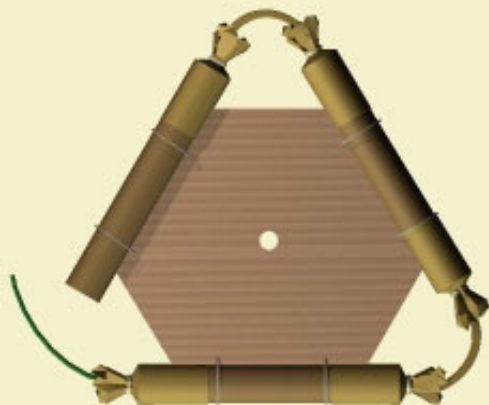




Build This...

Three Stage Triangle Wheel

**March, 2002 Issue****Build This:**[Three Stage Triangle Wheel.](#)**Technique:**[Round Stars, Part II.](#)**Tool Tips:**[Star Roller Comparisons](#)**Autopsy:**[German Made Class B Rocket.](#)**Summary:**

This wheel is one of those projects that fall under the "instant gratification" category, meaning you can crank one out and go fire it all within an hour (assuming you have the compositions already on hand). It makes for a perfect backyard celebration device, creating little noise but lots of effects. This is among the simplest types of wheels to make, and can easily be fitted with auxiliary effects such as whistles and color pots.

Formulas: [1/2" Gold Driver](#), [1/2" Firefly Driver](#), [1/2" KNO₃ Silver Driver](#), [1/2" KClO₄ Silver Driver](#),

Materials:

- ▶ (3) 5" long x 1/2" I.D. x 3/4" O.D. kraft tubes
- ▶ (1) scraps of 3/16" luan plywood at least 5" square
- ▶ (6) 5" long pieces of 18 gauge wire
- ▶ (5) 5" x 3" pieces of 30lb kraft (nosing paper)

Tools:

- ▶ 1/2" wooden or non-sparking metal rod
- ▶ Brass hammer
- ▶ Wire cutters
- ▶ Box nose pliers
- ▶ Drill Press
- ▶ 1/2" ramming base (spindle optional)

Unmeasured Materials:

fire clay (bentonite), meal powder, cotton or flax twine, white glue or wood glue, visco, black match





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Introduction:

This wheel project makes a good introduction to building revolving pieces, as it doesn't require the construction of any kind of fancy frame. Three drivers, often of a different effect each, are fastened to a triangular hub made of thin plywood, plastic or sturdy cardboard. I prefer the use of 3/16" luan plywood sold in 4x8 sheets at most home improvement centers.

Since some builders might not want to bother with cutting a full size piece of plywood into useable triangles, other materials such as lexan, acrylic or sheets of sturdy cardboard may be used. If scissors are your only cutting tool, you may be able to laminate several triangles cut from chipboard by stacking three or four of them with white glue between the layers. The finished material must be thick enough to hold the drivers on edge once they are wired onto the hub. Ideally you should be able to reuse your hubs many times over, so the more sturdy they are the better.

You can [Print the Triangle Pattern](#) with this link in order to have a template to trace onto your hub material.

Figures 1-3 shows the performance of each driver using the compositions given on page 1. When used with the ball-bearing type spin axis described at the end of this article, this wheel will spin quite fast, throwing sparks about 10 feet in all directions.

The basic design of this wheel can be enhanced easily with the addition of whistles and color pots. While whistles are strong enough to drive the wheel, they do not throw many sparks and can appear dull. It is best to fasten auxillary whistles to the sides of the main spark producing drivers, or use a whistle as the driver for an effect that produces attractive sparks but little driving force, such as glitter drivers.

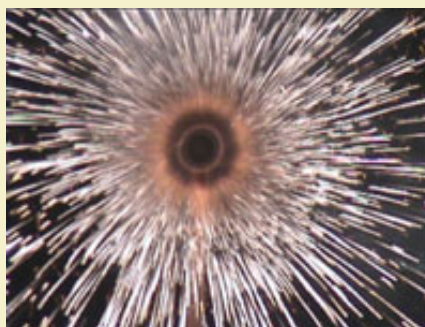


Figure 1: Stage 1: Ferro-titanium gold.

