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INSIDE THE ARCHIVE

DISASSEMBLY AND REASSEMBLY OF THE SMITH & WESSON M&P PISTOL

FIREARMS INDUSTRY ASSISTS VETERANS • CONVERTING THE RUGER 10/22 TO .17 MACH 2 • PUT A NON-SLIP GRIP ON...

ORIGINAL METHODS. MODERN ACCESS.

ARCHIVE EDITION 060

DIGITAL ARCHIVE EDITION

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Firearms Industry Assists Veterans

BY AMERICAN GUNSMITH EDITORS DECEMBER 2008

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In case you're not familiar with it, Honored American Veterans Afield (HAVA) is a not-for-profit organization that was formed last year by companies in the shooting and outdoor-sports industries. HAVA was developed to raise awareness and to assist disabled veterans in their healing process through participation in guided hunts, shooting events, and other active outdoor sports. HAVA recently launched anew website at which I'm sure you'll want to check out.

The HAVA website contains information about the organization along with details on how an individual or business can become involved and/or become a contributor.

Supporters who assist with HAVA's mission of helping veterans heal through active participation in outdoor sports will receive a listing on the HAVA website, a link to their own website, a commemorative recognition award, plus the satisfaction of contributing to a cause that supports those Americans who have given so much to protect our freedoms and our way of life. "HAVA was formed by several concerned firearm and outdoor companies for the sole purpose of supporting disabled vet-

erans and active-duty soldiers," said Tom Taylor, Chairman of HAVA. "Support for the organization has been overwhelming, and the website gives us new means to communicate and raise awareness.

Thus far, HAVA has served 57 disabled veterans and active-duty soldiers by hosting three hunts and a shooting event at Ft. Bragg, North Carolina. Another major shooting event took place October 18, 2008, at the National Shooting Complex in San Antonio, Texas. HAVA is also currently planning several other hunts and events across the United States.

HAVA, in my opinion, is another good example of the many ways in which members of the firearms industry support our great country and the brave individuals who do so much to ensure it remains great. Need Some Extra Cash? If you would like to turn your gunsmithing ideas and expertise into cash (we pay pretty handsomely), I would like to discuss your article ideas with you. Contact me, Keith Lawrence, Editor, at: American Gunsmith, Merritt Island, FL 32954; email voice@gunsmithmag.com; fax [407-944-1111](tel:407-944-1111); Editor Keith Lawrence Technical

PEOPLE & COMPANIES

Disassembly and Reassembly of the Smith & Wesson M&P Pistol

After an introduction to global military and police markets, this new S&W auto is now rolling out to civilian buyers. You can expect it to be popular.

BY CHICK BLOOD DECEMBER 2008

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“**m** I guessing you probably weren’t around back in the day when S&W first scored big with the military and law-enforcement communities with its Model 10 revolver—a sixround .38 Special. That was, after all, over 100 years ago, and even yours truly is not quite that old. Nevertheless, it was that venerable wheelgun that was the ancestral namesake of the newest series of Military & Police duty weapons. Of course, any similarity between the old and the new M&Ps begins and ends with the name.

Smith & Wesson’s first model in the new M&P series is chambered for the .40 S&W, packing 15-plus-one of this potent round. Coming up, if not already here by the time you read this, is a 17-plus-one in 9mm, a 15-plusone in .357 SIG, some compact models and, rumor has it, a .45 ACP is looming just beyond the horizon. The M&P measures a neat 7.5 inches long, 5.5 inches from the rear-sight top to grip-frame bottom, with a 6.4inch sight radius. Empty weight is a mere 24-1/4 ounces.

Width of the grip ranges from 1.168 inch (small) to 1.279 inch (medium) to 1.393 inch (large), by means of instantly interchangeable grip panels. Among other features area polymer frame with a rigid embedded stain-

less-steel chassis, and a through-hardened-stainless-steel slide and barrel with black Melonite finishes boasting a surface hardness of 68 HRC.

The M&P also features an ambidextrous slide stop, a sear-deactivation lever, a reversible magazine catch, an internal locking system, and an optional magazine disconnect. The magazine disconnect may or may not appear on an M&P brought in to you for a clean up or repair, but I’ll be showing you how to spot the presence of the disconnect anyway. So let’s take this thing apart and see what surprises it holds.

Field Stripping With the magazine out, the chamber empty, your finger outside the triggerguard, and your eye protection in place, grasp the slide by its rear serrations and draw it back. Press up on the slide stop, ease the slide forward to engage it, and lock the pistol open. Check again to ensure you’re dealing with an empty chamber. Every M&P carries a tool in its grip frame. Give the tool a quarter turn in either direction and withdraw it from the frame.

You’ll be using it right away to push the sear-deactivation lever down into the magazine well. Rotate the takedown lever on the left side of the frame clockwise. Get a grip on the top of the slide, move it slightly to the rear, and then pull it forward to

DISASSEMBLY AND REASSEMBLY OF THE SMITH & WESSON M&P PISTOL CONTINUED

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The cutout in the top of the slide serves as a loaded chamber viewing port. The T-shaped object near the grip is the integral frame tool. get it off the frame. Now invert the slide. Remove the recoil spring by compressing it away from its barrel lug notch and then lift out the barrel. Spotting the Safety Features Or Lack Thereof When you lock the slide open during field stripping, look down through the ejection port into the magazine well.

If you see a small lever sticking out down there, the pistol has a magazine disconnect to disengage the trigger linkage and prevent firing when the magazine is out of the pistol. If there's no small lever, then there's no disconnect feature. All M&P pistols will at least have a single thumb safety on one side to block the trigger when the safety is in the upward position, and some will have an ambidextrous manual thumb safety.

Regardless of the type of safety levers or their location, when the thumb safety is "on," the slide can be opened or closed and the maga-

zine removed or installed. I doubt you'll see an internal-locking system on a military or law enforcement duty gun. You most likely will on an M&P that's civilian owned. When locked, the system prevents firing and requires a key to unlock it. As with the thumb safety, the slide is operational and the magazine can be removed or inserted with the system engaged.

Detailed Disassembly You should read this section all the way through, including the re-assembly tips, before taking down the pistol beyond field stripping. Okay? Good. Start with the slide inverted. You'll probably want to secure the slide between padded vise jaws so you have both hands available. With a small punch, press down on the striker spring guide (#11). Remove the end cap (#21) upward. Place a finger over the rear of the slide to control the striker assembly when you depress the striker-block plunger (#60).

