

## **615-0190 (20-020) Barlow's Wheel**

### **Purpose:**

The Barlow's Wheel was designed by Peter Barlow, an English mathematician, in 1822. Barlow's Wheel was considered to be one of the first electric motors supplied by continuous current. While it does spin, the design is considered too inefficient to do useful work. The device works based off of the interaction of magnetic and electrical fields.

For classroom purposes, electricity and magnetism are the same force. This means that an electrical field is magnetic. Thus, if we can induce electrical currents, we can interfere with them using a powerful magnet. If we produce the electrical field the right way at the right position relative to the magnetic field, we can do interesting things, in this case getting a wheel to spin without using a motor.

A moving charge in a magnetic field feels a force perpendicular to the field, and to the movement of the charge. This force is called a Lorentz force, after the scientist who first described it. Thus, if you arrange a magnetic field in a certain way and move electrical charges through it in the right direction, they will feel a perpendicular force. In the case of Barlow's wheel, brushes allow current from a battery to enter the wheel, causing charge to move inside the wheel. This charge is then shunted by the field created by the magnets in the legs of the unit. As the charges get pushed, they take the wheel with them.

### **Operation:**

To use your Barlow's Wheel, first install 4 AA batteries. The twin battery holders are connected in parallel. Due to the inherent inefficiencies of this design, the double current supplied by parallel batteries is essential. In addition, the wheel rotates on Fluoropolymer cone bearings, providing a very low friction environment. This lower friction helps make up for the lower efficiency. Next, adjust the brushes. These brushes will allow electricity to flow from the batteries into the wheel. You can adjust the brushes by twisting the small knobs on the leg of the unit. If the brushes are too far away they can't carry a charge into the wheel, but if they are too close they will interfere with the wheel's rotation due to friction.

When you have set up the unit, flip the switch and give the wheel a gentle push. It should start spinning on its own, continuing as long as there is a supply of current

### **Warranty and Parts:**

We replace all defective or missing parts free of charge. Additional replacements parts may be order toll-free. We accept Visa, MasterCard, American Express and Discover as Well as School P.O.s. All products warranted to be free from defect for 90 days. Does not apply to accident, misuse or normal wear and tear. Intended for children 13 years of age and up. This is not a toy. It may contain small parts that can be a choking hazard.

Adult supervision is required.