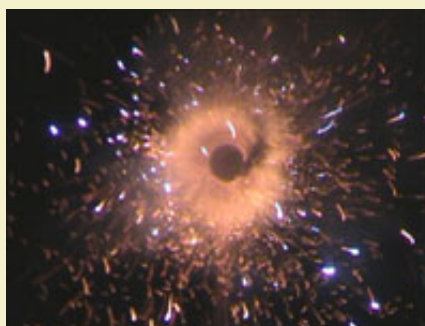


Figure 2: Stage 2: Firefly.



Figure 3: Stage 3: Silver flitter.

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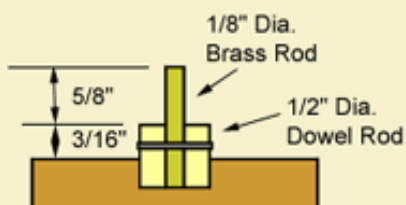


Figure 4: Home made wooden spindle.

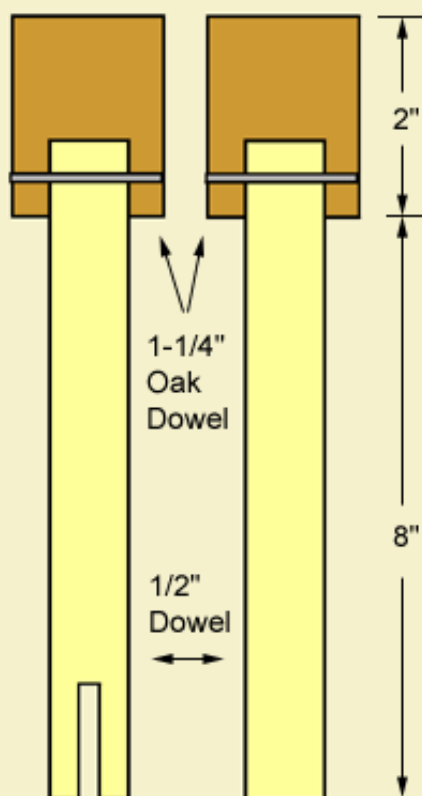


Figure 5: Drifts made from wood or aluminum rods with oak heads.

Making the Tooling:

The tooling required to make the drivers for this project can be made from parts available at most hardware stores. The spindle base can be a small 3/4" thick block of hardwood such as maple or oak. A 1/2" diameter hole is drilled half way into the base using a drill press to make sure it is straight. A 9/16" long segment of a 1/2" diameter wooden dowel rod is glued into the hole using wood glue and allowed to dry. Next a 1/8" hole is drilled into the exact center of the dowel rod, running all the way through it as shown in Figure 4. Into this hole a 1-3/16" segment of brass rod is inserted, which is held in place by a pin that runs through both the dowel rod and the brass rod. The pin can be a small nail or whatever is handy, as long as it doesn't exceed 3/32" in diameter.

Note that the brass pin is optional if the drivers will be vented using a drill press to make the hole. Using a drill also eliminates the need for the drift containing a hole in the end. In this case, you will only need to make one solid-end drift and a flat spindle with no brass pin. However, the drill method is slower, less accurate and requires caution. More on this method will be discussed later.

The drifts are made by cutting 9" long segments of 1/2" diameter wood or aluminum rods and capping them with 2" long segments of 1-1/4" oak dowel rods. The oak serves to provide more striking area when ramming, prevent damage to the ram rods and also provide a non-sparking surface so that a normal hammer may be used with them. The oak segments must be cut straight so that they will sit perpendicular to the drill stand when making the holes to receive the ram rods. The holes should be about 1" deep and centered as accurately as possible. A small nail is also used as a pin to hold the oak caps onto the rods, as seen in Figure 5.

If the ramming base is to have the brass pin, a 3/16" hole is drilled 1" deep into the bottom of one of the drifts. If wood is used to make the ram rods, they may be strengthened by dipping them in Minwax Wood Hardener for a few minutes and allowing them to dry. The inconsistent nature of dowel rod diameters may require some sanding before they will easily fit inside the tubes you will be using.

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