Withdraw the assembly to the rear. If there's a reason for further disassembly of the striker, such as part replacement or major filth, a

nylon bench block or square of hardwood is suggested. Position the striker against the block to support it. Compress the striker spring (#13). Remove both spring keepers (#12) to free the spring, the guide, the return spring (#15), and the striker (#16). The extractor pin (#3) is drifted toward the top of the slide to access the extractor (#7) and its spring (#8).

The extractor pin on the pistol I used in preparing this article was of a solid configuration. That could possibly change to a roll pin some day. If so, don't drift it completely out, which will simplify your life when the time comes to reinstall the extractor assembly. Speaking of roll pins, a 1/8-inch roll-pin punch will be required to work on the frame.

After you rotate the takedown lever counter-clockwise until it comes to a stop (so you can lift it away from the frame), pick up that 1/8-inch roll-pin punch and begin moving part #29 right to left but not completely out. The trigger pin (#30)

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When reassembling, the striker guide (A) must be held clear of the end-cap recess (B) for reasons described in the text. is headed at one end. The opposite end is smaller. A drift punch matching the small-end diameter is just the ticket for pushing out the trigger pin right to left. You should be able to lift the locking block (#32), slide stop assembly (#64), and trigger assembly (#35 to 40) out of the frame. No luck? Give #29 another nudge or two, but not all the way out (for reassembly reasons already stated).

Don't put the 1/8-inch roll-pin punch away. Another pin identical to #29 awaits at the rear of the frame. It's moved from right to left and gives you freedom to lift off the sear housing (#49). You may have to insert the punch under the housing to start it on its way. The need for this gentle prying depends on how new the pistol is and/or how tight the factory fit between housing and frame was during final assembly.

Once the housing is out of the gun, remove the ejector (#42), set the housing aside, and focus your attention on the magazine catch (#68). Keep this in mind: The magazine-catch spring has no part number. It's integral with the frame, and it's not removable. Don't bend it too much during the

following steps or you'll be in the market for anew frame. With that unpleasant thought held foremost in your mind, move the spring from its recess in the catch, letting it come to rest on the body of the catch.

Slide the catch halfway out, grab the protruding end, and hold onto it while you maneuver the spring around the inside end of the catch. Now slide the catch out of the frame. I know, I know... I haven't said a word about the detailed disassembly of the trigger or sear housing so far. Don't send me nasty emails.

I've done so deliberately and with every confidence that you'll be receiving one or both assemblies in a plastic bag thanks to the misguided efforts of an M&P owner to "make the gun better." This often occurs prior to any shooting of the pistol and immediately after it has been taken from its pristine box. When you took the trigger assembly out you noted'or should have noted'how the trigger (#38) and trigger bar (#40) were retained in the assembly by pins #36 and #37.

And when you removed the locking block, you saw (or should have) how the trigger pin (#30) ran through the block and the

slide stop. What you may not have noticed was the takedown-lever spring (#34) nesting in its recess on the side of the block and how the trigger-return spring (#35) was assembled with its open end uppermost and its opposite end hooked on the trigger bar.

Of course, your examination of how the open end of the return spring B Awas impaled by the trigger pin showed you instantly how the two components were to be reassembled Now for that plastic bag you've been handed that contains what once was the sear housing. Insert the sear-spring (#48) followed by the searreturn plunger (#49) into the housing.

Place the sear (#50) on top of the plunger, and press down to align the sear with its pin hole in the housing. Install the sear pin (#41). Where you go from here depends on whether or not the gun has a magazine safety. If it does have a mag safety, assemble the safety lever (#52) and lever spring (#51) with the bent leg of the spring within the loop on the lever. Install the spring and lever subassembly in the block and secure them in place with the deactivationlever pin (#46). If there's no such



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Smith & Wesson M&P Semi-Automatic Pistol (Specifications subject to change without notice) 1 Front Sight 2 Slide 3 Extractor Pin 4 Firing Pin Plunger Spacer 5 Striker Block Spring 6 Striker Block Plunger 7 Extractor 8 Extractor Spring 9 Rear Sight Set Screw 10 Rear Sight 11 Striker Spring Guide 12 Striker Spring Keeper (2) 13 Striker Spring 14 Striker Bushing 15 Striker Return Spring 16 Striker 17 Barrel 18 Recoil Guide Rod Cap 19 Recoil Spring 20 Recoil Guide Rod 21 Slide End Cap 22 Slide End Cap Plate 23 Magazine Tube 24 Magazine Follower 25 Magazine Spring 26 Buttplate Catch 27 Magazine Buttplate 28 Grip Insert (3 widths) 29 Locking Block Roll Pin 30 Trigger Pin 31 Back Strap 32 Locking Block 33 Takedown Lever 34 Takedown Lever Retaining Wire 35 Trigger Return Spring 36 Trigger Bar Pin 37 Trigger Assembly Pin 38 Lower Trigger 39 Upper Trigger 40 Trigger Bar 41 Sear Pin 42 Ejector (caliber

specific) 43 Manual Safety Detent Spring 44 Manual Safety Detent 45 Manual Safety Assembly 46 Sear Deactivating Lever Pin 47 Sear Housing Block 48 Sear Spring 49 Sear Return Plunger 50 Sear 51 Magazine Safety Lever Spring 52 Magazine Safety Lever 53 Sear Deactivation Lever 54 Backstrap (small) 55 Backstrap (large) 56 Spacer Spring 57 Frame Plug, Left* 58 Frame Plug, Right* 59 Magazine Spacer 60 Striker Assembly 61 Slide Assembly 62A Sear Housing w/Manual Safety 62B Sear Housing w/Manual Safety, w/o Sear Deactivator 62C Sear Housing w/Sear Deactivator, w/o Manual Safety 62D Sear Housing w/o Deactivator & Manual Safety 63 Trigger Bar Assembly 64 Slide Stop Assembly 65 End Cap Assembly 66 Recoil Guide Rod Assembly 67 Magazine Assembly (caliber and capacity specific) 68 Magazine Catch Assembly 69 Frame Tool

*For pistols without internal-locking systems.

