Making a Flint & Steel Striker

by Jim Buller

Whole books have been written on the subject of forging steel. However, all that will be attempted here is to present enough of the bare basics, so that with some simple tools, you should be able to make a workable flint & steel striker. Also, since I have ran across usable steel in some very remote places, (probably left behind by some hunter or trapper, or by some mining, ranching or lumber operation), suggestions have been included here that might even enable you to make a striker in a primitive wilderness setting. This steel can be re-shaped and heat treated to make a flint & steel strikers, or possibly even a crude but functional knife. Although knife making, as such, is not covered here, many of the principles and techniques are the same.

Metallurgy

For our purposes, there are three basic types of iron metals: (1) 'Mild Steel,' which doesn't have enough carbon in it to be able to take a heat treatment. (2) Carbon Steel, which does have enough carbon that it can be heat treated. And, (3) Cast Iron, Stainless Steel, and numerous other alloys, which either have too much carbon to be workable, or are not practical to work with under primitive conditions. There are two 'quick and easy' ways to tell which type of metal something might be: (1) What was it used for? And (2) whether or not it 'rings.' A third way to determine what type of metal it is, would be to heat it up, try working it, and see if it can be heat treated —but more on that later.

A flint & steel striker must be heat treated to be able to 'throw sparks,' so we need to use carbon steel. Since most springs are made from carbon steel, this is a good place to start looking, as there are many types and sizes of springs. Another easy to recognize option would be various tools, as many tools are also made from carbon steel. Most carbon steel will also 'ring' if it is struck or dropped. Try dropping different iron metal objects such as: nails, bolts, wrenches, and pieces of scrap, and notice the difference in the sound they make. Mild steel has a tendency to just 'thud' or 'clunk,' whereas carbon steel will frequently have a musical ring. To make a striker, look for a spring, tool, or something else you suspect might be carbon steel with a cross-sectional diameter of between ⅛ to ¼ in / 2 to 6 mm. Larger stock could also be used, but you will end up either with a striker that is heavier than necessary, or having to do considerably more work to thin it down. Upholstery springs and bed springs can make

CAUTION: If the metal has a textured 'shiny' or grey non-rusty look to it, it may be galvanized. This is a zinc coating on the steel which helps keep it from rusting. Heating metal that has been galvanized will give off poisonous fumes. If at all possible use something else. If not, be sure to heat it outdoors, and stay upwind until the galvanized coating has burned off.

workable strikers, but they tend to be a bit on the thin side. Garage door springs, and some motorcycle springs, are a good choice.

After you have located some steel that you think might work, heat it up to see how it reacts. As iron is heated, it changes color. First it turns a bluish grey, then it will start to glow a faint dull red. As it gets hotter, it will go from the dull red to bright red, to orange, then bright orange, yellow, and finally white. At a bright yellow the metal will start to liquify, and at white hot it will be melting —and throwing off bits of molten metal that look like coarse sparks.

Corresponding somewhat to these heat glow color changes, the internal crystalline structure of carbon steel also changes. If it is 'quenched,' or quickly cooled at these various heats, the quenching will 'freeze' the metal in these different crystalline structures, causing the steel to be anywhere from relatively soft and malleable, to hard and brittle. For example, if the steel were to be quenched at a grey heat it would be relatively soft and could be shaped somewhat, by bending or hammering, without breaking. On the other hand, if the steel were quenched at a yellow heat, it would be very hard, but also very brittle. If thin enough, it could break just by being dropped! Quenching the steel at the red to orange heats, will give variations of soft to hard, and malleable to brittle. This is what makes it possible to 'heat treat' carbon steel. Most tools, including knives and strikers need to end up somewhere in the middle between soft and malleable, and hard and brittle. They need to be hard enough to keep their shape, hold an edge, or in the case of a flint & steel striker, throw sparks. But they should not be so hard that they would break while being used, or if they were dropped on a hard surface. 'Critical temperature,' a function of the heated crystalline structure, is the point where the metal loses its attraction to a magnet —usually somewhere around orange hot. It is nice to know what color corresponds to critical temperature, but this not absolutely necessary.

While shaping the striker, as well as for most other forge work, the working range is be between red hot and orange hot. At these heats the metal is quite malleable and 'plastic,' which allows it to be bent and shaped relatively easily. Although it is possible to slightly shape steel which has cooled beyond a dull red, the metal may start to crumble and break apart inside. So only work on metal that has a visible heat glow. Notice also that, even within the red hot to orange hot range, the 'cooler' the metal is, more force will be necessary to get the same results. So once it loses its visible glow, put it back into the forge and reheat it. At the other end of the scale, 'bright yellow hot,' the steel is starting to liquify and will be getting very soft. Working metal at a bright yellow heat may cause it to simply fall apart, or even to shatter, sending little pieces of extremely hot metal in all directions. At 'white hot' the metal will be throwing out coarse sparks and melting, so you definitely don't want to let it get that hot either. Many strikers have been ruined by letting them get too hot during the final stages of shaping. So again, the working range is basically no cooler than a dull red heat glow, and no hotter than a bright orange.

