

FAIRY FOUNTAINS

By ned gorski

More Details Available at Fireworking.com

Based on the Fountains developed by Lloyd Sponenburgh, For the Movie
“Things That Hang From Trees”

Introduction



Fairy Fountains are simple and easy devices, which produce elegant and graceful effects. Long-hanging, orange-gold charcoal sparks, interspersed with occasional bright-white, popping and branching sparks, are mesmerizing as they fall gently from the fountain tubes.

The effect is quiet, and perfectly suited to a relaxed, backyard setting, where neighbors won't be annoyed by them, and mosquitoes will be relocated by the smoke.

Lloyd Sponenburgh developed these fountains in 2005 to simulate the delay-composition-burn of a roman candle, for the Hollywood film “Things That Hang From Trees”.



Making these fountains can be a satisfying project for seasoned fireworkers, and the effect is often something that even makes spouses happy, which can sometimes be a challenge. (-:

But, these devices are also perfect as a first-time pyro lesson for beginners, and make great, fun projects to work on with adolescent children and grandkids.

As usual, all the standard safety precautions should be studied, and observed. The most basic ones are:

- Wear eye protection.
- Wear cotton clothing, not synthetics which melt.
- Don't breathe chemical dusts.
- Minimize the exposure of compositions and finished devices.
- Store compositions and devices in safe, secure storage.
- Don't allow small children to display any fireworks devices.

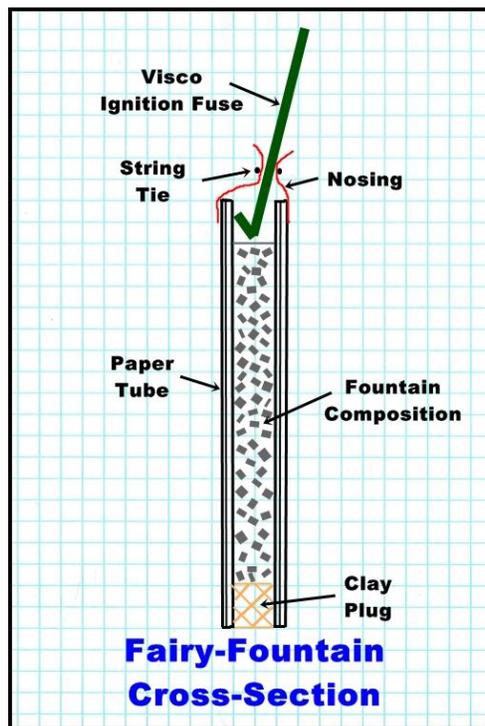
All of the basic processes and skills are spelled out in individual tutorials in the Fireworking.com Articles:

- Making Charcoal
- Milling Chemicals, Ball Mill or Rocket Blender
- Weighing Chemicals
- Mixing and Screening Chemicals
- Dampening and Granulating Compositions

- Hand-Ramming Clay and Composition using a Good Mallet and Ramming Post
- Safety Articles

Here is a link to a video which contains many of these how-to details:
http://www.youtube.com/watch?v=SoQHA3_yCuA&list=UUo9xwj6WnQGPp0w_uv0lzZg&index=1

The Basic Elements of a Fairy-Fountain



A simple, standard paper tube is used; in this case we'll employ a 1/2"-ID x 5"-long tube. Skylighter TU1028 tubes are 5"-long, or four 5" tubes can be cut from the 20"-long, 1/2"-ID tubes from HobbyHorse.com. Of course, there's no reason longer tubes can't be used for the fountains, instead. I've made them as long as 16", for a really long-burning effect, with no adverse results.

Smaller diameter tubes, or larger, may also be used for these devices, no problem. There's plenty of room for experimentation here. One fireworker that I know of has already incorporated micro-stars into some of the propellant increments, for a matrix-fountain effect.

Hand ramming, with a good mallet is sufficient for making this device, and the tube-bottom is simply closed with an increment of rammed dry clay.

