# Triggers: Set or Simple? Part I

*By Fred Stutzenberger*

"In the old days, rifles were made with simple single triggers as well as with double set triggers. The simple trigger, if carefully made, will work well for all but the most exacting target work, and in retrospect it seems a bit silly that so many old rifles were equipped with double set triggers. It was of course, a fad." *(Buchele et al. 63)*

In the '50s, there weren't many commercially available set triggers. I was a kid just turned 17 and planning my first muzzleloader. I had never had a rifle with set triggers and thought the ability to alter trigger pull was really cool. So I bought the best triggers available, made by P.I. (Pop) Spence. Pop was born in 1876 and died in 1968. He was proud of his triggers and wasn't afraid to show it by the stamping on the plate (Fig. 1). I thought myself fortunate indeed to get one of the last triggers he made (even though I gradually realized later that for my purposes, I really didn't need them).


***(Fig. 1) Pop Spence was justifiably proud of his triggers and didn't mind letting everyone know it.***

Logic dictates that before you decide to install set triggers on your rifle, you ask how the rifle is to be used. If the rifle is to be used primarily for hunting, some type of simple single trigger (Fig. 2), will serve as well and are less expensive than set triggers. Some of the finest rifles, including Jägers, had simple single triggers. In George Shumway's *Rifles of Colonial America*, Vol. 1, 73% of the rifles of purported European origin had simple single triggers. Of those rifles of American origin, 90% had simple single triggers. Besides simplicity and economy, the simple trigger provides the opportunity to express creativity. Part I of this two part series describes the production, installation, and adjustment of single simple triggers and some specialized tools to speed the process. Part II will describe methods to make set triggers safer and more versatile.

The simple single trigger has many merits, particularly for first time builders. It is straightforward to make. It requires neither heat-treating nor spring tempering. I have been making single trigger/plate assemblies for years using materials you can find in the dumpster behind any tech school machine shop building. A few lengths of 3/8 x 1/8" mild steel plate, some

***(Fig. 2) There are many simple single trigger/plate assemblies, both commercial and homemade that are suitable for most muzzleloading rifles.***

scraps of 1/16" cold rolled sheet metal, and a length of 1/2 x1/2 by 1/8" angle iron can be easily shaped into a fancy trigger (Fig. 3). If you want to go fancy, do not use metal thicker than 1/16" unless you want a lot of work and a bulky looking trigger. I usually make a few assemblies ahead of time, taking advantage of the feeling when it comes, sometimes forging the triggers to final form, sometimes using commercial trigger blades (see suppliers), and sometimes just pinning in the trigger blank with 1/16" diameter drill rod (Fig. 4) to keep them for future shaping and installation.

Hammer-forging the trigger shoe is pretty straightforward. I start with a rough sawed blank as was shown in Fig. 5. If I am using 1/16" thick sheet metal, I do not grind a curvature in the area that will become the shoe. Sometimes as shown in Fig. 6 where a long, plain trigger shoe is desired in a guard with a spacious bow, I will use 3/32" or 1/8" thick cold-rolled mild steel plate with a shallow indent ground to bring the curvature along a bit. Then I begin peening with Grandpa's ball-peen hammer until the shoe is upset to the width I desire. I do

***(Fig. 3) The simple single trigger allows some room for homegrown creativity. This trigger was shaped from 1/16" thick mild cold-rolled sheet metal.***

*(Fig. 4) This collection of triggers and plates includes (from top) a plate hammer-forged in the traditional way by folding and unfolding to allow cutting of the slots with a saw. Next is a plate with a trigger blank. Below that is a cast trigger/plate assembly with plate extensions on both ends. At the bottom are parts for making trigger plates.*

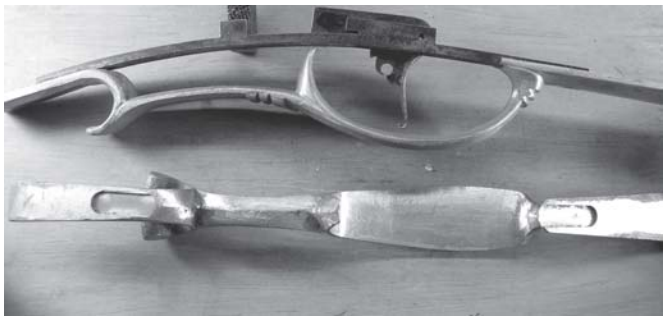
the finish peening with a small hammer, followed by filing to smooth the dimples and shape the shoe to symmetry (Fig. 5). Finally, if I want the tip of the shoe to end in a curl as shown in Fig. 3, I file the tip very thin, heat it and start tapping on the end to gradually bring the curl around. If a bit of discontinuity occurs in the curl, I may use a nail on which to final-form the curl with the help of needle-nose pliers. Then the pattern behind the shoe is drilled and filed to the desired shape.