DISASSEMBLY AND REASSEMBLY OF THE SMITH & WESSON M&P PISTOL CONTINUED

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safety present, insert the spring along with the lever that has no loop (#53) into the block, and secure them in the block with the deactivation pin. Reassembly Tips The Sear Housing. Pull the trigger to the rear with the trigger bar out of the frame. Slide the block onto the tail of the trigger bar, insert the housing halfway into the frame, and then install the ejector. Push the housing all the way down and install its retaining pin with the 1/8-inch roll-pin punch.

Opposite page: This schematic shows the M&P pistol with the sear housing (#62A) for a manual safety. The Trigger Assembly. Install the locking block including its takedown-lever wire in the frame. Reinstall the trigger pin left to right. The 1/8-inch roll-pin punch will move the lockingblock pin in the same direction. The Striker Assembly. The vise you used previously to hold the slide will make doing this easier. Push down on the striker-safety plunger and install the striker assembly.

Push the assembly as far into its tunnel as you can, and hold it there with a punch. You won't be able to press in the end cap unless the striker guide is clear of the cap so it can fully seat in the slide. Then and only then will the end of the striker guide be able to "snap" into its circular cut in the end cap. Beware: This little opera-

tion can be somewhat frustrating. The Slide. Insert the M&P's takedown lever. Rotate it downward. Insert the barrel and guide rod with the guide rod's small end forward.

Make sure the sear-deactivation lever, if the pistol is so equipped, is in its down position. Align the slide and frame rails/grooves, pull the slide back, and lock it there with the slide-stop lever. Swing the takedown lever upward and control the forward movement of the slide. Safety Checks Push on the upper half of the trigger. It should remain locked. If it moves into the firing position, replace the assembly. Now push on the lower end of the trigger.

When released, the trigger should return to a locked position. If it doesn't, replace the trigger assembly. The striker safety is supposed to block the striker and prevent any contact with alive round until the trigger is pulled. With the slide off and inverted, push the striker forward. It should not move or protrude from the breechface. If it does, replace it. After that, push and hold the striker-safety plunger down and try pushing the striker forward.

If you don't succeed, you'll have to consider replacing more than just the striker.

PEOPLE & COMPANIES

Converting the Ruger 10/22 to .17 Mach 2

Here's one person's story of the problems encountered and the solutions devised while converting this popular Ruger rifle from .22 to .17 M2.

BY ROBERT E. DRISCOLE DECEMBER 2008

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This project started last year at Camp Perry when my buddy Carl and I got talking about going out west on a prairie-dog hunt. It wasn't long before we were talking to another competitor that Carl has known for quite awhile. We were invited out to Colorado for a hunt. While discussing which rifles to take, it was suggested that we build a Ruger 10/22 in .17 Mach 2. We initially thought this was a little light, but were assured that the M2 would be plenty.

It did not take much convincing as I wanted to build one anyway. By the time we returned home from Camp Perry and got back into the daily grind, it was the end of August. I started researching what was needed and began planning my project. Due to the higher pressures, I needed a heavy bolt handle, a quality barrel, and anew stock. Ie Midway USA of

which were an""and started the assembly. I did have a little trouble installing the barrel, as the shank was the same size as the receiver hole.

I called the manufacturer and they suggested I just put it in a vise and sand it down until it fit. Since I have a lathe, I decided I could do a better job with it than with a piece of sandpaper. And I didn't mind the extra work as it allowed me to get a better fit of the barrel to the receiver. With the new barrel and heavy bolt handle installed on the receiver into the new Houge overmolded rubbers time to go to the range. On the drive to the range I had visions of shooting tiny groups with this rifle.

What a disappointment. The best I could do was about 2-inch groups at 50 yards. I tried three different brands of ammo. The results

were the same. I decided to take a closer look at some of the cases, and found them to have bulged bases and some of them were ruptured at the rim and necks. I first suspected the bolt handle and spring might not be heavy enough for the extra pressure.

After along conversation with the bolt-handle manufacturer and some proper measuring of the headspace (specification: 0.042 to 0.045 inch), I found the headspace to be 0.047 inch. I corrected this and tried the rifle again, but still had bulged and ruptured cases. By this time, Carl had ordered anew bolt and handle combination from another manufacturer, and he offered it to me to try in my rifle since he was still waiting for his barrel to come in. The results with Carl's bolt and handle were the same'bulged

CONVERTING THE RUGER 10/22 TO .17 MACH 2 CONTINUED

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and split cases. I weighed Carl's bolt and handle against mine and found them to be within a few tenths of an ounce. The headspace of both bolts were within 0.0005 inch. After more head-scratching and phone calls, I was beginning to suspect the barrel, so I decided to send everything back. I must say the folks at Midway USA were great to deal with; after explaining what I'd been dealing with, they took everything back without hesitation.

After doing some more research on the 10/22 bolt for the .17 Mach 2, I decided to purchase a bolt from ision Chambering What I liked abo at they put the weight in the bolt and not on the handle. The bolt came jeweled, polished, pinned, and headspaced to 0.0425

inch. Now I had to decide on anew barrel. I have used barrels from most of the major barrel makers on my match rifles.

After giving it some thought, I remember I had rebarreled a Remington 700 from .17 Remington to .223, and still had the old barrel lying around. After finding the barrel and taking a few measurements to be sure the bore diameter was correct, I decided to use this old barrel. Step 1 was to turn off the threads and turn down the barrel to match the chamber end of the stock Ruger barrel.

After turning the chamber end to the proper diameter, Ire-chucked the barrel in a four-jaw chuck and centered it off the existing cham-

ber. After the barrel was centered, I measured the old chamber to get as close to the end of the chamber as possible without taking too much off. I then faced the barrel off and cut the barrel shank to fit the Ruger receiver and it was ready to be chambered.

If you've ever held one of the little .17-caliber reamers in your hand, the thought of chambering under power ought to scare you. I know it scared me. So I locked the head and turned the chambering reamer by hand. After turning the shank to fit the (continued on page 16)

CONVERTING THE RUGER 10/22 TO .17 MACH 2 CONTINUED

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receiver and chambering it, it was time to move the barrel to the end mill to cut the extractor slots and the slot for the receiver block that would hold the barrel to the receiver. I first cut the slot for the receiver block, as this gave me a reference point for cutting the extractor slot. (You may notice that some of the photos show a finished barrel.

I got involved and forgot to take photos as I was doing the work.) The extractor slot is 10 degrees off of 90, so you need to set it up in an indexing head so you can rotate it to the proper angle. I don't have the type of machine or cutter to make the slot look like they do it at the factory, so I simply milled out the

3/8-inch slot to the proper depth and then used a 1/2-inch 45-degree dovetail cutter for the barrel block.