The rest of the tube is filled, almost all the way, with rammed fountain composition, and a simple ignition fuse and nosing completes the project.

A few minutes per fountain is all that is required for assembly. A line of the fountains, fused together and hung upside-down, can make for a very effective waterfall, too.

Fairy-Fountain Formula

Chemical	Percentage	Factor	4-Ounce	115-Gram
Potassium Nitrate	44%	0.44	1.76 oz	50.6 g
Charcoal, Airfloat	40%	0.40	1.6 oz	46 g
Sulfur	6%	0.06	0.24 oz	6.9 g
Calcium Carbonate	3%	0.03	0.12 oz	3.45 g
Dextrin	6%	0.06	0.24 oz	6.9 g
Titanium, Spherical	1%	0.01	0.04 oz	1.15 g

Note: -40 mesh titanium works best, with most of the particle sizes being between 40 and 80 mesh.

Note: Commercial, airfloat charcoal (mixed hardwoods) works fine. I really like using charcoal made from Southern-Yellow-Pine, for the long-hanging orange sparks it produces.

Note: All chemicals should be fine enough to easily pass a 40-mesh screen.

Note: This composition rams to a density of about ½ ounce per 4" propellant-grain, which is what is used in a ½"-ID, 5"-long tube. So, a 4-ounce, 115-gram, batch of composition will be sufficient to make 8 fountains that size.

Note: Any size batch may be made by multiplying the individual factors above, by the batch total-weight, to determine how much of each chemical to use. There is also an automatic formula-batch calculator in the Formulas section of Fireworking.com.

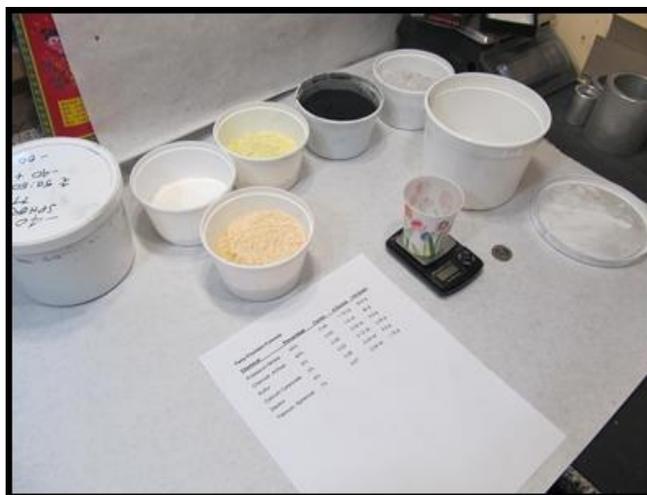
Weighing the Chemicals

Print the fountain formula, including the batch individual-ingredient weights, to take to the shop.

Weigh each individual chemical, except the titanium, into an empty tub on the scale, one at a time, and combine the chemicals in a mixing tub, off the scale. The titanium will be added later.

Cap the tub, and shake it well, holding the lid securely in place.

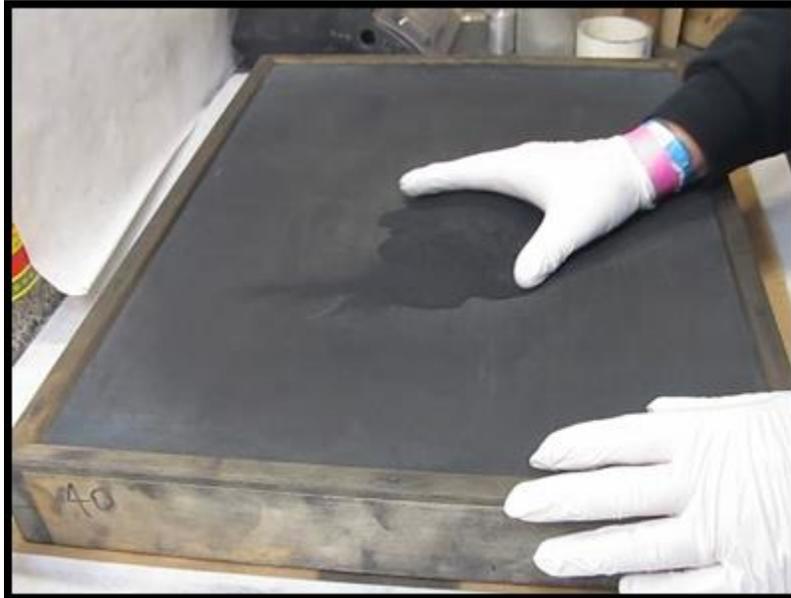
Reweigh the combined mix, to ensure that it weighs what the batch weight is, minus the titanium. This ensure no mistakes were made in the weighing.



