The Art of Fire by Friction

Fire by friction is thought by most to be a long outdated method of creating fire. Modern backpackers use matches and lighters that are both water and wind resistant. They also use small, lightweight backpacking stoves that eliminate the need for campfires except in an emergency. Many organizations and individuals have adopted “Leave No Trace” practices. These practices rightly discourage building unnecessary fires in order to help preserve our precious remaining wilderness resources. Considering all of these things, is there still a place in our technologically advanced and enlightened society for making fire using ancient methods? If you take the time to explore this topic, you may find that this [all but forgotten] skill has more value in today’s world than most people realize.

Fire is one of the five physical requirements for survival. We use it everyday but often do not recognize it as “fire” because it comes disguised as microwave ovens, stoves, furnaces, light bulbs, etc. Like the other four basic needs – air, shelter, water and food – it receives almost no attention because it is there at the flip of a switch or a flick of a lighter.

If you could travel back to the not so distant past, you would find that fire was thought of much differently than today. Less than a century ago fireplaces and wood or coal burning stoves heated most homes and businesses. But even then, matches were used to start those fires. Going further back in time before matches came into general use (around 1827); the “state-of-the-art” method of making a fire was by flint and steel. Before steel was invented, two pieces of flint were struck together. Traveling even further back in history, you would likely discover that the very first manmade fires were created by friction.

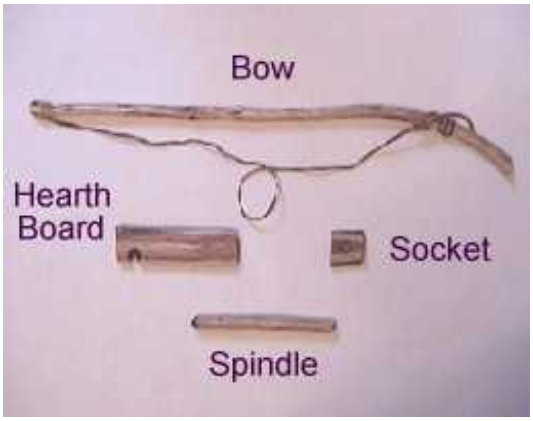
Up until the invention of matches, almost everyone understood fire (and the subtle knowledge required to successfully build one). Today, there are only a handful of people in the United States who can consistently start fires using ancient methods.

No matter what equipment you carry into the backcountry, you need to be prepared for the event that your equipment is lost or if it fails. Having the skills necessary to provide for your basic needs out of the materials around you is therefore a high priority. Since one of these needs is fire, the wise wilderness traveler would need to know how to build one, especially in adverse conditions. Understanding the materials, techniques and subtleties necessary to create fire by friction will significantly enhance the chances of survival of even those who are skilled in modern fire making techniques. For the beginner, it is the place to start because it is where fire making began.

There is another aspect to this nearly forgotten skill. Learning to make fire by friction creates a connection with the past that gives a taste of what life was like at a time that covers all but the last 175 or so years of Earth’s history. Success brings with it feelings of excitement, satisfaction and pride. The very first time you are able to produce a viable coal, transfer it to a tinder bundle, and then blow it into flame, is a day you are not likely to forget. You will also discover that the thrill of making a fire by friction does not diminish – The same excitement is experienced each time you do it.

Building a Fire by Friction

Figure 1



The Fire Set – Bow and Drill (figure 1)

- Hearth Board
- Spindle
- Socket
- Bow

The materials used for the h*earth board* and s*pindle* are critical to success. Ideally, they should be made from the same wood. At a minimum, the two pieces should have approximately the same hardness so that one is not consumed before producing a viable coal. The wood itself must be of a type that is non-resinous and must be able to produce a very fine wood powder (char) that does not feel gritty when rubbed between the thumb and index finger. Low-density (soft) woods require less energy and time to produce a coal than woods of higher density. However, the most important attribute is that the hearth board and spindle combination must produce large amounts of char that is not gritty. It is possible create a coal from woods that produce a moderately gritty char, however, much more energy is required and your technique must be well practiced.

Your choice of materials will depend on their availability in your locality. Materials must be dry, but not decayed. Some woods that have proven to work well are various North American Cedars (Junipers), Mimosa, Redwoods, and Cottonwoods. One or more of these varieties can be found throughout the continental U.S.

The s*ocket* is used to hold the spindle in place while the spindle is being turned and can be made from the same material as the hearth board or spindle, but a wood with greater density will prove more durable and less problematic.

