CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY

Name(s)
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Project Number
J0303

Project Title
Perpetual Motion: The Myth That Never Stops

Abstract

Objectives/Goals
We tried to make Newton's Cradle more efficient by replacing the metal balls with magnets, removing the energy-consuming variables of heat and sound, and adding lubricant, lessening friction.

Methods/Materials
6 6" x 6" Wooden Planks; 4 12" x 7/8" Wooden Cylinders; 6 2" x 1" x 1/2" Ceramic Magnets; 3 7" x 1/2" Metal Cylinders; Screws; Duct Tape/Masking Tape; WD40; Newton's Cradle.

The machine consisted of three magnetic pendulums suspended from a plank supported by wooden cylindrical columns. The pendulums were oriented to ensure that adjacent pendulums repelled each other. The pendulums were hung on metal cylinders passing through corner braces attached to the plank.

For the experiment, a Newton's Cradle was used as the control. We provided energy to the cradle by raising one of its outer balls a measured distance, and then released. We measured the amount of time the system continued to move after this energy input. This was repeated five times for each energy input level to have a statistically valid sample.

Then, we tested the machine with the same energy input levels that were used with the Newton's Cradle. Since the machine's pendulums had a different mass and shape than the Newton's Cradle's balls, they needed to be moved to a different height to provide the same amount of energy. Finally, the machine was tested with lubricant applied to the cylinder to reduce friction even further. Again, multiple observations were taken each time.

Results
The machine moved for a slightly longer period than the Newton's Cradle at each energy input level. The addition of lubricant to the machine made it move much longer (relatively) than the prior two setups.

When given 16 millijoules, the Newton's Cradle moved for 126.32 seconds, the machine continued to move for 127.3 seconds, and the machine with lubricant kept moving for 134.24 seconds. The results at other energy input levels were similar.

Conclusions/Discussion
The machine did better than the Newton's Cradle as expected, primarily because the repelling magnets had less heat and sound related energy losses due to them not touching. The machine with lubricant did

Summary Statement
We attempted to get close to perpetual motion by improving on the Newton's Cradle's design.

Help Received
Father helped with sawing planks and drilling holes.