I went slowly during this step, as I was making a cut to full 17 Mach 2, produced five-shot 50-yard groups under 1/2 inch and 200-yard groups of about 2 inches. depth and it's easy to snap the cutter if you feed it too fast. Once finished, I removed all of the sharp edges from the slot. Once this step was done, I rotated the barrel and changed to a 1/8-inch woodruff cutter to mill out the extractor slot, taking care not to cut into the chamber wall.

After finishing the extractor slot, the only thing left to do was to remove all the sharp edges, polish and blue the barrel, assemble the rifle, and go to the range. With its factory-stock barrel contour, the rifle still looked

very much like the original Ruger 10/22 at this point, except that the barrel is about 4 inches longer. The barreled action fit nicely into the Hogue overmolded rubberized stock made for a factory barrel contour.

After test firing and zeroing in, I fired several groups at 50 and 100 yards just having fun with the rifle. Then I fired a five-shot group at 50 yards to see just how well it did. After seeing the results, I couldn't help but put up a prairie-dog silhouette at 200 yards and see what I could do. (All five were "lethal" head shots.) Although I wasn't able to go on the trip to Colorado, I was able to complete a very satisfying project that turned out even better than I expected.

I HOPE YOU ENJOYED READING ABOUT IT AS MUCH AS I ENJOYED DOING IT. I

FROM THE ARCHIVE

Put a Non-Slip Grip on A Plastic Gunstock

Embossing is a practical and simple method that will put a more effective gripping surface on some of those slippery plastic stocks.

BY DENNIS A. WOOD DECEMBER 2008

ORIGINAL PP. 10-14

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Gunstocks and grips made of composite, polymer, or other “new-era” plastics have been around for quite awhile now. And with the ever-increasing price of the fancy grades of gunstock timber, we’re likely to see more and more plastic as time goes by. So, if you’ve been dragging your feet over the idea of getting involved with plastic stocks, it’s time to get with the program. Of course, like most gunsmiths, I’m a big fan of blued steel and walnut.

But I eventually came to the conclusion that if the customer wants a stock made of ugly black plastic, I couldn’t afford to let his business pass me by. As in any business, the customer’s taste and desires are the only things that matter. Some of the materials’ particularly the composites’ used in these plastic stocks are said to be stronger and lighter than most of the wooden stocks they’ve replaced.

I’m not so sure about strength, but the composite stocks that have made their way to my bench have indeed been light in weight and, unfortunately, most have also been pretty darn slick in the grip and forearm areas. I can just imagine what would happen if the shooter had a little perspiration on his hands or if rain or snow fell on these slippery surfaces at a time when a sure grip was needed most.

Multiple Experiments In my quest to come up with a workable solution to putting a better nonslip on a plastic gunstock or a polymer pistol grip, I tried quite a few ideas borrowed from others along with a few ideas of my own. Actually, cutting checkering into these tough composites is an idea I considered but abandoned quickly. First, if I did manage to cut through the surface of the material with a checkering tool, I had no way of knowing if the strength of the material would be compromised.

I was pretty sure, however, that the cutting edges of my checkering tools would definitely be compromised. I’ve shortened the length-of-pull on a few of these composite stocks and have seen how fast the material can dull a band-saw blade; I’ve even seen sparks coming off the area being sawn. So I wasn’t about to ruin my checkering cutters doing any experimentation. Some of the alternative methods I tried included the application of peel-and-stick strips of grit-impregnated tape.

This is the stuff that’s used on stair treads or ladder rungs to keep feet from slipping during wet or icy conditions. The problem I found with these strips was a difficulty in getting both sides even before the sticky side of the tape gets stuck in place. And once they’re in place, they don’t stay

PUT A NON-SLIP GRIP ON A PLASTIC GUNSTOCK

CONTINUED

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stuck for very long before they walk off the job. The next thing I tried was “wrinkle-finish paint.” I sprayed it on some composite stocks while rotating them on a rotisserie-type setup and directing a hot blow-dryer onto the paint. The hot air helps the paint wrinkle up and helps to prevent runs in the finish. This produced an effective nonslip finish, but eventually the wrinkle paint will rub off in the areas where the hands are positioned the most, and then it’s back to the smooth surface once again.

The same thing will happen with paint that has grit added to it. The grit will rub off or wear thin in time and the job would have to

be done over. There must, I reasoned, be something better. The Embossing Solution I’d heard about folks who were using a heat-pressing process that imparts a roughed-up surface on the polymer pistol-grip frames made by several manufacturers.

The first time I saw the end result of this process on a pistol frame I made a guess as to how it was being done, and it turned out my guess was fairly close. The pattern I saw had elongated striations of a semi-circular design in an overlapping pattern that wrapped fully around the grip frame. The pattern looked interesting, so I thought I’d try an experiment to see if I could produce the same end result.

I dug out an old “Walnut Hollow” brand electric wood-burning pen that I’d stashed away years before, and I tried my hand at making the striation pattern on a 4-inch section of 1-1/2-inch-diameter black polyethylene pipe. I used a bullet-shaped tip mounted in the wood-burning pen. After several attempts, I had the process down fairly well, but it took too much time and there was a lot of going back over the work and touching up areas that needed to be filled in.

Ultimately, I concluded that this process did not give me the look or feel I was trying to achieve. My next attempt involved latheturning a couple of tips with #8-32

PUT A NON-SLIP GRIP ON A PLASTIC GUNSTOCK CONTINUED

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threads that would fit into the working end of the wood-burning tool. I made up several tips that were flat and a couple that had ends with a radius for dealing with the underside of curved areas such as those found on a gunstock grip. Another method of making embossing tips I tried used slotted-head brass machine screws with #8-32 threads, 5/8 inch long. The heads of these screws were either lathe-turned or filed until the bottoms of the screw slots disappeared and the top surfaces were flat.

Some of the tips were left round and others were filed square or triangular to get into tight areas or maintain a straight-line border. The definition of the word "embossing," by the way, means to "raise the surface" of an area you're working with. Thus, the next step in making an embossing tip is producing a surface on the tip that will impart a raised gripping surface on the area to be embossed. Brass is an easy metal to cut, file, or turn into a desired shape.

