
Great Lakes Regional Advisory Lodge



Help Papers Series
Support Materials for Parent/Child Programs

TOPIC:

Firestarting

Great Lakes Region – Help Paper Series – Firestarting

Outdoor (ONLY) Firestarting

This document will offer some suggestions for creating magic campfires. Any magical firelighting should be rehearsed so that there are no accidents. Safety is critical. Basic methods are described including mechanical, chemical, and electrical. All methods should be tested in advance. Backup methods should be employed in case of failure. Chemical fires should be used away from the campers, as there is always the danger of fumes (e.g. chlorine). Mechanical fire starts require someone to stand guard while the campers arrive to the fire circle. Electrical fire starts are dangerous in that a closed switch will set off the fire prematurely - use a light tester to ensure the circuit is broken before connecting the wire leads. Weather conditions may affect a successful magic campfire more than anything, so practice, practice, and practice. Building the fire lay is important to keeping the fire going after it is lit. Fuels include citronella fuel, kerosene, lamp oil, motor oil, and transmission fluid. Never use gasoline!

Fire Lay

SAFETY FIRST-ALWAYS!

Basic Fires

The base logs of the fire should be 3 feet long and from 8 to 10 inches in diameter. The two base logs should be placed on the ground about 2 feet 6 inches apart and the next two logs laid crosswise on top of them, about one foot from the ends, in log cabin style. Other logs from 4 to 6 inches in diameter are laid crisscross on top of them, as shown in the drawing. The logs should be a little shorter with each tier. When the first three tiers have been placed in position, it is time to build a very flammable heart in the fire. Thick sticks, when available, should be built into the fire, binding support on the main crosslogs. A few small logs, about 3 or 4 inches in diameter and just long enough to overlap the top row of logs should be laid a few inches apart on the very top of the fire. A fire a little over 3 feet tall is high enough for most purposes, but an extra tier of logs can always be added when desired.



Variations: Oblong, Straight-Up, Triangle

When logs are only 2 feet long, they may be arranged as shown in the drawing. They will form a sturdy fire frame of standard size. The four base logs are arranged on the ground so that there is a space of about 6 inches between them at each corner. Four more of these logs are laid one at each corner, at an angle across the base logs. This arrangement adds length and width to the fire when the next tier is laid. The angle logs do not detract from the log cabin shape of the fire, since the next tier of the framework, four more short logs, fits easily into the log cabin pattern, as do the remaining tiers.



For this fire, about a dozen logs around 3 feet 6 inches long and from 4 to 7 inches in diameter at the butt end, are needed for the framework. The logs should be placed on the ground in teepee formation, as shown in the drawing, and held in place about 3/4 of the way up by a strand of wire wound around all of the logs to hold them in place. This is done after the kindling, small sticks, etc. have been built into the heart of the fire.



The Raft Fire

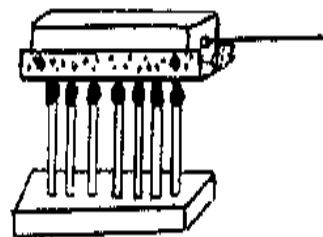
On a windless night, a large buoyant raft is built about 8 feet square. It is covered with earth and a regular log cabin fire is built on its center. The raft is anchored offshore. The fire can be lit by the Fireball method or electrically with wire supported by floats or suspended from a spot onshore (e.g. tree).

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Mechanical Fires

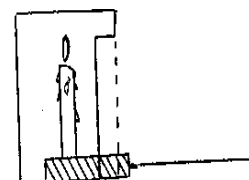
1. The Friction and Match Method

A block of hardwood is prepared with tiny holes just large enough to hold matches. There needs to be twenty or thirty holes, all the same depth. Matches are placed in the holes so that all the heads are even. Resting on this is another piece of wood covered with sandpaper, to which a wire or string is tied securely. The lower block with the matches must be held firmly in place. The upper block must be heavy enough so that there will be enough friction to cause the matches to light. Be sure to practice this one before using.



