

Mike's Web Page

Friction-Based Firestarting Techniques



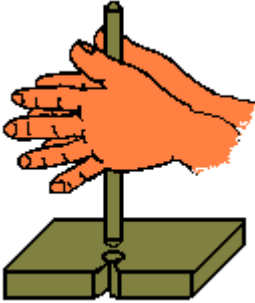
To start off, I don't consider myself an *expert* on these "fire by friction" topics - I've certainly got a lot to learn and would appreciate any feedback that you can provide. There are many different ways to do these things correctly. Also, I should note that emphasis is placed on using materials found in my geographic area - Southern New England. That said, here's some information that I gathered on fire starting with:

- [Spindle & Fireboard \(Hand Drill\)](#)
- [Fire Bow](#)
- [Fire Drill](#)
- [Fire Plow](#)
- [Fire Piston](#)
- [Fire Thong](#)

NOTE: if you're going to try this, find a good reference, and **MAKE SURE** beforehand that you're acting responsibly and taking precaution! Kids should have parental permission and be supervised. Have a big pail of water handy for dowsing. **Fires can quickly get out of hand, and you should be prepared to deal with this emergency!**

I've found [Firecrafter](#), a Boy Scouts group, has some great information on the bow drill method. Also, the US Army's Field Manual FM 21-76 has a section called [Survival](#), which is a great resource.

Spindle & Fireboard



Also called the *hand drill*, this is a simplification of the bow technique. It is probably older in my opinion. This technique uses a spindle and a fireboard, with the spindle being simply rotated between both hands. Getting smoke is not difficult, but practice is generally needed before getting an ember. Once you do it, though, it's cool!

It's a wonderful feeling to be secure in the knowledge that you can create fire in the most rudimentary way. It doesn't get much more basic than the hand drill method. Using the hand drill, you generate friction with rapid spinning of the drill against the fireboard. This produces black or brown dust called *goofer* or *goofer's dust*. Eventually, if properly done with the correct, dry materials, you will get a glowing, red hot ember or coal in your pile of dust. This coal is transferred onto tinder and blown into a fire.

Materials

The spindle & fireboard, or *hand drill* method uses two components, aside from tinder. I prefer my spindle to be made from mullein and to be about 15 inches (roughly 37.5 centimeters) long. I like to point the thicker end down, so that it makes contact with my fireboard. The thick end of the mullein stalk is about 3/16-1/4 inches (about 4.5-6.25 millimeters) in diameter. My preferred fireboard is Norway Maple or willow, and is 1/2-5/8 (12.5-15.5 millimeters) inches thick, about 1 1/2 inches wide and about a foot or so long. I should note that there can be significant variation in these choices due to personal preference.

Preparation

For my spindle, I scrape the stalk smooth, removing the velvety covering and shaving down any bumps that could blister my hands when vigorously rotating the spindle. I like to round both ends of the spindle prior to use.

The fireboard should be very dry. I start off by abrading a small divot in the fireboard about 1/4-1/2 inch (6.25-12.5 millimeters) in from the side of my fireboard. Then, I rotate the spindle with my hands, keeping the thicker end firmly pressed into the divot until it wears its own indentation. Once I'm content that the spindle won't hop out of the indentation during use, I cut a "V" notch in the fireboard such that the point of the "V" touches inside the indentation that the spindle is wearing. This way, the dust will fall into a pile inside the "V." I like a narrow "V" as opposed to a wide one.

Tinder preparation and placement

In order to use the kit, you should acquire and prepare tinder. Some types of tinder include milkweed down, cattail fluff or cedar bark. If it is bark, it should be finely shredded; in either case it should be formed into a bird's nest shape. The "V" notch of your fireboard should be placed such that the coal generated can be easily and quickly guided into the tinder. Often, I arrange my friction kit as follows: lay a piece of birch bark, leather or a large leaf directly on the ground, lay the bird's nest of tinder on top of that, arrange the fireboard for ease of transferring the coal. You are now ready to use your kit.