I used a 20 and a 30-line-per-inch metal checkering file to cut across-hatch pattern into the faces of these now-flat screw heads. If you don't have metal-checkering files on hand or don't want to invest in these files, thread-chasing files will work just as well on the soft brass screws. These can be purchased for less than \$10 with various line-per-inch designations on each of the four sides of the chasing file.

If you have a steady hand and a fairly accurate eye, you could also cut the crosshatch pattern with a triangular needle file. To help you see how the line cutting is progressing, it helps to first darken the cutting surface with a black felt-tip pen so you can see when the top of the cross-hatch pattern is pointed up and maintain even cutting and spacing.

Getting a Grip Now that you have several embossing heads made for your wood-burning tool (or electric soldering pen), you're ready to practice your embossing technique. As was mentioned earlier, I practiced on some black plastic pipe to establish patterns and learn how much pressure to place on the pen to get the result I wanted. Because there is some smoke involved with this process, I placed a small fan nearby to blow the smoke away from my eyes and nose.

The process is rather simple and, once you develop a feel for it, it goes quite quickly. All of the patterns in this embossing process are "fill-in style" patterns. What this means is that you first establish a border and then emboss the area inside the borders. As you go along pressing the heated tip into the top surface of the polymer, you'll get a buildup of plastic in your heated embossing tip.

When this occurs, you only need to use a small wire brush to clean the softened plastic out of the cross-hatching on the tip. For me, I found that I liked the 30 line-per-inch

spacing on the embossing tip, but some of the gun owners I've done this for wanted a rougher surface and opted for the texture created by the 20 line-per-inch tip. It's a good idea to have several samples on hand to let your customer get a feel for the texture when the grip is done. This is where your plastic-pipe samples will come in handy.

Most of the work in these photos shows wraparound full-control patterns. There's no reason why a somewhat fancier look can't be part of the plan. For the fleur-de-lis pattern in the photo, the outline was drawn in place with a white lead pencil and then filled in using various shaped tips on the wood-burning tool. **Conclusions** Once your embossing tips are made, they'll last virtually forever. If they ever get dull or rounded over, a few touch-up swipes with the metal-checkering file will point them up again.

This process has been successful with all the polymer and plastic stocks I've tried it on, as well as on a compound-bow grip and the black plastic scales on a hunting knife. The only stocks I've found that this process will not work on are those made of fiberglass, especially if the fiberglass contains Kevlar as apart of the composite.

The heat from the wood-burning pen is not sufficient to raise the surface on these stocks, so I'll continue to use the wrinkle paint on them until I discover a better way to emboss this type of stock. I

PEOPLE & COMPANIES

Micro-Lapping Winchester Model 70 Locking Lugs

When accuracy really counts, many factors must be considered, and this includes truing up the locking lugs on bolt-action rifles.

BY NORMAN E. JOHNSON DECEMBER 2008

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In this report, I'll discuss lapping the bolt-locking lugs on a Winchester Model 70 rifle, although the basic principle used here can also be applied to most other bolt-action rifles. This procedure can be accomplished with the barrel on the receiver. I prefer to remove the barrel from the action, however, since this makes it easier to observe the results and do the cleanup later.

The only items required are lapping compound, an empty cartridge, and a shim to be placed between the chambered cartridge head and the bolt face. With the shim between the cartridge and the bolt face, the chambered cartridge will apply controlled axial preload against the bolt face, which is transferred to the locking lugs. If the barrel is loosened and freely turned, the bolt-face shim can be oversized in thickness for the lapping process.

Pressure between the boltface and chambered cartridge can be increased or decreased by simply turning the receiver against the bolt face while lapping the lugs. This is best done with the barrel in a padded vise. In this way, the left hand can turn the action as the right hand

works the bolt. If the barrel is to remain fixed during the lapping, take shim stock and cut it to the size and shape of the cartridge head. This may require several thousandths of shim stock.

When a firm feel is attained on bolt lift, it's time to apply lapping compound to the locking-lug surfaces. I B. Bore Paste serves as a very good medium for lapping the locking lugs on a bolt-action rifle. The shim between the cartridge and the bolt face serves to create pressure during the lapping process. Use J. B. Bore Cleaning Compound (from Brownells) for this. This product is a mild abrasive and does an excellent job of lapping.

During the lapping process, you're not trying to remove an appreciable amount of metal from the lugs or the receiver's mating surfaces; in fact, you want to stop as soon as uniform contact is made between locking lugs. In most cases, this will remove less than .002 inch of metal from the high contact lug and will not alter cartridge headspace to any appreciable degree. As a light lap to the bolt face, I sometimes apply a small amount of

MICRO-LAPPING WINCHESTER MODEL 70 LOCKING LUGS CONTINUED

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Above left and center: These before (left) and after (center) photos of the locking-lug surfaces show the evenly lapped surfaces on this bolt. Prussian blue can be applied to the lug surfaces to show how well the lapping process is going. Half the lug is lapped where bolt-lug contact is made, shown by the worn-away bluing on half of the lug's mating sur-

face. the J. B. Compound to the bolt face as well. I do this as I see the locking lugs becoming polished.

This lapping process is a very effective means of getting the locking lugs uniform, which is likely to improve accuracy in any bolt-action target or varmint rifle. There's virtually noth-

ing in materials cost that you can pass on to your customer, but you can easily charge for an hour's labor, which is usually more than enough to perform a complete lapping job. Thus, this project is often a good "add-on" that can increase your profit when performing other accuracy work on a customer's rifle.

I

FINISHING

Working the Colt Sauer Bolt-Action Rifle

Little information exists on this superior-quality bolt action, so make sure this takedown procedure finds its way into your permanent files.

BY DAN HERMAN DECEMBER 2008

ORIGINAL PP. 17-21

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With only about 15,000 produced, the Colt Sauer rifle (Sauer Model 90) manufactured by J. P. Sauer & Sohn and imported from Germany under the Colt name from 1974 to 1985, rarely comes into the shop. But when one does, it's a real treat. The fine finish, the supersmooth action, and the unique nonrotating rear-bolt-locking design speak to the superb quality of this firearm. In the (literally translated) words of Sauer-Waffen: "Only the few products of our time reach the status of a classical author.

Singular function, unmistakable design, and the nimbus of imperishableness are the attributes which distinguish such milestones of

our work. The Series-90 have themselves over years their weapon history secured. And who held it once in hands Top of page: The finely crafted Sauer Rifle is a work to behold. Despite the complicated appearance, with a few simple tips and cautions, it's relatively easy to dismantle. and chamber let which slide forward and in the back, it knows why.