Also keep in mind that the color of the metal will be constantly changing as it either heats up in the fire, or cools down while it is out of the fire. Therefore it is necessary to keep a close eye on what is happening. Because of this, it is a good idea to 'set up shop' in the shade, as bright light, especially sunlight, will make it difficult to tell exactly what color the metal is.

To determine for sure whether or not a piece of metal can be heat treated, heat one end of it to a bright orange/almost yellow. Then, noting the places on the metal that correspond to the different colors, quench it in container of warm water. After quenching it, try to file the heated area with the corner of a metal file. If the file just slides across the place that was bright orange, and doesn't 'bite' into it at all, this is a good sign. If the file does seem to bite into it a little, try filing on the place where it was grey and compare the two. If there is a noticeable difference in the amount of bite between these two areas, this is still good. If there is no difference in the way the file bites into the metal, then it is probably not carbon steel, and it cannot be able to be heat treated by simple methods.

Next, try placing the spot that was bright orange just over the edge of the anvil and hit it with a hammer, gently at first, then harder. If it breaks, look at the end of the break. If the break looks very finely grained, this is good. If the break looks coarse grained, or if the metal is just dented and/or bent by the hammer blows it is probably not carbon steel, and won't take a heat treatment.

Once you have found some good carbon steel, and tested it, you are ready to make a striker. All that is really needed to throw adequate sparks to start a fire is a straight section of heat treated carbon steel about 1½ to 2½ in / 4 to 6 cm long —the rest is just some type of handle for the striker. Throughout the ages there have been many different designs, and you can find many pictures on the internet. Here, we are more concerned with being able to 'throw sparks' and make a fire than with creating a work of art, so we will keep things as simple as possible.

Primitive Forge

A bed of coals with air being blown on them is known as a 'forge.' Blowing air on the coals makes the fire hotter so you can work more efficiently. Barbeque grills, a fireplace or wood stove, or even a simple campfire could be set up as a primitive forge. Rig up some type of bellows or blower, such as an old hair dryer, to blow on the coals. However, keep in mind that too much air can easily heat the metal so hot that it will melt. So if you are using some type of electric blower, have a way to control the airflow. In a primitive setting you can simply blow on the coals through a non-galvanized metal tube, or a hollow plant stalk —but be sure you don't hyperventilate. A blow torch could also be used to heat the metal, particularly if the heat is contained in a 'box' of bricks. There are many good ideas for constructing simple forges on the internet.

Uncoiling a Spring

If you have a coiled spring, it may first be necessary to uncoil and straighten a section before you can test it —or make a striker. To do this drive a large nail or spike into a solid block of wood or a tree stump. Be that the spring coil will fit onto this spike, (you may have to cut off the 'head'). Then place one end of the spring in the fire, and heat it up to a bright red/orange. Take it out of the forge and quickly grasp the end of the spring with a pair of pliers, ('vise-grips' work really good for this), and place the coil over the spike. Pull on the end of the coil with the pliers to unwind the spring much like pulling toilet paper off of the roll. Unwind as much of the spring as possible. Repeat this process if necessary until you have a usable length. A rod about 12 to 18 in / 30 to 45 cm is a good length, as you can hold on to one end while working the other end without

the need of tongs or pliers. Of course a shorter length can still be used, but you would have to hold on to it with a pair of pliers or tongs when working it to avoid being burned. Bolt cutters or a cold chisel work good to cut the rod off of unwound portion of the spring, and to cut it into workable lengths. In a primitive situation, re-heat the rod at the point you want to make the cut, then place it on the sharp edge of a good sized rock and hit the opposite side or the rod to cut it.

Scale

As you heat the metal, a thin layer on its surface will oxidize and form what is know as 'scale.' Usually this scale will come off with the first couple hammer blows, or separate when the metal is bent. (See the photos a little farther down in this article, particularly the photo of making the bend in Step 4 for an example of what the scale will look like.) This scale is quite hot, and it can burn you! It can also get in the way of finer work. So, when working on the anvil after the first couple of hammer blows, quickly blow it out of the way. And when making bends, be careful that you are not holding things in such a way that the scale will fall on you as it comes loose. Wear gloves and eye protection if at all possible!