Using the Kit

Once this setup is complete, I again start to rotate the spindle between my hands, applying firm, downward pressure on the spindle. You will notice that your hands naturally slide down the spindle as you do this. When this happens, simply (but quickly) move your hands to the top of the spindle and continue vigorous rotation. Dust begins to form in the "V," and eventually, you start to see smoke. Once you see the smoke, continue to rotate with downward pressure until you see lots of continuous smoke and you think that you might have generated an ember. Then stop, lift the spindle out of the hole and examine the dust pile to see if it's still smoking. If it is, you may have an ember! Blow on the dust pile to make the ember grow into a decent coal. Once you see the coal, transfer it to your tinder bundle and blow on it some more until you have a fire. Note that it helps to have your tinder bundle placed under your fireboard before you start. This way, the ember plops right where you want it.

Tips & Hints

One pointer I picked up that helps get started: use a string to keep downward pressure on the spindle. Take a 10-inch or so string and make loops around each end. Place your thumbs in the loops and place the end of the spindle in the string much like you would place an arrow in a bow string. You may want to notch the spindle. Use this method to place downward pressure on the spindle while practicing. See the illustrations below.



People on the Primitive Skills Group list have suggested using mullein, cattail or yucca stalks for spindle material and willow or red cedar for fireboard material when trying this.

Note that while practicing the hand drill method, you may want to try for short bursts over several days. If you're not accustomed to using your hands in this manner, you can get blisters.

Fire Bow

With this method, you start with a spindle, a fireboard, a bow and a socket cap. You rotate the spindle by moving the bow backwards and forwards until a hot coal (not a flame!) appears in the pile of fine, black *goofer* or *goofer's dust*.



Materials

The fire bow method has five components: a bow, made of springy wood about 24-30" long and good cordage, a spindle of dry wood, a fireboard also of dry wood (similar to the one used in the hand drill) and a socket. The socket can be made of hardwood or other materials and is used to

steady the spindle as it is used to make a coal. Dimensions for the spindle, socket and fireboard can vary considerably, but should be comfortable for the user. Note that spindle and fireboard may be made of the same type of wood. Mine frequently are. My spindles are typically about 12" long by 1/2" in diameter and are made of Norway Maple, catalpa or willow. My fireboards are made of Norway Maple, cedar or willow and measure about 3/8" x 1 1/2" x 8" with considerable variation. It's a matter of personal preference.

Members the Primitive Skills Group recommend sycamore, cypress, elderberry, syringa (or lilac,) big leaf maple, spruce, balsam fir, incense cedar, sagebrush, redwood, box elder, saguaro cactus and tulip poplar as fireboards. I haven't tried these. They also recommend bear grass, sagebrush and red cedar as spindles. Again, I haven't tried these.

Rule of Thumb

There is a test for determining the suitability of a given wood for spindles and fireboards. If a wood is not resinous and if you can make an impression in the wood by pressing your thumbnail or fingernail into the wood, that wood may be a good candidate for friction fire material. There are exceptions to this, but it's a good rule of thumb. Note that if your socket is wood, this is not a good test of the material. Socket material should be hard.

Preparation

I make my spindle first and typically make a pointier end for the top of the spindle and a duller, rounder bottom.

Next, I make the socket. Sockets can be wood, horn, antler, or stone. Personally, I like to use a stone socket when making fire this way. Admittedly, it's just a personal preference, and I'm sure many others have used wooden sockets just fine. I'd been attempting to make friction fire for about two years unsuccessfully and had been trying the various types of wood recommended. I did most of my experimentation with a hard wood socket and briefly tried an antler socket. When the antler didn't work right away, I abandoned it. In retrospect, I should have given it more time. I think the lesson is to experiment and not to get discouraged. I make my socket by finding a soft stone and use a piece of quartz or harder stone to abrade an indentation in the socket stone using a circular boring motion with the quartz. This can take about 20 minutes to get a good divot.