I always make my single trigger plates, whether I use a commercial blade or one that has been hammer-forged. A long single trigger plate allows me to attach the trigger plate to the guard at both ends as shown in Fig. 2. The foot of the trigger

*(Fig. 5) The only tools needed to shape your own single trigger are a couple of ballpeen hammers and a vise to hold the material.*

brackets on my plates is attached to the plates using Hi-Force 44TM low temp (470° F) silver solder (see suppliers). That provides a double thickness of material to be threaded for the tang bolt and provides mutual support for the bracket, the plate, and the thread engagement of the tang bolt.

If I am using a purchased trigger assembly, I usually have to solder an extension to the rear of the plate to create a much stronger unit than the separate trigger and guard. I have access to a milling machine in our campus machine shop where I can mill indents in the guard returns (Fig. 6). Trigger guards are hard to hold for milling because they come in many shapes and sizes, none of which have parallel sides. It took me a while to develop a fixture versatile enough to firmly hold guards in sizes from children's rifles right on up to muskets (Fig. 7). The indents are pretty shallow (~0.050") into the forward and rear guard returns; the ends of the trigger plate are attached with 4-40 screws passing through the plate into the guard. The indents allow the guard to be inlet into the stock while



***(Fig. 6) If the trigger plate is long enough, its ends can be attached to the trigger guard returns. I used to mill my trigger plates full length (top) and allow a boss to hold a light return spring to hold the trigger blade away from the sear at rest. However, I silver solder the trigger boss on now to raise the pivot point and increase leverage.***

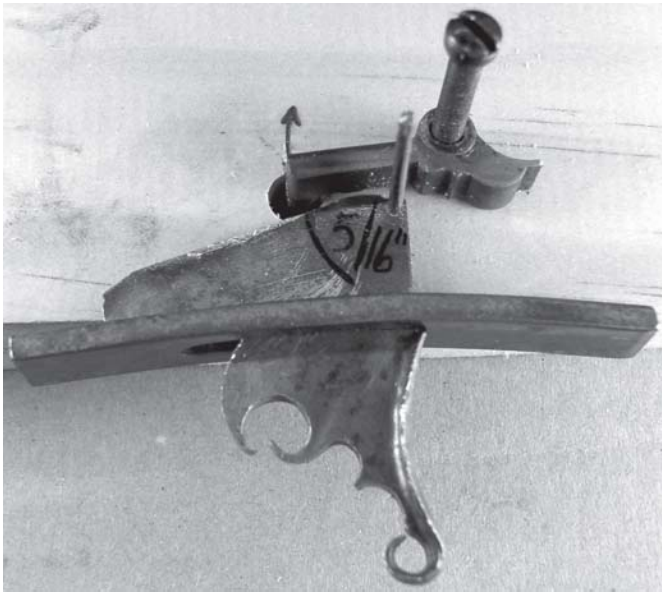
***(Fig. 7). This fixture has been made from a scrap of aluminum bar. For milling indents, it can hold guards of any size from a child's rifle (shown) up to musket size guards.***

keeping the trigger plate flush with the surrounding wood. If you do not have access to a milling machine, don't worry. You can file a bit of relief on the ends of the trigger plate and achieve essentially the same results. Milling is just faster and perhaps a bit more precise

The twin spans of this rigid unit acts like a buttress to reinforce the wrist of the rifle, the weakest point most susceptible to breakage. The Hawken brothers used a similar strategy by turning the threaded stud of the guard into the plate at the forward end and passing a screw through the plate threading into the scroll on the rear of the guard. Besides the strengthening effect, the guard acts as a "handle" by which the assembly can easily be pulled from the stock for repair or adjustment. If you buy a commercially available trigger/plate assembly, you can gain the same advantages by soldering extensions on to both ends then attach them to the guard via screws threaded into the returns.

