CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY

Name(s)
Jackson L. Wopat

Project Number
J0926

Project Title
The Effect of Wire Spacing on an Electromagnet

Abstract

Objectives/Goals
To find out if spacing wire wraps on an electromagnet strengthens or weakens the electromagnet.

Methods/Materials
12 inch iron nail; Insulated copper wire; 6-volt battery; Duct tape; Wire cutters and strippers; 250 small paperclips; 2 small alligator clips.

Wrap as many loops of wire around the nail in an area of 2 inches, at the front of the nail going back. Attach the alligator clips on both ends of the wire and clamp the clips onto the terminals of the 6-volt battery. Then determine how many paperclips the electromagnet can pick up by dipping the tip of the nail into the container with the paperclips and swirl it around. Count how many paperclips the electromagnet picks up and repeat nine more times so you have picked up paperclips a total of ten times. Average the numbers, then spread the wire so the ends are at a distance of 3 inches without adding or taking any wraps off the wire. Then pick up paperclips ten more times and average the number. Spread it out over 4 inches and repeat the steps for 4 inches, 5 inches, 6 inches, and so on until you average the numbers for 11 inches. Then graph the data.

Results
2"- average of 15 paperclips picked up
3"- average of 13.3 paperclips picked up
4"- average of 10.5 paperclips picked up
5"- average of 10 paperclips picked up
6"- average of 7.4 paperclips picked up
7"- average of 5.1 paperclips picked up
8"- average of 4.8 paperclips picked up
9"- average of 3.7 paperclips picked up
10"- average of 1.9 paperclips picked up
11"- average of 1.5 paperclips picked up

Conclusions/Discussion
My results support my hypothesis. The more space in between the wraps of a wire on an electromagnet, the weaker the magnetic pull from the electromagnet. If you look at my results, you will notice that the number of paperclips picked up steadily decreased, as more space was added in between the wires. If the space was increased even more, it would eventually pickup no paperclips and finally have no magnetism

Summary Statement
The effect of wire spacing on an electromagnet.

Help Received
Dad revised typed parts; Mom helped with poster board set up.