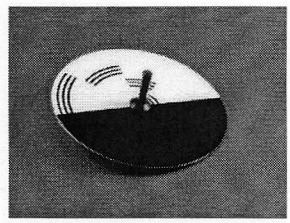
Benham's Top Instructions



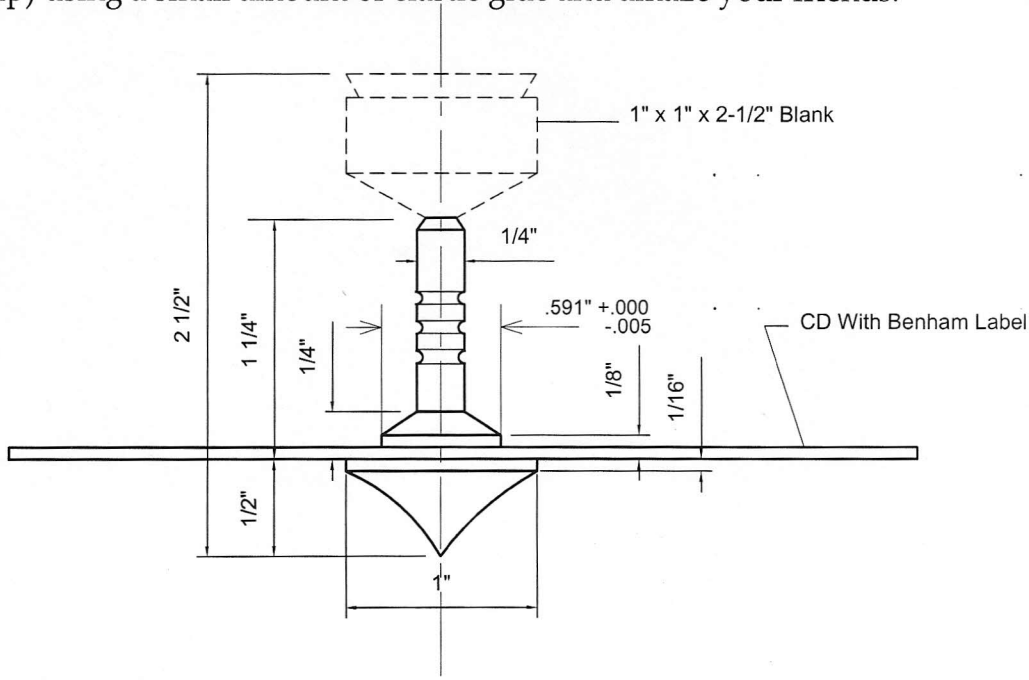
Background: Benham's top, also called Benham's disk, is named after the English toymaker Charles Benham, who, in 1895, sold a top painted with the pattern similar to the one I have on my disc. When the disk is spun, arcs of pale color are visible at different places on the disk. Not everyone sees the same colors. When a fairly high speed is reached, the arcs take on weak (de-saturated) colors. For instance, I see a red-brown in the center arcs and blue on the outer arcs. When the direction of rotation is reversed, the colors flip places.

Benham's top is a classic example of subjective colors. Because of the interaction of space and time they are called "pattern-induced flicker colors". One possible reason people see colors may be that the color receptors in the human eye respond at different rates to red, green, and blue. More specifically, the latencies of the center and the surrounding mechanisms differ for the different types of color-specific ganglion cells. While nobody knows for certain why the colors appear, lateral inhibition and the different rates of stimulation for the color-specific retinal ganglion cells clearly are involved. They code the pattern of light in space and time into patterns of nerve firings in space and time.

Instructions: The top is made using a CD label, attached to a used or unused CD or DVD, and a turned stem. A copy of the Benham Top label is shown on page 2. It can be scanned to get an electronic copy and then imported into a CD labeler software program and printed on a CD label. The label can then be attached to the disc using the CD Labeler.

See the drawing below to make the stem. Turn a 1"x1"x1-1/2" hard wood blank to a 1"cylinder between centers and cut a dovetail on one end to hold in a scroll chuck. If you don't have a scroll chuck, make the blank 1"longer and turn a morse taper to fit into your headstock. Note that in order to get a really good point on the end, the stem is turned with the point at the free end. This requires measuring the shoulder that the CD fits on rather than using the CD directly to check the fit, since it won't fit over the base of the top. The dimension on the stem that fits the hole in the CD is fairly critical to getting a well balanced, long running top. I have specified a tolerance of .005", but .015" would still work. The grooves shown on the stem are marked with a skew chisel and burned with a wire. After turning, glue the disc to the stem (making certain the label is up) using a small amount of elastic glue and amaze your friends.

Phil Brooks
Turn-On! Chicago 2010



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