My fireboard is prepared in a manner similar to the one described above. I abrade a small divot in the fireboard about 1/4-1/2 inch (6.25-12.5 millimeters) from the side of my fireboard using a stone or a knife. Alternately, I can use my kit to rotate the spindle into the fireboard to make a deeper hole, keeping the spindle firmly pressed into the divot until it wears its own indentation. The socket is used for balance and control and this is a good method of trying out the action of the kit to see how it works. Either way, once I'm content that the divot is deep enough that the spindle won't hop out during use, I cut a "V" notch in the fireboard such that the point of the "V" touches inside the indentation that the spindle is wearing. This way, the dust will fall into a pile inside the "V." I like a narrow "V" as opposed to a wide one.

Tinder preparation and placement

In order to use the kit, you should acquire and prepare tinder. Local types of tinder will vary, but ideally, the closer to cotton puffs it looks, the better, as a general rule. Some types of tinder include milkweed down, cattail fluff or cedar bark. If the tinder is bark, it should be finely shredded. All tinder must be dry. It should be formed into a bird's nest shape. The "V" notch of your fireboard should be placed such that the coal generated can be easily and quickly guided into the tinder. Often, I arrange my friction kit as follows: lay a piece of birch bark, leather or a large leaf directly on the ground, lay the bird's nest of tinder on top of that, arrange the fireboard for ease of transferring the coal. You are now ready to use your kit.

Using the Kit

String the bow. Assemble the kit as like so: leaf or bark on the ground, tinder on top of that, fireboard on top of the tinder such that the "V" notch is close to it. Wrap the spindle around the string. It should be wrapped tightly, but should be able to be moved up and down the bowstring if rotated. Place the lower end of the spindle in the divot in the fireboard. Place the socket on the top of the spindle and hold the assembly in place by putting slight downward pressure on the socket with one hand and by holding the bow with the other hand.

As you rotate the spindle using the bow, start slowly. Moving too fast at this time can cause the spindle to pop out of the socket/fireboard combination and can surprise or injure you or those nearby.

Once you have a comfortable back & forth motion on the kit, start applying downward pressure on the socket. You'll start to get whisps of

smoke at first and eventually, you'll get a lot of smoke. Eventually, a red hot coal should form in this pile of black dust.

You probably won't see the coal right away. Rather, it will be evident if when you stop rotating the spindle, lighter wisps of smoke continue to rise from your dust pile. If you see that, you'll want to gently blow on the dust pile. This will further show that you have a live coal as the air begins to feed it. Unless your tinder bundle is already placed under the "V" of your fireboard, you'll want to transfer this coal to your tinder bundle, still blowing on the coal/tinder bundle and (hopefully) get your fire started by blowing the coal into ignition on the tinder. I like to place my tinder bundle under the "V" notch of my fireboard before I start.

Tips & Hints

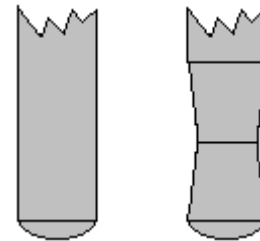
- This method requires effort and patience to learn and you'll want to practice to remain proficient. If your attempt doesn't show promise after about 3 minutes of vigorous effort, try to analyze it to figure out what you may be doing wrong. Try another approach!
- I think most friction fire starters would agree that material selection is *CRUCIAL*. Here in Southeastern New England, my advice is: Think Norway Maple - dead & seasoned. Try willow, white cedar, cottonwood, slippery elm or sassafras for your fireboard or spindle.
- Watch that spindle! One of the things that can happen when you try this method is that the spindle "pops out" and goes flying. This could injure you or a bystander, so be careful.
- ALL of your friction fire materials must be as dry as possible! I cannot stress this enough, especially for a first friction fire. Wet materials greatly complicate the friction fire process and extend the frustration. Mine have been air drying for weeks indoors. I've also tried the suggestion of placing them in the kitchen oven and kept the wood in there until dry.
- Facial grease lubrication on the spindle where it meets the socket helps. Do not lubricate the spindle end that meets the fireboard.
- Aside from finding antlers in the woods, try your local flea market.
- Use a good, strong cordage for the bow. Oak for a spindle never worked for me. Lots of smoke, but no coal. Pine as a fireboard did not work for me, but supposedly results vary based on species.
- I've made cordage out of milkweed (see my [cordage](#) link) and it

quickly broke. A good boot lace has lasted longest for me.

