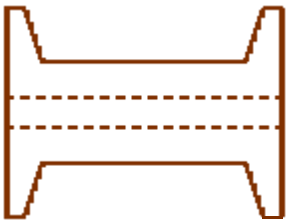
Instructions to Build the Cotton-Spool Tank

Introduction

This toy is made from a wooden spool and is powered by a rubber band. I used to make these as a kid and they are great fun. When you wind it up it will creep forward and climb over small obstacles like pencils, erasers and electrical power leads. It goes for quite a long time on a single wind up of the rubber band. As a small kid I also liked to place the tank on its end and imagine that the turning pencil was the tank's turret. Cotton-spool tanks are easy to build if you have the right parts. No special tools are required and you can probably build one in an hour.

What You Will Need

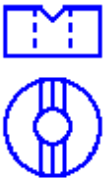
- An old cotton-thread spool like the one shown in the figure. You are going to cut notches in the flanges so old wooden spools that have large flanges are the best but you can get by with a more modern spool that has small flanges. If you have a spool with small flanges you can choose to glue 40 mm diameter discs of 3-ply plywood or stiff cardboard onto the ends of the spool. If you do have to use a modern spool try for a wooden one because you will need to put nails into it.



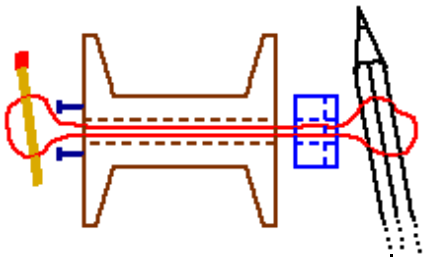
- A rubber band that is a fraction shorter than the cotton spool, *or* a long rubber band doubled over.
- A pencil.
- Two small nails (10 mm long).
- A match
- 12 mm off the end of an ordinary candle stick.

To build this you will need a triangular file, a hammer, some string and a pointed knife (pocket knife is ideal).

How To Build It



1. Start with the *wooden* cotton spool. With the triangular file cut V-shaped notches all the way round the circumferences of the flanges. Viewed from the end, the spool will look something like the one in the figure. The notches make teeth in the spool that allow it to climb over obstacles. Take the candle stub and rub a layer of wax onto one end of the spool. At the same time the candle stub should be given a smooth end surface. *Note: if you don't have a triangular file and if the wooden spool is soft enough you can use a sharp Stanley knife to cut the notches. You will have to apply a lot of pressure to cut the spool with a knife and it is easy to slip and cut yourself so be very careful.*



2. Take the two small nails and hammer them into the end of the spool opposite where you have rubbed the wax. Put the nails on either side of the hole in the middle of the spool. The nail heads must poke up about three or four millimetres and be about 15 mm apart.
3. Get a pointed knife and gently drill a hole through the centre of the piece of candle. You can remove the wick in the process. The candle stub has a habit of breaking so drill the hole slowly. One or two rubber bands must pass through this hole.
4. Using the knife cut a V-shaped groove across the face of the candle stub that was not smoothed down in step one. The pencil will lie in this groove and the groove needs to be deep enough only so that the pencil does not spin over the surface of the candle.
5. The tank is now ready to be assembled. Pass a rubber band through the hole in the candle stub and put the pencil, sharpened end first, into the loop of the rubber band. Pull the rubber band back and make sure that the pencil rests in the groove in the candle stub. The candle should be at one end of the pencil.
6. Pass a piece of string through the cotton spool and tie it to the loose end of the rubber band. Pull the rubber band back through the spool so that the candle stub lies against the layer of wax that you put onto the spool. Pass the match through the rubber band on the nail end of the spool, so that the rubber band is held by the pencil on one side of the spool and the match on the other.

The tank is complete! Wind it up by some amount and put it on the floor. The pencil will rotate around till it also touches the floor and then the tank will roll forward. Put a small obstacle in its path and watch the tank climb over it. It should move quite slowly - if it unwinds rapidly you need more wax on the end of the spool or a smoother contact between the candle stub and the spool. If the tank does not roll forward well enough use two rubber bands instead of one. If the rubber bands keep breaking and it still rolls forward too slowly, chamfer the face of the candle stub that rubs against the spool. That is, reduce the area of the candle where it contacts the spool to give it less friction.