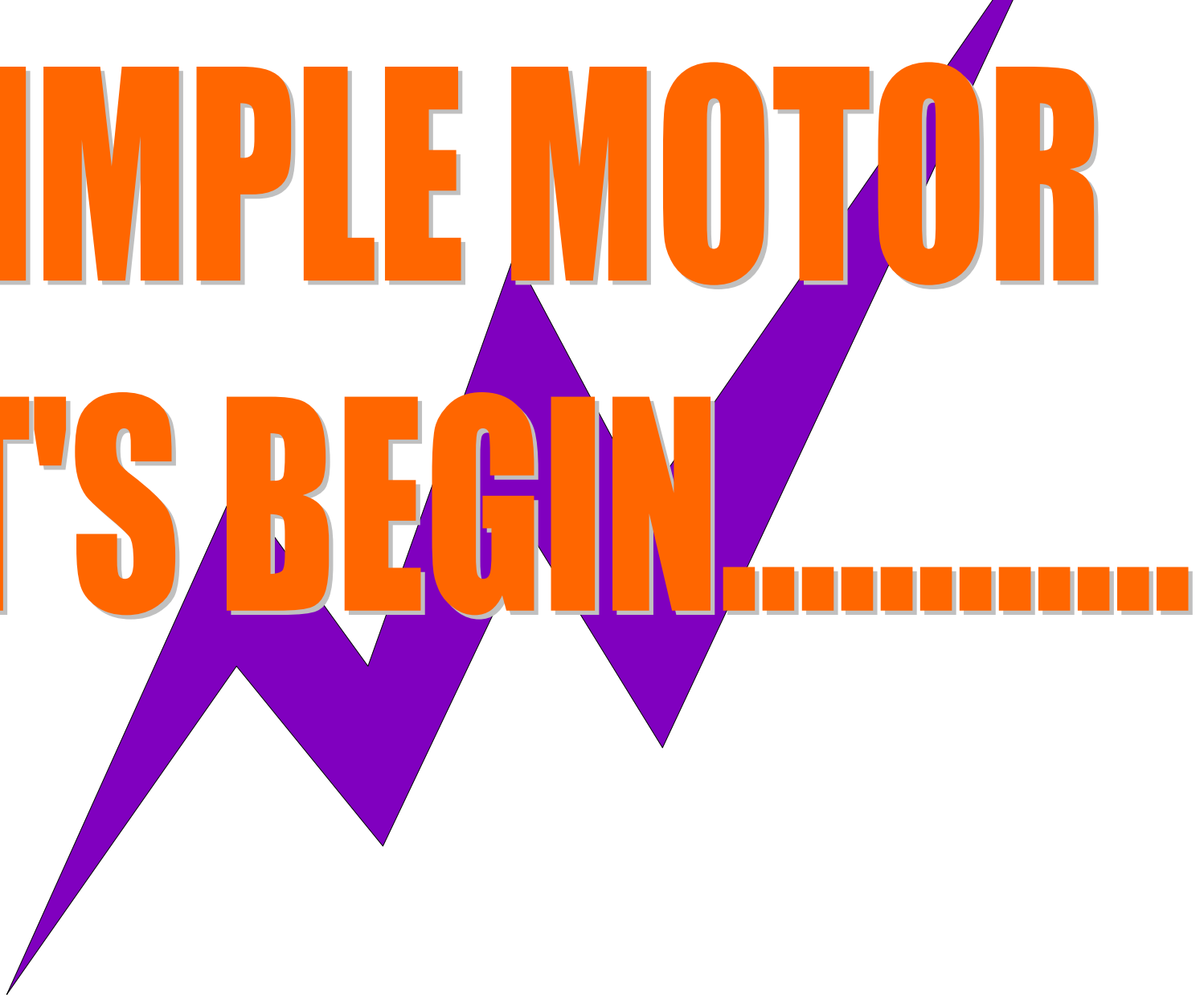


SIMPLE MOTOR

LET'S BEGIN.....



TOOLS

Flathead screwdriver

Wire
Strippers

Diagonal
Cutters



Needle Nose
Pliers



Phillips Screwdriver

6 Volt Lantern Battery

Spring terminals
(also available in
screw terminals)

Alligator Clips

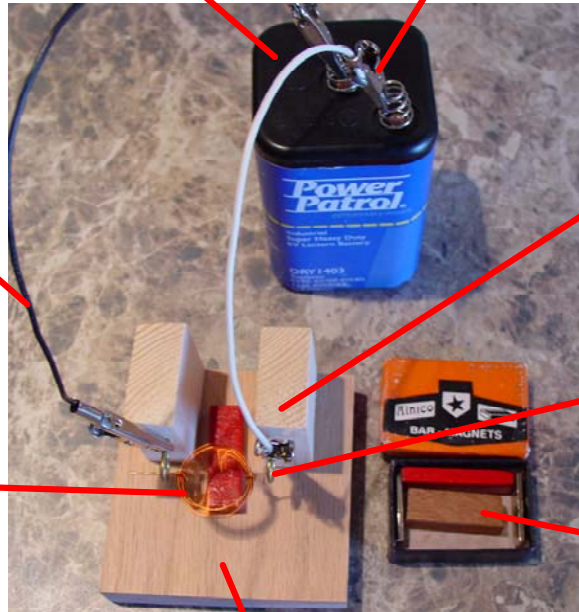
Best method to attach
wires to the spring
terminals on a lantern
battery.

Wire

18 gauge, single
conductor. Black,
Red, White colors.

Support

Wood. Pine was used in this
example. 1-1/2"x1-3/8"x0-3/4". Hot
glued to base.