- One note about your goofer's dust: darker and finer are better. Your goofer's dust should be black or dark, dark brown. Tan or brown may work, but isn't preferred. The closer your dust looks to ground-up charcoal, the better it will act like it. I don't mean the briquette type of charcoal, I mean the burnt-log type. Coarse dust may not light easily, nor may brown dust.

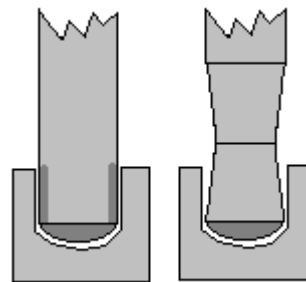
One experiment that I've done to improve the efficiency of my spindle is illustrated in the pair of drawings below.

I tapered & flared out the bottom of my spindle into something of an hourglass shape. The purpose for this is to concentrate the friction generated in a downward fashion, rather than a lateral fashion (as seen in the set of illustrations below, with the darker grey indicating where friction normally builds up.)



Regular & Hourglass Spindles

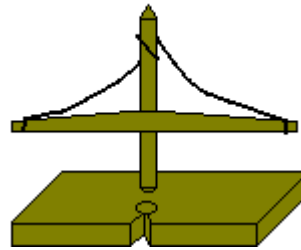
The theory of operation with this (shown on the right) is this: as the straight spindle spins its way into the fireboard, friction builds up on the bottom *and the sides* of the spindle. The friction on the sides of the spindle shaft is wasted energy. Concentrating the energy on the bottom of the flared spindle generates a coal swifter and more efficiently.



For simplicity, I left out the "V" notch in the drawing.

Fire Drill

A variation of the fire bow technique. Picture the bow, with a hole in the middle, through which the spindle rotates. This is more labor intensive to build.



This design could be augmented with a counterweight at the base of the spindle to aid the spin and add stabilization.

Fire Plow



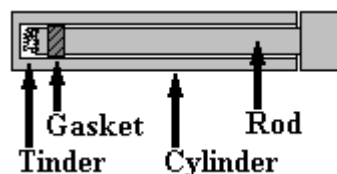
I've haven't tried the fire plow method (yet!) Essentially, from what I've read, you use a very dry, hardwood stick to "plow" a trough in another piece of wood. The friction is supposed to generate an ember.

Also called the "Fire Trough," I consider this method to be less efficient than the hand drill or bow drill, though I have no practical experience with it. The reason I consider it less efficient is that I think it requires more energy to get the dust to combustion temperature in a trough than in a hole like the drill methods use.

Fire Piston

Another method that I haven't successfully used (yet!)

A fire piston is made up of a small-diameter cylinder and a rod. Secured to the end of the rod is a gasket made of string or



fiber. It is usually waxed or greased to ensure a good seal.

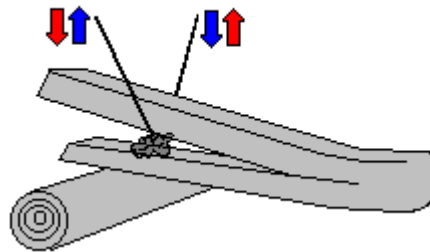
Also, there is tinder in either the bottom of the cylinder or attached to the rod itself. Compressing the cylinder rapidly is supposed to generate enough heat to ignite the tinder. Once smoldering, the tinder is extracted from the cylinder, sometimes with a stick or piece of wire bent into a hook. Alternatively, it could be stored in a recess at the bottom of the rod, such that when the rod is extracted, the smoldering tinder comes out.

This technique was used in various incarnations by the peoples of South East Asia, the South Pacific Islands and others such as Malaysians.

Fire Thong

Another method that I haven't successfully used (yet!)

A fire thong is a made up of a split small-diameter log, tinder and, of course, a thong. The thong is slid along the log, between it and the tinder. Friction ignites the tinder with a coal.



[Home](#) | [Spark-Based Fire](#)