2. The Candle Method

A lighted candle is placed firmly on a block of wood or flat candle holder with a black string tied to the block, so that the candle can be pulled out from under a tin-can shield that keeps the audience from seeing it. The candle is lighted just before the campers arrive and is covered with the tin can shield. The tin can is open on one side to allow the block to be pulled out. The fire is laid over the shield. At the proper time, a helper pulls the block out of the can so that it touches the tinder and lights the fire.



3. The "Flaming Arrow"

Drive a stake a little beyond the heart of the fire lay, as it is being laid. From this stake run a length of nylon fishing line up to a nearby high point and tie securely so that the line is very taut. The angle should be sufficient to ensure a smooth and fairly rapid decent of the 'arrow' otherwise you run the risk of the flame burning through the fishing line before the arrow reaches the fire.

The arrow is attached to the line through two spools (so make sure you thread the spools onto the line before you tie it off!) To the head of the arrow secure a bundle of dry flammable material. At the appropriate time during the introductory story, an assistant lights the arrow and releases it to slide down to set the fire alight.

One of the benefits of using fishing line for the line to the fire, is that once the fire is alight the fishing line will burn through and the assistant can then retrieve the line without those attending the campfire being aware of it. If you find that the fishing line does not work for you, use wire instead, but tie the wire to fishing line where it passes through the fire lay. This piece will burn away when the fire is lit, allowing you to retrieve the length of wire.

Variations on this method include tying the flammable material directly around a weighted spool and sending that down the line to create a 'fire-ball' effect. Attaching fireworks sparklers to the arrow can give quite a spectacular impression.

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4. Rubbing Stick

Soft maple and elm are frequently used but balsam, fir, cedar, white pine, basswood, poplar, and willow also produce an excellent flame.

Hand Rest - A round disk of wood cut to fit in the palm of the hand. The center has a partial hole into the flat surface. Embed a small flat stone, button, or thimble at the base of the hole to allow the drill to spin easily.

Drill - This twirling stick is $\frac{3}{4}$ inch in diameter and 12 inches long. The slightly tapered upper end fits loosely into the hand-rest hole and the lower is bluntly rounded to give maximum friction.

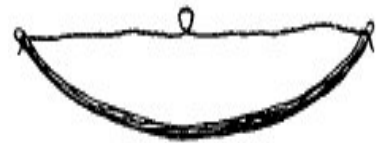
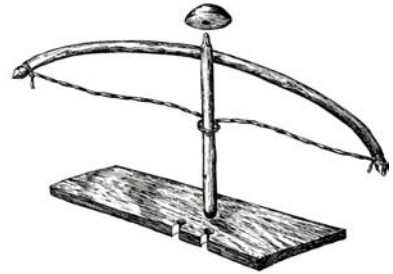
Bow - A naturally curved stick about $\frac{1}{2}$ inch in diameter and 2 feet in length. It rotates the drill. Cut a groove at both ends to tie the bow thong. The string is 4-5 inches from the center of the bow.

FireBoard - Make it out of the same wood as the drill. Measurements should be roughly $\frac{3}{8}$ to $\frac{1}{2}$ inch thick, 1 foot long, and 3 inches wide. Drill several small holes $\frac{3}{8}$ inch from the edge of the board. Whittle a rounded "V" to the exact center of each hole. Cone the hole slightly as a rest for the business end of the drill.

Bowstring - A leather strip about $\frac{1}{8}$ to $\frac{1}{4}$ inch in width, such as leather boot lacing. Give it a number of twists to keep the cross section round and not oblong. This will give a smoother winding and unwinding around the drill. Tie at one end of the bow, loop about the drill (loop is away from the bow), and tie loosely to the opposite bow notch.

Tinder - The Indians favored shredded red cedar bark, well rubbed between the palms until it was reduced to frazzled shreds. Other excellent spark catchers are shredded white cedar and birch bark, the inner bark of chestnut and slippery elm. Excelsior is an acceptable substitute. Form the tinder into a small nest to catch a spark.