**Enamel Magnet Wire,
Rotor**

Students will wind the rotor
around a 3/4" form such as
an index card rolled up and
taped.

Brass Eyelet Screws

Screw into support.
Open eyelet with
needle nose pliers
to allow rotor to slip
inside

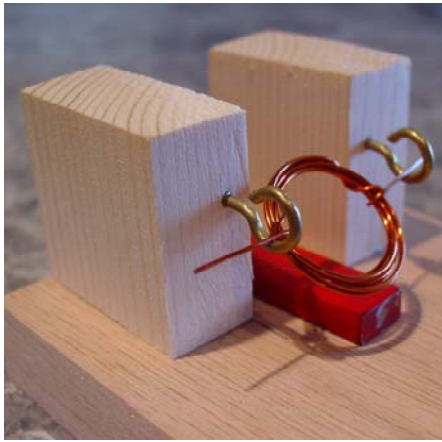
Bar Magnets

Typically come in a set of 2.
Just need 1 for this project.

Base

Wood. Oak was used in this
example. 3-1/2"x3-1/2"x0-3/4" (size
may vary).

Note: Kits may contain a small
round silver magnet.



Close-up of rotor and supports

Follow Activity 14 in Magic of Electricity manual to make rotor.

BILL OF MATERIALS

| <u>Designation</u> | <u>Qty</u> | <u>Part Number</u> | <u>Description</u> |
|--------------------|------------|--------------------|--|
| Battery | 1 | 7690K131 | McMaster-Carr 6 Volt Lantern Battery |
| Alligator Clips | 4 | SB23790M | 5 black, 5 red per pkg |
| Wire | 1 ft* | 8073K671 | McMaster-Carr 18AWG solid hook-up, black |
| | 1 ft* | 8073K674 | McMaster-Carr 18AWG solid hook-up, white |
| Magnet Wire | 1 ft** | 7588K61 | McMaster-Carr 20AWG copper magnet wire |
| Switch (optional) | 1 | SB09736M | Single Pole Single Throw |
| Base Board | 1 | | Wood |
| Support | 2 | | Wood |
| Bar Magnets | 1 | SB26086M | Ceramic Bar Magnets 50mmx15mmx8mm |
| Brass Eyelet | 2 | | Hardware store, 1/4" opening |
| Switch (optional) | 1 | SB09736M | Single Pole Single Throw |

* wire sold in 100' spools

** magnet wire sold in 900' spools

Part Number in the format 'SBnnnnnM' are NASCO SCIENCE parts (www.eNasco.com)

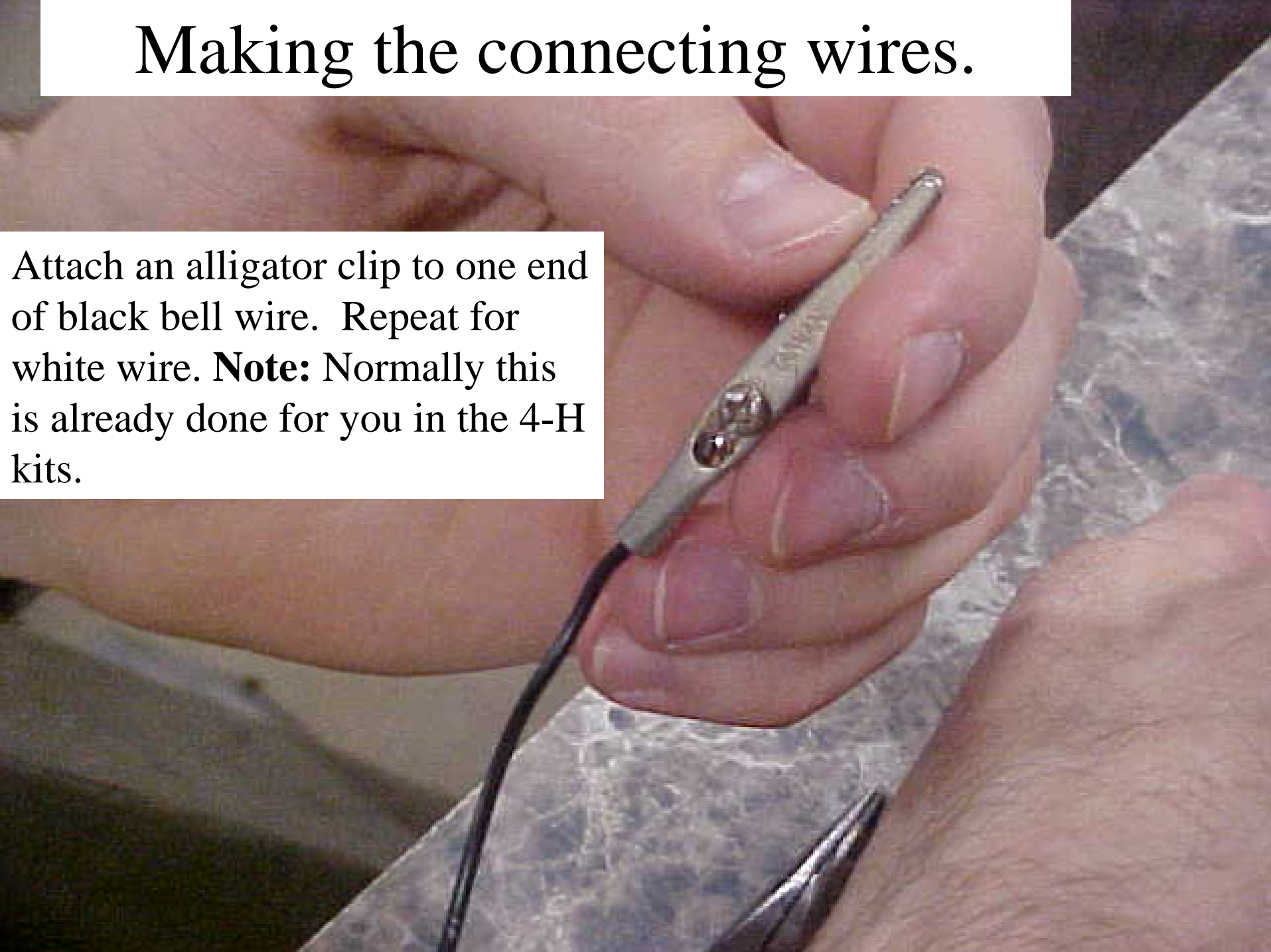
McMaster-Carr www.McMaster.com

Make sure each kit has one black and one white wire with alligator clips on each end like shown.



