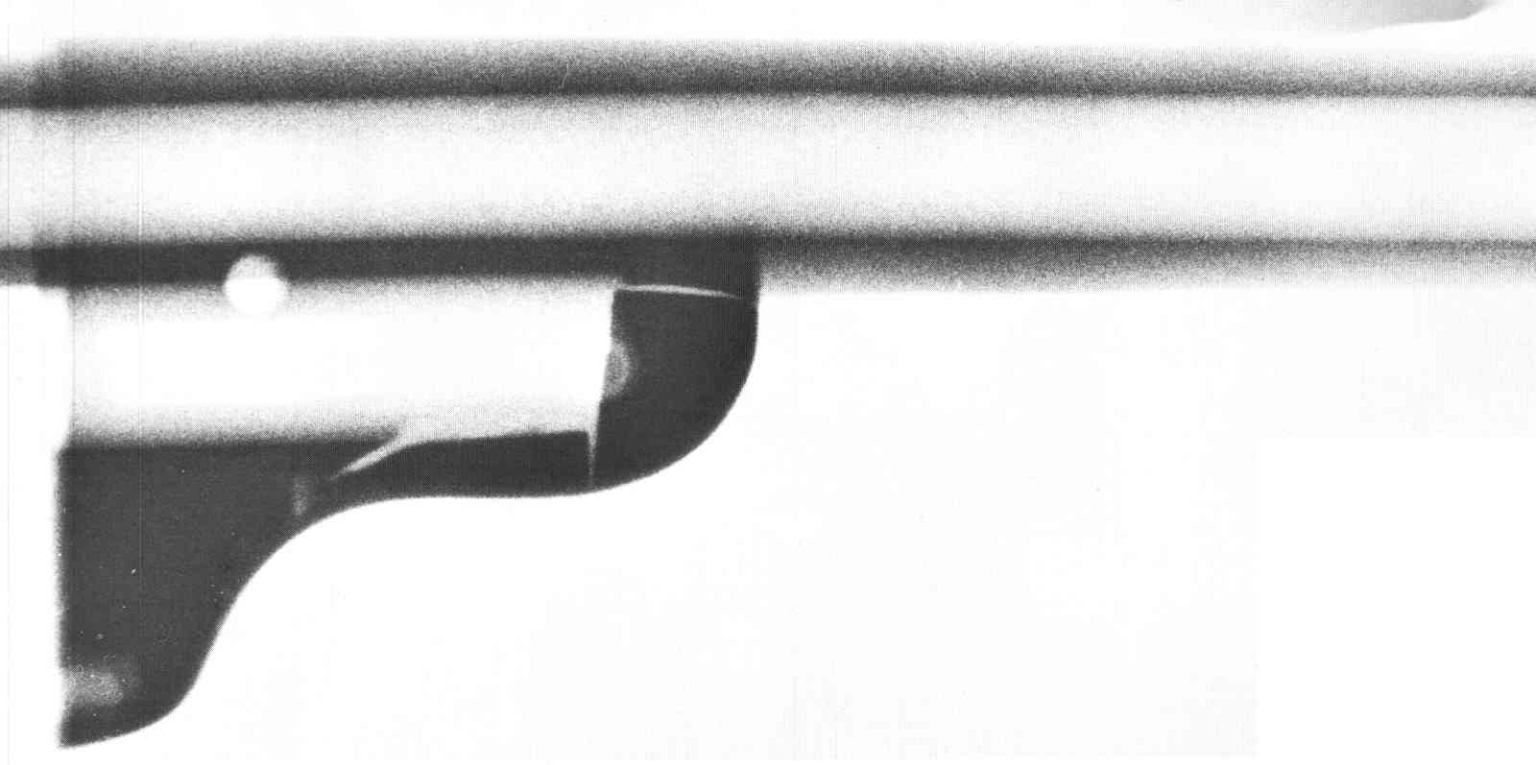

Figure 21. This is an X-ray photo of a steel plug welded into the packer hole of a common Colt Pocket Model to create the rarer "Wells Fargo."

ings which relieves the faker of the onerous task of duplicating these markings. All in all there is no easier way for a faker to pick up a couple of hundred dollars for an hours work than by finding a low-numbered Common 1860 Army and milling 6 flutes in the cylinder. The only problem in such a conversion is to refinish the cylinder to match the rest of the weapon and consequently the only real clue to a fake "fluted cylinder" lies in the quality of the refinishing job and a buyer should pay special attention to how well it matches the rest of the gun.