A few years ago, I was visiting with a riflemaker friend who was fretting over trying to get the proper clearance between trigger and sear using a traditional trigger pinned through the lock mortise. Each time he took the trigger out for a bit of filing, he had to pull the pin and then put it back in. After an hour or two of this tedious exercise, the pin was wearing out the wood and my friend's patience alike. Of course, that was the way triggers were done in many of the old original American longrifles and if you want to remain steadfastly traditional, that is what you would do. The weakness is that the trigger had no direct mechanical attachment to the plate (Fig. 8). I would rather have the assembly all together as a unit strong, stable, and easily removed for adjustment or replacement.

The conservative traditionalists might wring their hands at the thought of removing tiny snippets of wood on each side of the trigger to provide room for a steel support firmly attached to the plate. "Weaken the stock!" they say. Never mind that in their traditional trigger pinning method the pin goes all the way through the stock at its weakest point, is supported by a thin web of wood on one side, and conflicts with the sideplate on the other. Nevertheless, the traditional method




***(Fig. 8) This crude mock-up shows the interaction of a simple single trigger with the sear bar of the lock. The closer the bar/trigger contact is to trigger pivot point, the easier the trigger pull. Likewise, the higher the blade is pinned in the stock, the easier the pull.***

did have its advantages of simplicity and a trigger pivot point with great leverage. Its construction was very sparing of materials and required no joining of metals by soldering or brazing. However, by the time that the American longrifle came into its Golden Age, British gunmakers had already gone beyond the pin-through-the-mortise method of trigger attachment. They had nicely cast trigger plates with integral bosses providing high pivot points for maximal mechanical advantage without the use of set triggers (Alexander 171). That type of trigger assembly was employed for more than a century. Ron Dillon showed me the integrated all-in-one trigger assembly on an English Gibbs-Metford "thousand yard rifle." The trigger was hinged high on a sturdy support post integral with the plate. There was a hefty boss into which the tang screw was threaded and there was a fine wire return spring secured at the back of the plate. This was good enough for one of the most sophisticated rifles at the peak of refinement toward the very end of the muzzleloading era.

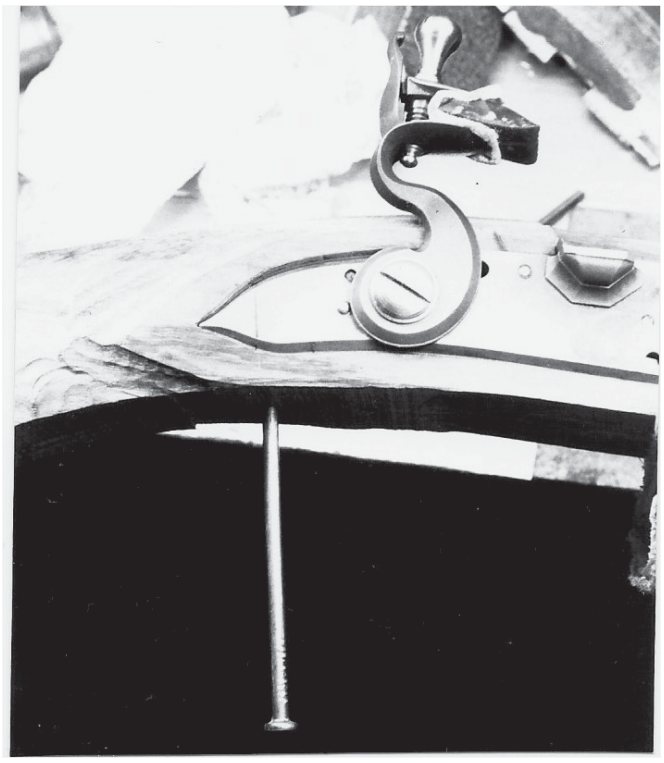
No matter what sort of trigger/plate combination you choose, remember that you want a dependable, predictable trigger pull, both for performance and safety. That means getting the most leverage by pinning the trigger pivot point high up in the stock, whether on a steel support attached to the plate or through the lock mortise. On the early rifles with heavily swamped barrels, there was enough wood left in the lock mortise to support the right side of the pivot pin. The barrel of the Jäger rifle I am currently building has a breech diameter of 1.130" across the flats. Across the tails of the lock panels, it is 1.905". From the lock mortise bottom to the trigger midline is 0.465", a web of wood sufficient to support the trigger pivot pin even if the area around the pin were relieved 0.125" to allow grasping the pin with a pair of pliers for removal. However, as rifles got skinnier in the 1800s, the web of wood between the lock innards and the trigger got thinner. On my .36 caliber southern mountain rifle with its 13/16" diameter barrel, the distance between the lock panels is only 1.360". The web of wood between the trigger midline and the bottom of the lock mortise is only 0.230". Take off 0.030" for trigger clearance and 0.125" recess around the trigger pin for its removal and you have only 0.075" of wood left to support one side of the pin. After hard use wears that little hole bigger, the pivot pin might loose support on one side. Could that reality have contributed to the abandonment of the traditional pinned-in-the-wood single trigger for the sturdy, mounted-in-the-plate set trigger assembly?