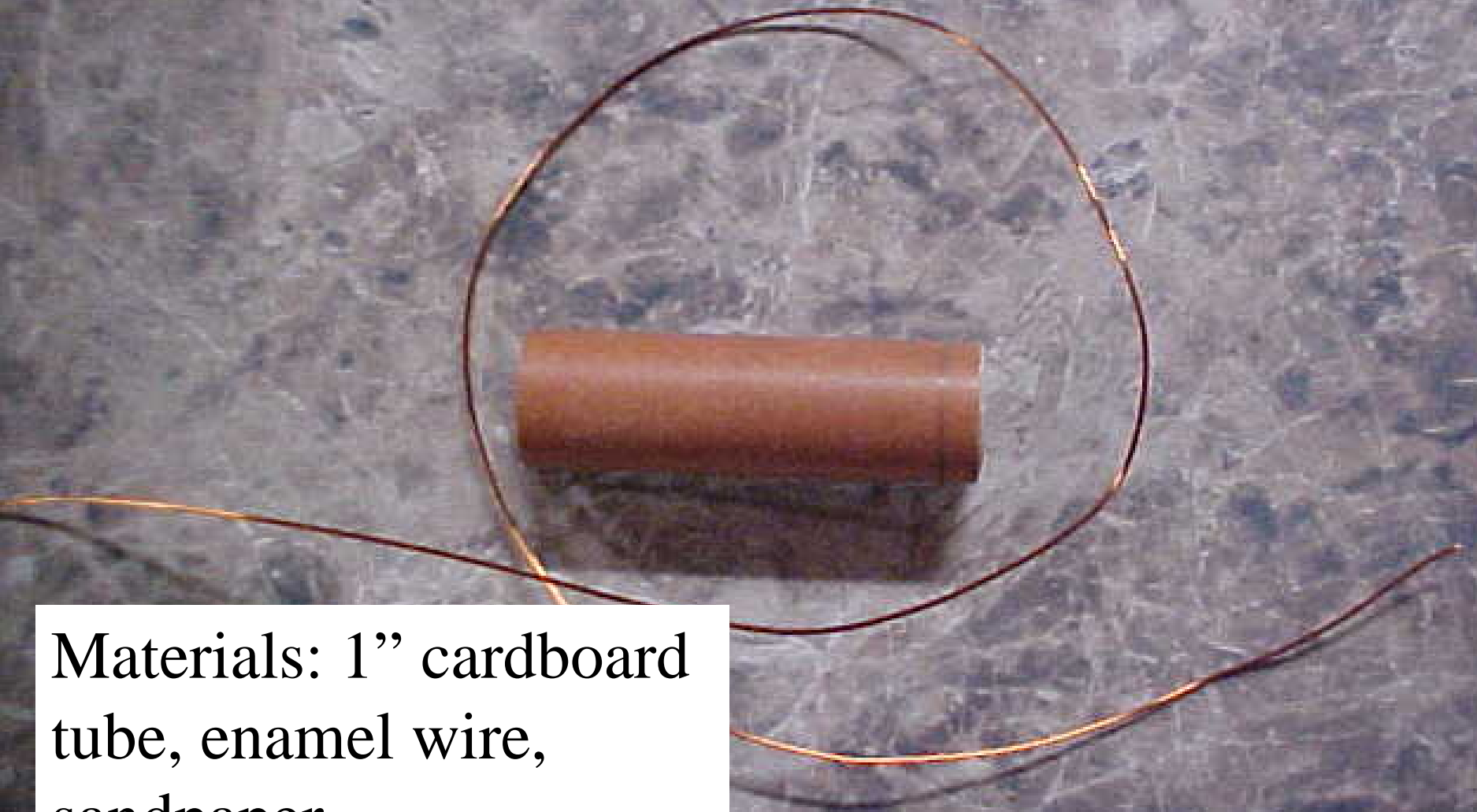
Making the connecting wires.

