Hot Air Balloon

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Project supplies

- Wood for a hollow balloon – about 3 to 4” diameter and 4 to 6” tall
- Wood for a base – I prefer the base to come from the same wood as the balloon. About 2” diameter and 2” thick.
- Wood for a basket. I like the look of Bocote or Black Palm (Black Palm is challenging to work with - it splinters). Something with a strong dark/light grain so it looks like a wicker basket. 1” or so in diameter and a few inches long.
- Some scrap wood for making a jam chuck
- Brass rod, 1/8” diameter
- Brass tube 3/16” OD (brass rod should fit inside)
- Chuck to hold the balloon and base (2” jaws or similar)
- Chuck to hold the basket blank (pin jaws)
- Hollowing tools and other normal lathe tools (bowl gouge, spindle gouge, parting tool, etc)
- Drill bits: 1/8”, 3/16”, 20mm Forstner (¾” can work).
- Jacobs chuck
- Two strong ring/donut neodymium rare earth magnets – N52, ¾” diameter, 1/8” thick, ¼” hole
- Two-part epoxy
- Masking tape, hot glue

Overview

The pieces for this project are a balloon (hollow form), a basket, and a base.

The basket and balloon are attached to each other with a bass tube, and that assembly slides onto a brass rod supported by the base.

There is a magnet in the basket and another in the base, oriented to repel each other. If the balloon is light enough, it will float, spin, and bounce.

The Balloon

Make a hollow form with the tenon at the top of the balloon. Check online pictures of balloons to get the shape right. The neck will be somewhat long and narrow – around 1” diameter with a ¾” opening. So it is not the easiest shape to hollow.

If you don't have the tools to hollow through the neck, put the tenon on the balloon's bottom end and hollow through a wide opening at the top (leave enough waste to part off at the balloon's neck). Later, you can make a cap (like making a lid) and glue that onto the top of the balloon.

You need a fairly thin wall thickness so the balloon is light enough to be suspended by the magnets. I usually aim for around 1/8" to 3/16". I've found that something like 85 grams (3 oz) or less works well.

If your balloon is too heavy, it may "crash land" into the base. You may need to make a thicker base with room for 2 magnets.

Create a cup from a piece of scrap wood and turn the balloon around into the cup so that you can turn away the tenon and finish the top. Get as much as you can with the tailstock in place. To finish the very top, use masking tape to secure the balloon in the cup. Then drill a 3/16" hole through the balloon's top to fit the brass tube. (Sometimes I drill the hole first). Bring up a cone center to finish removing the tenon.

The Basket

Chuck a 1" or so piece in pin jaws. Use a 20mm Forstner bit and drill about ½" deep from the end. The 20mm hole is just a bit larger than the ¾" magnet, so it'll fit easily. If all you have is a ¾" bit, you might have to widen the hole with a scraper or something so the magnet will drop in.

Drill a 3/16" hole deep enough to go through the bottom of the basket.

Next, turn the outside shape of the basket. It should be about 5/8" tall: the hole depth plus a 1/8" bottom. We want the bottom thin so it doesn't take up too much space between the magnets, but thick enough to capture the tube.

Part the basket off.

To clean up the bottom, create a 20mm diameter tenon and slide the basket on that. I don't make this a "jam chuck" since the thin walls of the basket might break. Make it a slip-fit and use masking tape to secure the basket while you work the bottom.

The Base

Chuck a chunk of wood, about 2" diameter. Turn a nice shape for the top of your base. I like just a gentle curve, nothing fancy. Plan on the base being about ½" thick overall. Drill a 1/8" hole about ¼" deep but no more than ½". We're going to use the wood below the base near the chuck to plug the hole that the magnet goes in, so don't drill through that plug. Before parting off the base at ½" thick, mark alignment lines to help align the grain in the bottom plug.

Chuck a scrap wood faceplate and turn a "dish" that matches the curve on the top of the base. Drill a 1/8" hole through the dish. Use a short length of the rod in that hole to center the base in the faceplate. I use hot glue to secure the base to the face plate.

Drill a 20mm hole, about 3/8" deep in the bottom of the base. This should leave 1/8" of wood at the top of the base. You may drill into the brass rod a bit, but it's soft and won't hurt your bit.

Denatured alcohol will soften the hot glue so you can remove the base from the faceplate.

Next, re-chuck the scrap from the bottom of the base to make a plug for the magnet. I score the surface with the Forstner bit so I have a measurement for the size of the plug. The point of the bit also creates a “divot” that will help support the rod. Turn carefully down to size and check frequently how it fits in the base. It only needs to go in ¼” deep or so.

Assembly

Cut the tube to length such that it holds the basket and balloon at a good spacing from each other - about ½” apart usually looks about right.

Glue (2-part epoxy) a magnet and the tube in the basket. Make the tube just flush with the bottom of the basket, and ensure the end of the tube is not plugged with epoxy. Ensure both rod and tube are straight and let that epoxy cure.

Mix up more epoxy. Get some on the end of the tube (but not inside it) and insert it into the balloon. I like to have enough glue so it’ll create a fillet (aka blob) around the tube (on the inside of the balloon). The tube should be flush with the balloon top. Wrap masking tape around the bottom of the balloon and basket, to keep the spacing right and to keep the tube straight. Let the epoxy cure with the balloon upside down, so the glue doesn’t run down the tube. The balloon and basket are glued in 2 separate steps for this reason.

Now that I can see how high the balloon floats, I can trim the brass rod. Some options for the rod:

1) Nothing fancy, rod flush with the balloon top
2) Cut the rod to mid-balloon length, and turn a wood finial for the balloon top
3) Chuck the rod in the lathe and turn a finial on top. Regular lathe tools will turn brass just fine, but it's challenging to get the rod chucked securely and running true. When it works, it can look nice just sticking out of the top of the balloon.

Glue a magnet into the base, ensuring that it repels the magnet in the basket. Insert the rod, and glue in the plug. Nest the end of the rod into the “divot” in the plug made by the point of the Forstner bit. Ensure there’s enough adhesive in the magnet’s “donut hole” to secure the rod.

Finish the Base

Fit the base back on the scrap wood faceplate, running the rod through the 1/8” hole and securing with hot glue. Part off the waste from the plug and clean up the bottom. If things were measured right, you should have about 1/8” wood available to make a foot (leaving 1/8” wood to cover the magnet).