Keith Lisle (www.custommuzzleloaders.com) came up with a better alternative explanation for the trend away from the traditionally pinned trigger:

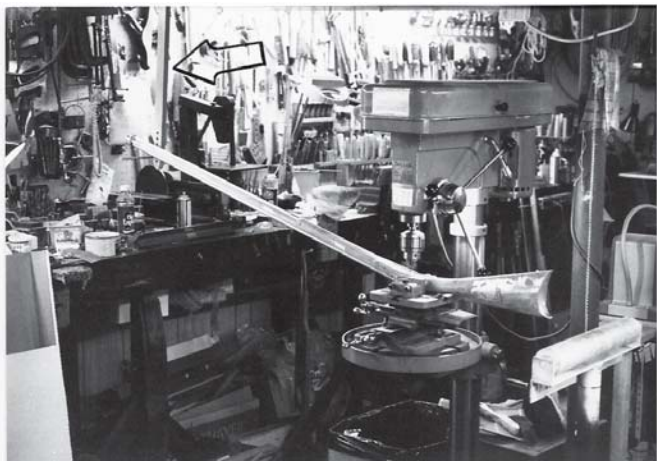
"I think another reason for the loss of the "pinned in wood" single trigger is because if you have to change the lock, or modify the lock in anyway, it changed the position of the sear arm. Thus again taking the pin in and out of the wood many times to refit the trigger. Where as, with a trigger assembly, you can actually hold it up in the stock and feel/test it and simply drop it out or use a small C clamp to hold it in and test."

Surely readers with a collection of original rifles with triggers pinned through the mortise can provide more insight into this issue than I.

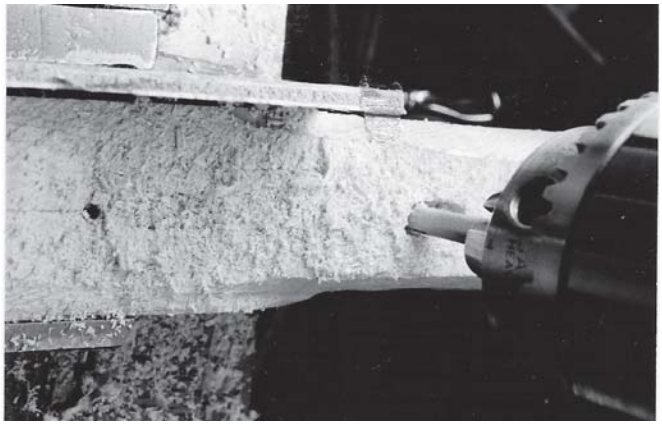
Whatever trigger assembly you use, you are going to have to inlet it precisely so that it mates well spatially with the lock for dependable action. Before you start the inletting process, be sure that your lock works freely within its mortise. Once you get the trigger inlet and find a problem you have to determine whether it is lock or trigger related. It's best to eliminate half of that question. Mark the position of the sear arm with a long line across the plate and panel. After locating the position of your trigger plate, drill a hole up through the mid-line to the



*(Fig. 9) Before you inlet your trigger, you can make a trigger "pushrod" by drilling a hole up under the sear bar and inserting a nail to trip the lock.*