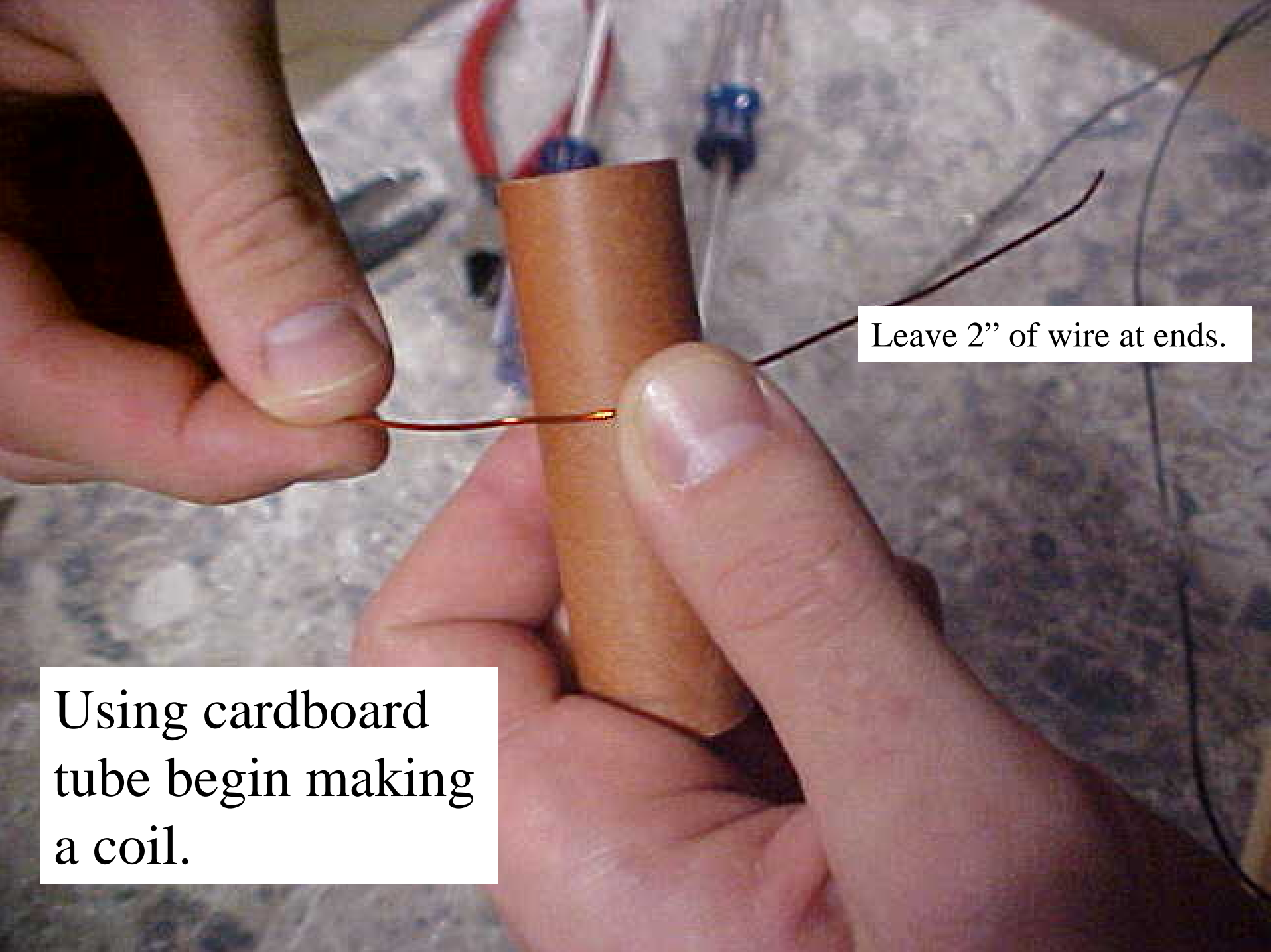
Attach an alligator clip to one end of black bell wire. Repeat for white wire. **Note:** Normally this is already done for you in the 4-H kits.



Making the Rotor

Materials: 1" cardboard tube, enamel wire, sandpaper.





Leave 2" of wire at ends.

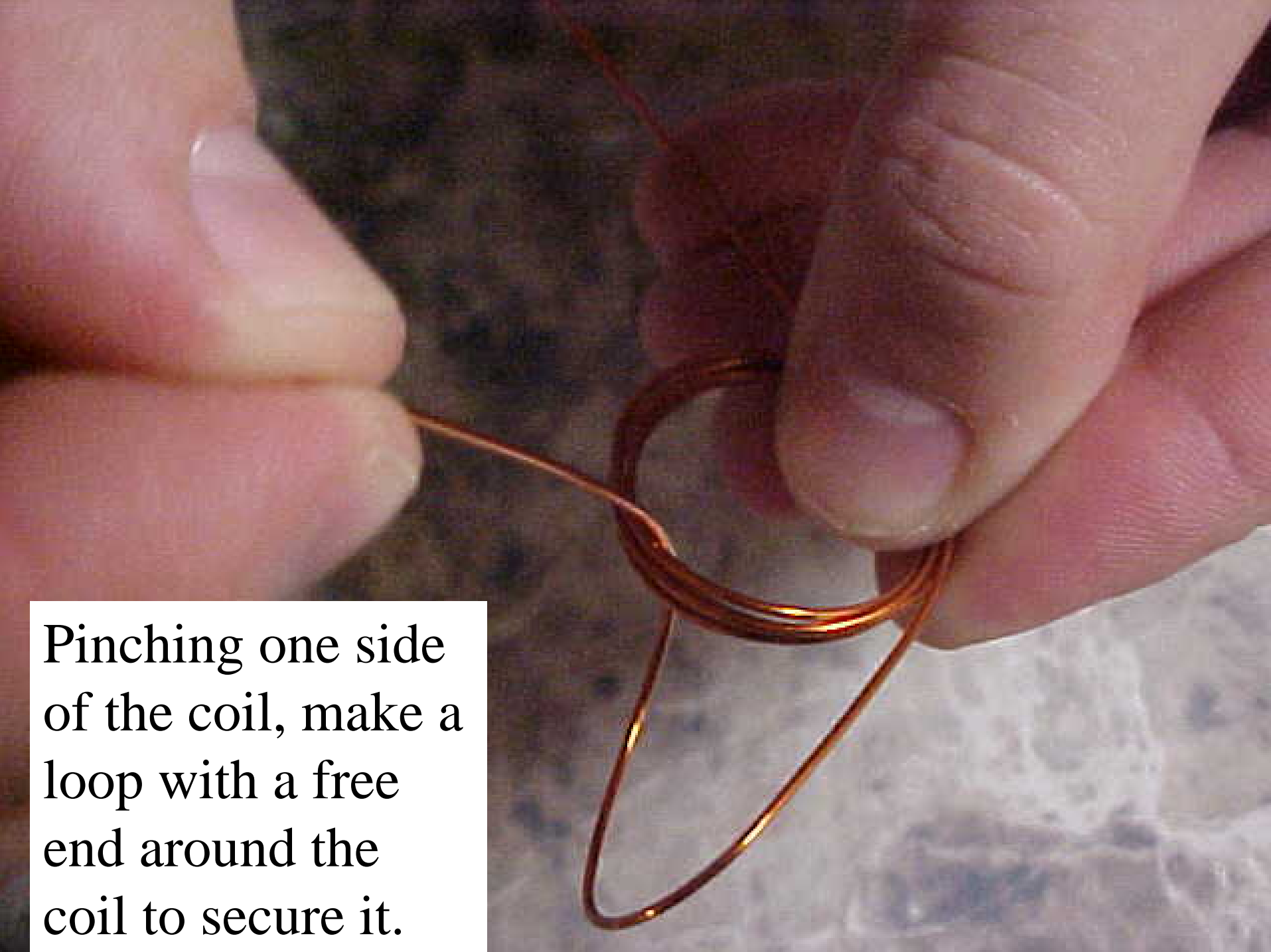
Using cardboard tube begin making a coil.




