

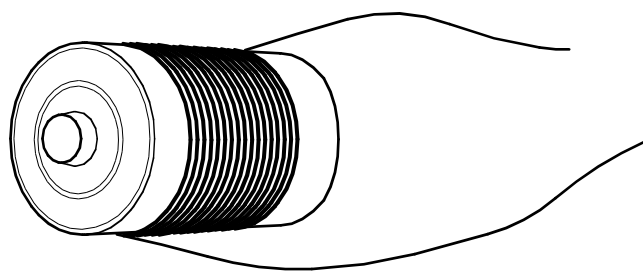
A HOMEMADE MOTOR

You know from last time how to use electricity to create a magnetic field. You know that a magnetic field can make some things move. Today you will make a machine that uses electromagnetism to create continuing motion. This machine is called a MOTOR.

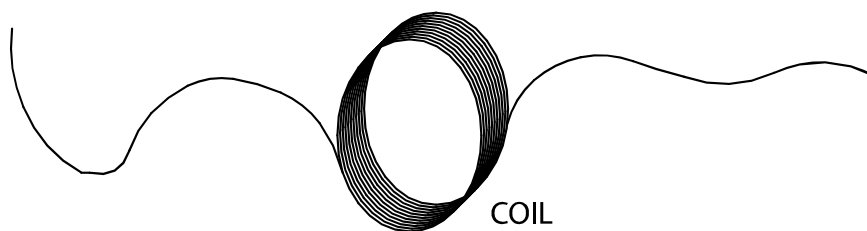
WHAT YOU NEED: a C battery, a long coated wire, a piece of sandpaper, 2 latch magnets, 2 large paper clips. You will also need to provide a piece of cardboard and a pair of scissors.

WHAT TO DO: (If you are using the wire from Lesson 10, snip off the sanded ends.)

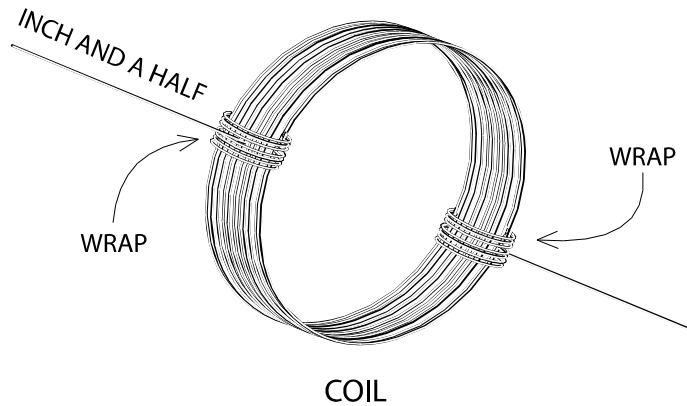
- 1 Turn the wire into a coil by wrapping it around the C battery.



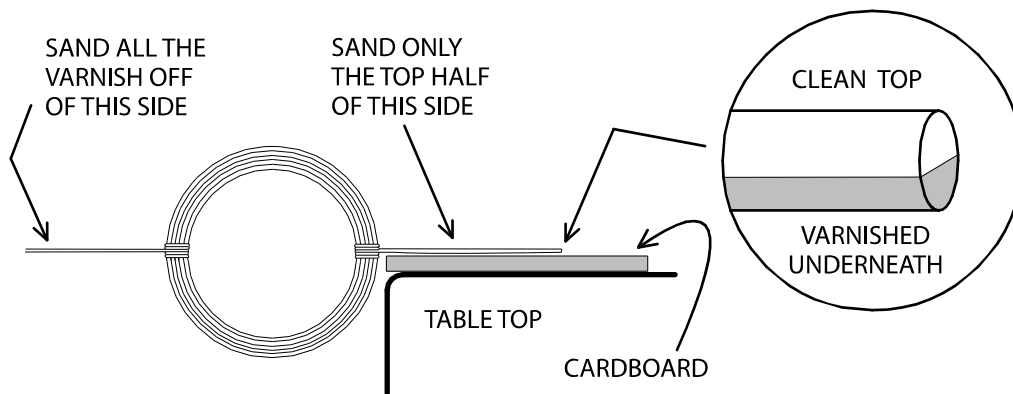
- 2 Slide your coil off of the battery. You need 3 or 4 inches of loose wire on each end.



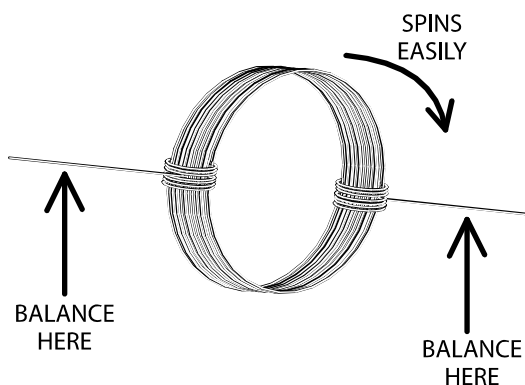
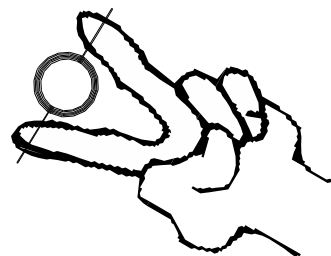
- 3 Take the loose ends and wrap them around and around the coil. Leave about an inch and a half sticking out of each side. The purpose of these wraps is to hold your coil together.