*(Fig. 10) The muzzle end of the rifle must be supported when milling out the trigger mortise on the drill press. A swinging support can be hung from the ceiling (arrow) or a roller rest can be used (seen at right).*



*(Fig. 11) Milling the mortise produces a mass of chips that will hide your reference lines. An assistant with a vacuum source is a big help here.*

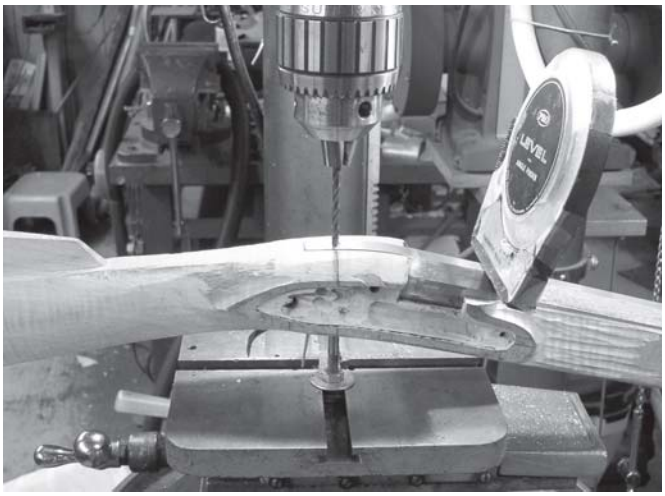
sear armhole so that you can insert a pushrod. I use a nail (Fig. 9) that is just a slight resistance fit in the hole. The nail takes the place of the trigger in tripping the lock. If it does so with ease, and if the lock comes to half and full cock with nice crisp action and reassuring clicks, and if there are no black rub marks on the mortise, you can assume that any problems associated with triggering the lock are in the trigger mechanism, not in the lock. Proceed with the inletting.

The difficulty in inletting any trigger combination occurs neither in its length nor width, but in its depth. That is where most of the work is involved. It is just hard to cut a multilayered inlet that deep and have it come out to the exact depth you want. First of all, do your measurements carefully. Take off wood underneath the stock if necessary – no need to inlet through more wood than you have to. I am well into my 70s and perhaps don't have much shop time left, so I take the easy way out and cut the mortises on my drill press (Fig. 10). I used a swinging support (I called it the trapeze) hung from the center joist of my basement shop to support the muzzle end of the rifle while the mortise was being cut for the trigger assembly. Then lay your trigger assembly along side the stock under the lock mortise and work the trigger to see how it will come up through the sear armhole. Use your dial caliper to measure the working dimensions of your assembly to determine how deep you need the mortise for the trigger blade to come up into the bottom of the hole.

You can mill the trigger mortise as just described or go at it with chisel and mallet after drilling a series of holes to the required depths. Be sure to draw dark, easy-to-see guidelines to mark off the different depth requirements of your trigger assembly in the mortise. Don't just hog out a long trench to the depth of the most prominent part of the trigger assembly. A disadvantage of my system is that it generates a mass of chips (Fig. 11) that obscure my reference lines unless I have an assistant handy to do vacuuming. If you are milling, mill a little bit, vacuum out all the chips and lay the assembly alongside the mortise to make sure you get a clean job (Fig. 12) with no gaps. Carefully cut the mortise for the "action area" first, not taking out more wood than necessary at each depth and width (measure with your dial caliper), then cut the plate mortise last. That way, if you need a little lengthening of the mortise, it can be done by hand and will be covered by the plate.

Traditionally, the trigger plate was held in its mortise on the forward end by the tang bolt and is driven into the under-

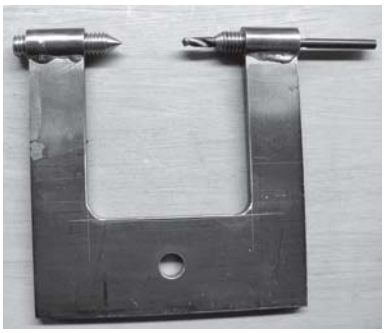
*(Fig. 12) This milled mortise will be an easy cleanup fit for the trigger assembly.*