Keep coils neat. 5-6 turns should do.

Carefully move
coil of form,
pinching coils
together.

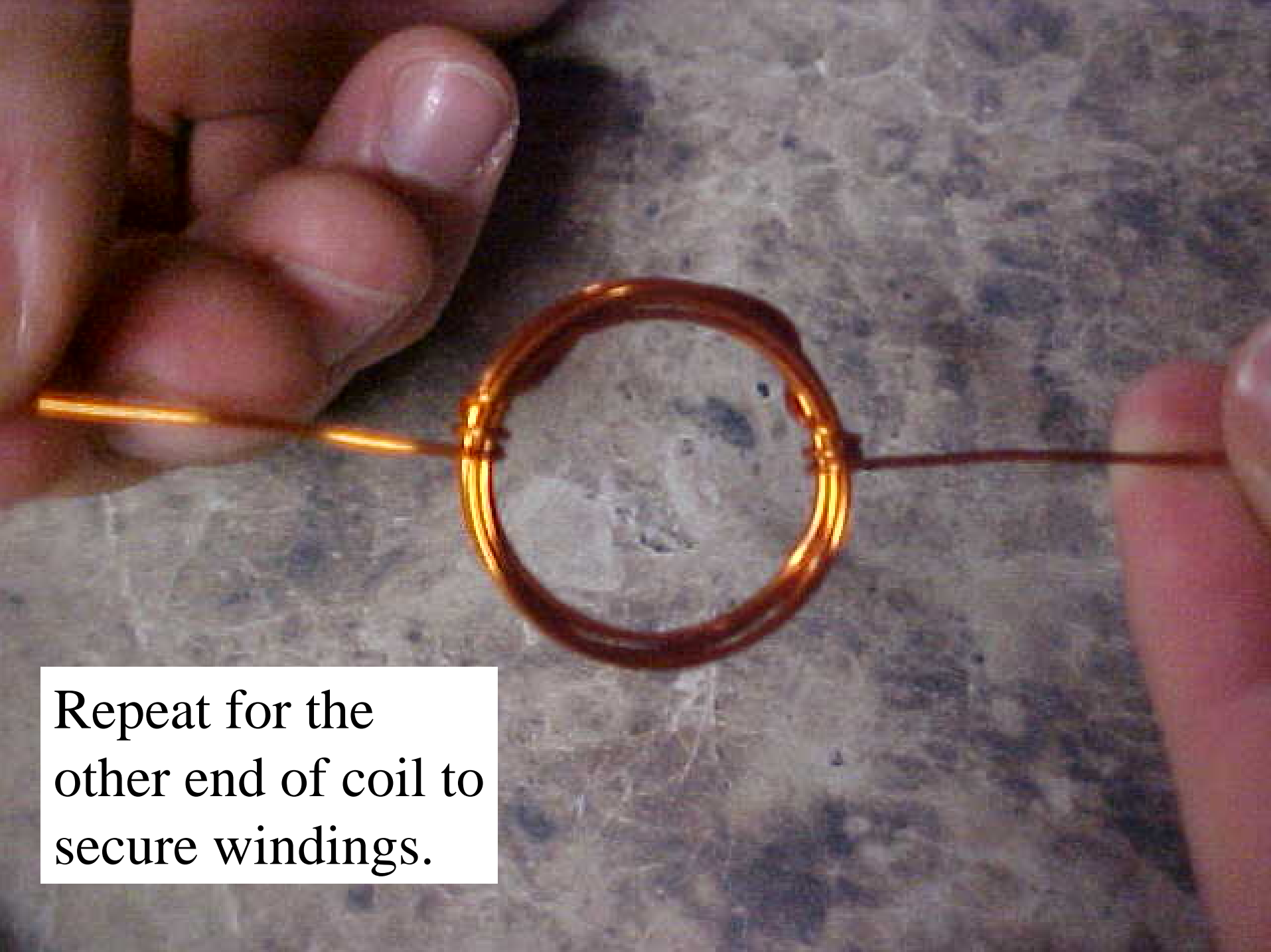




Pinching one side of the coil, make a loop with a free end around the coil to secure it.

A close-up photograph of a person's hand holding a piece of copper wire. The wire is bent into a large loop, and a knot is being formed at the top of the loop. The wire is a reddish-brown color. The background is a dark, textured surface.