Okay, so a little bit is lost in the translation from German, but you only have to hold and shoulder this rifle to understand what Waffen was saying. The rifle shown here came into my shop to be completely refinished, which, of course, required complete disassembly. Searching the literature, both printed and on

the web, I could find nothing to guide me, so I chose to take a slow, deliberate, and well-documented approach to taking it down.

I was able to find a poor-quality parts diagram on the Numrich Gun Parts web site, which still helped a great deal, giving a fairly clear notion of how things were supposed to go together. It, unfortunately, seems to be the exploded diagram of the Colt Sauer in existence. So, with the fuzzy schematic and a cup of hot coffee in hand, I tackled what turned out to be

WORKING THE COLT SAUER BOLT-ACTION RIFLE CONTINUED

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Rotating the bolt body relative to the bolt-locking head allows the bolt body to be removed, thus exposing the firing pin and firing-pin spring. a pretty straightforward disassembly process with a couple of exceptions. What follows here is based on the notes I recorded through that process. Field Stripping As always, the first step is to ensure that the firearm is not loaded. With the safety (#42) "on," depress the magazine release (#60) in front of the trigger guard (#56) and remove the magazine (#64).

With the safety still on, depress the safety-release button which protrudes from the upper surface of the bolt handle. This allows the bolt to be opened while the safety is still on a practice that should also be used when unloading the firearm. Once the bolt has been pulled back, visually inspect the chamber to make certain it is empty.

Having done that, move the bolt forward far enough to clear the safety slide, move the safety to the "off" position, depress the trigger, and slide the bolt out the rear of the receiver. Set the bolt aside and we'll begin the disassembly of the rest of the firearm.

Using an appropriately sized screwdriver, remove the front and rear stock/receiver screws (#29), and then lift the barrel and receiver up out of the stock. (You might have to wiggle things a bit since it's a tight fit.) With the barrel removed, it's a simple task to push the trigger-guard assembly out of the underside of the stock. At this point, if a thorough cleaning is your goal, you've gone far enough; everything that would normally require cleaning is exposed.

Detail Disassembly To continue a more complete takedown, using an appropriately sized roll pin punch and being careful to clear the safety slide (#42) and the safety-slide spring (#41), drift out the retaining pin (#46). This

pin is tiny, so be careful to avoid sending it across the shop. Now remove the slide and Arrows indicate the location of the trigger group roll pins. The forward pin should be removed first. Once it's understood, however, removal is simple. slide spring.

Note the small tab on one end of the slide spring. On reassembly, that tab fits into the slot milled into the underside surface of the tang. The trigger group is retained by two roll pins (#37) which penetrate the rear of the receiver. Using a rollpin punch, drift out the rear pin first. The trigger spring (#45) resides above this pin and places the whole trigger group (#38) under tension.

As a result, while you're withdrawing the punch, you'll want to apply a slight downward pressure on the trigger group until the punch is removed and then ease off to allow the trigger group to rotate up on its own. Drifting out the front pin will free

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1 Extractor 2 Extractor Pin 3 Extractor Spring 4 Ejector 5 Ejector Spring 6 Bolt Body 7 Bolt Body Lock Pin 8 Bolt Body Lock 9 Bolt Body Lock Spring 10 Lug Pin 11 Closing Cam Ring 12 Spring Ring 13 Bolt Locking Head 14 Pressure Pin the entire trigger group, allowing it to be lifted straight up and out of the receiver. Pay attention to the orientation of the bolt stop (#34) and the spring (#35) which penetrates the side of the receiver. The stop can slide off the spring if you're not careful.

Fur- 15 Lock 16 Ejector Pin 17 Firing Pin Assembly 18 Firing Pin Ring 19 Firing Pin 20 Cocking Piece 21 Firing Pin Key 22 Mainspring 23 Bolt Cap Pin 24 Headspacer Ring 25 Indicator Spring 26 Indicator Snap Ring 27 Indicator 28 Receiver 29 Receiver Lock Screw 30 Thread Screw 31 Safety Screw the disassembly of the trigger group is not advised.

The only way to describe the bolt of this rifle is to call it "a precision machine." Rotation of the bolt handle causes three locking lugs (cams) at the rear of the bolt body

to pivot into 32 Bolt Lock Pin 33 Receiver Lock Pin 34 Bolt Catch 35 Bolt Catch Spring 36 Bolt Catch Pin 37 Trigger Mech.

Pin 38 Trigger Assembly 39 Bolt Stop Link Pin Snap Ring 40 Safety Connector 41 Safety Slide Spring 42 Safety Slide 43 Bolt Stop Link Pin 44 Safety Link 45 Safety Link Spring 46 Safety Slide Pin 47 Bolt Stop Link 48 Front Sight 49 Front Sight Base 50 Barrel Colt Sauer Bolt-Action Rifle 51 Rear Sight 52 Rear Sight Base 53 Rear Sight Screw 54 Stock 55 Swivel Assembly 56 Trigger Guard 57 Trigger Guard Screw, Front 58 Magazine Ejector Screw 59 Magazine Ejector Spring 60 Magazine Latch 61 Magazine Latch Spring 62 Magazine Latch Pin 63 Trigger Guard Screw, Rear 64 Magazine recesses cut into the inside of the receiver, thus locking the bolt into position.

The bolt body (#6) itself does not turn when loading or unloading the chamber. Before starting disassembly of the bolt, grasp the cocking piece (#20) in a vise, rotate the

WORKING THE COLT SAUER BOLT-ACTION RIFLE CONTINUED

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The round toothpick shown inserted into the hole in the cap pin is used to help “wiggle” the pin from its recess while slightly depressing the bolt cap itself. The lock is shown released and can be withdrawn to the right. bolt-locking head (#13), and allow the firing pin to move to its forward-most position. To disassemble the bolt, depress the bolt-body lock (#8), rotate the bolt body (#6), and the locking lugs will pivot into position.

Rotate the bolt body a little more and it can be separated from the bolt-locking head (#13) revealing the firing pin and firing-pin spring. Note the position of the closing-cam ring (#11) and the spring ring (#12) to be certain they get reassembled in the proper sequence. Now comes the tricky part. The lock (#15), which also forms a cap closing the rear of the bolt, is retained by a short and fat (approximately .3 inch in diameter) bolt-cap pin (#23).