Materials & Tools:

• Carbon Steel Stock —at least ⅛ in / 2 to 3 mm, but not much more than ¼ in / 4 to 5 mm diameter
• Heat Source —some type of forge or blow torch
• Hammer —just about any hammer could work; if you have a choice, pick a 'ballpen' hammer or a 'blacksmiths hammer;' in a primitive setting the back of a hatchet or even a fist-size smooth hard rock could be used
• Anvil —this could be almost any fairly large chunk of metal that has a relatively smooth surface, such as a large sledge hammer head, splitting wedge, piece of railroad rail, or tractor part; in a primitive setting, a large smooth hard rock could be used
• Tongs or Pliers —preferably at least an '8 inch' pair, longer handles will help to avoid burns; in a primitive setting, if someone in camp had a 'multi-tool,' that would be wonderful; otherwise, a pair of 'tongs' could possibly be made from some green wood to help hold the hot metal
• Cutting Tool —something to cut the metal with, such as a cold chisel or bolt cutters; in a primitive setting a hard rock with about an 80 to 90 degree edge together with the hammer stone could work
• Quench Bucket —this could be just about any open container that will hold at least about a quart / liter of fluid, such as a metal bucket or can; a metal container would probably be the safest, but with care, other types of containers could also work; for relatively thin items like a flint & steel striker, it would be best to quench with warm oil, (either vegetable oil or automotive oil), but if oil is not available, fill the quench bucket with 'bath-water warm' water
• Gloves, Eye Protection, and Clothing You Don't Mind Getting Dirty and Possibly Burned —sometimes things slip, and little bits of hot scale are almost always falling on things or flying around

Forging the Striker

(1) Fire up the forge and get a good bed of coals going. Heat about 1½ to 2½ in / 4 to 6 cm of one end of the carbon steel stock in the forge. If necessary straighten it on the anvil with gentle taps of the hammer. Remember to reheat the metal once there is no more heat glow.

(2) A straight, flattened and narrowed striking edge is the easier to get good hot sparks from. So, heat one end of the steel stock, then place it on the anvil, and use the hammer to flatten the last 1½ to 2 in / 4 to 5 cm from the end. Make it a little over 1/16 in / 2 mm in thickness. Re-heat as necessary. Finish by making this section as straight and even as possible. One of the thin sides of this section will be the striking edge.

(3) Heat the spot where the flattened section and the original dimensions of the steel stock come together. With the pliers or tongs, grasp the end of this flattened section closest to the rest of the steel stock. Grasp the thin edge, not the flat surface. (The inner part of the jaws of a pair of pliers works well for this.) You want to make as close to a sharp 90° bend as you can just past the flattened section so that the striking edge is to the outside of the bend. This could also be done by placing the spot where the bend is to be made on a well defined edge of the anvil and tapping it over the edge with the hammer to make the bend. The 'flat' of the striking edge needs to end up in-line with the bend, not cross-ways or at a twisted angle to it. So if the striking edge gets twisted during this step, simply heat the bend area again and twist the striking edge into alignment. The striking edge also needs to be as straight and smooth as possible, so if the flattened section was bent or dented during this step, straighten and smooth it before continuing.

(4) Heat and bend the next section of the steel stock into a gentle curve to make a 'D' shape. The straight part of the 'D' is the striking edge, and the curved part is the handle.

(5) Cut off the extra stock, and straighten and/or smooth out any waviness in the ‘D.’

(6) Place the striking edge of the ‘D’ back in the forge so that it heats evenly. It doesn’t matter whether the handle of the striker gets hot or not. When the whole striking edge is evenly heated to a good orange hot, quickly take it out of the forge, and place the striking edge into the quenching liquid, but keep the handle section out of the liquid. Carefully hold it in this position until the handle has cooled to the point that there is no longer any visible heat glow. Then plunge the whole striker into the quenching liquid, moving it up and down, (not side to side, which could cause it to warp). When it no longer ‘sizzles,’ take it out of the quench bucket and set it aside to completely cool before you pick it up.

(7) Grind the striking edge smooth to take out any roughness of bumps. In a primitive situation you could use a flat rough stone. At this point the striker should ‘throw sparks.’ Test it!

(8) Clean the whole striker. Use a grinder, wire brush, and/or sandpaper. Finish by giving it a thin coating of oil or wax to prevent rust. However if you quenched it in oil, oiling it might not be necessary as there would be enough of the quenching oil left in the pores of the metal.

Update Note:

This was originally written to show the simplest way to make a striker. However, as I was reading through it again and doing a little editing, I kept thinking of small changes and/or additions to the technique that could just as easily be made. Such as first making the 90° bend where the striking edge and handle come together, and then flatten the striking edge section. Or, adding a small tab at the end of the handle section, (which would look somewhat like a fish’s tail), to make the striker more easy to grip while striking a spark. The ‘bottom line’ is, people have been making and using flint & steel strikers for thousands of year, and the possibe designs and techniques of making them are practically endless. In my shop for example, I make the handle section first, drawing out a tapered on the end, and then putting it in a curl, which is both artistic and functions to give a better grip while striking the flint. Then I use a ‘jig’ to shape the striker handle into a nice rounded curve, (rather than the 90° bend), and flatten the striking edge last. So, set up a forge and get together some tools and metal and see what works best for you.