Fire Making - Center the nest of tinder on a dry slab of wood and place a fireboard notch directly over the tinder. Hold the fireboard firmly with the left foot while kneeling on the right knee. With the hand rest held in the left palm, the elbow pressed firmly against the left leg to keep the wrist steady, and with the bow held in the right hand, long and short strokes should bring a curl of smoke. Pressing harder on the hand rest should produce black powder. Gently set aside the bow while picking up the fireboard and the slab of wood underneath. Then blow into the notch. The spreading spark will soon burst into flame. If it's stubborn, fold the tinder around the spark and continue blowing.



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Magical Fires

5. Lighting Delayed – Action Fires

This method of lighting fires of most types, especially the “fireball” fire that follows, is worth the comparatively small amount of effort taken to prepare the surprise. Once you have figured out exactly how long it takes for the fuses to burn, you can light the fire simply by placing your fingers for a few moments on the red head of a little brave.

Make the fuse from soft white string that has been thoroughly soaked for several hours in a soupy solution of saltpeter and water and then allowed to dry thoroughly in the sun. Two teaspoonfuls of powdered saltpeter dissolved in about one tablespoonful of very hot water, mixed together in a glass lid, will impregnate at least ten feet of string. A 9-inch length of soft white string 1/8 in diameter will burn for approximately five or six minutes, when burning upward. Ordinary white string about 1/16 inch thick will burn in approximately the same time, but there is more chance a thin fuse of this sort may go out unless it has been very well -- and evenly -- soaked in the solution. They will burn a little faster or slower, depending on how well they have been soaked. If you rub the tiny crystals from the string, when it is 1/8 inch, it will slow down, but the blow will be practically invisible.

6. Black Sand

Method 1:

This method uses what appears to be water and sand to start the fire. The Black Sand is actually potassium permanganate. The water is glycerin. To insure ignition, be sure to grind the potassium permanganate into as fine a powder as possible. Put a depression in the center of the sand as it is placed on the ground so that the glycerin does not run out. It is best to experiment with this gimmick before attempting it. This type of chemical fire is much safer than an acid fire, but it will flare up to some degree.

Method 2:

In the fire lay, place a pre-prepared piece of 2 x 4 wood, with four 6-inch nails driven partially into it. Between the nails, on the wood, place a small aluminum tart cup with at least two tablespoons of Potassium Permanganate (available from most pharmacies) in it. Supported on the heads of the 4 nails place a second aluminum cup that has had three or four small holes punched in the base. Tilt this cup to one side by placing a twig across two of the nails and then balance the cup so it is supported. In this cup place a quantity of Glycerin (also available from Pharmacy's) - but not enough so that it trickles through the holes. The twig should have a length of fishing line tied to it, with the line stretching away from the fire lay.

By pulling on the fishing line and removing the supporting twig, the cup containing Glycerin will drop to rest horizontally and the glycerin will spread out over the cup's base. A couple of drops will then fall through the pre-punched holes and onto the Potassium Permanganate.

After a short pause the glycerin will react with the Potassium Permanganate and create a flame which will need to catch your kindling thereby setting the fire lay ablaze.

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7. Model Rocket Igniter

Take a model rocket igniter (available at most hobby shops) and pass the igniter through the inside of a paper baggy leaving two little wires sticking out. Then carefully remove the contents of a "Colored Flower Bloom" or "Giant Fountain" firework (use only one) and place into the paper baggy.

Attach the clips from a model rocket-firing device to the two wires coming out of the baggy. Prepare the mechanism by pulling the safety pin. Then, when you're ready, press the firing button and POOF! another magic fire start.

8. Color Fires

Color fires are beautiful for occasional use, and easily made. The number of chemical powders and cubes on the market which produce multicolored fires when placed on the main fire are many, but the "nature" effect of having the color come from a manufactured cube is lost. Better to soak pinecones and small sticks to have a more natural effect, even though some of the chemicals are rather expensive. Mix one pound of the chemical to one gallon of water, leave the pine cones or porous lengths of dry sticks overnight or longer in the solution. They're ready to use when dry.