Screen-Mixing the Fountain Composition

After shaking the non-titanium composition once in the mixing tub, put it through a 40-mesh screen, followed by more shaking in the tub, and repeat

three times. This breaks up all the chemical clumps, and very intimately mixes the chemicals.



Adding the Titanium to the Composition

Now, weigh the required titanium, and add it to the tub of composition. Close the container and shake the comp.



Dampening the Composition

Using a fine-spray bottle of water, and gloved hands, gradually dampen the composition, working the water into the comp with the hands, until it has the stick-together consistency of brown sugar.

I kept track of how much water I added to my composition to get it to that state, and it required 20 grams of the water. That was an added 17%, or so, which will vary from one type of charcoal to another, and will depend on how much moisture might already be in the chemicals that are used.



Screen-Granulating the Damp Composition

Granulate the damp composition by gently pushing it through a 20 or 24-mesh screen, onto a paper-lined drying tray or screen. Spread the comp out into a thin layer for drying. Dry in a safe, warm location, or in a drying-box, until it is completely dry. This typically only takes a couple hours.



Breaking up the Dry Clumps of Composition

Once the composition has dried, there will be relatively large clumps of it, which would be difficult to scoop and then put through a funnel into a fountain tube.

Screening the dry comp, gently, through the same 20 to 24 mesh screen, breaks those clumps up, and produces a nice, free-flowing, relatively non-dusty powder, perfect for ramming in fountain tubes.



Ramming a Clay Plug, and Increments of Fountain Composition, in a Paper Tube



Necessary materials for hand-ramming a Fairy-Fountain include:

- Solid ramming post
- Solid ramming “puck”
- Solid mallet
- Leather glove for the hand which will be holding the fountain during ramming
- Eye protection and cotton clothing
- Paper tube
- Masking tape
- Rammer
- Clay for plug (Hawthorne-Bond-Fireclay or Bentonite Clay)
- Cup of fountain composition
- Small funnel
- ½-teaspoon measuring scoop

Put a piece of the masking tape over one end of the paper tube. Introduce ½-teaspoonful of the clay into the tube, insert the rammer, and ram it with 8 medium-solid whacks of the mallet. Remove the rammer, and pour any excess clay back into its tub.