Finally with the Winchester "1 of 1000," we come to a piece where the ratio of fakes to originals is surely higher than that of any other mass-produced weapon. The reason for this is primarily the tremendous differential in value between this rifle and its common counterpart and secondarily the ease with which confidence is instilled in a prospective victim by a Winchester "factory letter" proclaiming that a rifle with a certain serial number and specific characteristics is indeed an original "1 of 1000." To an overanxious buyer an original "factory letter" is gospel itself and if the serial and general characteristics of the piece match those related in the letter he often ignores danger signals that would be obvious to an experienced collector who knows how simple it is to fake stationery and a signature. Even in the case of genuine factory letters their probative value is exactly zero because the serial numbers of true "1 of 1000's" are widely known and have been applied to numerous fakes whereafter the faker or subsequent owner obtained a "factory letter" which merely states that a rifle with this number and with certain characteristics was indeed a "1 of 1000" but which does not in any way certify that the one in question is the original. All genuine "1 of 1000" barrels were made in 44 caliber only during 1874 and 1875 and were fitted to first model and early second model guns made prior to 1881 with serial numbers below 80,000. All rifles thus marked had fancy wood, usually checkered, and most had case-hardened actions and single set-triggers; thus if a faker can secure a common piece with these characteristics his major work consists of engraving the legend on the barrel, removing the original number from the lower tang, and engraving or restamping a new serial that corresponds to a genuine "1 of 1000" and can be authenticated by a real factory letter. Since most buttstocks were serially numbered under the upper tang he must also remove the original number from the wood and restamp it to correspond with the new number on the lower tang and to apply the final touch he should stamp assembly numbers, which need not match the serial number, on the side plates and perhaps on the lever. If he can do all these things beyond detection then he's made a fake that will be difficult to disprove but as usual in such cases his chances of doing so in a manner that will escape an experienced eye are practically nil. First, with the engraving of the legend, the faker must remove the burrs thrown up by the burin and disguise the resulting white surround either by refinishing the entire barrel or by spot retouching, both difficult jobs to perform without leaving evidence. Second, to remove the original serial number, he must thin the lower tang to some degree which may not be too noticeable since many early Winchester serials were lightly stamped. Third, in the reapplication of a proper serial for a "1 of 1000," it may be either engraved or stamped because Winchester used both methods. Since stamping dies in the unusual script form used by Winchester for 1st and 2nd model '73's are neither easy to find nor cheap to purchase, the faker almost always hand-engraves his new number but in either event, since

Genuine Die

Fake Die

Figure 22 and 23. Impressions of steel die as used by Palmento Armory, Columbia, S.C., 1853.

the lower tang was deeply case-hardened, he must anneal it before restamping or engraving his number which of course brings on the additional job of re-hardening and refinishing to match the balance of the metal work. Fourth, the removal of the original number from the wood under the upper tang can only be done by removing some of the wood itself, a dead give-away because there is no way I know of to disquise this removal which is not only obvious to the eye but would almost surely be revealed by ultra-violet inspection. Finally, since most of the internal parts are also case-hardened, these too must be annealed before assembly numbers can be applied and would again require refinishing to match the rest of the frame. With respect to annealing and re-hardening it may be well to mention that this can seldom be accomplished without warping the parts to some degree which usually destorys the original fit and is evidenced by the feel of a sharp edge at joints or difficulty in removing or replacing screws, both of which are obvious danger signals in the case of a well-finished weapon, such as the "1 of 1000's" were when they left the factory.

These are the main points to watch for when acquiring a "1 of 1000" and if any of them show up, the gun should be examined with extreme care. As a final note of caution, remember that no "1 of 1000's" ever left the factory with double set-triggers and it is almost certain that none had pistol grips although several of them are floating around today equipped with either or both of these features.

This completes my presentation but before closing let me say that it was barely possible to scratch the surface of my subject even in this lengthy paper. Some of you may wonder why I mentioned nothing of other techniques such as Carbon-14 dating, so perhaps I should say that while this test might tell us the age of antique gunstocks or iron parts (not steel ones) with an accuracy of $\pm$ 80 years (under best conditions) its value in such an application is very slight because the test procedure is destructive with present techniques. The same thing is true of chemical analysis which might be used to identify elements present in metal parts that could not have existed if they were contemporary with the period of the gun. It is also true to a lesser degree of spectroscopic analysis which could provide the same type of information, however, a type of non-destructive spectroscopic analysis has been developed which, when perfected and in general use, may become a valuable tool for the fake detective. Unfortunately even a brief description of these techniques and their potential is quite beyond the scope of this paper.

In closing, let me say that in any treatment of the subject I have covered it is almost impossible not to leave the impression that dangerous fakes and forgeries are more numerous than they really are. As a matter of act, the truly deceptive ones are few and and far between, provided the intended victim is reasonably alert and well informed, and most of them, if not *all* of them, can be revealed by the simple expedient of a thorough, unhurried, piece-by-piece examination in calm surroundings away from the excitement of a trading session. In these circumstances a genuine gun for comparison purposes is invaluable, but lacking that, an extensive arms library with numerous cross references to various minor peculiarities of the piece will be very helpful. If any doubt remains after the initial examination it is hoped that some of the clues and tests suggested in this paper may provide the final evidence needed and may save someone from a discouraging experience that could forever turn him away from the most interesting and absorbing hobby I ever had.