The pin penetrates the rear side of the bolt-locking head (#13) through a small-diameter hole in its center and is retained by friction. To remove the pin, grasp the bolt-locking head in the hand so that the “cap” of the lock can be depressed with the thumb. Repeated depression and release of the cap will cause the bolt-cap pin to start working out. Use patience here. I assume there was a tool designed to be inserted

into the small hole to effect pin removal, but this “working-it-out” process will work just fine.

Around toothpick is just the right diameter and can help as you work the pin out. (I would caution you, however, not to turn, drive, or otherwise force this pin out. To do so could cause severe damage to the pin and to the lock.) As the pin begins to work its way out, grasp the exposed edges with your fingernails and while still keeping pressure on the cap, remove the pin. The lock is under spring pressure so keep your thumb on it while extracting the pin.

Once the pin is clear, ease the pressure off and the lock will back out exposing the mainspring. These parts can then be removed together. Unless you are replacing broken parts (firing pin, firing-pin spring, extractor, etc.), further disassembly is not required. If broken parts are to be replaced, their removal and replacement is quite straightforward. The Numrich Gun Parts catalog shows a complete list of parts, but most were listed as “out of stock” at the time of this writing.

Colt would be a contact of last resort, since they will not provide parts or guidance on repair to either gun owners or gunsmiths. For “liability” reasons, Colt requires that the unaltered firearm be returned to them for any necessary repair or parts replacement. Reassembly of the Colt Sauer simply proceeds in reverse order of

the disassembly’ with a few cautions. First, ensure the correct positioning of the closing-cam ring and the spring ring when reassembling the bolt.

Also note that the tabs on the exposed ends of the three cams (locking lugs) must be “captured” by the closing-cam ring. When reinstalling the trigger group, make sure that the bolt stop slides into its hole and that the spring is properly oriented. Line up the holes in the trigger group with their respective pin holes in the receiver. Insert a punch into the front hole, making sure it clears the notch in the bolt catch, and then drift in the roll pin from the opposite side.

With the front of the trigger group secure, push down on the rear of the group to depress the trigger spring and align the holes. Insert a punch to hold it all together and drift in the roll pin. Once you replace the safety slide, safety-slide spring, and safety-slide pin, you can replace the trigger guard and barreled action into the stock. Then it’s ready to receive the bolt. Make sure to rotate the cocking piece into its cocked position before reinserting the bolt.

Other than these few potential snags, the rest of the reassembly process should go smoothly and easily. Finally, I have to offer a special thanks to Kim Stuut, whose rifle is featured here, and to Donn Hilker for taking the photographs appearing in this article. I

MACHINING

Reader Forum

BY AMERICAN GUNSMITH EDITORS DECEMBER 2008

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Making Revolver Cylinders I have a question that you may be able to help me with. I've been working on firearms since 1968, specializing in long guns and also working on handguns. I am a machinist by trade and have taken metalurgy. With that said, this is my question, is there any information available regarding the complete process of manufacturing revolver cylinders? I want to also take the time to say how much I appreciate the work that you and your organization do and provide. Thanks in advance.

If you're thinking of something like a video, article, or book, no. But we've seen the operation several times. Ruger is the exception to what we've witnessed since they use the lost wax process to form a cylinder before finishing it on CNC machines.

Other manufacturers begin with around of high-quality gun steel, cut it to the proper length, drill it through for the chambers (taking care to leave a safe amount of mate-

rial between chambers) then counterbore the back end of the chambers sufficiently to accept the rim of the cartridge case. Additional machining is performed to establish the ratchets, perhaps the most complex step in the fabrication.

The cylinder is then fitted to the revolver frame, blued if so desired, and the finished product test fired using proof rounds. Being a machinist, you would, of course, be able to turn out a cylinder if you could get your hands on a set of blueprints. But there's no way you could test it. Proof rounds are not available to anyone except manufacturers of firearms. Uberti Revolver Disassembly I have an A. Uberti Cattleman .44 Magnum single-action revolver in my shop.

I'm looking for disassembly instructions, but have been unable to locate anything in my library of books or on the internet. Can you recommend a place to find this? We understand a design/engineering change has been made in the newer production

Cattleman. A coil spring and plunger installed through the rear of the frame have replaced the older leaf spring which was integral to the hand.

Other than this and its lack of a barrel/frame wedge, your revolver disassembles and reassembles just like the Single Action Army, instructions for which are undoubtedly in your library. Savage Model 420? I'm working an old 12-gauge over/ under in good condition. It has no markings of any kind except serial #17224. It's plain-barreled, doubletrigger, extractor-only, and the top lever cocks the hammers. I think it might be a Savage 420. Do you know where I can get a schematic?

I think apart may be missing, since the top lever will not stay in the right-hand open position. Do you know what part accomplishes this? There's an empty hole at the bottom inside of the

READER FORUM CONTINUED

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barrel recess, but I can't figure out what, if anything, is missing. We seriously doubt that a schematic exists, but the first thing you should do is confirm the identity of the shotgun. Send a photo of it with an inquiry to the NRA Museum (Waples Mill Rd., Fairfax, VA 22030). Be sure to enclose a stamped, self-addressed envelope. Shotgun Shell Disposal I was helping my father-in-law clean his house in preparation for sale when he approached me with a five-gallon bucket that was nearly full of old shotgun shells.

He offered me the shells, and I respectfully told him "thanks but no thanks," as most of them were corroded around the base of the shell and some even had corrosion around the primers. The question that comes to mind is two part: I assume the method of soaking the shells in kerosene, motor oil, WD-40, or Kroil mentioned in the March 98 issue ("Removing Live Rounds Safely") will suffice to neutralize the primers after a month or so.

After the soaking, is there away to safely recover the lead from the shells or should they be disposed of intact? The other question is more general. How old is too old for a shell to be considered safe to shoot? I obviously know that if the shell shows sign of corrosion or damage, it should be tossed. But for otherwise undamaged unpackaged shells it's not so easy. I told my father-in-law that since no one knew how old these shells were, the safe thing would be to dispose of them. Any help will be appreciated.

At the least, the corrosion around the bases indicates poor storage conditions, as does the corroded primers' which could themselves be corrosive and cause maintenance complexities if fired. It's safe to assume that the integrity of the old shells has been breeched in one way or another. At least one consideration that must be made when this occurs is the nature of the powder charge, which sometimes results in a change in its original burning rate.