- 4 Sand away ALL the insulating varnish from the LEFT end of the wire. Make sure you get all the paint off, from the tip of the wire all the way in, till the wire meets the coil (and maybe a little more). When you are done, sand the right side, BUT ONLY THE TOP HALF! This can be done by holding the coil as shown in the diagram below: rest the right end on a table edge and sand the top half. (Put a piece of cardboard under it to make sure you don't scratch up the table!)



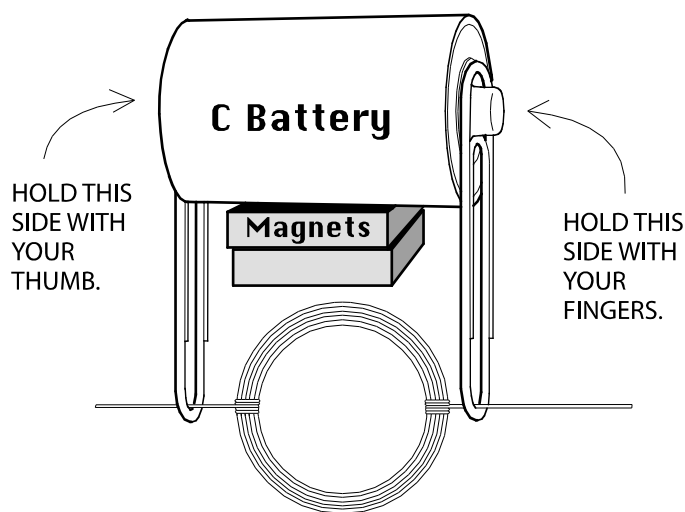
- 5 Wrap the ends of the wire around the coil one more time, so only about an inch sticks out on each side. Make sure the sanded half on the right end is still facing up (see the picture in step 4).



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Straighten the two wire ends so that you can balance the coil on your fingers. The coil must be balanced so that a light flick of the finger will send it spinning around. If the bottom of the coil is heavier than the top, adjust it until they are the same, then pinch the wire wraps to hold the coil in the correct place.

- 7 Now you are ready to put your motor together. Just follow the picture:



Give the coil a spin and see what happens!

First, stick the magnets under the battery.

Second, hold a paper clip to each side of the battery.

Third, put your coil in so that the ends rest on each paper clip.

It should go now! If it doesn't, see the next page.

TROUBLESHOOTING YOUR MOTOR

Try spinning the coil. Sometimes it just needs a little help to get started.

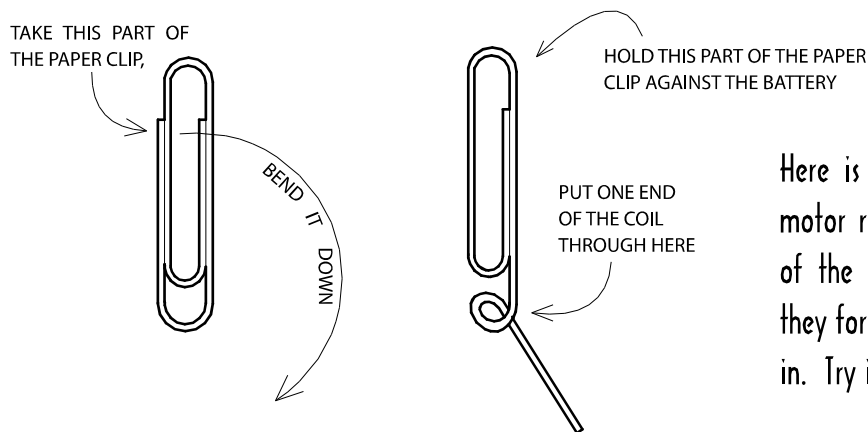
Gently tip your motor from side to side as you try to spin it. Sometimes this helps the wire make better contact with the paper clips so the electricity can flow.

Check if the coil is still balanced. It should spin if you flick it with your finger. Once it's balanced, pinch the wraps tightly to hold the coil in place.

Check if it's scraped correctly. Sometimes leftover varnish stops the electricity from flowing. Did you remember to sand the whole top half of the right end of the wire?

Make sure you have a fresh battery.

IMPROVED PERFORMANCE:



Here is an idea that can help your motor run faster. If you bend both of the paper clips as shown below they form loops that the coil can ride in. Try it!

ALSO:

You can use a rubber band to hold your motor together.