Like this! Make two loops to secure.



Repeat for the other end of coil to secure windings.



Bare copper end

Using sandpaper,
sand away enamel
all the way
around one end of
coil.

The complete rotor.

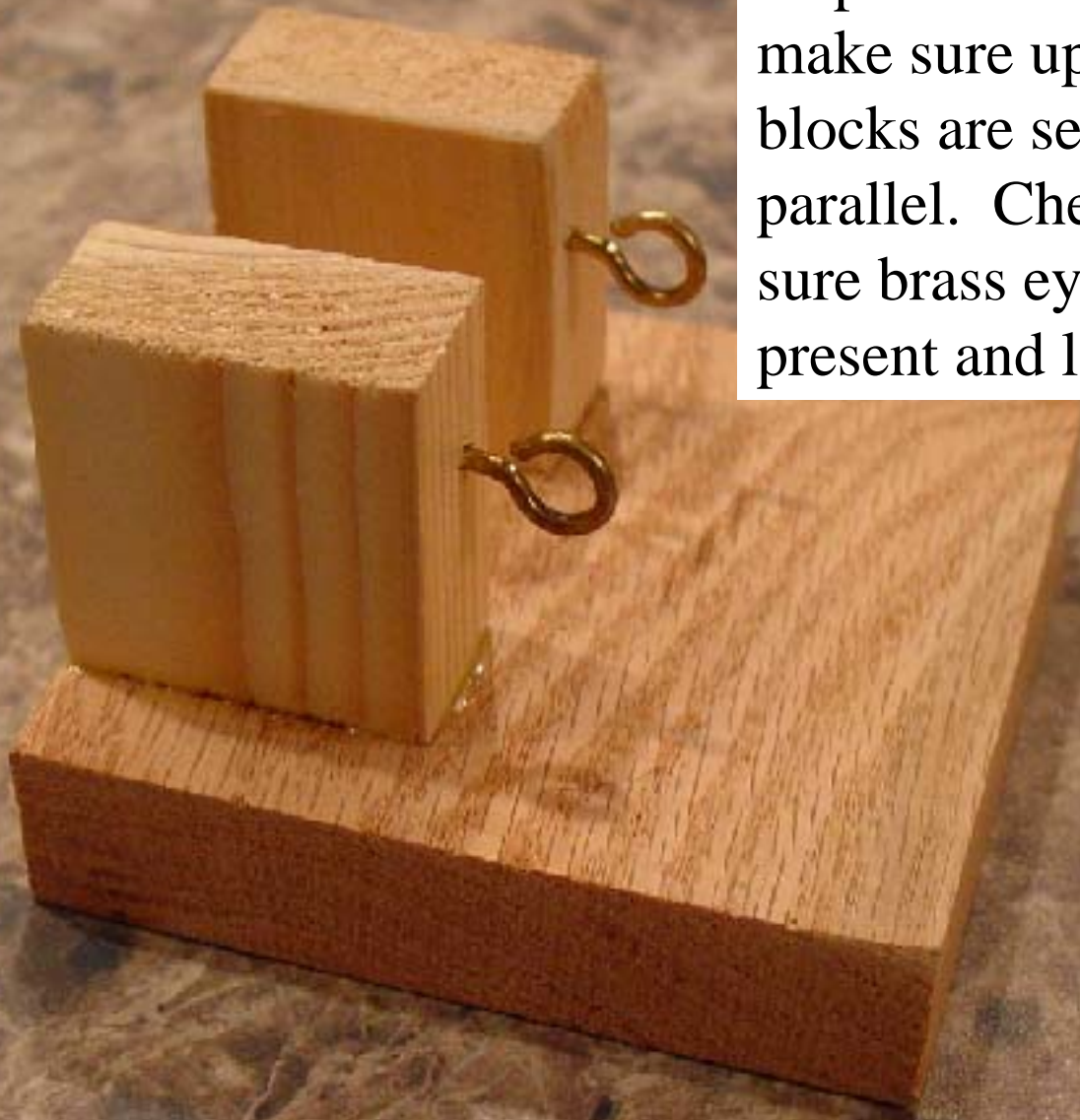
IMPORTANT

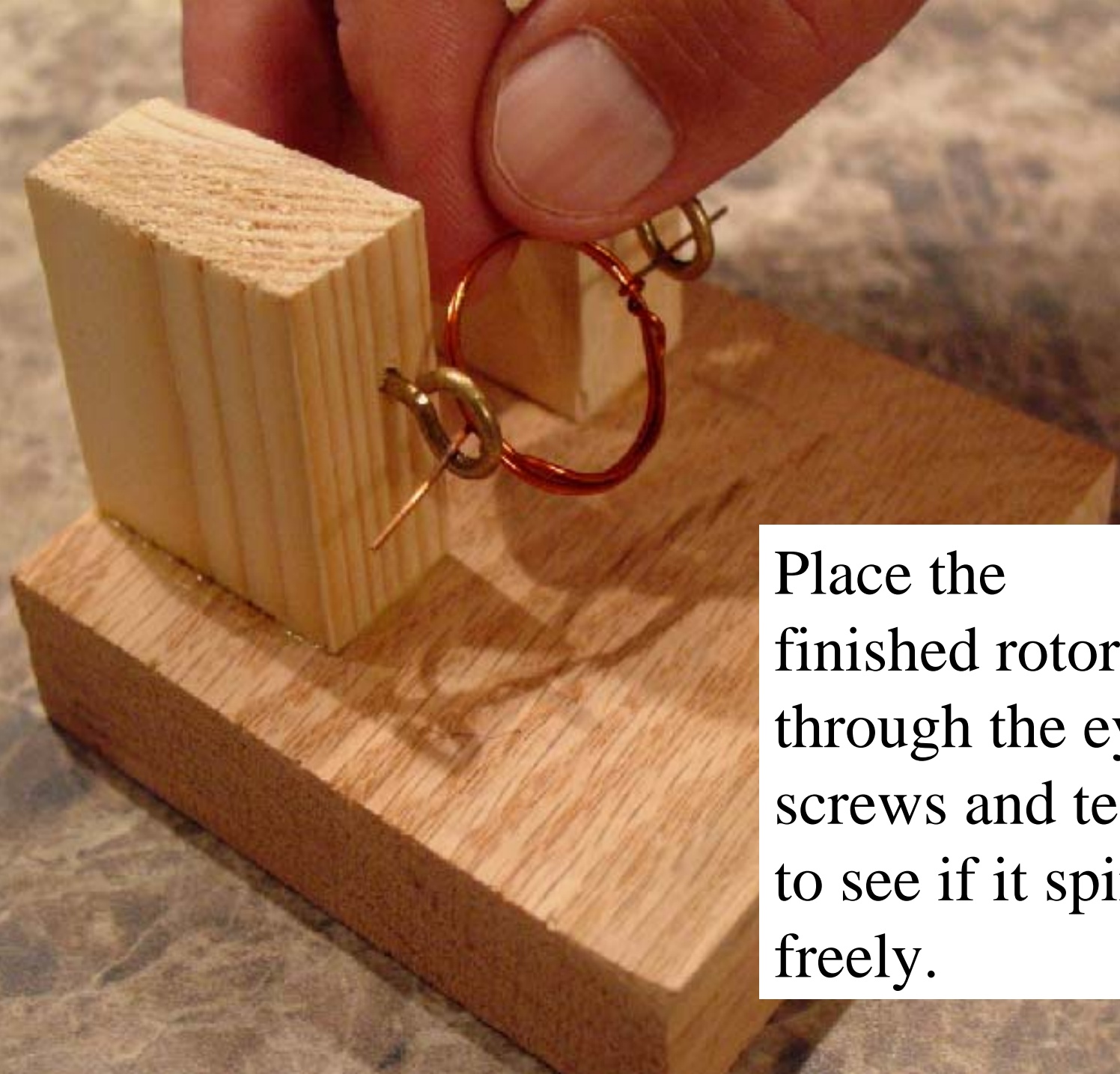
Sand away enamel
ONLY 3/4 the way
around this end of coil.

Enamel removed
all the way
around this end.