The b*ow*, which is used to efficiently turn the spindle, can be made from any small, rigid tree branch that has a natural bow in it. Rawhide or any durable cordage can be used for the bowstring.

Making the Hearth Board and Spindle

Find a suitable wood as described above. The hearth board should be flat and rectangular in shape measuring 7 - 10" long, 2 - 3" wide and ½ – ¾" thick. The initial shape of the wood may be a round branch. If this is the case, you will need to split the branch in half and flatten the rounded side of one of the halves using a knife or stone. The remaining half can be used to make another hearth board. It can also be used to make a socket.

Before the hearth board can be completed, it will be necessary to make the spindle. A straight, round branch measuring 6 – 8" long and ¼ – ½" in diameter is the best choice because minimal shaping will be required. If it is too small in diameter, it may drill through the hearth board without producing enough char to form a viable coal. If the spindle is too large, it may be difficult to spin it in the hearth board. Excellent spindles can also be made from mare's tail, golden rod, or almost any woody stemmed plant that has a large pith and can withstand the stresses of being spun by the bow.

When the spindle is completed, place it on top of the hearth board perpendicularly about 3/16" back from the edge. Using the point of a knife, mark a dotted-line pattern of the spindle on the board. This will leave a pattern in the hearth board that is approximately the circumference of the

spindle. Using the knife, remove just enough wood layers from inside the pattern to create a bowl that will prevent the spindle from slipping off the hearth board during initial use.

Making the Socket

The socket is used to support the top end of the spindle and hold it in place. It is gripped in the left hand and the palm of that hand is used to apply pressure to the spindle so that the opposite end drills into the hearth board. It should be large enough so as not to be uncomfortable when pressure is applied, and there should not be any sharp edges.

Regardless of the spindle's size, the end that fits into the socket should not exceed ¼" in diameter. The top end of the spindle should be whittled down to meet this requirement and a dotted-line pattern similar to the one made in the hearth board should be cut into the center of the socket board. More wood layers should be removed from inside the pattern than for the hearth board. The goal is to create a hole deep enough so that the spindle should fit nicely in the hole and spin freely. It should not slip out during use (figure 5).

Making the *Bow*

Find an 18 – 30" long rigid branch that has a natural bow. The diameter should be ½" (or larger). Attach a piece of durable cordage or rawhide permanently to the top end of the bow by cutting a notch. Fold the cordage (bowstring) over the top and use a smaller diameter cord to secure it by wrapping and tying it off (figure 2). If no cord is available, a knot can be used to secure this end.

Use a helical knot to attach the other end of the bowstring to the bow (figure 3). This allows for easy adjustment of the length of the bowstring so that the number of wraps around the spindle can be varied. It also allows you to easily compensate for stretch as the bowstring warms up during use.

Figure 2

Figure 3

Burning in the Fire Set

It is necessary for the top of the spindle to spin in the socket while creating as little friction as possible. To accomplish this, use a light oil to lubricate the socket and top end of the spindle. Oil from the face and/or hair works very well as does pine pitch. Next, place the hearth board flat on the ground. Your left foot should be firmly placed on top of the board with your right knee on the ground. Wrap the bowstring around the center of the spindle 3 – 4 times. Increasing the number of wraps of the bowstring around the spindle helps spread the stress over a larger portion of the

spindle's length (This helps prevent breakage of spindles made from weaker materials). Tighten the adjustable end of the bowstring until it feels as though the spindle wants to twist and pop out of your hand. Now, place the spindle on the hearth board with the top end inserted into the socket (study figure 4 carefully). Note: Using a constrictor knot (or other similar knot) to attach the spindle to the center of the bowstring almost completely eliminates any issues with the bowstring slipping on the spindle.

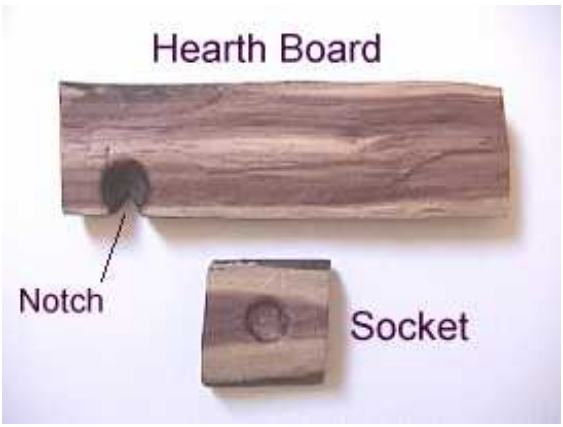
Begin with slow steady strokes and gradually increase the speed of the bow while applying light to medium pressure to the socket. After a short time char, and possibly, some smoke will be produced. The idea is to begin drilling a cradle/hole in the hearth board while insuring that the spindle does not pop out of either the socket or the hearth board. Spin the spindle long enough to create a deep impression, but not so long as to actually drill deep into the board.