Color desired	Chemical
red	Strontium chloride
orange or yellowish-blue	calcium chloride sodium chloride (salt) copper oxide
green	copper boron borax boric acid barium chloride
blue-green to purple	copper sulfate copper chloride
mauve to violet	potassium chloride
crimson to purple	Lithium chloride

SAFETY FIRST-ALWAYS!

9. Fireballs

This type of fire lighting is very effective when staged properly. A fine wire is strung from a branch of a leafy tree to a stake driven in the center of the central fire, after an ordinary spool or photographic film spool has been strung on it. Wrap the spool with cotton wool or gauze bandage, which has been thoroughly soaked in kerosene. The height of the branch is determined by the length of the tree from the fire, but remember that the effect may be completely lost to onlookers if the angle is so high that the fireball reaches the fire almost before the audience has a chance to follow it. Experiment closely with this one, and be sure you have a fireball lighter that knows the cue and who can really be trusted to get the trick right.

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10. Iodine and Aluminum

Crush 1 teaspoon of iodine crystals to a very fine powder, then mix with 2 teaspoons of powdered aluminium. IT IS CRITICAL THAT THIS MIXTURE REMAINS ABSOLUTELY DRY.

Place this mixture in the fire lay on a piece of plywood, forming a volcano shaped mound. When the participants are gathered around the campfire, ask if anyone has a canteen of water in case the fire gets 'out of hand' (you may want to set this up beforehand). Pat your pockets as if looking for a match, but finding none, ask to borrow some water. Sprinkle it on the fire lay (ensure a few drops hit the iodine/aluminium mixture) and you will be greeted by billowing purple smoke, followed by deep red flames. Someone is bound to ask, "OK. So how do you put it out?" Simply tell them you'll throw matches on it!

Note: The powdered iodine "evaporates" very quickly. As a result this mixture must be used within about 10 minutes of preparation.

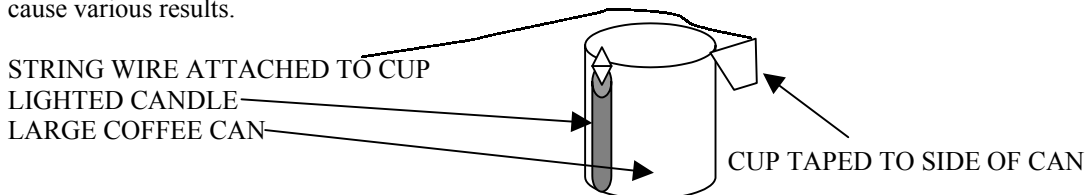
11. Pine Oil and HTH Chlorine

A teaspoon of Pinesol or Pine Oil is placed in a shallow container within the fire lay. The story that Bill uses to introduce this magic fire start is based on the ashes from a previous campfire. The "Ashes" are a half a cup of HTH Granulated chlorine. When the two are combined, they produce a large quantity of white smoke, followed by flames. This is a relatively slow reaction, so Bill opens the campfire with the following story.

"As we gather here tonight, for our formal campfire, I think back to the closing campfire from last year. It was such a great fire, and the feelings of love and friendship so strong. In order to try and rekindle those feeling for our fire tonight, I would like to add some of the ashes from last year's fire. Now, before I light the fire tonight, I would like you all to look at this pile of wood, and think about your own feelings about last year's fire, and what made it special for you."

12. Calcium Carbide in a Coffee Can

A spectacular fire. Try this MANY times before you actually use it. Various amounts of the element cause various results.



In the bottom of the can, place Calcium Carbide, in the cup water. When ready for the effect, pull the string, dumping the water into the can. It's debatable whether more water than chemical produces a higher flame, but we have had results with flames 20+ feet high. The effect can be placed in a central fire or used a method of torch lighting, you be the judge after you try it.