*(Fig. 13) Getting the hole in the tang through the stock and into the hole in the trigger plate requires precise alignment of the drill press chuck and a point on the table. A fixed point was fastened to the table and aligned with a center point held in the chuck. Drill the clearance hole for the tang bolt most of the way through the stock, then turn the rifle upside down and run the tap drill through the trigger plate. The two holes will be aligned concentrically with each other. The magnetic inclinometer will aid in alignment.*

cut wood of the mortise on the rear. You can understand why the old gunsmiths did that, because making screws was a chore and every one omitted was work time saved. Nowadays, unless you are a diehard traditionalist, secure that plate in its mortise at both ends so there is no room for movement of the plate; it must not move either horizontally or vertically. Either way will alter trigger/sear interactive geometry and potentially create an unsafe or unreliable situation. Remember that when you pull the trigger, it presses upward on the sear; the sear's resistance creates a downward force that could force the plate back out of its mortise if not bedded properly.

Getting the tang to go through the tang at the right angle, down through the wrist and exactly into the hole in the trigger plate can be an adventure (aka a bad trip) if you don't use the right strategy. You can use the center point strategy on the drill press (Fig. 13) to line up the pre-drilled holes in the tang and the trigger plate. The hole through the tang should be the clearance hole for the bolt. The hole through the plate should be the tap hole for either the 8-32 or 10-32 bolt. An easier strategy is to use the drill guide (Fig. 14) described earlier (Stutzenberger 65). It's not hard to make. It is hard to remedy a misguided hole through the wrist of the rifle. I felt pretty clever, using just a scrap piece of steel plate and a piece of all-thread rod to make a jig for aligning a bit to come out exactly where I wanted it. After I published my little creation, I got a package from Scott Coy up in Minnesota. He came up with a jig like mine only much more sophisticated and more easily adjustable (Fig. 15). I was soundly chastened by Scott's mechanical skill and ingenuity. I hope that he can sell his idea and make some money off of it. If you get a chance to buy one of Scott's drill guides, do it because it will save you a lot of frustration in your rifle building, particularly if you plan more than one rifle. Every one of those rifles needs a hole drilled precisely through the tang, the wrist, and the trigger plate. Don't just run a wood screw down through the tang; you want to lock the tang and the trigger plate together with a sturdy bolt (either 8-32 or 10-32).



*(Fig. 14) If you don't have a drill press, this little homemade jig will do the same thing.*

*(Fig. 15) Scott Coy's alignment jig is much more sophisticated than mine. It has guides for #8 and #10 bits and a movable center point - a nice piece of work.*

One final point: nothing spoils the feel of a single trigger more than a case of "the rattles" (also called "floppies") caused by a lock having different positions of the sear arm when moved from rest to half cock to full cock. Usually, the sear arm drops to its low point at half cock. It is imperative that the trigger does not interfere with the sear movement firmly into the half cock or full cock notch – very dangerous otherwise. However, without a one-position sear, the trigger blade must be shaped to allow some play between it and the sear arm. That play allows the trigger to rattle or flop around when the lock is in the rest position. I mill a little relief in the belly of the tumbler (Fig. 16) to allow room for the sear nose to rotate a bit higher, allowing the arm to drop down to rest on the trigger. No more floppies. This may seem like a minor point, but a floppy trigger ruins the feel of an otherwise fine rifle.

*(Fig. 16) An indent ground into the belly of the lock tumbler allows a little more room for the sear to rotate and let its arm contact the trigger blade to avoid trigger rattle when the lock is at rest.*

Having regaled the reader with all the virtues and vicissitudes of the simple single trigger, I will admit that there are some rifle styles that demand the installation of set triggers. Part II of this series will address that demand.

**Suppliers:**

Brownell's (Brownells.com) 1-800-741-0015, for silver solder and a wide range of gunsmith tools and supplies.

Dru Hedgecock, Inc., 5420 Morris Hill Ave., Walkertown, NC 27051, 1-336-595-4257 for a wide range of triggers and trigger guard castings.

L&R Locks (www.lr-rpl.com) 1-803-481-5790 for 11 styles of muzzleloading triggers.

R.E. Davis (www.REDavisCompany.com) 1-419-833-1200 for 17 styles of muzzleloading triggers.

**References:**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Buchele, W., Shumway, G., and Alexander, P. A. *Recreating the American Longrifle*. York, PA: George Shumway, Publisher, 1980.

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