Suspended Spinner
Investigation #6

Description
In this activity, you will create an awesome motor!

Materials
- C- or D-cell battery
- Length of copper wire, about 6 inches long
- Dx48 neodymium magnet
- Watch battery
- 3 LED lights
- Electrical tape
- Metal flathead screw

Procedure
1) Place one of the LED lights so the legs of the light are on each side of the watch battery. If the light doesn’t turn on, switch the legs.
2) Repeat with the second LED so that the bulbs are on opposite sides of the watch battery. Tape both lights in place.
3) Place the watch battery on one end of the magnet.
4) On the other end of the magnet, place the flat head of the screw in the middle of the magnet with the head down and the point facing up.
5) Place the tip of the screw on the positive end of the battery so that it is suspended.
6) With one hand, carefully hold one end of the copper wire against the negative terminal on the large battery.
7) With the other hand, touch the lose end of the wire gently against the side of the magnet.
8) What do you notice?
9) What happens if you remove the wire?

My Results

Explanation
This is an example of a homopolar motor. The first homopolar motor, which looked very different, was made by Michael Faraday in 1821. A homopolar motor is designed to use direct current, or DC, that results in rotational movement. Rotational movement happens because the magnetic field moves vertically through the battery, while at the same time, the current from the battery moves into the center of the magnet stack and then turns horizontally to spread out toward the outside edge of the magnets. At this point, there is current that is perpendicular to the magnetic field, which creates a new horizontal force, called the Lorentz Force. The Lorentz Force runs perpendicular to the vertical magnetic field and the current, which acts on the wire conductor and causes the wire to spin. This is a short circuit that will drain the battery charge quickly, and the parts can get hot, so be cautious. This also means that the homopolar motor is not a very efficient motor. Because there is little friction between the large battery and tip of the screw, this motor will continue to spin even when the wire is removed. The lights make the rotation easier to see.

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