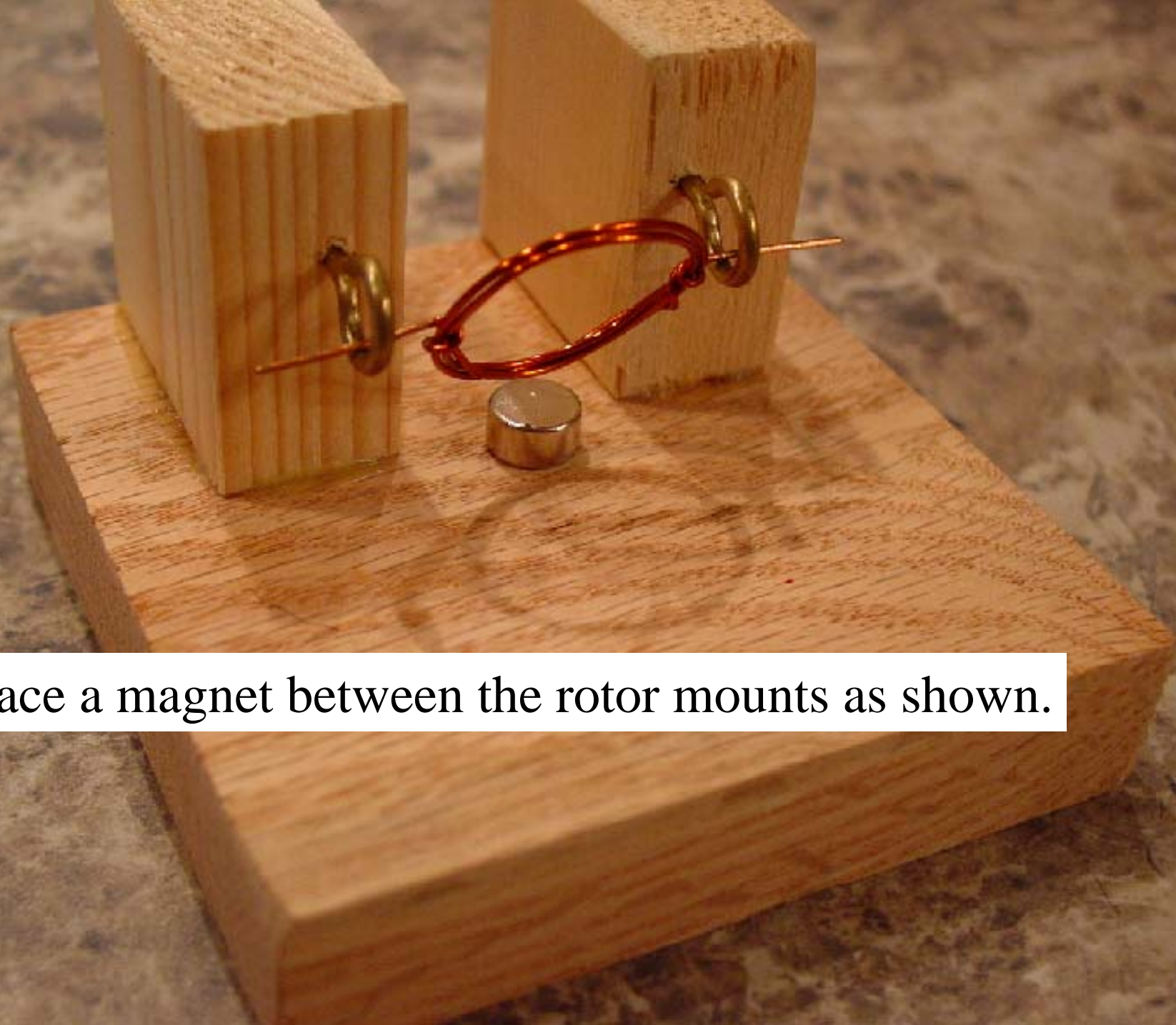


Inspect the motor mount to make sure upright wood blocks are secure and parallel. Check to make sure brass eye screws are present and level.

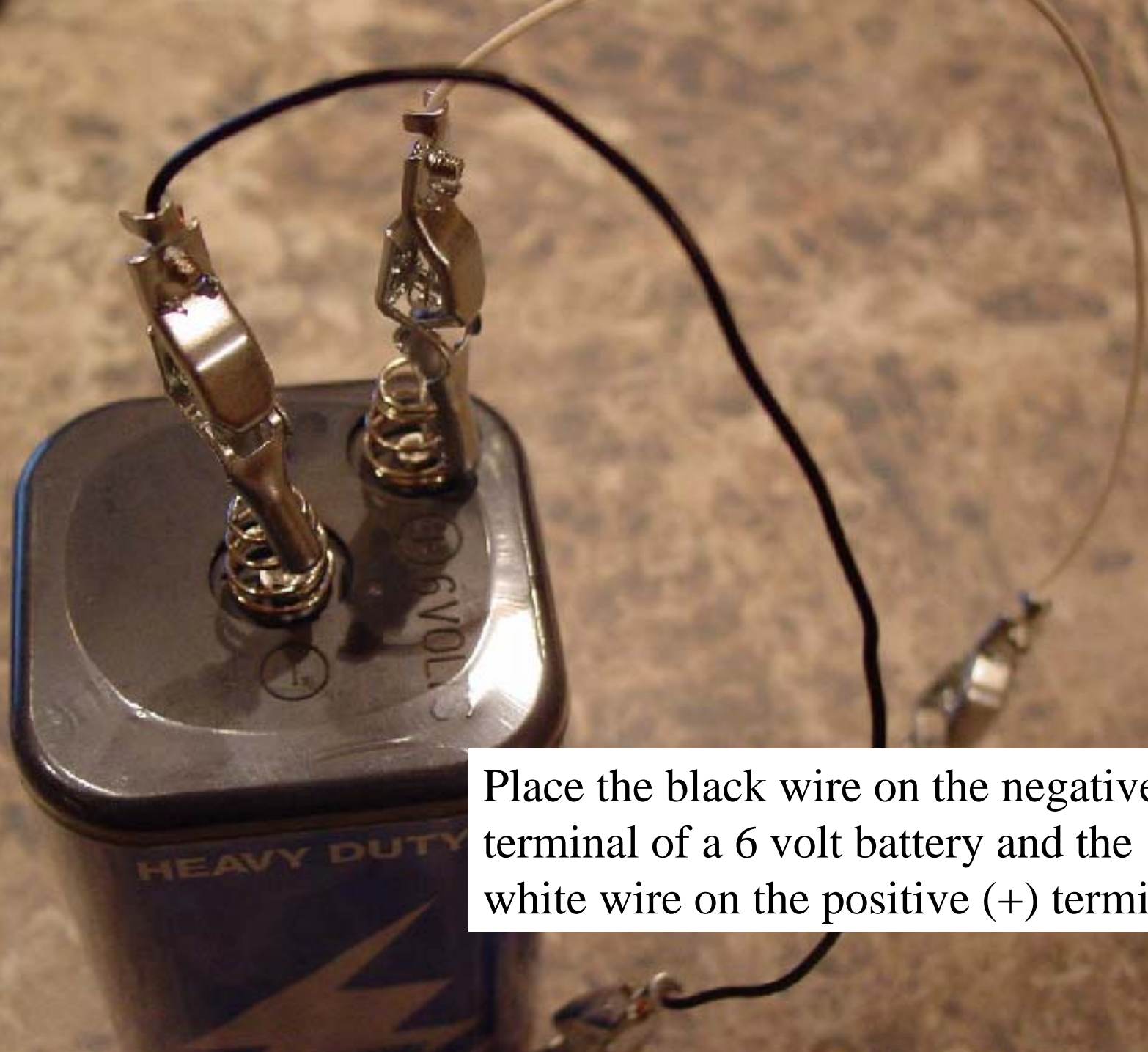




Place the finished rotor through the eye screws and test to see if it spins freely.



Place a magnet between the rotor mounts as shown.



Place the black wire on the negative (-) terminal of a 6 volt battery and the white wire on the positive (+) terminal.



Connect the black and white wires to eye screws. Spin your rotor and motor should take off running.

Trouble Shooting Tips if rotor does not spin...

- 1.) Check battery. Try a fresh battery.
- 2.) Check to see if rotor spins freely and does not hit the wood mounts.
- 3.) Move magnet forward or backwards to improve magnetic pull.
- 4.) Make sure enamel is sanded completely off one arm of rotor and bare copper touches brass eye. Make sure other arm of rotor has about $\frac{3}{4}$ of enamel sanded off and only a $\frac{1}{4}$ of strip of enamel remains on arm.

Note to Instructors: Work with participants in removing enamel from rotor arms as this is a critical stage in the success of making motor run.