If there's even a remote possibility the shells contain blackpowder, the danger increases to instability. Merely deactivating the primers would not eliminate the possibility of a detonation on impact. Personally, we'd make no attempt at reclamation. As for the useful, safe age of shotshells, there is no industry-wide standard. However, one major ammunition manufacturer tells us that 10 years is the safe limit. Some of their reasons include those stated above.

We agree that disposal is the best course after contacting your local law enforcement agency regarding the approved methodology. Winchester 1400 Cycling Problem I'm a newbie gunsmith trying to get started. I've got a problem with a Winchester 1400 Mk II. For one thing, I don't understand why it's built the way it is, and therein lies the problem. It will not cycle when fired. All functions work according to plan as long as I cycle it manually.

It will feed, eject, and fire no problem, just so long as I work the bolt myself. On a gas-operated system, I suppose things should work a little better. On close observation of the system, I don't see how the system itself can work. When the shotgun is fired, the gas does go down into the cylinder via the two port holes in the barrel. But then, there are three strikes against it in order for it to complete its job.

First, the magazine tube/gas cylinder cap has a spring-loaded gas escape mechanism to release gas when the cylinder is under pressure. Second, the piston can only travel about one inch before the cylinder opens up to allow gas to escape, due to how the action bar is connected to the piston. Third, the forearm has two ports right above the place where the cylinder opens up, which allow gas to escape straight upward after one inch of travel of the piston.

So, as I see it, I'm only getting one inch of pressure on the piston, but that's only when the cap doesn't release pressure as it

comes in. The spring that the piston is working against is rather stout, but must be so in order to cycle the bolt all the way back into the lock position, ready for the next shot. So, I cannot shorten the spring or take out some of its temper, as that would be shooting myself in the other foot.

I did a test by blocking the ports on the cap, not allowing the spring-loaded valve to open under pressure, as I knew that there was plenty of release of pressure everywhere else, and I was not going to be in danger. When I fired once with that in place, the shotgun almost cycled completely.

The ejection was thwarted and the spent shell was stuck in the ejection port, holding the bolt back, while the next shell was patiently waiting underneath as it was supposed to be doing, ready to be lifted up and shoved into the chamber. After that, I figured something had to change with all those pressure releases, and so I'm writing you to see if you can help me out here. Any suggestions would be much appreciated.

If there was ever anything fundamentally wrong with the Model 1400 and its variants it was that they were not designed to fire 2-3/4-inch and 3-inch shotshells interchangeably. Such was the nature of the gas system. More propellant gases were generated by the longer Magnum shells. Therefore, the orifices in Magnum barrels were smaller than those in the non-Magnum barrels. The gas bled off through these orifices and entered the gas piston.

This forced it to the rear along with the bolt to achieve extraction, ejection, allow the next shell to exit the mag tube and impact the carrier release. This allowed the carrier to raise it for chambering by the bolt as it moved forward under pressure from the recoil spring to reset the firing mechanism, return to battery, and

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(continued from previous page) ready the shotgun for discharge when the trigger was again pulled. If a Magnum shell was set off in a non-Magnum barrel, too much gas was bled off, the gas system was overcharged, and the shotgun frequently short cycled. Conversely, when a non-Magnum shell was discharged in a Magnum barrel, insufficient gas might be bled off to fully function the gun.

However, far more prevalent than these examples are clogged barrel orifices. (Seldom if ever are the openings in the gas cylinder cap blocked due to their large diameters.) When you attempted to obstruct the gas-cylinder holes, you didn't seal them off completely. Some propellant gas got through or the shotgun wouldn't have "almost" cycled. Check those barrel orifices. If they're clogged or partially clogged, don't try and clean them out with a drill bit.

A straightened-out paper clip, perhaps followed by a pipe cleaner dipped in solvent will do very nicely. As a general rule in your gunsmithing career, the first thing to suspect when a gas-operated shotgun malfunctions is the firearm's mortal enemy'd irt. S&W Model 66 Trigger I have a Smith & Wesson Model 66 that has me baffled. This gun is my brother's, owned since 1977, and shot very little. In the 70s, I had a FFL and was able to pick up some combat hammers and triggers from S&W.

The old-style wide combat hammer and triggers were steel. I had Rebel Refinishers nickel plate these parts to match the stainless-steel revolver and back then they did a great job. The problem with the gun was the ultralight trigger. I mean about 6 ounces, if that! I have stripped and cleaned the parts. I lightly bead-blasted the entire gun for a velvet-hone finish. I installed anew mainspring and 14pound rebound spring from Wilson. Every thing seemed perfect except it still has the 6-ounce trigger.

After careful detailed inspection of the hammer and trigger, I can see the most minute chipping of the nickel finish at the exact contact point of the hand and sear. There's no other deterioration of the finish anywhere. I don't own a Ron Powers stoning fixture (yet), but would like your resolution to fix this hammer-trigger combo. I don't want to change the hammer and trigger. Send help...please! With the possible exception of an overly heavy hand spring, the hand has little to no effect on trigger pull.

So run this check: Cock the gun to its single-action position and place your thumb behind the hammer. After removing your finger from the trigger, push forward on the hammer (no more than 6 pounds of force). If the hammer falls, you have "push-off"; in other words, poor engagement between the hammer and trigger.

In that case you will either have to recut the engagement angles according to the instructions for increasing trigger pull that come with the Powers fixture, or you'll have to purchase and install anew trigger and hammer. Split Savage Rifle Barrel I'm fairly new to gunsmithing and have had what I calla "major" repair come in. It's a Savage bolt-action in 7mm Magnum. The customer couldn't sight it in and wanted me to take a look.

What I saw was a 1/2-inch crack starting at the muzzle and running more or less straight down the barrel. The gun is well out of warranty. I'm planning to cut the barrel off and recrown it to fix the problem and need all the input I can get. I do not have a lathe but have access to one. Is there a suitable tool for cutting the barrel off other than a lathe? Any input would be greatly appreciated. We're assuming you mean the crack extends 1/2 inch in from the end of the barrel.

If that's the case, cutting off an inch is okay. For the actual cutting, a lathe and parting tool will give you a dead-on true cut. We've also heard of gunsmiths who've gotten good results using a metal cutoff wheel in a chop saw or a metal-cutting bandsaw. Going at the job free hand with a hack saw seldom if ever results in a true cut. However the shortening is done, the new muzzle should be recrowned and finished off by burnishing with a brass ball.

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