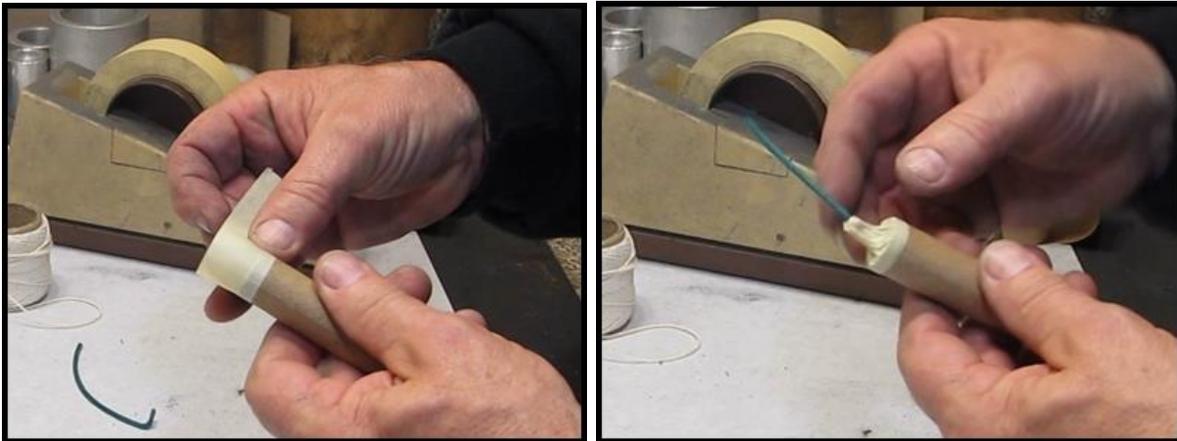
Start ramming ½-teaspoonful of the fountain composition in the same manner, until the tube is full to within ½” of the open end.



Finishing the Fountain

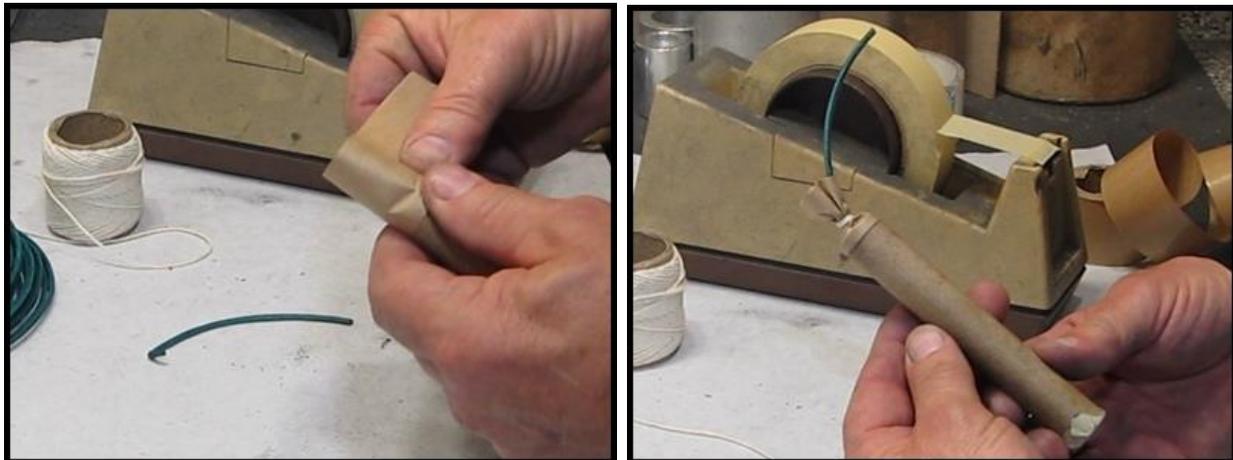
For individual firing, a simple piece of Visco ignition fuse is all that is required. Cut a 3"-4" piece of the visco with a razor-cutter, and bend a J-hook in one end of the fuse.

A simple masking-tape nosing is all that's required to hold the fuse in place, against the fountain composition, for immediate test firing.



For more secure fusing, and especially for long-term storage of the fountain, a nice kraft-paper nosing may be made with a strip of the paper, glued to the tube, or a piece of gummed-kraft-paper-tape, moistened on one edge.

In either case, the strip should be long enough to go around the fountain tube twice. Crimp the paper around the fuse, and tie it snugly closed, to secure the fuse in place.



The fountain is now ready to install on a support for display. These fountains do not generate much thrust, so simply securing them with good tape is sufficient. It is best to mount the fountains high, since their sparks flow out of the mouth of the tube gently, and fall a long distance.



Enjoy the Fountains, and Happy Fireworking.

Ned (Fireworking.com)