The candle does not have to be as high as the can, a shorter one will work, making sure it doesn't burn out before it is time for the effect. The can may be buried partially in the ground. Use a strong tape such as ductape to attach the cup to the can. It must be flexible so that it can tip up easily.

You will love this unusual effect.

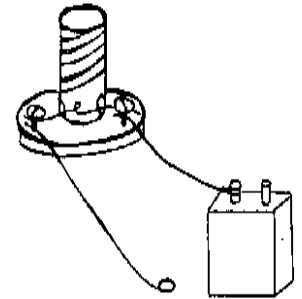
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Electrical Fires

13. Battery and Gunpowder

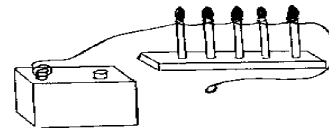
In this method, a porcelain light socket is the basis for ignition. One strand of wire is run through the socket and connected to each terminal; a small loop is put in the wire in the center of the socket cup. Place a small amount of gunpowder in the socket, burying the wire. Place a ball of excelsior, which has been soaked for about 15 minutes in kerosene on top of the cup. Be sure to shake out the ball before setting it or the dripping kerosene will dampen the powder and the effect will not work. (Set the ball no later than one hour before ignition). Two lengths of bent coathanger are placed over the excelsior ball so that it will not “blow” the fire apart. This gimmick can be placed in a teepee fire made of split sticks that have been soaked in kerosene, or light tinder that has been pre-soaked can be placed on top of the ball. Be sure to test this before trying it; it can be tricky. Go easy on the gunpowder at first. Contact can be made with a battery or through any electrical outlet, but do not connect both wires before placing the powder, and do not plug in to the outlet before setting the powder and you are ready to blow the shot.

Originated by Herbyn Maynard
Chief electrician, Culver (Indiana)
Woodcraft Camp Council Ring



14. Battery and Matches

This technique requires a battery for starting power. Place wooden matches firmly in slots, and wrap with high-resistance wire as shown in the illustration. Make contact, and with a strong battery, the fire should light effectively.



Alternative

Take a bunch of friction type matches and secure with a rubber band. The bigger the bunch, the more spectacular will be the fire start. Then take a metal spring from a spring-loaded pen and stretch this spring to be slightly larger than the diameter of your bundle of matches. Lay the spring through the matches, so that it is touching the match heads. Place this bundle on kindling in your fire lay.

Remotely attach a battery to the ends of the spring wire, through a switching mechanism. At the correct time, throw the switch and the spring will generate electrical heat, which will ignite the matches.

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15. Steel Wool and a Car Battery

Steel Wool and "D" cell batteries are frequently used in survival techniques as an emergency method of starting a fire. Based on this principal, one campfire start idea is to use steel wool in the fire lay (surrounded by small dry kindling) remotely attached to a car battery. The battery could be disguised by hiding in a box that would double as a seat for the Campfire Leader, with a switch on the side of the box to complete the electrical circuit and start off your fire.

A variation on the above involves a little more creativity with the electrical connections. From the disguised car battery/campfire seat, you'll need 3 electrical circuits and switches. Switch #1 connects to a yellow taillight secured in the fire and hidden under kindling. Switch #2 is hooked up to a two more light bulbs. Switch #3 hooks up to steel wool, as detailed in the previous method.

As part of your campfire opening, get everyone to assist by blowing towards the fire. As they do so, throw switch #1 and everyone should see a yellow glow coming through the fire. Turn off the switch after a second or two.

Obviously not everyone was helping or blowing hard enough, so get them to blow again. Throw switch #2 and a stronger light will be seen in the fire. Turn the switch off after maybe five seconds. One last time! Obviously it was the Scouters who weren't trying hard enough. As everyone blows hard for the last time, trigger the third switch to set the fire alight.

Remember to pull the lights attached to Switches #1 & #2 out of the fire lay before you set the fire going, unless you want to compete with exploding light bulbs!

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