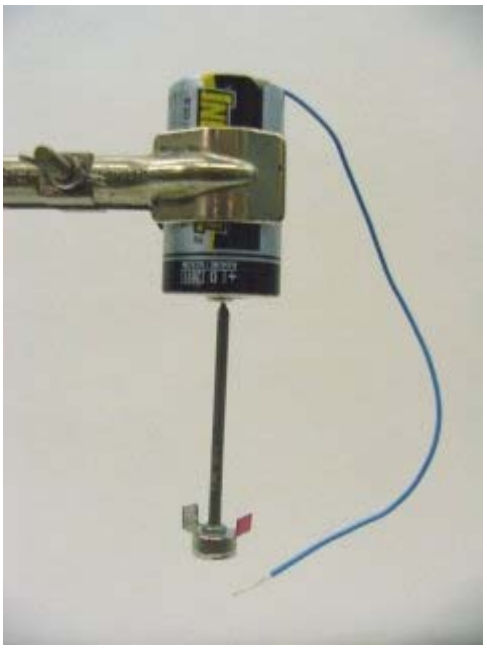
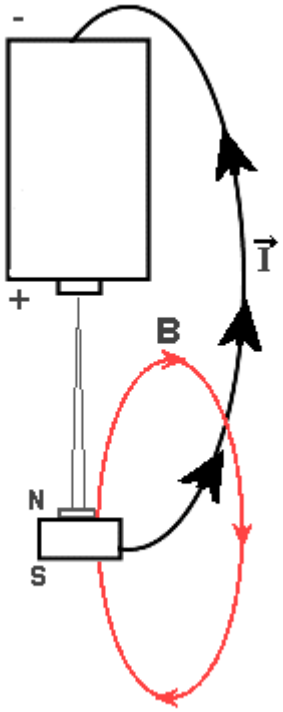
Answer #284

The answer is (a): The nail will rotate CW as viewed from above, as seen in an mpeg video by clicking your mouse on the photograph at the left below.





When the wire contacts the magnet, (positive) current flows from the positive (lower) terminal of the battery, outward through the magnet, and upward through the wire to the negative terminal of the battery. The magnetic field points upward within the magnet, upward from the North (upper) end of the magnet and outward in a loop, returning to the South end of the magnet as seen in the drawing. The vector force on the (positive) current flowing in the magnet:

$$\mathbf{F = v \times B}$$

points *out of* the paper, creating a torque on the magnet that is clockwise when viewed from above, causing the nail and magnet to spin in the CW direction as viewed from above.

A really nice video of possible the world's simplest homopolar motor can be found on the web site Fundacion Julio Palacios, and can be seen by clicking here. So here is the question: Does the direction that the motor moves depend on the orientation of the battery, assuming that the magnet(s) are attached to the battery?

Archive 15

Question of the Week

Outreach Index Page

Lecture-Demonstration Home Page

For questions and comments regarding the *Question of the Week* contact Dr. Richard E. Berg by e-mail or using phone number or regular mail address given on the Lecture-Demonstration Home Page.