Creating the Notch

The last step in making a fire set is to cut a notch on the side of the cradle/hole in the hearth board. This notch is smooth and wedge-shaped. It should be about 1/8th of the size of the impression that was created by the spindle. It begins at the edge of the hearth board and extends just up to the center of the impression. The cut should be clean and smooth (figure 5).

Figure 4

Figure 5



Preparing for Fire

All grades of fuel required for fire must be collected and prepared in advance. They are:

- Tinder – A light and airy bundle of material that can be processed and formed in the hands without it breaking into small pieces or falling totally apart (e.g. birch bark, pine pitch shavings, other wood shavings, dried grasses, etc.).
- Kindling – Sticks of the smallest diameter possible, up to about the size of a pencil.
- Squaw Wood – Wood from pencil size up to about 2½" in diameter.
- Bulk Wood – Large diameter logs.

Figure 6

First, assemble the *kindling* and *squaw wood* in a teepee fashion (figure 6). Additional squaw wood and the *bulk wood* should be stacked neatly near the fire site for use once the fire has been started. Next, prepare the *tinder*.

The care and effort necessary to prepare a tinder bundle that will ignite from the starter coal cannot be over emphasized. Birch bark is a very good example. It will burn easily, even when damp, without any preparation if a flame from a match or lighter is applied to it. That same bark will smoke and never ignite using a coal from a fire set if it is not properly prepared.

The tinder must be absolutely dry. It is prepared by rolling, squeezing and packing it in the hands until it is soft and fibrous. It is the small fibers created from this processing that ignite and cause the tinder bundle to burst into flame. This same method of processing tinder that makes a friction fire possible will also significantly increase the chances of starting a fire in wet conditions using matches, lighter or other ignition source.

Once the tinder bundle is ready, place it inside the teepee described above (refer to figure 6). Next, use your index finger and create a depression in the center of the tinder where the coal from the fire set can be placed. Part of the bundle should be placed to one side. It will be used later to cover the coal after it is placed in the depression. Tinder bundles should be large enough to produce the heat necessary to ignite the kindling that will in turn ignite the squaw wood and the bulk wood.

Creating the Fire

"Time to make fire with stick" (you may want to grunt while you say this phrase). Refer back to the instructions under *Burning in the Fire Set*. It is important that each step of this process be performed in a controlled manner. Breathe calmly and deeply – Don't get in a hurry. First, place a piece of bark or green leaf underneath the hearth board and directly underneath the notch. Start slowly and deliberately. Gradually increase the speed and pressure as the fire set warms up. After some time, a small amount of char will begin to collect in the notch and some smoke will be produced. Soon the amount of char and smoke will significantly increase. When this happens, increase speed and pressure for 30 – 45 seconds. Then stop drilling and examine the char to see if smoke is actually coming from the char (do not remove the spindle from the hearth board). If not, continue the drilling process. When a continuous wisp of smoke rises from the char, you are ready for fire!

Blow very lightly on the forming coal and give it a little time to become an actual solid coal. Now move the hearth board away from the coal. You should be able to transfer the coal to the depression previously made in the tinder bundle with the help of a knife blade or a small stick. Next, take the portion of the tinder bundle that was set aside and gently cover the coal. Insure that wood fibers are in contact with the coal, but be careful not to break it apart by packing the tinder too tightly.

Now begin to blow lightly into the tinder bundle. As the coal turns red and the bundle begins to smoke, blow harder. At the point when a lot of smoke is being produced, blow very hard until it bursts into flame. Continue to blow as the tinder ignites the kindling and the squaw wood. Note: covering the coal with crumbled dead wood, forest duff, or additional char as a *coal extender* will produce larger coals and increase the success rate for damp or less than perfect tinder (add the coal extender after the coal has been transferred to the tinder bundle).

During the actual process of gathering the materials, making the fire set and attempting to start a fire, many lessons will be learned. You will probably not be successful on your first few attempts. It is necessary to determine what prevented success, make adjustments and try again. Once you are consistently successful at producing a coal, practice in less hospitable conditions to improve your skill level.

The process is not easy, but the satisfaction of making that first fire is well worth the effort, and this newly acquired skill will remain with you for the rest of your life.